

**AGENDA
PLANNING COMMISSION
CITY OF ROELAND PARK, KANSAS
ROELAND PARK
4600 W 51ST STREET
SEPTEMBER 17, 2019 6:00 PM**

I. Roll Call

II. Approval of Minutes

1. Minutes - 8/27/2019

III. Public Hearing

1. Rezoning and Preliminary/Final Development Plan Approval at the northeast corner of Johnson and Roe

IV. Action Items

V. Discussion Items

VI. Other Matters Before the Planning Commission

VII. Adjournment

Scheduled Meeting Dates

Item Number: **Approval of Minutes- II.-1.**
Committee **9/17/2019**
Meeting Date:



City of Roeland Park
Action Item Summary

Date:
Submitted By:
Committee/Department:
Title: **Minutes - 8/27/2019**
Item Type:

Recommendation:

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description	Type
☐ Planning Commission Minutes August 27, 2019	Cover Memo

PLANNING COMMISSION MINUTES
CITY OF ROELAND PARK
4600 W 51st Street, Roeland Park, KS 66205
August 27, 2019, 6:00 P.M.

The Roeland Park Planning Commission met on August 20, 2019, in City Hall, 4600 West 51st Street.

Commissioner Gleason declared a quorum and called the meeting to order.

Present: Paula Gleason Pete Davis
 Mike Hickey Kyle Rogler

Absent: Bill Ahrens
 Mark Kohles
 Darren Nielsen

Staff: Jennifer Jones-Lacy, Assistant City Administrator
 John Jacobson, Building Official
 Keith Moody, City Administrator

I. ROLL CALL

The roll was called and Commissioners Ahrens, Kohles and Nielsen were absent.

II. APPROVAL OF MINUTES

1. Planning Commission Minutes - 5/19/19

The minutes were approved as submitted.

III. PUBLIC HEARING

No public hearing was held.

IV. ACTION ITEMS

There were no items discussed.

V. DISCUSSION ITEMS

1. Comprehensive Plan Update Kick Off

Ms. Jones-Lacy introduced the principals from Confluence to the Commissioners. Chris Klein, principal, Chris Shires, principal planner from Des Moines, and Marshall Allen, planner/landscape architect from the Kansas City office were in attendance at the meeting. Jane Reasoner, also a planner in the Des Moines office, was not present for the meeting.

Mr. Klein said that Confluence will be working with Roeland Park on their Comprehensive Plan update. He went over his agenda as outlined in the packet.

Mr. Shires said that the Planning Commission's role as a steering committee is very appropriate for the work as they deliver the Comprehensive Plan to the City and it is ratified by the Council.

Confluence wants to help Roeland Park create a community vision and hope to wrap up all the components of the process in April 2020.

The Commissioners asked to fill out cards to tell people why they should come to Roeland Park and visit them in 2040, and what about the community has changed and exciting.

Commissioner Hickey said they have become the best little city in the Midwest, with a new downtown, new development, and new opportunities for you and your family.

Commissioner Rogler said the Strang Line Street car just reopened to connect the downtown to the incredible food district at 47th Street. They can also take the street car to Mission and maybe to Overland Park.

Commissioner Gleason said we have a safe and beautiful city. She is living in a senior villa but just down the street from nice young couples who she enjoys seeing and seeing their children out playing. They also have some fun restaurants and shopping that you can visit while you're here.

Commissioner Davis said they've gone net zero in terms of greenhouse gas emissions and have a great community center/sports dome and Aquatics Center.

Ms. Jones-Lacy said because there is an awesome entertainment district where there are restaurants, live music, pickleball, rock climbing and more. It's also a great place to raise a family because it's safe, has a great trail system that connects all the way downtown Kansas City and has great parks.

Mr. Jacobson said he would expand the trail system which is an integral piece to the whole plan, to tie everything together, every civic and private element in the City through a centralized trail system. He said, come to Roeland Park, park your car and we'll walk the rest of the way.

City Administrator Moody said they have a great mixed-use downtown with wonderful local shops and eateries and a gathering place for families and friends with an amazing variety of cultural activities.

Confluence told the Commissioners they should think of naming their comprehensive plan. They also asked for survey questions to ask in addition to what is listed in the presentation packet.

Commissioner Rogler said they need to plan for demographic changes, different housing types and where they can allow for greater density.

Commissioner Hickey added that they need to figure out how to get demographics to stay in the city, especially growing families.

Mr. Jacobson said they need to determine where people are transitioning to. He added that it is possible for senior living centers to anchor certain sites. Currently in the City they are seeing a lot of heavy remodeling to existing structures both large and small structures. People are choosing to spend more money to remodel the smaller structures so they can be located in Roeland Park. They have something that's marketable that younger people want to be a part of. He said they need to determine what that is and put it on every sign in the City. They also have to keep in mind to have a place for each demographic to transition to for all stages of their lives.

Commissioner Rogler thought it would be a good idea if Confluence were to come and make a presentation at their business breakfast.

Commissioner Hickey said they also need to contact smaller businesses and see what their plans are and also get a better idea of what Walmart is going to do.

Ms. Jones-Lacy they could target the businesses with information to attend the breakfasts.

Commissioner Rogler asked for the best way to incorporate 47th Street into the plan. Ms. Jones-Lacy said they have a Foodie Fest on September 8th to promote the corridor. Mr. Jacobson said they could hand out information and people could log on and take a survey after receiving that information.

Confluence said any community events would be a good time to do some outreach to the public.

Ms. Jones-Lacy said they have a Community Center open house event around Halloween.

Confluence reviewed the demographics of Roeland Park compared to Johnson County and the state of Kansas as outlined in the packet.

City Administrator Moody said Johnson County does an average appraised value per square foot compared with average sale price per square foot. Roeland Park's pricing is on the upswing and their average appraised value per square foot is on par with Lenexa, Olathe, and Overland Park. So, they are competitive on the per square foot value but come in lower because of the smaller housing stock.

There was some discussion on whether the City wants to incorporate universal design. This comes from the Fair Housing Act where if building an apartment there needs to be a certain number of unit accommodations that are accessible. The Americans with Disabilities Act requires things like Government subsidized housing which are not usually applied to a single-family home.

After the presentation Mr. Jacobson said he would like to see the relationship of universal design relative to senior components of housing within the community. He asked the question if universal design is the answer or just another type of housing.

With regard to residential design regulations they need to determine Roeland Park's value system. They will need to decide the types of tear-downs and rebuilds, window styles, garages and finish materials.

Mr. Jacobson said such changes can be scary to most people.

Ms. Jones-Lacy said the timing also is a factor. There has been a lot done in 2019 and they have the largest remodel in the history of Roeland Park going on and there are segments of the population that are up in arms about this thing.

Confluence asked the Commissioners what things are waiting to be capitalized on in Roe Park.

Commissioner Davis said linkages to other northeast communities, Mission, Westwood and Prairie Village all cities facing to them. There is also the metropolitan area, recreational attractions, and the Rocks redevelopment.

Commissioner Gleason wants to see Roeland Park remain a city that's easy to work with for building and remodeling and viewed as a city that's reasonable on those things. She said it is important for them not to go overboard with regulations.

Commissioner Rogler said the local connections to neighboring cities, Mission, 47th Street, and Westwood were important. He added that doing very fine grain improvements like crosswalks, and other low hanging fruit items as well as freeing up and revising the zoning code to allow certain things to happen.

Commissioner Hickey said that when the changes come they need to find unique developers who are willing to do tear-downs and rebuilds.

The Commissioners were also asked what are the biggest challenges facing Roeland Park.

Commissioner Gleason said there is not much available land so it makes it more difficult to do any of the things they have talked about such as senior housing, new restaurants, entertainment, trails, and things that tie it in because something else will probably have to go away.

Commissioner Rogler said that with anything they do there is going to be high land costs. Everything is a challenge because of the size of the city. They have lofty goals, but can only handle a small workload and many people are volunteers on a board such as the Planning Commissioners.

Commissioner Hickey said that money and budgets are a challenge. With a population of 6,800 there is only so much you can take from residents and sales tax dollars.

Commissioner Davis said economics and affordability are challenges.

Ms. Jones-Lacy added that stubborn and uncooperative commercial property owners are also a challenge.

Each Commissioner was then asked for their one big dream for the City.

Commissioner Hickey would like to see a sit-down restaurant, something they have been trying to get for over 20 years.

Commissioner Rogler wants to see a walkable town center.

Commissioner Gleason would like to have senior housing alternatives.

As a swimmer, Commissioner Davis wants a year-round Aquatics Center with a permanent structure over it.

Next, the Commissioners were asked for their biggest fear in the city.

Commissioner Davis feared bankruptcies of the big box stores as well as individual and residential.

Commissioner Gleason feared a lack of improvement due to budget approval constraints

Commissioner Rogler was concerned they would be overwhelmed by demand.

Commissioner Hickey said that developers are going to be the key to success and finding developers that are willing to take on the projects. The City cannot afford to do this all on their own.

Mr. Shires thanked the Commissioners for their input and said it has given them good insight into what the issues are that they need to delve into. They will come back to the November 19th to review all of the analysis.

Mr. Klein said at the next meeting their goal is to have had a public meeting with local engagement, held stakeholder interviews, a public workshop, and gotten the survey out. The City website will host the necessary information. They would also like to have a joint Workshop to include the Planning Commission and Governing Body to discuss Universal Design as well as Residential Design Standards.

VI. OTHER MATTERS BEFORE THE PLANNING COMMISSION

1. Preview of NERJ Development

Ms. Jones-Lacy said this item will be presented in detail at the September meeting. The City has received documents from the developer of the northeast Roe & Johnson property who plans to build a two-story medical office facility. They have submitted a request for platting, rezoning, preliminary and final development plans and they do want to move fairly quickly. The City of Mission owns a small portion of the property. The City has tried to work with Mission to de-annex but that has not worked out so far and has been a slow process, so they have instructed the developer to work with both cities. Ms. Jones-Lacy has spoken with Mission's assistant city administrator who manages their Planning Commission and their

planning development process. They will focus on the piece that is in Mission which is part of the parking lot. The developer also wants to have some input on the public art piece that is required as part of the one percent for art. A sample of the art is provided in the packet.

City Administrator Moody said the size of the building, general layout, and orientation on the lot are in the packet. The property will also have to go through rezoning in both Roeland Park and Mission. The property in Mission doesn't have any zoning established as it was used as right-of-way. They hope to do easement vacations for the utilities that will be relocated and then establish easements for the new alignment of the utilities.

Comments on this are included in the packet. The City Council has seen and signed off on the renderings.

Mr. Jacobson added that sidewalks will be included in the project, and they basically asked to loop the entire subdivision with 8-foot and 5-foot sidewalks. The hope is to also widen Granada.

2. Screening Options at 5000 Johnson Dr

The property condition at 5000 Johnson Drive as a screen element on their air conditioning condenser on the west side of the building. It was supposed to be green screen, but they cannot locate one and have asked the City for an alternative. This does not represent a large change but City Administrator Moody wants the Planning Commission to take a look at vinyl options to screen the units from the adjoining neighborhood.

City Administrator Moody added that landscaping is not practical nor is there enough room. They do want the screening to complement the building and not distract from it.

There was agreement on the vinyl screen in the one of the woodland colors.

VII. ADJOURNMENT

MOTION: COMMISSIONER ROGLER MOVED AND COMMISSIONER HICKEY SECONDED TO ADJOURN. (MOTION CARRIED 4-0)

(Roeland Park Planning Commission Meeting Adjourned)

Item Number: Public Hearing- III.-1.
Committee 9/17/2019
Meeting Date:



City of Roeland Park

Action Item Summary

Date: 9/17/2019
Submitted By: John Jacobson, Building Official
Committee/Department:
Title: Rezoning and Preliminary/Final Development Plan Approval at the northeast corner of Johnson and Roe
Item Type: Other

Recommendation:

To make and approve the following motions:

- **Approve rezoning to a CP-O (Planned Office Building) district allowing a medical office building. Also, recommend the following stipulations:**
 - o The SW corner be maintained as the site for City gateway feature.
 - o Fulfilling the 1% for art requirement, with Arts Committee providing direction on the final design for this area;
 - o Allowing two wall signs and one monument sign at the north end of the property so as not to conflict with the gateway features at the south end;
 - o Require the noise from the site not to exceed 60 decibels at the property line;
- **Approve the Preliminary and Final Development Plan after considering the following potential conditions:**
 - o Extend 8' sidewalks on the south and 5' sidewalks on the Granada frontage within easements dedicated for that purpose;
 - o Commit to future Granada street widening improvements, through an appropriate financial instrument;

Details:

Developers for the property located at the northeast corner of Johnson Drive and Roe Boulevard have submitted applications for a rezoning to a new CP-O district and a medical office building use in the proposed district, and a preliminary and final development plan. City staff has reviewed the applications to ensure completeness and provided a notice for the public hearing on the property and in the Legal Record. The property in question is within the City limits of both Roeland Park and Mission. The developer has initiated parallel development applications in both Cities. Mission City Council is currently considering de-

annexation of their portion of the property whereby Roeland Park would then annex that area. The goal is to review and issue the final plat once the de-annexation process is complete and the plat can consist of one single lot. This application includes the development plans and rezoning.

However, the intention with tonight's application is to approve the rezoning and development plans for the entire site as though it is entirely within the City of Roeland Park so that this process only needs to be completed once.

Below is a description of the project proposal along with a summary of items submitted for review.

Request for Rezoning to a New CP-O District and Medical Use

The property is currently zoned Single Family Residential. The CP-O zoning designation is a considerable *down zoning* from the proposed use of MXD in the City's Comprehensive Plan which anticipated mixed use in this area. The property abuts several parcels zoned single family residential. City zoning code does not require any kind of buffer area around residentially zoned properties but given the proximity of parking to existing residential land uses, a landscape buffer has been provided.

Sunflower Medical plans to construct a Medical Office Facility (see Attachment A for more information on elevations).

Medical Clinics and Doctors' Offices are permitted uses within the CP-O District. The small size and limited care capacity is more in line with customary "clinic" or "medical office" use. The facility will be used by Sunflower Medical as a family practice/primary care provider with an Urgent Care facility. The upper floor will be leased for complimentary medical use. Tenants are not yet secured.

Preliminary and Final Development Plan

The developers submitted the preliminary and final development plans in an effort to expedite the review process. The plans submitted were reviewed by the City Engineer for compliance with the technical specifications and zoning code. The Development Plan includes:

- Site and Building Renderings (Attachment K)
- Building Elevations – (Attachment K)
- Site Plan (Attachment C)
- Grading/Storm Sewer Plan (Attachment C)
- Stormwater Management Plan (Attachment C)
- Landscaping Plan (Attachment C)
- Photometric Plan (Attachment D)
- Assurances of Adequate Public Utilities (Attachment E)
- Traffic Study (Attachment F)
- Stormwater Study (Attachment H)

All submitted items met or exceeded City requirements.

Additional Staff Recommendations and Considerations

The Landscaping Plan as presented includes a variety of colorful trees that will reforest the site at maturity, as well as shrubs and grasses. The developer has committed to saving as many mature trees as possible. The borders of the property indicate the installation of landscape and plantings. An employee park/relaxation area has been proposed. This will be of like architectural materials as the building.

Per Resolutions 601 and 664, new developments must allocate 1% of total project cost to public art. The developers propose to address this requirement with an outdoor public art display in the south lawn of the property. Staff recommends the applicant meet and discuss ideas and options for this requirement with the Arts Committee with the understanding that the SW corner of the site will be reserved for addressing this requirement.

The type of signage and dimensions for planned district sites are dictated by the approved Final Development Plan. The facility is requesting two wall signs and one monument sign. Staff suggests the Planning Commission

allow three signs on the building façade or two wall signs and a monument on the north end of the property, so any monument sign does not compete with the 1% for art project or proposed Roeland Park signage on the southwest corner of the development.

Surrounding properties are residential in nature so buffering parking has been a focus during the review process. Other potential noise contributors are the mechanical systems used for the facilities. To ensure noise does not become an issue, the performance standards for CP-O require that noise levels not exceed 60 decibels at the property line to protect the surrounding neighborhood.

Staff would like to note that exterior finish materials and architectural design elements have been altered by the applicant during the course of review in an effort to have this site compliment the bank/hospital which bookends this principal gateway for Roeland Park.

The applicant states that the property will be maintained by a 3rd party contractor and that such requirements will be documented within HOA agreements or a similar instrument and provided to the City prior to filing the FDP.

Action by the Planning Commission

The action requested is to determine whether to recommend passage of an ordinance to grant the CP-O zoning to the property that allows for the construction of a medical office building. Per Sec. 16-321 – Consideration of Rezoning and Special Use Permits – which requires the procedures set forth in Sec. 16-316 – Consideration of Zoning Text Amendments – a majority of the members of the Planning Commission present and voting at the hearing shall be required to recommend approval, approval with conditions, or denial of the zoning text amendment to the Governing Body. The Planning Commission's recommendation shall include a statement of the reasons for the recommendation.

Per Sec. 16-324 – Consideration of Preliminary Development Plans – the preliminary development plan shall be considered and approved as part of the rezoning application. The Planning Commission shall consider the factors stated in Sec. 16-321(e) (provided below), to the extent they are pertinent to the particular application, and any other factors which may be relevant to a particular application.

(1) The character of the neighborhood.

The character of the neighborhood is residential to the north and commercial to the east and west of the site. The limited commercial use allowed in this zoning district is in general conformance with future land use plans and compliant with code restrictions on the proposed use.

(2) The zoning and uses of nearby properties, and the extent to which the proposed use would be in harmony with the zoning and uses.

As stated above, the use of the property is compliant use, setback and requirements and provides a service to the community in harmony with surrounding land use patterns.

(3) The suitability of the property for the uses to which it has been restricted under the applicable zoning district regulations.

The property is vacant currently and has existing utilities on the site. The site has access to multiple streets including commercial arterials of Johnson Drive and Roe Boulevard. Ingress/egress as well as traffic volumes are supported by the traffic study

(4) The length of time the property has remained vacant as zoned.

The area has been vacant for approximately sixteen (16) years.

(5) The extent to which approval of the application would detrimentally affect nearby properties.

The requesting zoning change is consistent with other land uses fronting on Johnson Drive and Roe Boulevard. A medical office use is considered to have limited opportunity for detrimental impact as operations do not offend the senses and occur during the day when residents are at work. No detrimental effects to surrounding properties have been shown in any of the respective studies.

(6) The extent to which the proposed use would substantially harm the value of nearby properties.

No reduction in property values is anticipated as a result of this development, it is likely the development will enhance the value of neighboring properties.

(7) The extent to which the proposed use would adversely affect the capacity or safety of that portion of the road network influenced by the use, or present parking problems in the vicinity of the property.

Traffic studies on the site and adjoining sites do not indicate that a additional adverse condition will occur as a result of this development. Further, funding for improvements to Granada are being secured as a result of this development.

(8) The extent to which utilities and services, including but not limited to, sewers, water service, police and fire protection, and parks and recreation facilities are available and adequate to serve the proposed use.

All utilities are currently on site and "will serve" letters have been received from each utility. Pedestrian connectivity and sidewalk installation will be greatly improved by the development. The site has been reviewed by FD #2 for accessibility of existing fire apparatus and found to be compliant.

(9) The extent to which the proposed use would create excessive storm water runoff, air pollution, water pollution, noise pollution or other environmental harm.

Stormwater runoff has been addressed through stormwater BMPs and will incorporate landscaping and a rain garden to address surface runoff per the drainage study. Noise levels have been addressed by limiting the noise level at property line to 60DB post development as required by the district.

(10) The extent to which there is a need for the use in the community.

Medical uses of this type are necessary in every community.

(11) The economic impact of the proposed use on the community.

The proposed use will diversify employment opportunities in the community by creating professional, skilled medical jobs.

(12) The ability of the applicant to satisfy any requirements applicable to the specific use imposed pursuant to this chapter.

The ability to satisfy the requirements of this chapter have been completed through site studies and subsequent financial agreement relative to public improvement installation.

(13) The gain, if any, to the public health, safety and welfare due to denial of the application as compared to the hardship imposed upon the landowner, if any, as a result of denial of the application.

The development increases levels of services in the community, creates jobs, improves infrastructure and provides a commercial gateway for the community. Denial of the application would negate any of these improvements and the land would remain undeveloped as development occurs around it.

(14) The conformance of the proposed use to the comprehensive plan and other adopted planning policies.

The proposed use is far more restrictive than the mixed use or MXD district called out in the comprehensive plan. Substantially less traffic, less impact to utilities and less opportunity for commercial operations to conflict with the single family homes in the neighborhood while at the same time achieving a higher and better use of an area attractive to commercial development.

(15) The recommendation of professional staff.

The recommendations of professional staff have been outlined in this report and to the maximum extent possible, to address planning commission consideration items.

The Planning Commission shall consider the following additional factors:

(1) The capacity of the site to accommodate the building(s), parking and drives, with appropriate open space and safe and easy ingress and egress;

These elements have been addressed via the FDP with layout and design supported by respective studies. Ingress and egress of patrons as well as, emergency vehicles have been weighed via several studies as noted in this report.

(2) The degree of harmony between the architectural quality of the proposed building(s) and the surrounding neighborhood;

The current submittal is a reflection of staff and elected official comments and further, reflects a continuity of design with surrounding development and established goals/vision of the community.

(3) The appropriateness of the minimum dimensions, areas of lots and yards and setbacks contained in the applicable zoning district regulations;

The plan is compliant with setback requirements, areas, intensity of use elements, landscaping requirements and all elements required for this type of use.

(4) The consistency of the plan with good land planning and site engineering design principles; and

Vehicular connection, pedestrian interconnections and use of stormwater BMPS incorporated into the site are all based upon good planning and engineering principles.

(5) Compliance with all other applicable provisions of Chapter XVI – Zoning and Subdivision Regulations.

The submittal is compliant with all elements of the subdivision regulation.

Per Sec. 16-328 – Consideration of Final Development Plans, the Planning Commission shall approve final development plans that contain no modifications or additions from the approved preliminary development plan—which in this case, there is no such modification or addition—if the Planning Commission determines that the landscaping and screening plan complies all applicable Code requirements and the factors set forth in Sec. 16-320(e) – Concept Plans—Submission Requirements, Contents and Meeting with Redevelopment Committee:

- (1) A plot plan evidencing the location of the property, adjacent streets, the zoning designation of the subject property and adjacent properties within 300 feet, and generally where all proposed buildings and parking areas are to be located;
- (2) Preliminary estimate of the total square footage of buildings proposed;
- (3) Site photos;
- (4) Name, address and phone number of the property owner;
- (5) Date and signature of applicant, who, if not the owner, shall provide legally sufficient evidence that the applicant is the authorized agent of the owner;
- (6) A narrative statement of what the applicant proposes to develop on the property; and
- (7) Evidence, satisfactory to the City Engineer, of the applicant's ability to comply with the adequate public facilities and services requirements of Section 16-305.

If the Planning Commission fails to make a recommendation, the Planning Commission shall be deemed to have made a recommendation of denial. Any determination made by the Planning Commission shall be appealable to the Governing Body by the applicant within 15 days of the date of the Planning Commission determination.

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

Summary of Attachments:

Attachment A – Applications for Rezoning & Development Plans

Attachment B – Preliminary Development Plan

Attachment C - Final Development Plan

Attachment D – Site Plan

Attachment E – Grading/Storm Sewer Plan

Attachment F – Stormwater Management Plan

Attachment G – Landscape Plan

Attachment H – Photometric Plan

Attachment I – Assurances of Adequate Public Utilities

Attachment J – Traffic Study Requirements Met

Attachment K – Stormwater Study

Attachment L- Response Letter to Staff Comments

Attachment J - Traffic Study Comments

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

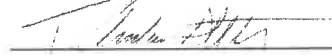
Description	Type
Attachment A - Applications for Rezoning and Development Plans	Cover Memo
Attachment B - Preliminary Development Plan	Cover Memo
Attachment C - Final Development Plan	Cover Memo
Attachment D - Photometric Plan	Cover Memo
Attachment E - Assurance of Public Utilities	Cover Memo
Attachment F - Traffic Study	Cover Memo
Attachment G - Comments/Responses to Traffic Study	Cover Memo
Attachment H - Stormwater Study	Cover Memo
Attachment I - Staff Comments/Responses	Cover Memo
Attachment J - Traffic Study Comments	Cover Memo

REZONING CHECKLIST [CODE 16-317]Date Submitted 08/07/19Name of Project Johnson & Roe Medical Office Building

Case # _____

Description/Type of Project: Medical Office Building

I, Andy Gabbert, (Contact Person's Name - Printed), hereby certify the attached and completed application contains the information as specified in accordance with the Roeland Park City Code. I understand the submission of incomplete or inaccurate information may result in a delay in processing and action on this application.



Signature of Contact Person

08/07/19

Date

NOTE: Some plans, because of their scale and complexity may require additional information not indicated on this checklist. You are encouraged to work closely with the Staff in advance of your actual application submittal. Please submit **ONLY THOSE DRAWINGS** necessary to provide information required by this checklist. Submission of construction drawing's or other nonessential drawings may delay the review process. Please check appropriate boxes (I = Included or N/I = Not Included) as the form is completed.

The following items shall be submitted in support of any application for rezoning:

☐ I ☐ N/I

1. Legal description of the property;
2. A statement of the reasons why rezoning is being requested;
3. ~~The written comments of the Redevelopment Committee on the concept plan, if applicable pursuant to section 16-322;~~
4. A preliminary development plan, except for rezonings to a Single-Family Residence District and Duplex Residence District;
5. All studies as may reasonably be required pursuant to section 16-304;
6. Assurances of adequate public facilities as required by section 16-305.

Legal Description – Johnson & Roe MOB

All of Lots 1 thru 4 and Lots 24 thru 26, ROSELAND COURT, and all that part of the NE 1/4 of Section 9, Township 12, Range 25, all in the City of Roeland Park, Johnson County, Kansas, more particularly described as follows:

Commencing at the Northwest corner of the NE 1/4 of said Section 09; thence S 1° 55' 22" E, along the West line of said NE 1/4, a distance of 1222.46 feet, to a point on the Westerly extension of the North line of said Lot 4; thence N 87° 16' 50" E, along the North line of the Westerly extension of said Lot 4, a distance of 40.00 feet, to the Point of Beginning; thence continuing N 87° 16' 50" E, along the North line of said Lot 4, a distance of 137.74 feet, to the Northeast corner of said Lot 4; thence S 1° 55' 37" E, along the East line of said Lot 4, a distance of 60.00 feet, to the Southeast corner of said Lot 4; thence N 87° 16' 50" E, along the North line of said Lot 24, a distance of 138.39 feet, to the Northeast corner of said Lot 24; thence S 1° 55' 37" E, along said West right of way line of Granada Lane (Platted as Walnut Street), as now established a distance of 130.27 feet, to a point of curvature; thence Southeasterly along a curve to the left having a radius of 80.00 feet, a central angle of 110° 07' 28", an arc distance of 153.76 feet; thence N 67° 56' 55" E, along said South right of way line, a distance of 75.47 feet, to a point on the East line of ROSELAND COURT; thence S 1° 55' 37" E, along the Southerly extension of the East line of said ROSELAND COURT, a distance of 90.54 feet; thence Southwesterly along a curve to the right having an initial tangent bearing of S 59° 37' 01" W, a radius of 475.00 feet, a central angle of 28° 29' 02", an arc distance of 236.14 feet, to a point of tangency; thence S 88° 06' 03" W, a distance of 193.98 feet (193.42 feet Deed), to a point of curvature; thence Northwesterly along a curve to the right having a radius of 34.00 feet, a central angle of 89° 58' 35", an arc distance of 53.39 feet, to a point on the East line Roe Boulevard, as established on said plat of ROSELAND COURT; thence N 1° 55' 22" W, along the West line of said NE 1/4, a distance of 349.43 feet, to the Point of Beginning, as described in Survey by McClure Engineering Co. dated April 12, 2019 as Project No. 190349.

Fee: _____
Rec'd By _____
Date Paid _____

**APPLICATION FOR
DEVELOPMENT PLAN APPROVAL**
City of Roeland Park, Kansas
PLEASE PRINT

Case No.: _____
Planning Commission
Date _____

Requested Action:

	<u>Fee</u>
☒ Preliminary Development Plan	\$150.00
☐ Revised Preliminary Development Plan	\$100.00
☐ Final Development Plan	\$200.00
☐ Revised Final Development Plan	\$200.00
☐ Landscaping Plan	\$125.00
☐ Site Plan (non-residential development in residential district)	\$150.00

Name of Development: Johnson & Roe Medical Office Building

Location: NE Corner of Johnson & Roe

Range 25E Township 12S Section: 09 Quadrant NE

Existing Zoning: SFR

Present use of Property: Vacant

Is Property subject to rezoning? ☒ Yes ☐ No

Is Property subject to Special Use Permit? Yes ☐ ☒ No

Applicant: SMG Investements, LLC

Address: 5555 W. 58th St

Phone: 913.333.3880

City: Mission

State: KS

Zip: 66202

Property Owner: Same as Applicant

Address: _____

Phone: _____

City: _____

State: _____

Zip: _____

Engineer/Surveyor/Architect: Renaissance Infrastructure Consulting - Andy Gabbert

Address: 5105 NW Canal St.

Phone: 913.333.3880

City: Riverside

State: MO

Zip: 64150

* Applicant signature [Signature]

* Date 8-6-19

To be completed by the City:

Fee Paid \$ _____

Date _____

Received by: _____

Proof of ownership and/or authorization of agent affidavit(s) submitted. Date: _____

☐ Rezoning Case No. _____

☐ Special Use Permit No. _____

☐ Previous Plan Approval: _____

☐ City Engineer review and comment submitted

Technical studies required? ☐ Yes ☐ No If yes, what type and when submitted? _____

Assurances of adequate public facilities received. ☐ Yes ☐ No If yes, date received _____

Supporting materials required: _____

Date Submitted: _____

Date application deemed complete: _____

Surrounding property owners notified: _____

Date of publication: _____

Sign Posted _____

Date notices sent: _____

Public Hearing date: _____

Planning Commission recommendation: _____

Date: _____

City Council Action: _____

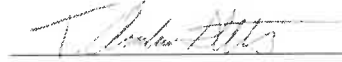
Date: _____

PRELIMINARY DEVELOPMENT PLANS CHECKLIST [CODE 16-323]Date Submitted 08/07/19Name of Project Johnson & Roe Medical Office Building

Case # _____

Description/Type of Project: Medical Office Building

I, Andy Gabbert, (Contact Person's Name - Printed), hereby certify the attached and completed application contains the information as specified in accordance with the Roeland Park City Code. I understand the submission of incomplete or inaccurate information may result in a delay in processing and action on this application.



Signature of Contact Person

08/07/19

Date

NOTE: Some plans, because of their scale and complexity may require additional information not indicated on this checklist. You are encouraged to work closely with the Staff in advance of your actual application submittal. Please submit **ONLY THOSE DRAWINGS** necessary to provide information required by this checklist. Submission of construction drawings or other nonessential drawings may delay the review process. Please check appropriate boxes (I = Included or N/I = Not Included) as the form is completed.

☒ I ☐ N/I

1. Application form
2. Eight copies of the preliminary site development plan that must include the following information:

☒ I ☐ N/I **GENERAL INFORMATION**

- a. North arrow;
- b. Scale;
- c. Date of plan preparation;
- d. Name and address of landowner.

☒ I ☐ N/I **SITE DEVELOPMENT**

- a. Location and dimension of buildings and other structures;
- b. Location and dimensions of parking areas;
- c. Location and dimensions of drives and walks;
- d. Location and dimension of public streets and all easements;
- e. General extent and character of proposed landscaping and screening;
- f. Proposed drainage patterns.
- g. Adjacent development (property within 200 feet) including lot lines, building footprints, access points and parking areas;
- h. Existing topography with contours at 5-foot intervals, and delineating any land areas within the 100-year flood plain;
- i. Location and size of any drainage structures, such as culverts, paved or earthen ditches or storm water sewers and inlets;
- j. Preliminary sketch drawings of elevations and floor plans depicting the general style, size and exterior construction materials of the buildings.

☒ I ☐ N/I **ADDITIONAL INFORMATION**

- a. Schedule indicating total floor area and land area;
- b. Parking Schedule showing the number of space provided and required for all existing buildings, and all spaces required for proposed buildings;
- c. Name and address of architect, landscape architect, planner, engineer, surveyor, or other person involved in the preparation of the plan.

3. All required studies pursuant to section 16-304.

☒ I ☐ N/I **TECHNICAL STUDIES**

- a. Traffic Study;
- ~~b. Parking Study;~~
- c. Lighting Study;
- d. Drainage Study;
- ~~e. Geo-technical Study;~~
- ~~f. Other (specify) _____~~

4. Assurances of adequate public facilities as required by section 16-305.
5. Assurances of proof of ownership and/or authorization of agent as required by section 16-302.

 PROOF OF OWNERSHIP AFFIDAVIT

STATE OF KANSAS)
COUNTY OF JOHNSON) SS

_____, being first duly sworn upon his/her oath deposes and states as follows:

 (1)

[FILL IN ONLY IF APPLICATION SUBMITTED ON BEHALF OF THE LEGAL OWNER]

That Wette Crabtree, managing partner, SM6 Investments LLC
(Name of owner signing Affidavit; if owner is a corporation or business, name of individual signing Affidavit, capacity and exact name and legal status of said corporation or business) is/are the legal owner/authorized official of the legal owner of the property that is the subject of Rezoning No. ____
____/Special Use Permit No. ____/(Other) _____. (ALL OWNERS OF RECORD MUST FILE AN AFFIDAVIT).

~~(2)~~

~~[FILL IN ONLY IF APPLICATION SUBMITTED ON BEHALF OF A CONTRACT PURCHASER]~~

~~That _____
(Name of contract purchaser signing Affidavit; if a corporation or business, exact name and legal status of said corporation or business) is the holder of a contract to purchase the property that is the subject of Rezoning No. ____ / Special Use Permit No. ____ /
(Other) _____ from the owner(s) and is therefore a "landowner" within the meaning of the Zoning Regulations.~~

 
Signature

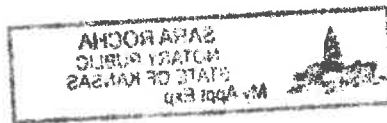
 Subscribed and sworn to before me this 6 day of August, 200 .


Notary Public

My commission expires:

1/27/21





Fee: _____
 Rec'd By: _____
 Date Paid: _____

**APPLICATION FOR
 DEVELOPMENT PLAN APPROVAL**
City of Roeland Park, Kansas
 PLEASE PRINT

Case No.: _____
 Planning Commission
 Date: _____

Requested Action:

- | | Fee |
|--|------------|
| ☐ Preliminary Development Plan | \$150.00 |
| ☐ Revised Preliminary Development Plan | \$100.00 |
| ☒ Final Development Plan | \$200.00 |
| ☐ Revised Final Development Plan | \$200.00 |
| ☐ Landscaping Plan | \$125.00 |
| ☐ Site Plan (non-residential development in residential district) | \$150.00 |

Name of Development: Johnson & Roe Medical Office Building

Location: NE Corner of Johnson & Roe

Range 25E Township 12S Section: 09 Quadrant NE

Existing Zoning: SFR Present use of Property: Vacant

Is Property subject to rezoning? Yes No Is Property subject to Special Use Permit? Yes No

Applicant: SMG Investements, LLC

Address: 5555 W. 58th St Phone: 913.333.3880

City: Mission State: KS Zip: 66202

Property Owner: Same as Applicant

Address: _____ Phone: _____

City: _____ State: _____ Zip: _____

Engineer/Surveyor/Architect: Renaissance Infrastructure Consulting - Andy Gabbert

Address: 5105 NW Canal St. Phone: 913.333.3880

City: Riverside State: MO Zip: 64150

* Applicant signature *[Signature]* Date 8-6-09

To be completed by the City: Fee Paid \$ _____ Date _____ Received by: _____

Proof of ownership and/or authorization of agent affidavit(s) submitted. Date: _____

☐ Rezoning Case No. _____ ☐ Special Use Permit No. _____ ☐ Previous Plan Approval: _____

☐ City Engineer review and comment submitted

Technical studies required? ☐ Yes ☐ No If yes, what type and when submitted? _____

Assurances of adequate public facilities received. ☐ Yes ☐ No If yes, date received _____

Supporting materials required: _____ Date Submitted: _____

Date application deemed complete: _____

Surrounding property owners notified: _____ Date of publication: _____ Sign Posted _____

Date notices sent: _____

Public Hearing date: _____

Planning Commission recommendation: _____

Date: _____

City Council Action: _____

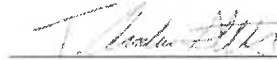
Date: _____

FINAL DEVELOPMENT PLANS CHECKLIST [CODE 16-327]Date Submitted 08/07/19Name of Project Johnson & Roe Medical Office Building

Case # _____

Description/Type of Project: Medical Office Building

I, Andy Gabbert, (Contact Person's Name - Printed), hereby certify the attached and completed application contains the information as specified in accordance with the Roeland Park City Code, I understand the submission of incomplete or inaccurate information may result in a delay in processing and action on this application.



Signature of Contact Person

08/07/19

Date

NOTE: Some plans, because of their scale and complexity may require additional information not indicated on this checklist. You are encouraged to work closely with the Staff in advance of your actual application submittal. Please submit **ONLY THOSE DRAWINGS** necessary to provide information required by this checklist. Submission of construction drawing's or other nonessential drawings may delay the review process. Please check appropriate boxes (I = Included or N/I = Not Included) as the form is completed.

☒ I ☐ N/I

1. Application form.
2. Eight copies of the preliminary site development plan to be drawn to a standard engineer's scale. The actual scale used will depend on the development and shall be subject to the approval of the city engineer. The plans must include the following information:

☒ I ☐ N/I **GENERAL INFORMATION**

- a. North arrow;
- b. Scale;
- c. Date of plan preparation;
- d. Name and address of landowner;
- e. A small key map indicating the location of the property within the City.

☒ I ☐ N/I **SITE DEVELOPMENT**

- a. All existing and proposed adjacent public street right-of-way with centerline location;
- b. All existing and proposed adjacent public street and public drive locations, widths, curb cuts and radii;
- c. Location, width and limits of all existing and proposed sidewalks;
- d. Location, size and radii of all existing and proposed median breaks and turning lanes;
- e. Distance between all buildings. between buildings and property lines and between all parking areas and property lines;
- f. Location of all required building. and parking set backs;
- g. Location, dimensions, number of stories and area in square feet of all proposed buildings;
- h. Area of land on site plan in square feet or acres.

☒ I ☐ N/I **PARKING**

- a. Location and dimensions of all driveways;
- b. Location and dimensions of all parking lots;
- c. Location and dimensions of all parking stalls and aisles;
- d. Location and dimensions of all loading and service areas and docks;
- e. Location, height, candle power and type of outside lighting fixtures for parking lots.

☒ I ☐ N/I **LANDSCAPE AND SCREENING**

- a. Location, size and materials to be used for all screening, including screening of outside trash enclosure areas.

☒ I ☐ N/I **GRADING AND DRAINAGE DESIGN PLAN**

- a. Finished grades or contours for the entire site at 2 foot contour intervals;
- b. Limits, location, size and material to be used in all proposed retaining walls;

☒ I ☐ N/I **ADDITIONAL INFORMATION**

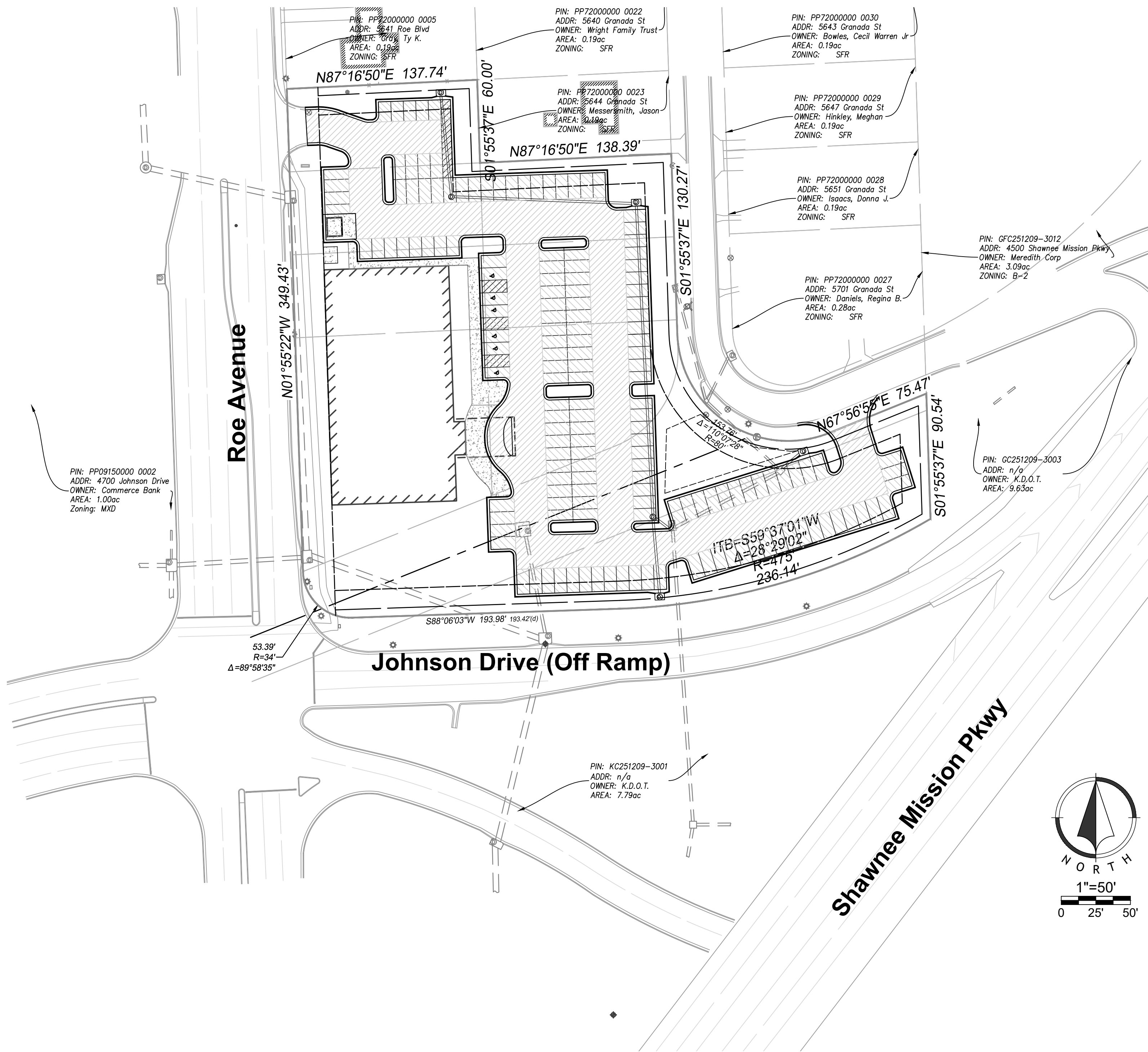
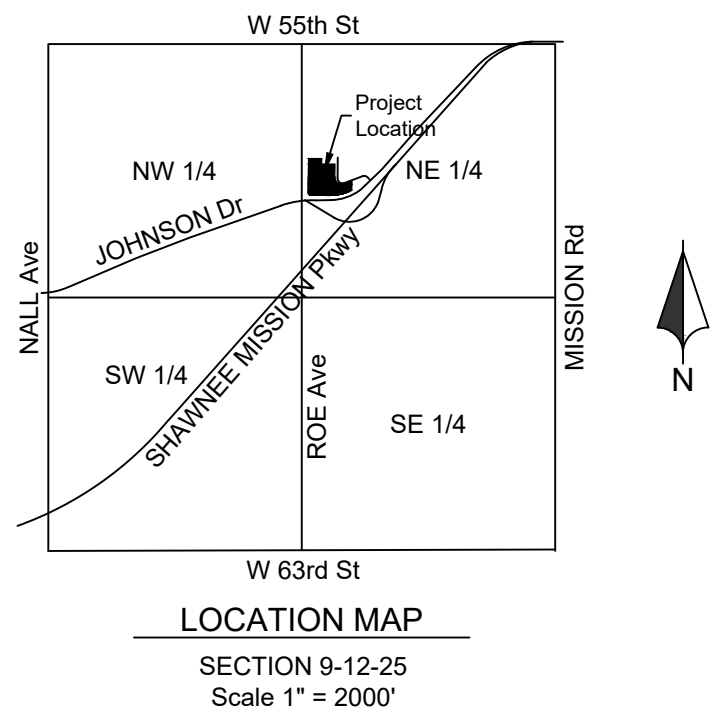
- a. Location, height, candle power and type of outside lighting fixtures for buildings;
- b. Location, size, type of material and message of all proposed monument or detached signs;
- c. Pertinent peripheral information to include adjacent developments, alignment and location of public and private driveways and streets, medians, public and semi-public easements

☒ I ☐ N/I

One copy of the proposed site plan and one copy of the proposed building elevations shall be reduced onto 8-1/2

1. inch by 11 inch bond paper.
2. Assurances of adequate public facilities as required by section 16-305.
3. Proof of filing of the statement required by section 16-325 (a).
4. ~~Deeds of dedication for all rights-of-way or easements required as a result of preliminary development plan approval if conveyance thereof is not to be made by plat or by the filing of the final development plan pursuant to Section 16-329.~~
5. ~~A copy of all covenants and restrictions applicable to the development, if required by the terms of the preliminary development plan.~~
6. ~~Evidence of the establishment of the agency for the ownership and maintenance of any common open space and all assurances of the financial and administrative ability of such agency required pursuant to approval of the preliminary development plan, if required by the terms of the approved preliminary development plan.~~
7. ~~Evidence of satisfaction of any stipulations of the preliminary development plan approval which were conditions precedent to consideration of the final development plan.~~

PRELIMINARY DEVELOPMENT PLANS for
Johnson & Roe Medical Office Building
City of Roeland Park, Johnson County, Kansas



Index of Sheets

C01.....	TITLE SHEET
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C04.....	SITE DIMENSION PLAN
C05.....	UTILITY PLAN
L01.....	LANDSCAPE ARCHITECTURE PLANS
A2.1.....	BUILDING FOOTPRINT
A5.1.....	EXTERIOR ELEVATIONS
LP101.....	PHOTOMETRIC SITE PLANS

APPLICANT/DEVELOPER

SMG Investments, LLC
5555 W 58th St, Mission, KS 66202
(913) 432-2080

CONSULTANT

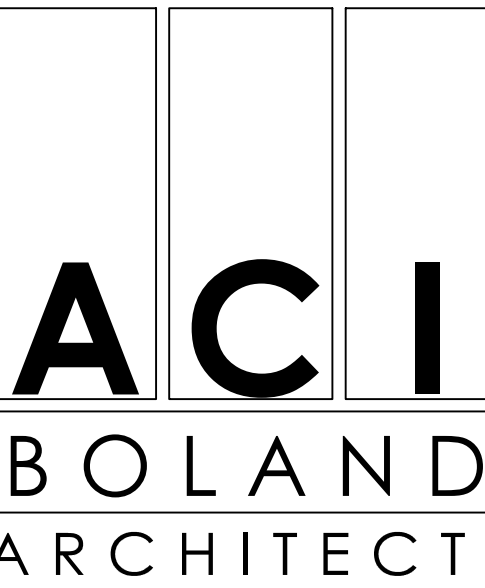
Renaissance Infrastructure Consulting
ric-consult.com | 816.800.0950
Attn: Dustin Burton, PE
dburton@ric-consult.com
1815 McGee Street, Suite 200
Kansas City, MO 64108

LEGEND

Existing Section Line	Proposed Right-of-Way
Existing Right-of-Way Line	Proposed Property Line
Existing Lot Line	Proposed Lot Line
Existing Easement Line	U/E
Existing Curb & Gutter	Proposed Easement
Existing Sidewalk	Proposed Curb & Gutter
Existing Storm Sewer	Proposed Sidewalk
Existing Storm Structure	Proposed Storm Sewer
Existing Waterline	Proposed Storm Structure
Existing Gas Main	Proposed Fire Hydrant
Existing Sanitary Sewer	Proposed Waterline
Existing Sanitary Manhole	Proposed Sanitary Sewer
Existing Contour Major	Proposed Sanitary Manhole
Existing Contour Minor	Proposed Contour Major
Existing Underground Power Line	Proposed Contour Minor
	Future Curb and Gutter



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RECORDING
PURPOSES, OR
IMPLEMENTATION
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1710 Wyandotte
Kansas City, MO 64108
T: 816.763.9600

ACI/Boland, Inc.
Kansas City | St. Louis
Licensee's Certificate of Authority Number:

CIVIL CONSULTANT

Renaissance Infrastructure Consulting
132 Abbie Ave.
Kansas City, Kansas 66103
Licensee's Certificate of Authority Number:

Phone Number: 913-317-9500

STRUCTURAL CONSULTANT

Bob D. Campbell
4338 Bellevue
Kansas City, Missouri
Licensee's Certificate of Authority Number:

Phone Number: 816-531-4144

MEP CONSULTANT

Smith & Boucher Engineers
25501 Valley Parkway, Suite 200
Olathe, Kansas
Licensee's Certificate of Authority Number:

Phone Number: 913-345-2127

LANDSCAPE CONSULTANT

Renaissance Infrastructure Consulting
132 Abbie Ave.
Kansas City, Kansas 66103
Licensee's Certificate of Authority Number:

Phone Number: 913-317-9500

Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS

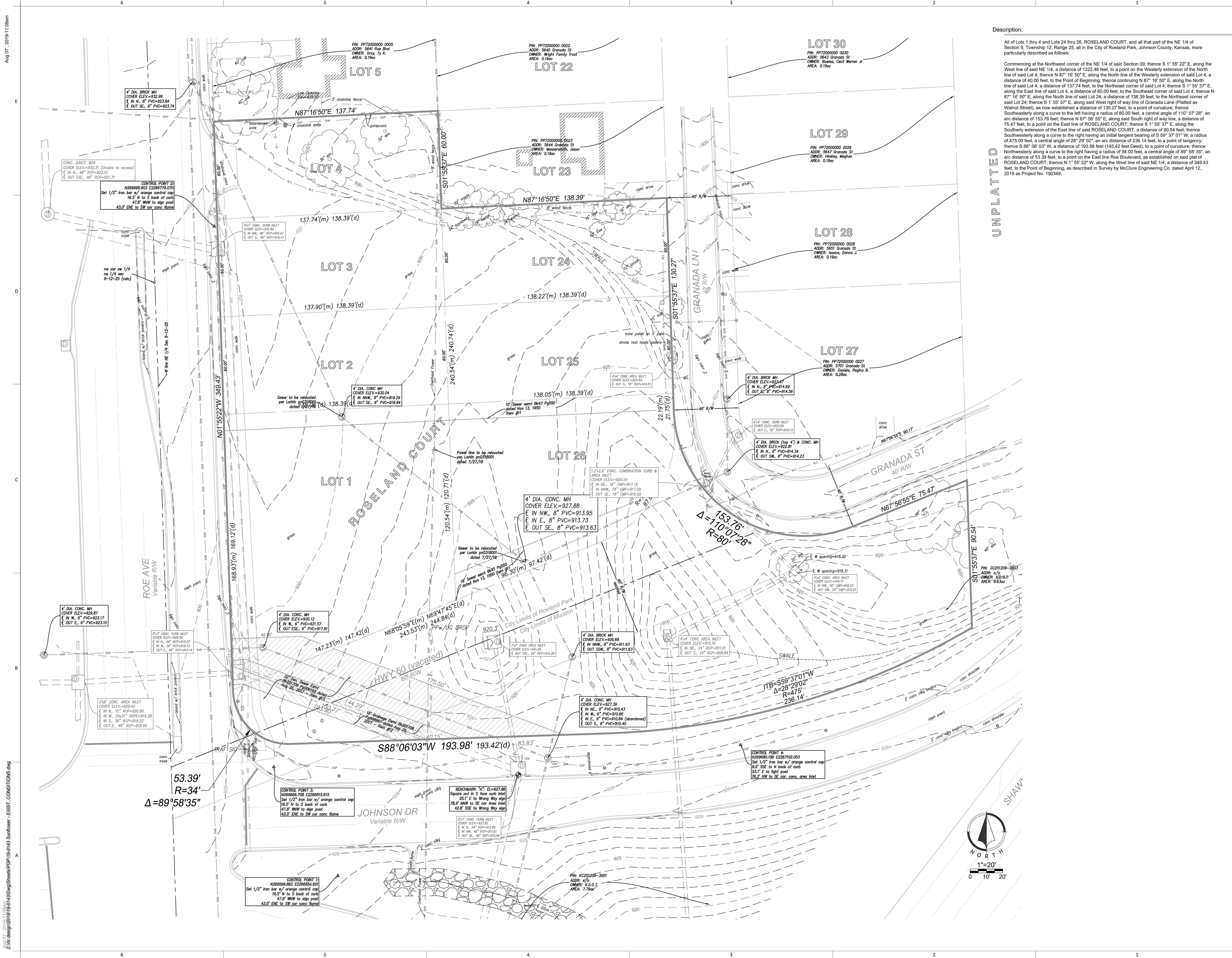
Date	Aug 07, 2019
Job Number	19-0143
Drawn By	FB
Checked By	DJB

Revision		
Number	Date	Description
	08/06/19	Original Submittal

C01

Aug 07, 2019 8:11:08am

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Description:
All of Lots 1 thru 4 and Lots 24 thru 26, ROSELAND COURT, and all that part of the NE 1/4 of Section 9, Township 12, Range 25, all in the City of Roeland Park, Johnson County, Kansas, more particularly described as follows:
Commencing at the Northwest corner of the NE 1/4 of said Section 09; thence S 1° 55' 22" E, along the West line of said NE 1/4, a distance of 1222.46 feet, to a point on the Westerly extension of the North line of said Lot 4; thence N 87° 16' 50" E, along the North line of the Westerly extension of said Lot 4, a distance of 40.00 feet, to the Point of Beginning; thence continuing N 87° 16' 50" E, along the North line of said Lot 4, a distance of 137.74 feet, to the Northeast corner of said Lot 4; thence S 1° 55' 37" E, along the East line of said Lot 4, a distance of 60.00 feet, to the Southeast corner of said Lot 4; thence N 87° 16' 50" E, along the North line of said Lot 24, a distance of 138.39 feet, to the Northeast corner of said Lot 24; thence S 1° 55' 37" E, along said West right of way line of Granada Lane (Platted as Walnut Street), as now established a distance of 130.27 feet, to a point of tangency; thence Southeastly along a curve to the left having a radius of 80.00 feet, a central angle of 110° 07' 28", an arc distance of 153.76 feet; thence N 67° 56' 55" E, along said South right of way line, a distance of 75.47 feet, to a point on the East line of ROSELAND COURT; thence S 1° 55' 37" E, along the Southern extension of the East line of said ROSELAND COURT, a distance of 90.54 feet; thence Southwesterly along a curve to the right having an initial tangent bearing of S 59° 37' 01" W, a radius of 475.00 feet, a central angle of 28° 29' 02", an arc distance of 236.14 feet, to a point of tangency; thence S 88° 06' 03" W, a distance of 193.98 feet (193.42 feet Dosed), to a point of curvature; thence Northwesterly along a curve to the right having a radius of 34.00 feet, a central angle of 88° 58' 35", an arc distance of 53.39 feet, to a point on the East line Roe Boulevard, as established on said plat of ROSELAND COURT; thence N 1° 55' 22" W, along the West line of said NE 1/4, a distance of 349.43 feet, to the Point of Beginning, as described in Survey by McClure Engineering Co. dated April 12, 2019 as Project No. 190349.

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BOLAND
ARCHITECTS

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T: 816.763.9600
ACI/Boland, Inc.
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CIVIL CONSULTANT
Renaissance Infrastructure Consulting
132 Abbie Ave.
Kansas City, Kansas 66103
Licensee's Certificate of Authority Number:
Phone Number: 913-317-9500

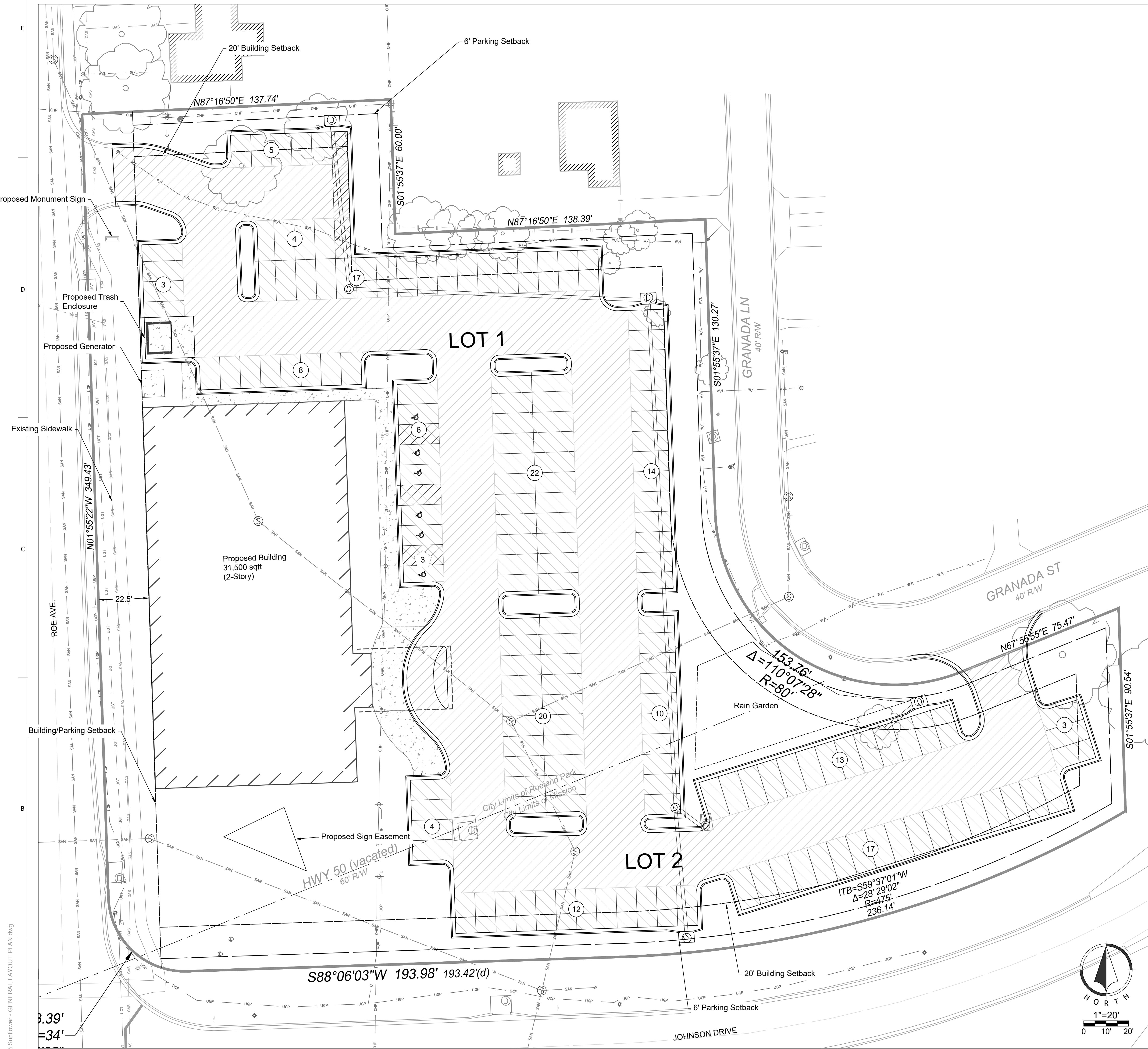
STRUCTURAL CONSULTANT
Bob D. Campbell
4338 Bellevue
Kansas City, Missouri
Licensee's Certificate of Authority Number:
Phone Number: 816-531-4144

MEP CONSULTANT
Smith & Boucher Engineers
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Olathe, Kansas
Licensee's Certificate of Authority Number:
Phone Number: 913-345-2127

LANDSCAPE CONSULTANT
Renaissance Infrastructure Consulting
132 Abbie Ave.
Kansas City, Kansas 66103
Licensee's Certificate of Authority Number:
Phone Number: 913-317-9500

Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS
Date Aug 07, 2019
Job Number 19-0143
Drawn By FB
Checked By DJB
Revision
Number Date Description
08/06/19 Original Submittal

C02
EXISTING CONDITIONS



Parking Count Legend:	
(X)	Parking Stall Count
(X)	ADA Parking Stall Count

Parking Required	
120 Stalls	
3.8 Stalls per 1,000sqft	
Parking Provided	
153 Typical Stalls	
6 ADA Stalls	
159 Total Stalls Provided	

SITE DATA TABLE	
Existing Zone: R-1	
Proposed Zone: CP-O	
FAR :	(31,500 / 117,217) = 26.9%
Lot Area (sf):	117,217 sf
Total Area (ac):	2.69 ac
Lot 1 Area (Roeland Park):	1.95ac
Lot 2 Area (Mission):	0.74ac
Building Gross Area:	31,500 sf
Paved Area:	60085 sf
Impervious Area:	75,577 sf (64%)
Pervious Area:	41,640 sf (36%)
Front Building Setback: 30'	
Proposed Front Setback: 22.5' (25% reduction)	
Front Parking Setback: 22.5' (25% Reduction)	
Interior Parking Setback: 6'	

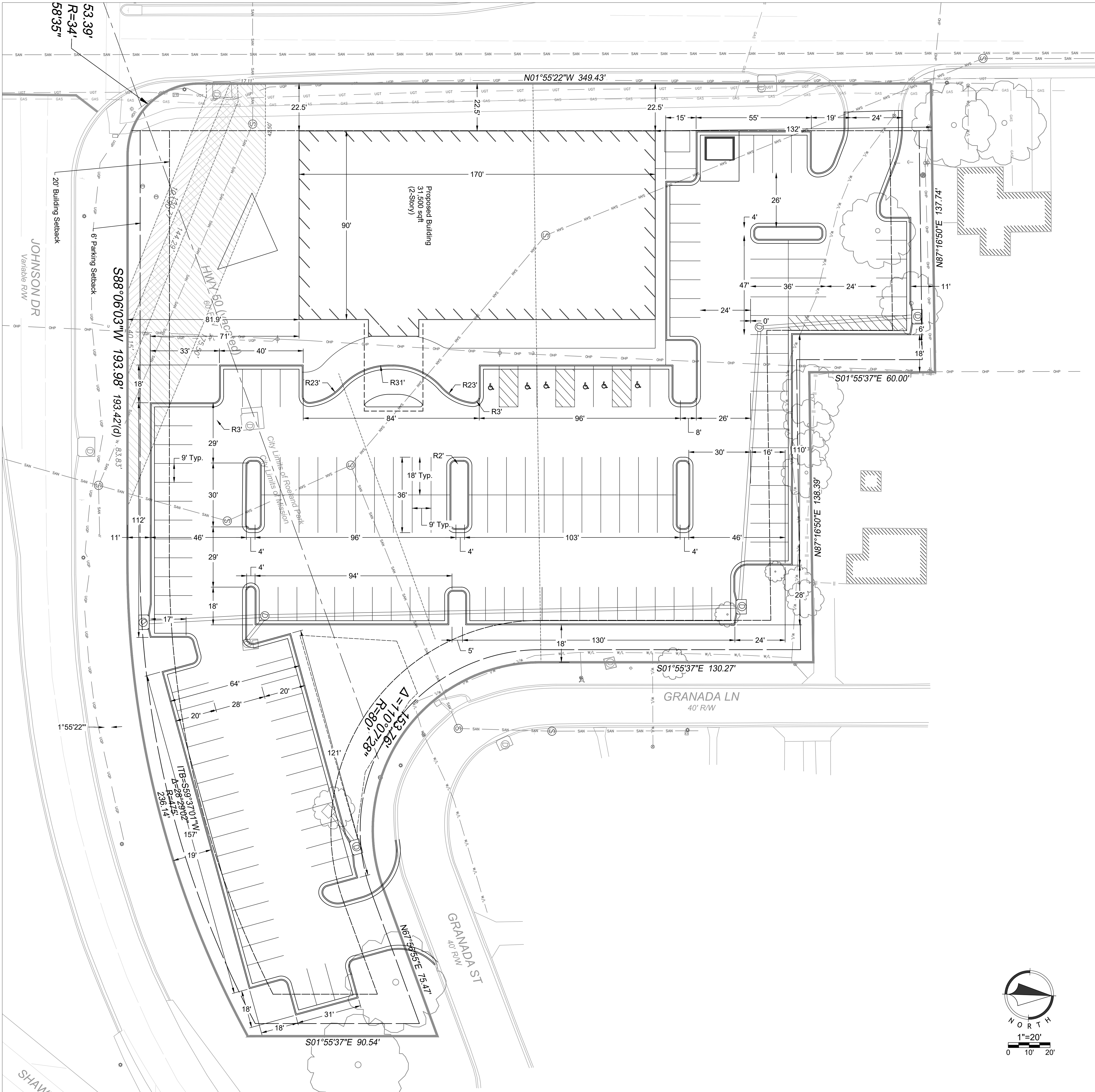
CURB LEGEND	
	Dry Curb
	Ribbon Curb
	Wet Curb

Pavement Section Details	
PC Concrete Pavement	Light Duty Asphalt Pavement
7" PC Concrete Pavement (4000 PSI, Air Entrained) KCMMB 4K	2" AC Surface Course (APWA 3-01) 2" AC Base Course (APWA 2-01) 6" Compacted Agg. KDOT AB-3 6" Compacted Subgrade (95% Std. Proctor Treated with Lime or Class "C" Flyash)
4" Compacted Agg. KDOT AB-3 8" Compacted Subgrade (95% Std. Proctor Treated with Lime or Class "C" Flyash)	
Heavy Duty Asphalt Pavement	
2" AC Surface Course (APWA 3-01) 4" AC Base Course (APWA 1-01) 6" Compacted Agg. KDOT AB-3 6" Compacted Subgrade (95% Std. Proctor Treated with Lime or Class "C" Flyash)	

Pavement Sections are based on information from
a Geotechnical Report, Dated 07/23/2019
Prepared By Cook, Flatt & Strobel Engineers, P.A.

Aug 07, 2019 8:11:08am

Z:\civic design\2019\19-0143\Draw\Sheets\PD\19-0143 Surflines - GENERAL LAYOUT PLAN.dwg



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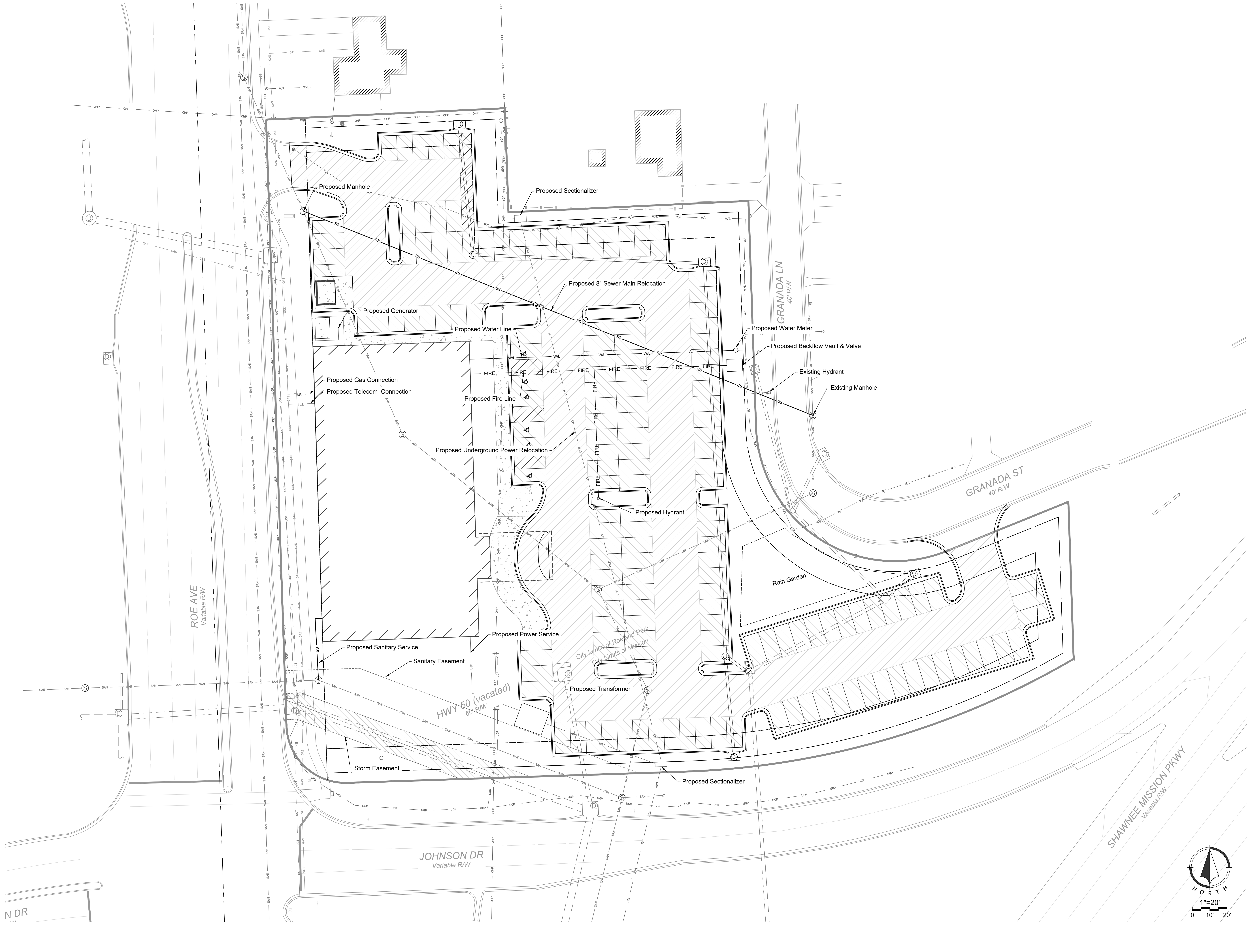
Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS

Date Aug 07, 2019
Job Number 19-0143
Drawn By FB
Checked By DJB

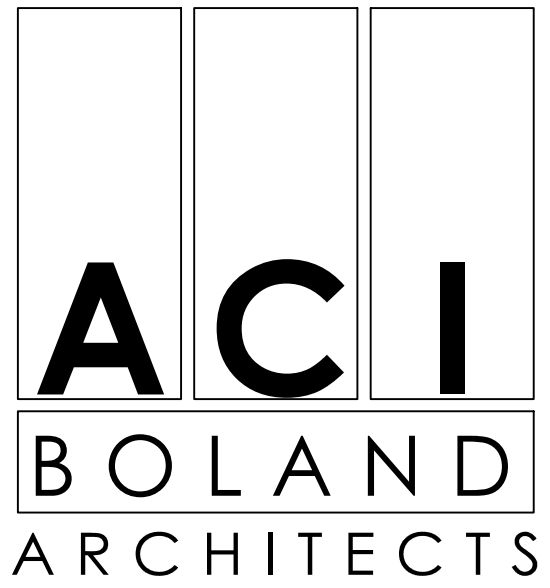
Revision
Number Date Description
08/06/19 Original Submittal

C04

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SITE DIMENSION PLAN



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1710 Wyandotte
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Johnson & Roe Medical Office Building
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Date	Aug 07, 2019
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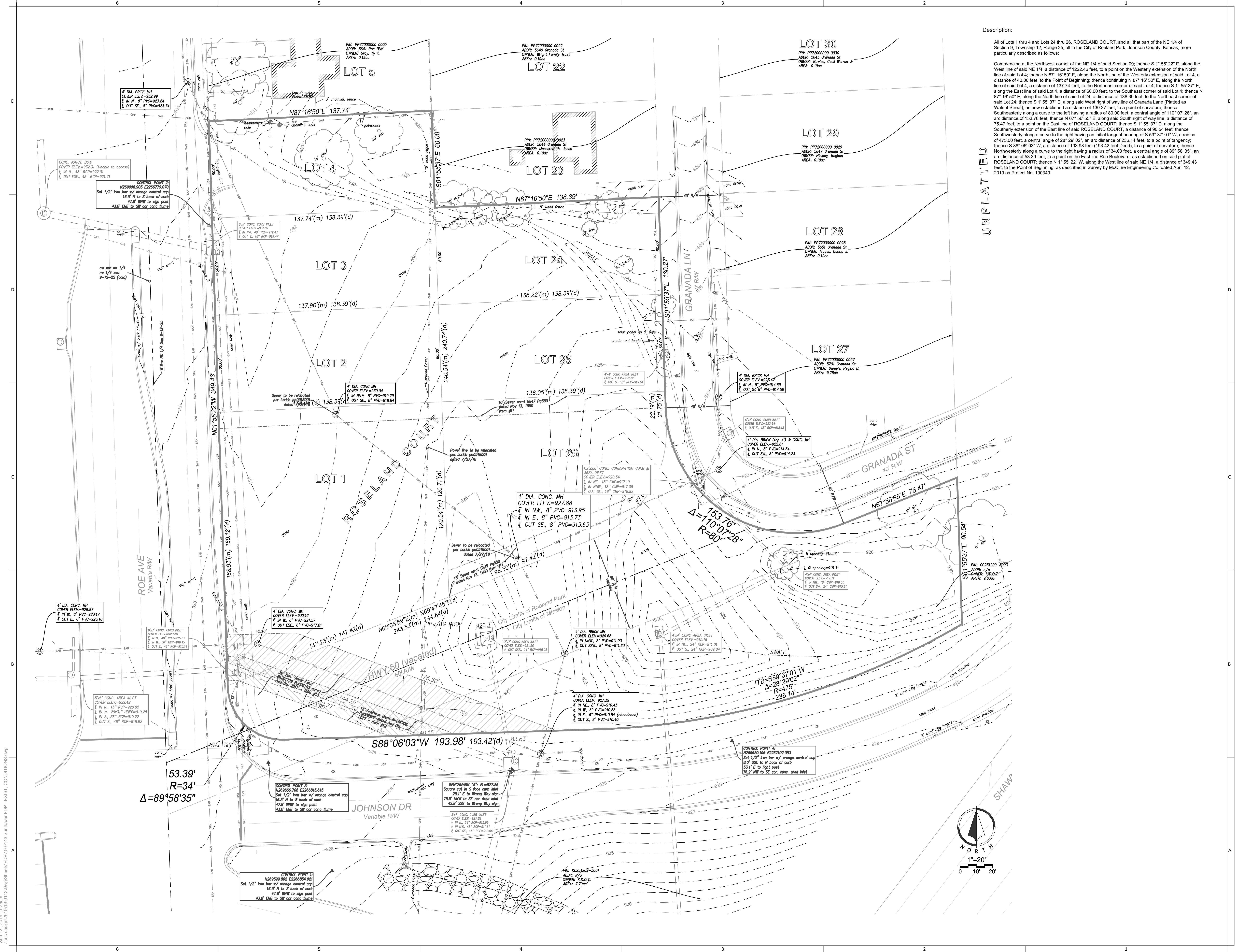
Revision		
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	08/06/19	Original Submittal

C05

Index of Sheets

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C04.....	SITE DIMENSION PLAN
C05.....	UTILITY PLAN
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C07.....	STORM PLAN
C08.....	EROSION CONTROL PHASE 1
C09.....	EROSION CONTROL PHASE 1
C09.....	EROSION CONTROL PHASE 2
C10.....	EROSION CONTROL PHASE 3
C11.....	OVERALL AREA PLAN
L01.....	LANDSCAPE ARCHITECTURE PLANS
A2.1.....	BUILDING FOOTPRINT
A5.1.....	EXTERIOR ELEVATIONS
LP101.....	PHOTOMETRIC SITE PLANS

Sep 13, 2019 11:25am
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Description:
All of Lots 1 thru 4 and Lots 24 thru 26, ROSELAND COURT, and all that part of the NE 1/4 of Section 9, Township 12, Range 25, all in the City of Roeland Park, Johnson County, Kansas, more particularly described as follows:
Commencing at the Northwest corner of the NE 1/4 of said Section 09; thence S 1° 55' 22" E, along the West line of said NE 1/4, a distance of 1222.46 feet, to a point on the Westerly extension of the North line of said Lot 4; thence N 87° 16' 50" E, along the North line of the Westerly extension of said Lot 4, a distance of 40.00 feet, to the Point of Beginning; thence continuing N 87° 16' 50" E, along the North line of said Lot 4, a distance of 137.74 feet, to the Northeast corner of said Lot 4; thence S 1° 55' 37" E, along the East line of said Lot 4, a distance of 60.00 feet, to the Southeast corner of said Lot 4; thence N 87° 16' 50" E, along the North line of said Lot 24, a distance of 138.39 feet, to the Northeast corner of said Lot 24; thence S 1° 55' 37" E, along said West right of way line of Granada Lane (Platted as Walnut Street), as now established a distance of 130.27 feet, to a point of tangency; thence Southeastly along a curve to the left having a radius of 80.00 feet, a central angle of 110° 07' 28", an arc distance of 153.76 feet; thence N 67° 56' 55" E, along said South right of way line, a distance of 75.47 feet, to a point on the East line of ROSELAND COURT; thence S 1° 55' 37" E, along the Southerly extension of the East line of said ROSELAND COURT, a distance of 90.54 feet; thence Southwesterly along a curve to the right having an initial tangent bearing of S 59° 37' 01" W, a radius of 475.00 feet, a central angle of 28° 29' 02", an arc distance of 236.14 feet, to a point of tangency; thence S 88° 06' 03" W, a distance of 193.98 feet (193.42 feet Dead), to a point of curvature; thence Northwesterly along a curve to the right having a radius of 54.00 feet, a central angle of 89° 58' 35", an arc distance of 53.39 feet, to a point on the East line Roe Boulevard, as established on said plat of ROSELAND COURT; thence N 1° 55' 22" W, along the West line of said NE 1/4, a distance of 349.43 feet, to the Point of Beginning, as described in Survey by McClure Engineering Co., dated April 12, 2019 as Project No. 190349.

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Sunflower Medical

Roe & Johnson Drive | Roeland Park, KS

Date

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Job Number

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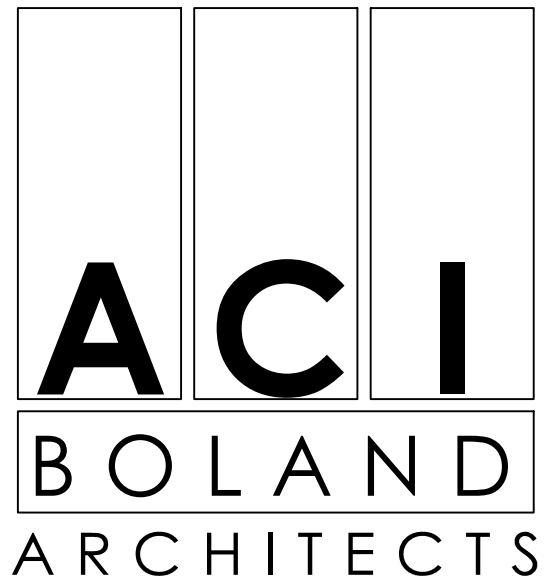
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Revision

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C02

EXISTING CONDITIONS



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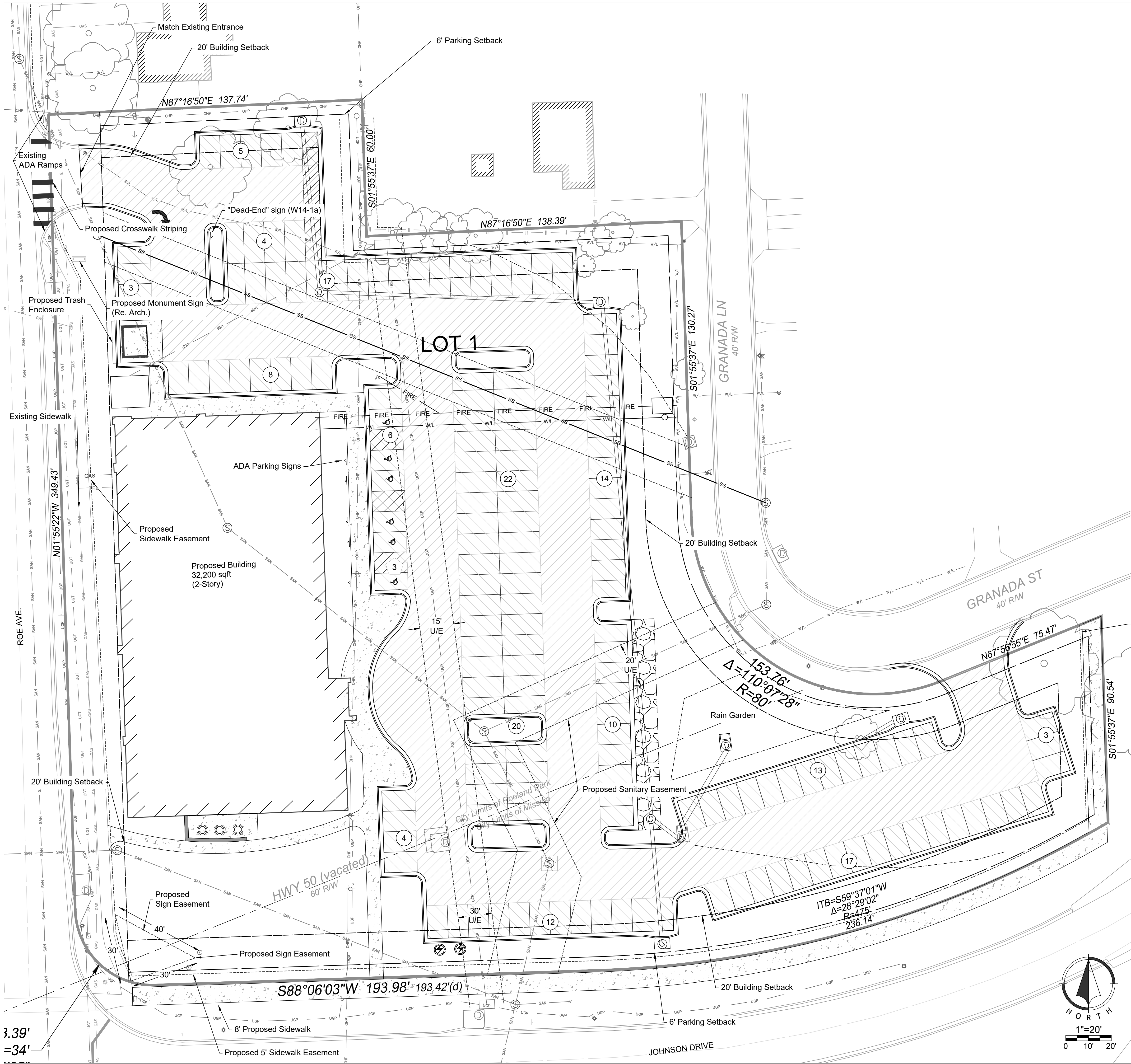
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C03



Parking Count Legend:	
(X)	Parking Stall Count
(X)	ADA Parking Stall Count

Parking Required	
120 Stalls	
3.8 Stalls per 1,000sqft	
Parking Provided	
153 Typical Stalls	
6 ADA Stalls	
159 Total Stalls Provided	

SITE DATA TABLE	
Existing Zone: R-1	
Proposed Zone: CP-O	
FAR :	(32,200 / 117,217) = 27.5%
Lot Area (sf):	117,217 sf
Total Area (ac):	2.69 ac
Lot 1 Area (Roeland Park):	1.95ac
Lot 1 Area (Mission):	0.74ac
Building Gross Area:	32,200 sf
Paved Area:	54,487 sf
Impervious Area:	70,701 sf (60%)
Pervious Area:	46,415 sf (40%)
Front Building Setback: 30'	
Proposed Front Setback: 22.5' (25% reduction)	
Front Parking Setback: 22.5' (25% Reduction)	
Interior Parking Setback: 6' (Variance Requested)	
Interior Building Setback: 20'	

CURB LEGEND	
(Line)	Dry Curb
(Line)	Ribbon Curb
(Line)	Wet Curb

Pavement Section Details	
(Pattern)	PC Concrete Pavement
(Pattern)	Heavy Duty Asphalt Pavement
(Pattern)	Light Duty Asphalt Pavement

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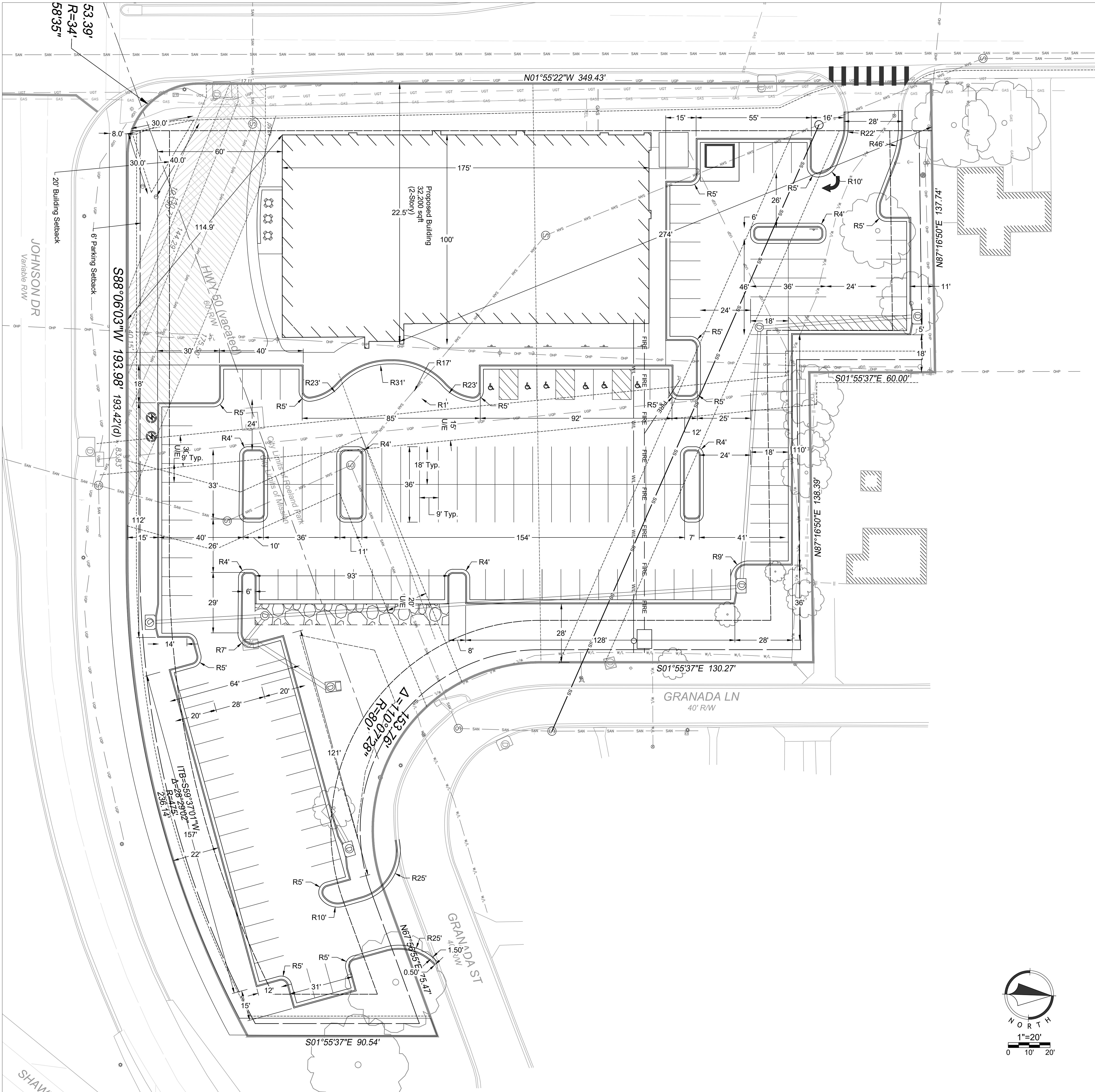
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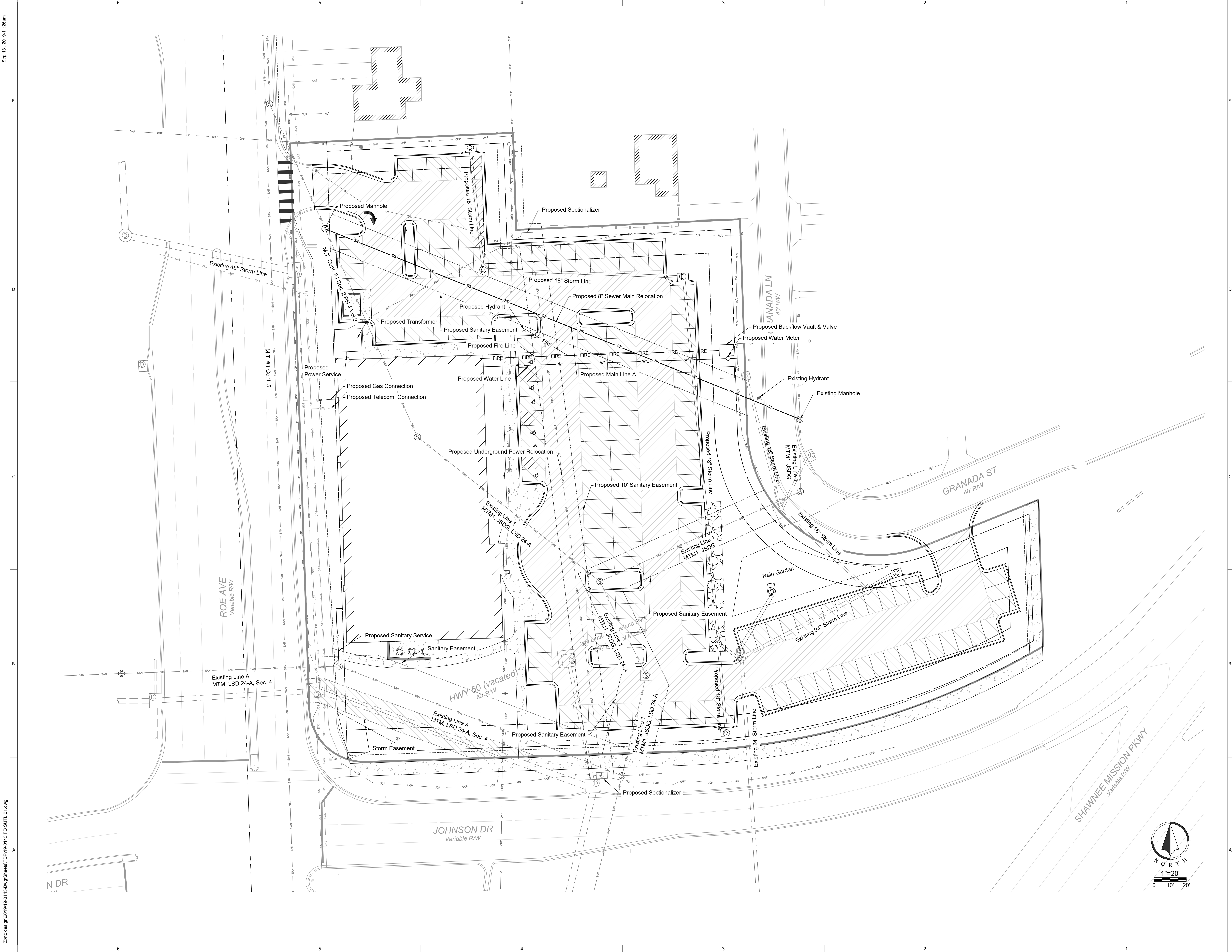
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SITE DIMENSION PLAN

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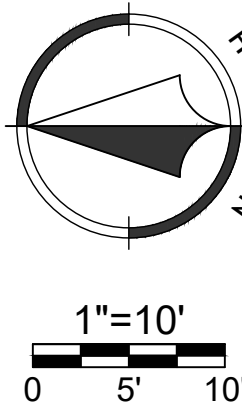
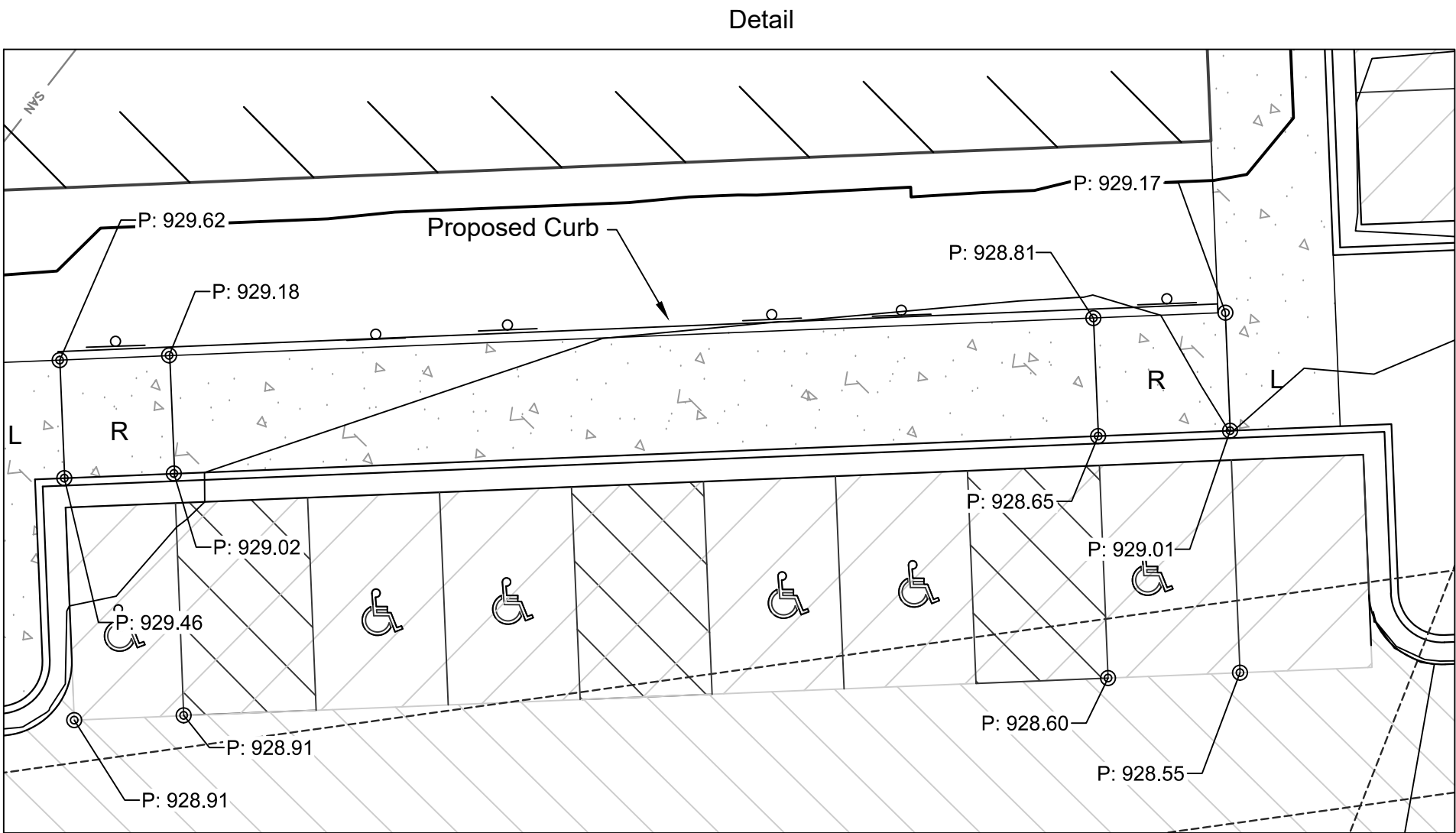
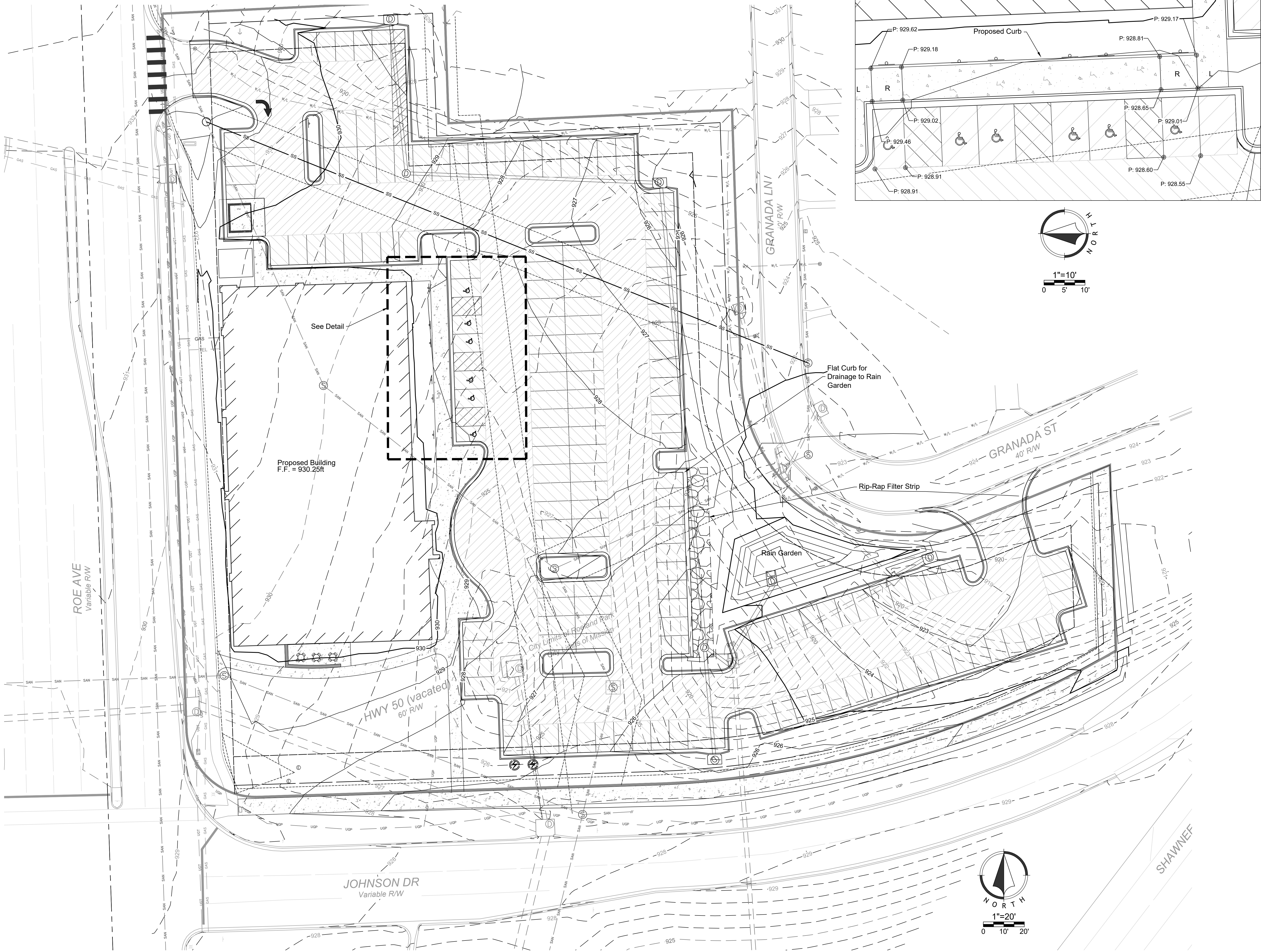
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Legend
--- Existing Grade
--- Proposed Grade



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GRADING PLAN

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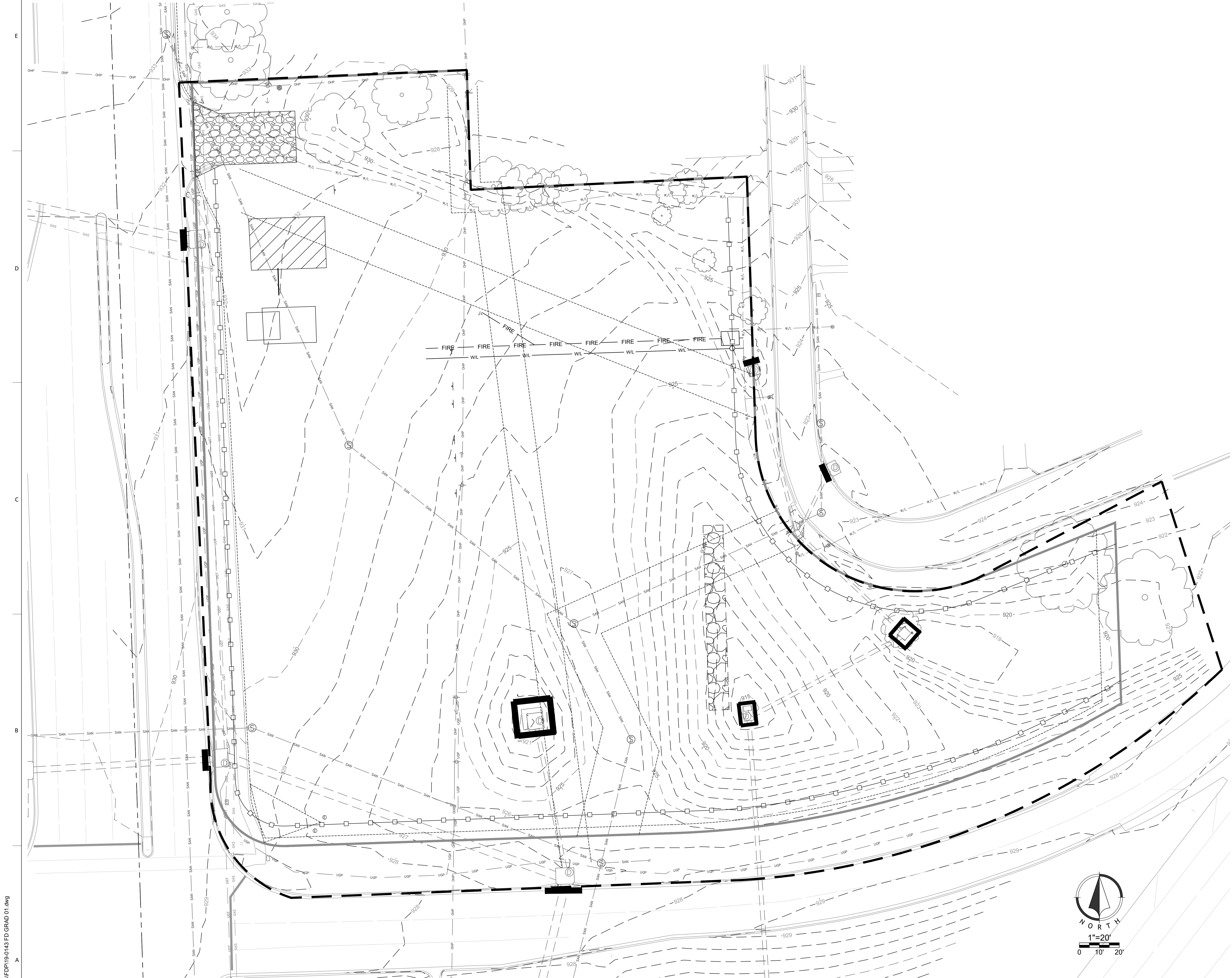
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STORM PLAN

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DISTURBED AREA : 2.69 ACRES

ESTIMATED EARTHWORK

Cut: CY
Fill: CY

Earthwork calculations are informational only. Contractor shall be responsible for their own earthwork calculations and perform all necessary earthwork shown herein without additional cost to the owner if quantities differ than above. Earthwork numbers are unadjusted.

WRITTEN SEQUENCING

1. Implement Pre-Clearing Plan:
All temporary structural BMP's shown on the pre-clearing plan must be in place before the general clearing operations. Clearing necessary to place temporary structural BMP's is the minimum required for installation. Coordinate clearing necessary to place temporary structural BMP's with local weather forecast so that clearing and placement may be completed within a forecast dry period. Temporary Barrier Fence shall be in Place, around areas not to be disturbed, prior to any construction activities.
2. Clear and Stabilize Work Areas:
Grade contractor areas and place all-weather surface on contractor areas.
3. Clearing and Grubbing:
After Phase I BMP's are installed, contractor may clear, grub, and demo required areas as necessary.

EROSION CONTROL LEGEND

- Stabilized Construction Entrance
- Staging Area
- Stockpile Area
- Concrete Washout
- Area Not to be Disturbed
- Limits of Disturbance
- Silt Fence
- Inlet Protection
- Visible Temporary Barrier Fence

EROSION CONTROL NOTES

1. Erosion control plan modifications shall be required if the plan fails to substantially control erosion and offsite sedimentation.
2. The retention of access controls and sediment controls shall be required for areas where seed has not established 70% cover.
3. The contractor shall temporarily seed and mulch all disturbed areas if there has been no construction activity on them for a period of fourteen (14) calendar days.
4. Install 'J' Hooks on silt fence every 100 LF

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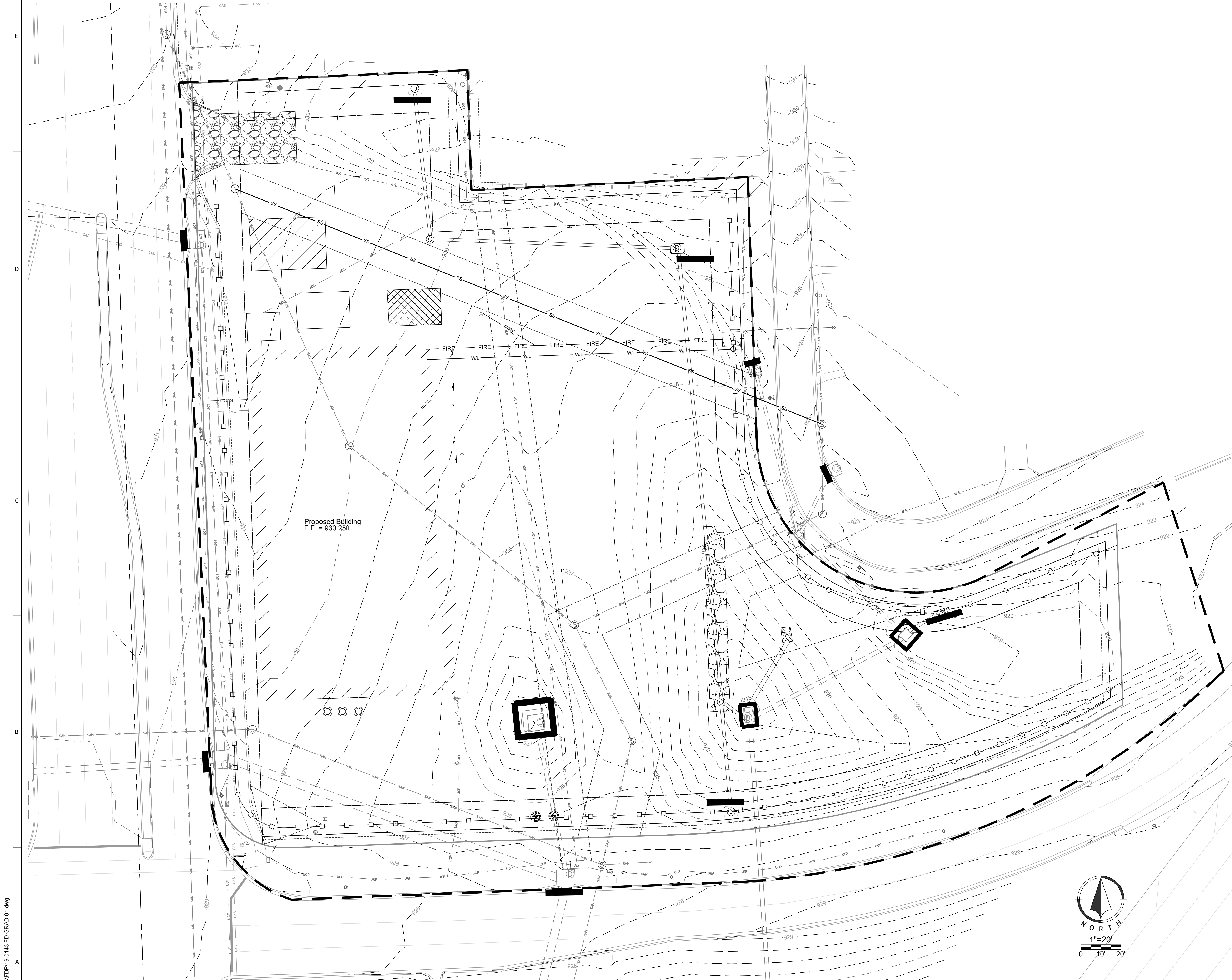
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EROSION CONTROL PHASE 1

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DISTURBED AREA : 2.69 ACRES

ESTIMATED EARTHWORK

Cut: CY
Fill: CY

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WRITTEN SEQUENCING

1. Implement Pre-Clearing Plan:
All temporary structural BMP's shown on the pre-clearing plan must be in place before the general clearing operations. Clearing necessary to place temporary structural BMP's is the minimum required for installation. Coordinate clearing necessary to place temporary structural BMP's with local weather forecast so that clearing and placement may be completed within a forecast dry period. Temporary Barrier Fence shall be in Place, around areas not to be disturbed, prior to any construction activities.
Clear and Stabilize Work Areas:
Grade contractor areas and place all-weather surface on contractor areas.
2. Clearing and Grubbing:
After Phase I BMP's are installed, contractor may clear, grub, and demo required areas as necessary.

EROSION CONTROL LEGEND

- Stabilized Construction Entrance
- Staging Area
- Stockpile Area
- Concrete Washout
- Area Not to be Disturbed
- Limits of Disturbance
- Silt Fence
- Inlet Protection
- Visible Temporary Barrier Fence

EROSION CONTROL NOTES

1. Erosion control plan modifications shall be required if the plan fails to substantially control erosion and offsite sedimentation.
2. The retention of access controls and sediment controls shall be required for areas where seed has not established 70% cover.
3. The contractor shall temporarily seed and mulch all disturbed areas if there has been no construction activity on them for a period of fourteen (14) calendar days.
4. Install "J" Hooks on silt fence every 100 LF

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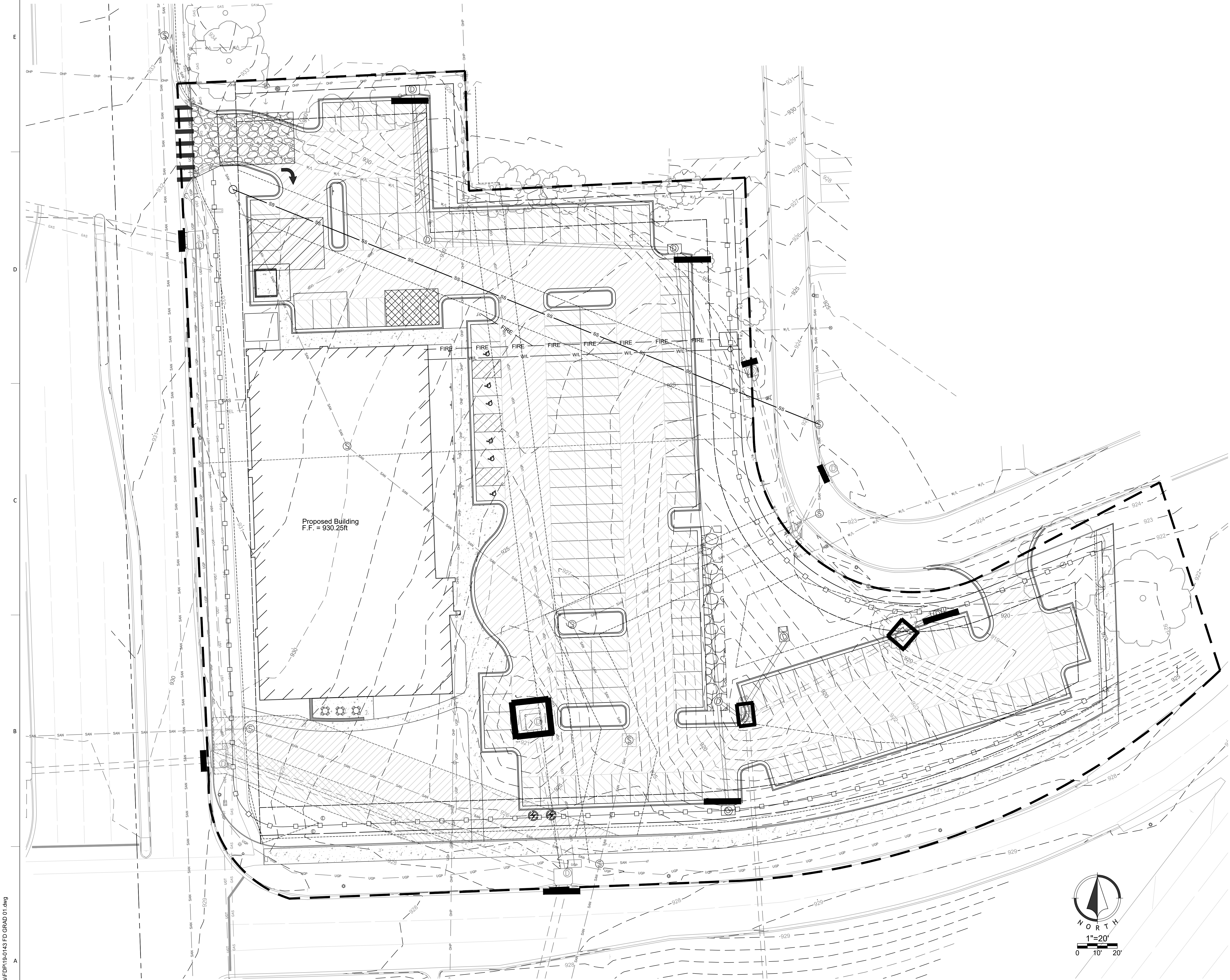
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EROSION CONTROL PHASE 2

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DISTURBED AREA : 2.69 ACRES

ESTIMATED EARTHWORK

Cut: CY
Fill: CY

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WRITTEN SEQUENCING

- Implement Pre-Clearing Plan:
All temporary structural BMP's shown on the pre-clearing plan must be in place before the general clearing operations. Clearing necessary to place temporary structural BMP's is the minimum required for installation. Coordinate clearing necessary to place temporary structural BMP's with local weather forecast so that clearing and placement may be completed within a forecast dry period. Temporary Barrier Fence shall be in Place, around areas not to be disturbed, prior to any construction activities.
- Clear and Stabilize Work Areas:
Grade contractor areas and place all-weather surface on contractor areas.
- Clearing and Grubbing:
After Phase I BMP's are installed, contractor may clear, grub, and demo required areas as necessary.

EROSION CONTROL LEGEND

- Stabilized Construction Entrance
- Staging Area
- Stockpile Area
- Concrete Washout
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EROSION CONTROL NOTES

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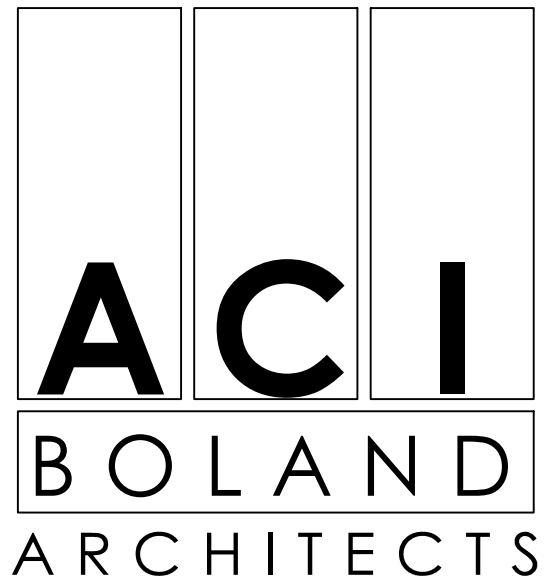
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EROSION CONTROL PHASE 3



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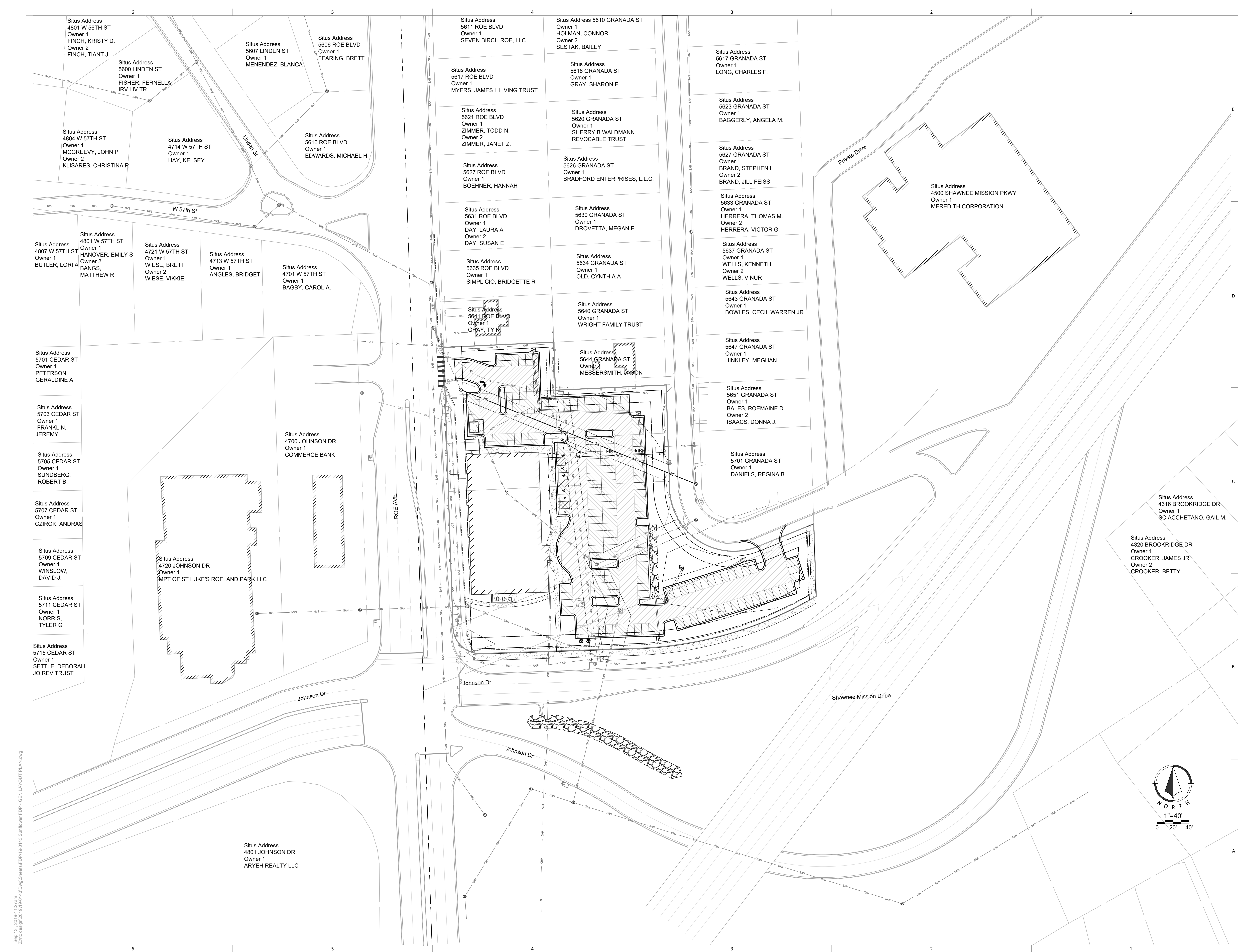
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Licensee's Certificate of Authority Number:

STRUCTURAL CONSULTANT
J. D. Campbell
 8 Belleview
 Kansas City, Missouri
 Licensee's Certificate of Authority Number:
 License Number: 816-531-4144

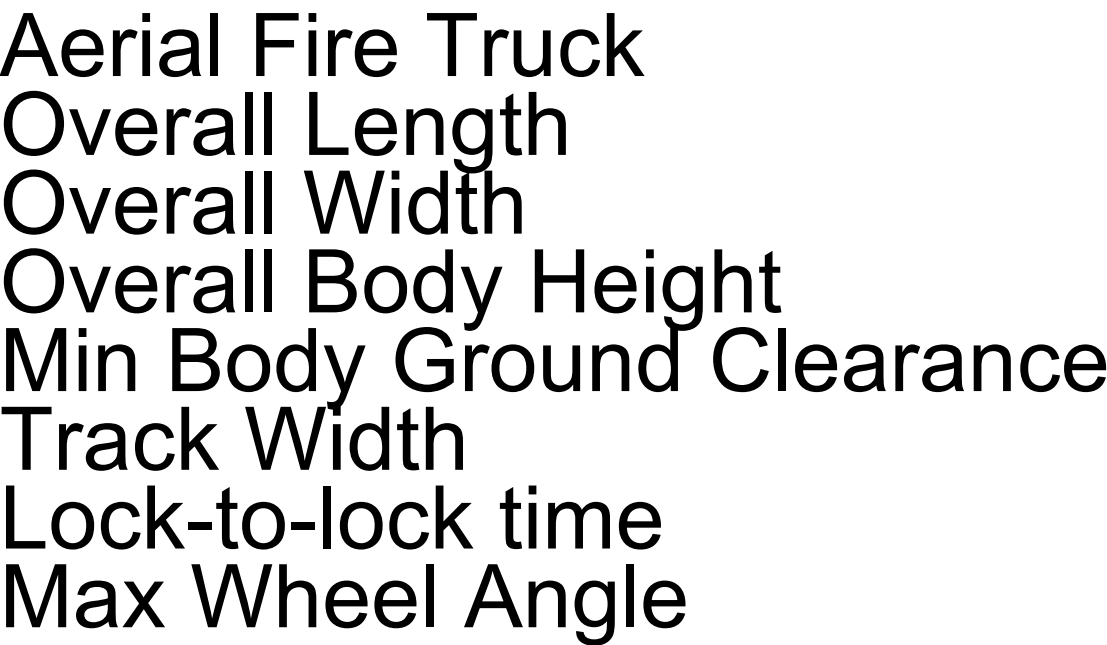
INDSCAPE CONSULTANT
naissance Infrastructure Consulting
 Abbie Ave.
 Kansas City, Kansas 66103
 Licensee's Certificate of Authority Number:
 Phone Number: 913-317-9500

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Job Number	19-0143
Drawn By	CR
Checked By	DJB

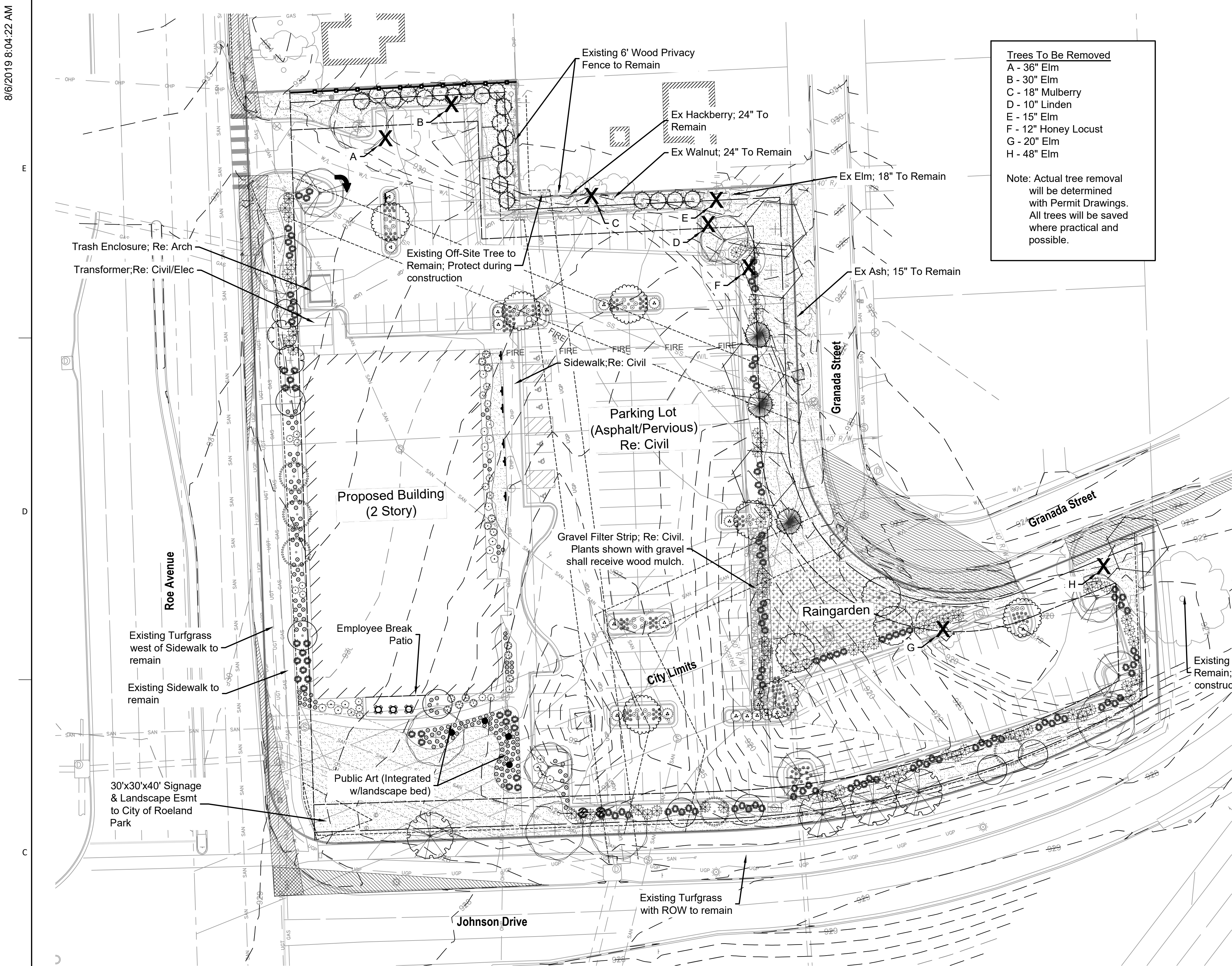
Revision		
Number	Date	Description
01	08/06/19	Original Submittal
02	09/03/19	Revised Per City Subm
03	09/13/19	Architectural Update

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FIRE DEPARTMENT ACCESSIBILITY



39.000ft
8.167ft
7.500ft
0.750ft
8.167ft
5.00s
45.00°



LANDSCAPE NOTES

1. LOCATE UTILITIES PRIOR TO COMMENCING LANDSCAPE OPERATIONS. ALL TREES SHALL BE FIELD POSITIONED AS TO AVOID CONFLICTS WITH EXISTING AND PROPOSED UTILITIES. NOTIFY LANDSCAPE ARCHITECT OF ANY CONFLICTS OR OBSTRUCTIONS.
2. CONTRACTOR SHALL STAKE ALL PLANTING AREAS IN THE FIELD PRIOR TO PLANTING FOR APPROVAL OF THE OWNER OR THEIR REPRESENTATIVE.
3. CONTRACTOR SHALL VERIFY ALL PLANT QUANTITIES PRIOR TO PLANTING. ANY DISCREPANCIES WITH THE PLAN SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. THE PLAN QUANTITIES SHALL SUPERCEDE SCHEDULED QUANTITIES.
4. ALL PLANT MATERIAL SHALL BE SPECIMEN QUALITY AND SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 THE 'AMERICAN STANDARD FOR NURSERY STOCK'.
5. ALL PLANTING BEDS & NATIVE GRASS STANDS SHALL BE EDGED AS SHOWN IN PLAN.
6. PREPARE PLANTING BEDS AND INCORPORATE AMENDMENTS ACCORDING TO PLANS.
7. SHREDDED HARDWOOD MULCH, PER SPECIFICATIONS SHALL BE USED AS A THREE INCH (3") TOP DRESSING IN ALL PLANTING BEDS AND AROUND ALL TREES. SINGLE TREES AND SHRUBS SHALL BE MULCHED TO THE OUTSIDE EDGE OF THE SAUCER OR LANDSCAPE ISLAND.
8. ALL TREES SHALL BE STAKED PER DETAIL.
9. ALL PLANT MATERIAL SHALL BE INSTALLED TO ALLOW A ONE FOOT (1') CLEARANCE BETWEEN PLANT AND ADJACENT PAVEMENT.
10. THE LANDSCAPE CONTRACTOR SHALL NOT COMMENCE WORK UNTIL THE SITE IS FREE OF DEBRIS CAUSED BY ON-GOING CONSTRUCTION OPERATIONS. REMOVAL OF DEBRIS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. LANDSCAPE WORK SHALL NOT BEGIN UNTIL THE LANDSCAPE ARCHITECT AND OWNER HAVE GIVEN WRITTEN APPROVAL FOR SUCH. THERE SHALL BE NO DELAYS DUE TO LACK OF COORDINATION FOR THIS ACTIVITY.
11. THE LANDSCAPE ARCHITECT AND OWNER SHALL APPROVE GRADES AND CONDITION OF SITE PRIOR TO SODDING/SEEDING OPERATIONS.
12. ALL AREAS DISTURBED DURING CONSTRUCTION AND NOT DESIGNATED FOR OTHER PLANTINGS OR HARDSCAPE SHALL BE SODDED WITH BUFFALO GRASS. ALL AREAS OUTSIDE OF THE BUFFALO PLANTING ZONE SHALL BE SODDED WITH TURF TYPE TALL FESCUE.
13. ALL SHRUB BED AREAS SHALL BE IRRIGATED BY DRIP IRRIGATION. BUFFALO SOD AREAS SHALL BE IRRIGATED BY QUICK COUPLE ACCESS AT 100 FT O.C OR WITHIN 50' OF A BUILDING HOSE BIB. IRRIGATION SYSTEM SHALL INCLUDE AUTOMATIC RAIN-SENSOR DEVICE. IRRIGATION SHOP DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR FOR APPROVAL PRIOR TO CONSTRUCTION.
14. RAINGARDEN PLANTINGS SHALL BE GROUPED IN NO LESS THAN 10 PLANTS PER GROUP. FINAL DESIGN OF RAINGARDEN SHALL BE PROVIDED WITH PERMIT DRAWINGS.

LANDSCAPE REQUIREMENTS

Proposed Zoning: CP-O

Minimum Tree Requirements (Sec 16-1005)

- Street Frontage: 1 Tree / 40 lf
- Open Space: 1 Tree / 3,000 sf Open Space

Vehicular Use Areas Requirements (Sec 16-1007)

- Min. 6% Interior Of Parking Lot (Spaces x 280)

Screening Requirements (Sec 16-1010)

- Trash Enclosures shall be screened and appropriately landscaped
- Exterior ground/building mounted equipment shall be screened from public view
- Adjacent to Residential (SFR) shall provide a solid screen or wall not less than 6' in height along the rear and side property lines which are common to subject property to the building line. The screening shall not be required where similar screening exists on the abutting residential property.

Provided Street Trees

- Street Frontage: Roe Blvd: 377 LF / 40 = 9.42 Trees Provided: 10 Trees
- Street Frontage: Johnson Dr.: 430 LF / 40 = 10.75 Trees Provided: 13 Trees
- Street Frontage: Grenada: 359 LF / 40 = 8.98 Trees Provided: 9 Trees

Provided Open Space

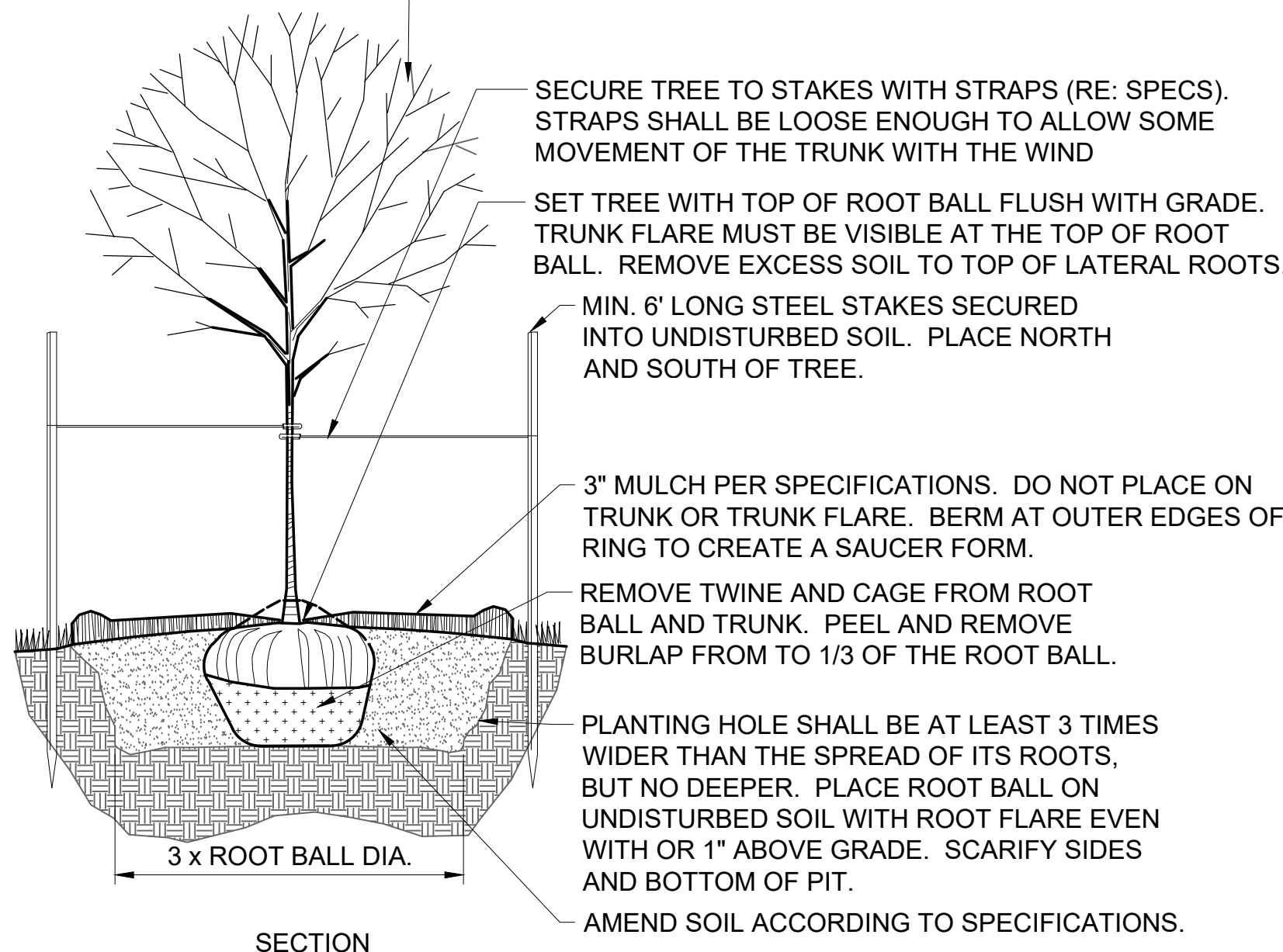
- Total Open Space: 36,363.47 sf / 3,000 sf = 12 Trees
- Open Space Trees (including parking lot trees): 17 Trees

Provided Vehicular Use Areas

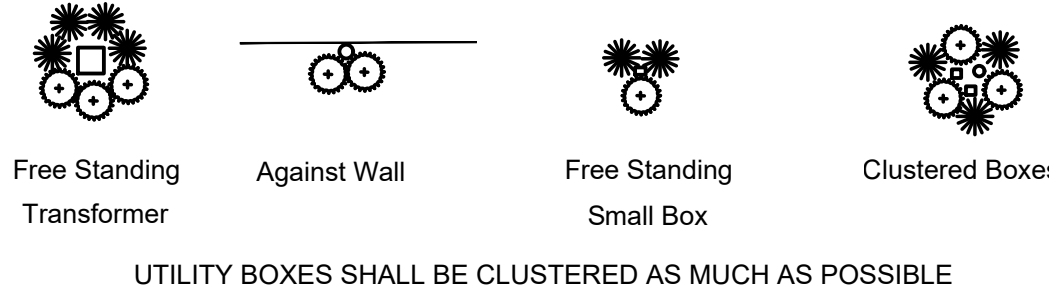
- Total Parking Spaces = 161 x 280 = 45,080 x 6% = 2,704.8 sf
- Total Area Provided = 3,724 sf

- NOTES:
1. TREES THAT DO NOT MEET THE SIZE REQUIREMENT WILL BE REJECTED
 2. TREES SHALL BE INSPECTED BY OWNERS REPRESENTATIVE PRIOR TO INSTALLATION.

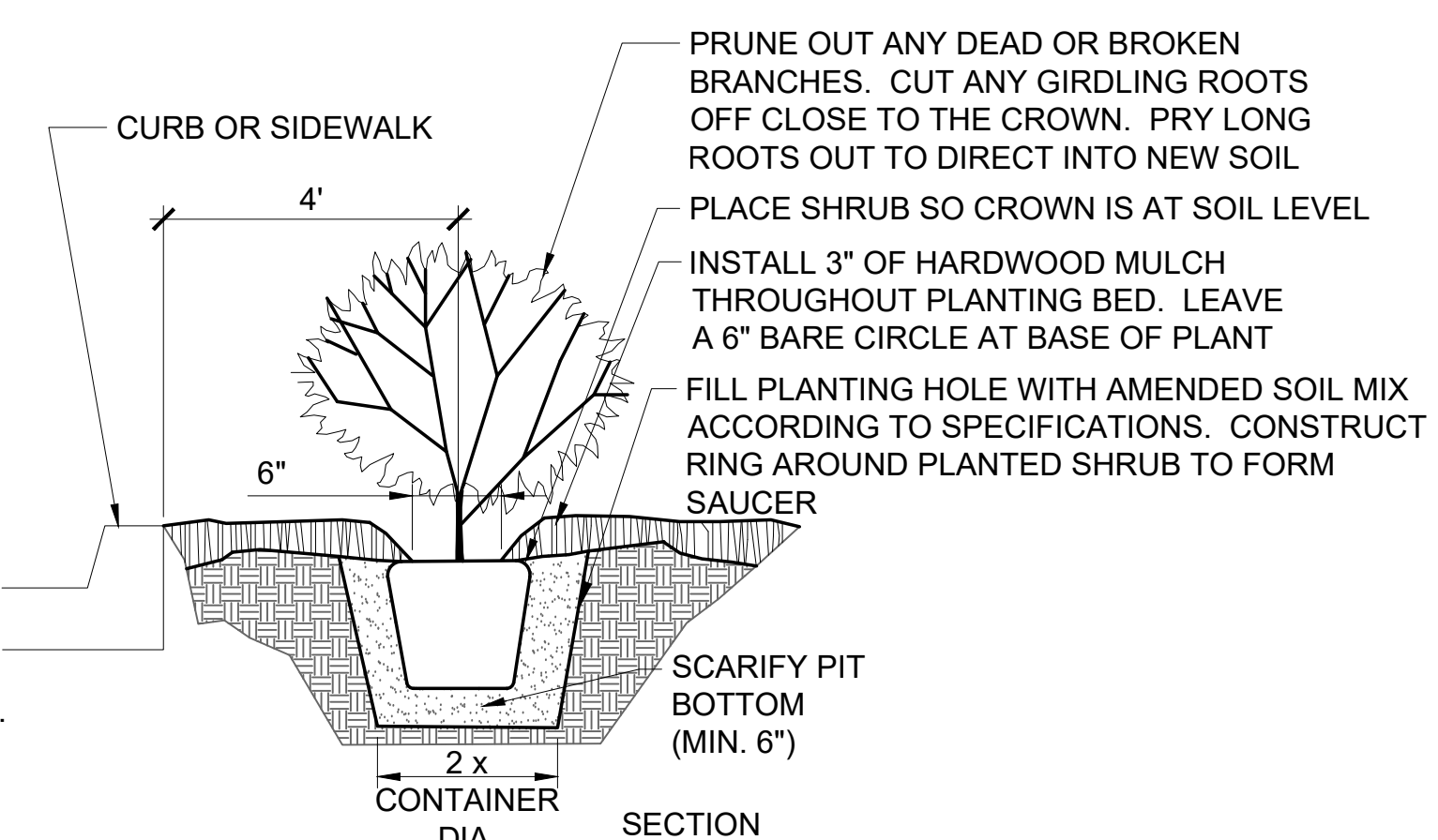
PRUNE OUT ANY DEAD OR BROKEN BRANCHES AND REMOVE DEBRIS FROM SITE.



DECIDUOUS TREE PLANTING DETAIL - NTS



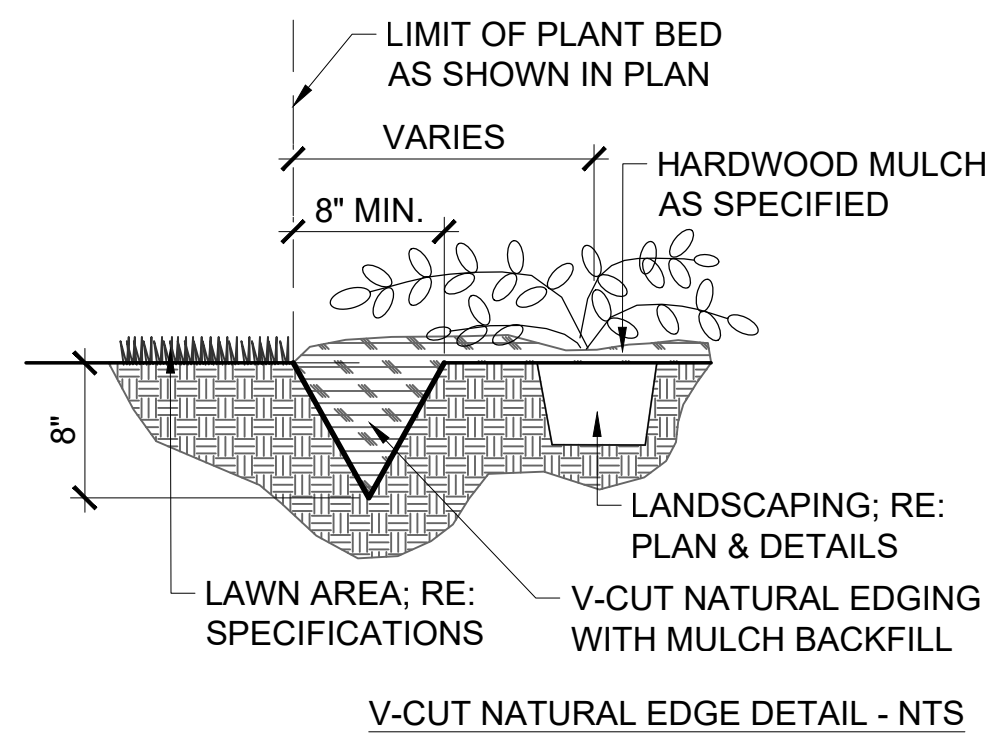
TYPICAL UTILITY BOX SCREENING DETAILS - NTS



- NOTES:
1. REFER TO SPECIFICATIONS FOR TOPSOIL BACKFILL MIX.
 2. CONTRACTOR TO WATER THOROUGHLY AFTER PLANTING
 3. INSTALLATION TO BE IN ACCORDANCE WITH PLANTING SPECIFICATIONS

SHRUB PLANTING DETAIL - NTS

- NOTES:
1. CONTRACTOR SHALL LOCATE AND MARK ALL PLANTBED LOCATIONS PRIOR TO EXCAVATING FOR FINAL APPROVAL BY OWNER OR LANDSCAPE ARCHITECT.
 2. TRANSITION TO MULCH CONTAINMENT DETAIL AT ALL LOCATIONS ADJACENT TO CURBS & SIDEWALKS. RE: DETAIL, THIS SHEET.
 3. CONTRACTOR TO VERIFY ALL UTILITY LOCATIONS PRIOR TO TRENCHING OR LANDSCAPE INSTALLATION.

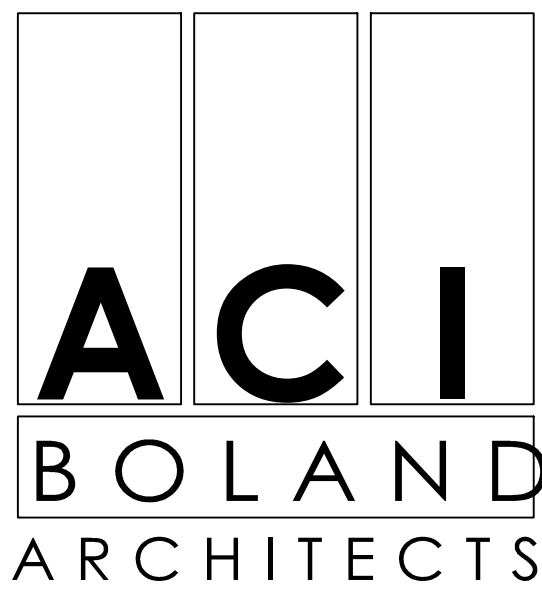


V-CUT NATURAL EDGE DETAIL - NTS

PLANT SCHEDULE

TREES	BOTANICAL / COMMON NAME	CONT	CAL	SIZE	QTY
	Amelanchier x grandiflora 'Autumn Brilliance' / 'Autumn Brilliance' Serviceberry	B&B	1.5" Cal.		7
	Betula nigra 'Heritage' / Heritage River Birch	B&B	2.5" Cal.		3
	Cercis canadensis 'Forest Pansy' TM / Forest Pansy Redbud	B&B	1.5" Cal.		3
	Ginkgo biloba 'Autumn Gold' TM / Maidenhair Tree	B&B	2.5" Cal.		7
	Juniperus virginiana 'Hillspire' / Hillspire Juniper	B&B		6' Ht. Min.	21
	Malus x 'Spring Snow' / Spring Snow Crab Apple	B&B	1.5" Cal.		5
	Nyssa sylvatica 'Wildfire' / Black Gum	B&B	2.5" Cal.		4
	Picea pungens 'Hoopsii' / Hoopsii Blue Spruce	B&B		6' Ht. Min.	3
	Quercus bicolor / Swamp White Oak	B&B	2.5" Cal.		6
	Ulmus americana 'Valley Forge' / American Elm	B&B	2.5" Cal.		5
	Zeakova serrata 'Green Vase' / Sawleaf Zeakova	B&B	2.5" Cal.		6
SHRUBS	BOTANICAL / COMMON NAME	CONT			QTY
	Aronia melanocarpa 'Morton' TM / Iroquois Beauty Black Chokeberry	3 Gal.			5
	Calamagrostis x acutiflora 'Karl Foerster' / Feather Reed Grass	3 Gal.			161
	Cornus stolonifera 'Arctic Fire' / Arctic Fire Dogwood	3 Gal.			2
	Hemerocallis x 'Stella de Oro' / Stella de Oro Daylily	1 Gal.			148
	Hydrangea paniculata 'Little Lime' / Little Lime Hydrangea	3 Gal.			14
	Hypericum frondosum 'Sunburst' / Sunburst Hypericum	3 Gal.			12
	Juniperus chinensis 'Sea Green' / Sea Green Juniper	5 Gal.			70
	Juniperus sabina 'Buffalo' / Buffalo Juniper	3 Gal.			20
	Juniperus virginiana 'Skyrocket' / Skyrocket Juniper	5 Gal.			18
	Miscanthus sinensis 'Gracillimus' / Maiden Grass	5 Gal.			128
	Sedum x 'Autumn Joy' / Autumn Joy Sedum	1 Gal.			36
GROUND COVERS	BOTANICAL / COMMON NAME	CONT		SPACING	QTY
	Bouteloua Dactyloides Cody / Cody Buffalo Sod	SOD			24,562 sf
	Rain Garden See Species List / Rain Garden	D.C.P.		15" o.c.	1,866
RE: Notes					
Upper Fringe Zone: Lower Flood Zone:					
- Prairie Drop Seed - 20% - Blue Flag Iris - 25%					
- Black Eyed Susan - 10% - Soft Rush - 25%					
- Blazing Star - 20% - Switchgrass - 50%					
- Switchgrass - 50%					

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MEP CONSULTANT

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Licensee's Certificate of Authority Number:

Phone Number: 913-317-9500

Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS

Date 8/7/19
Job Number 3-19133
Drawn By AG
Checked By AG

Revision		
Number	Date	Description
1	08-07-19	FDP/PDP
2	09-03-19	FDP/PDP
3	09-11-19	FDP/PDP
4	09-13-19	Architectural Update

L01

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LANDSCAPE PLAN

9/13/2019 10:27:52 AM

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Sunflower MOB
Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS

Date 9/09/19
Job Number 3-19133
Drawn By BM
Checked By JS

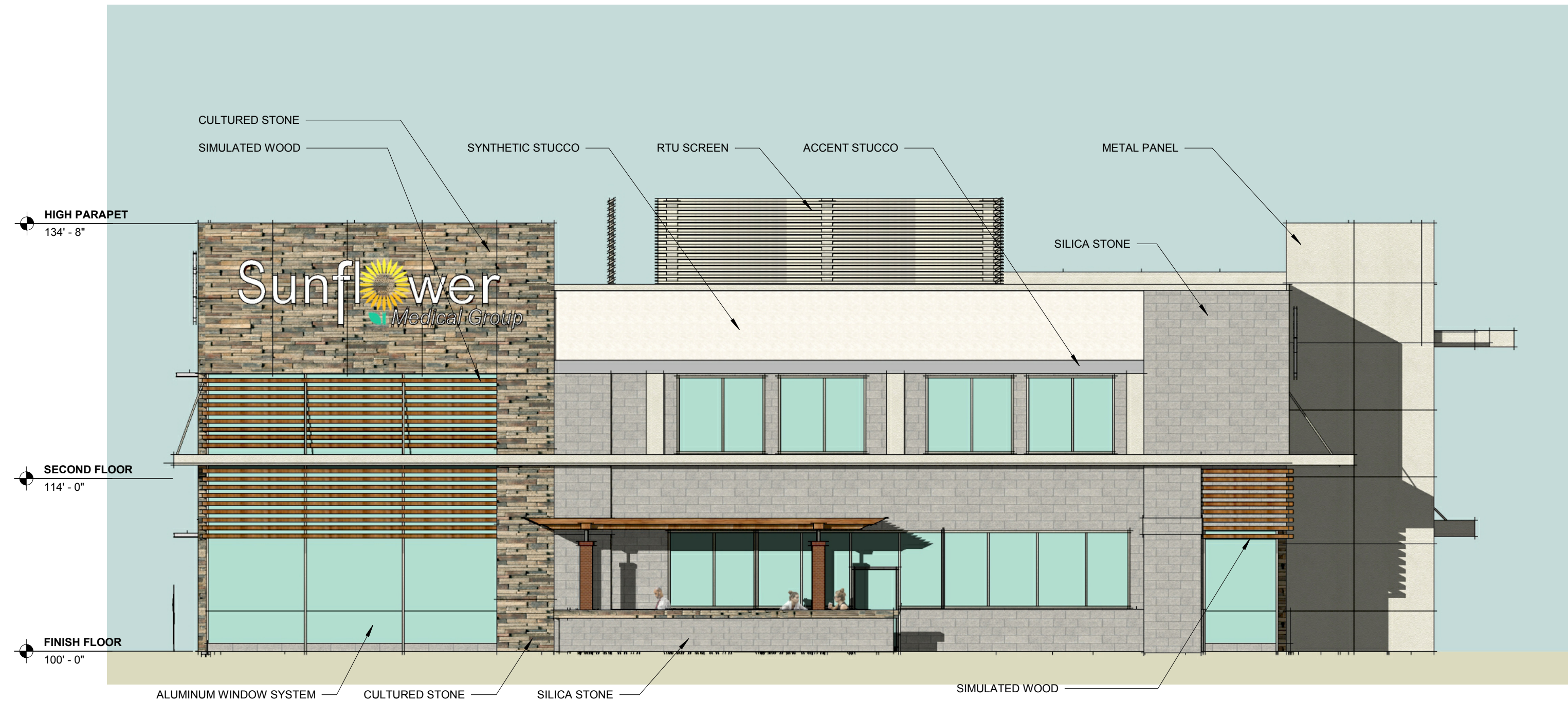
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Number Date Description

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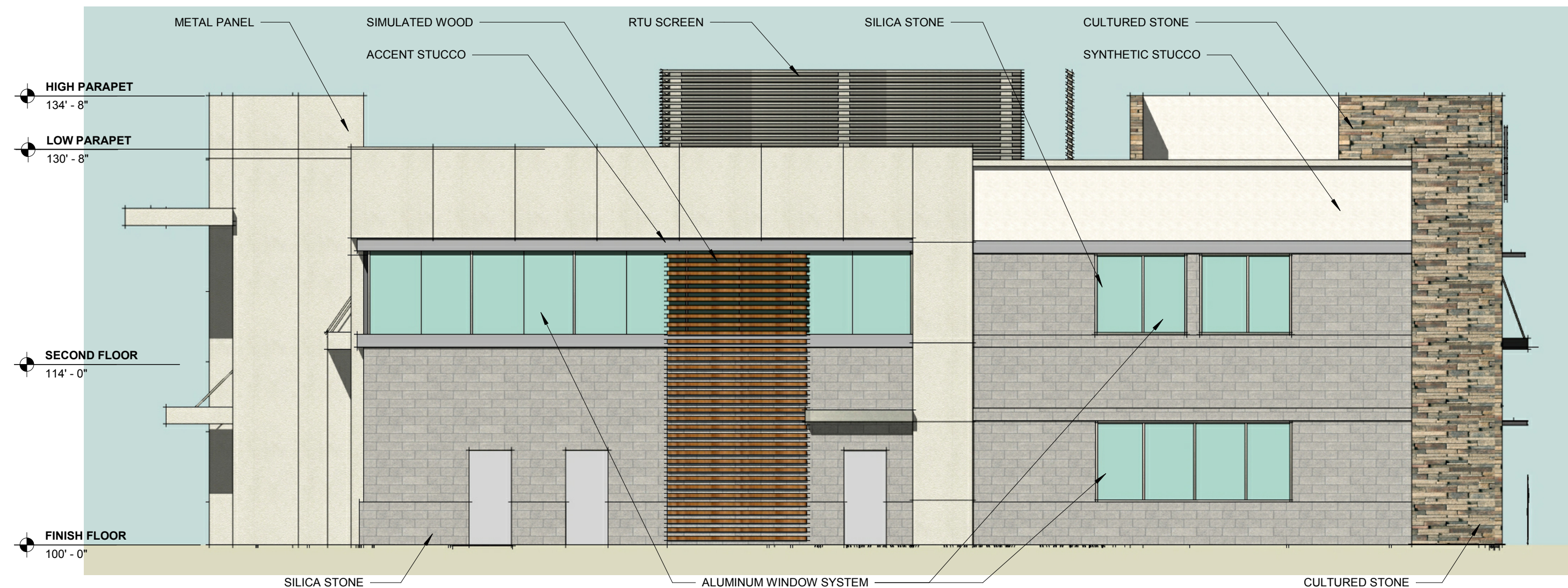
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EXTERIOR ELEVATIONS



D6 WEST ELEVATION
1/8" = 1'-0"



B6 SOUTH ELEVATION
1/8" = 1'-0"



B3 NORTH ELEVATION
1/8" = 1'-0"



A6 EAST ELEVATION
1/8" = 1'-0"

MATERIAL LEGEND

METAL PANEL

SIMULATED WOOD

SYNTHETIC STUCCO

BRICK

CULTURED STONE

SILICA STONE

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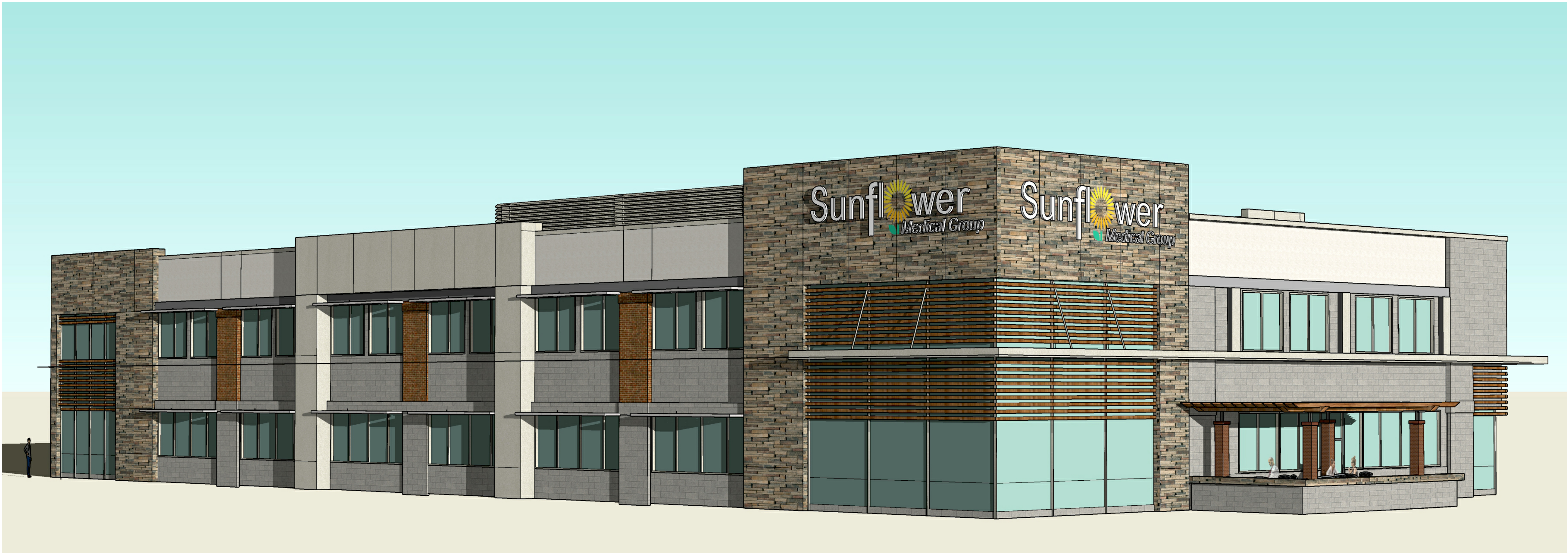
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C

B

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C6 ROE BLVD PERSPECTIVE
1/4" = 1'-0"



A6 EAST SIDE PERSPECTIVE
1/8" = 1'-0"

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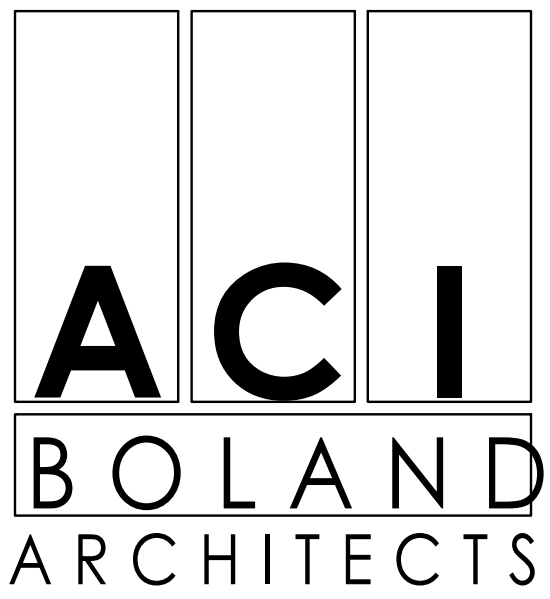
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Sunflower MOB
Johnson & Roe Medical Office Building
Roe & Johnson Drive | Roeland Park, KS

Date	9/09/19
Job Number	3-19133
Drawn By	BM
Checked By	JS

Revision		
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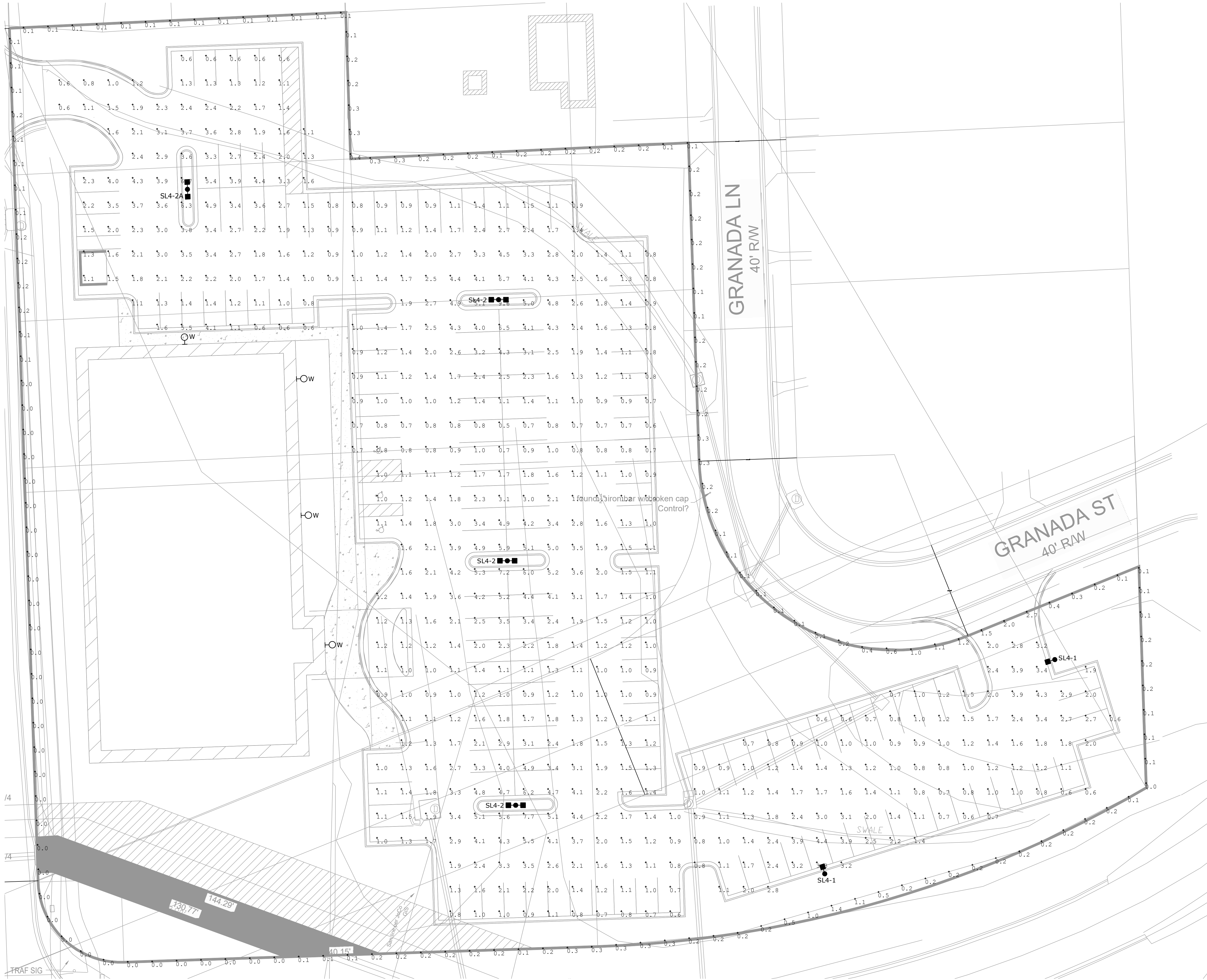
LP101

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PHOTOMETRICS SITE PLAN - LIGHTING

CALCULATION SUMMARY					
AREA NAME	AVE	MAX	MIN	AVG/MIN	MAX/MIN
PROPERTY LINE	0.21	2.7	0.0	N/A	N/A
PARKING LOT	1.96	9.6	0.6	3.3	16.0

NOTES:
1. ILLUMINANCE VALUES ARE IN FOOT-CANDLES.

FIXTURE SCHEDULE						
TYPE	IMAGE	DESCRIPTION	MOUNTING	LAMP	VOLTS	MANUFACTURER
SL4-1		1-HEAD PARKING LOT EXTERIOR POLE FIXTURE, TYPE T4FT DISTRIBUTION, 0-10V DIMMING, UL LISTED FOR WET LOCATIONS, ARCHITECT TO SELECT FINISH, 800mA DRIVEN, SPILL CONTROL.	POLE 20'-0"	LED 20,515 LUMENS 4000K 80+ CRI	120/277	McGRAW-EDISON SERIES GLEON
SL4-2		2-HEADS @ 180 DEGREES APART PARKING LOT EXTERIOR POLE FIXTURE, TYPE T4FT DISTRIBUTION, 0-10V DIMMING, UL LISTED FOR WET LOCATIONS, ARCHITECT TO SELECT FINISH, 800mA DRIVEN.	POLE 20'-0"	LED 20,515 LUMENS (PER HEAD) 4000K 80+ CRI	120/277	McGRAW-EDISON SERIES GLEON
SL4-2A		2-HEADS @ 180 DEGREES APART PARKING LOT EXTERIOR POLE FIXTURE, TYPE T4W DISTRIBUTION, 0-10V DIMMING, UL LISTED FOR WET LOCATIONS, ARCHITECT TO SELECT FINISH, 800mA DRIVEN.	POLE 20'-0"	LED 20,249 LUMENS (PER HEAD) 4000K 80+ CRI	120/277	McGRAW-EDISON SERIES GLEON
W		17"W X 8.5"H X 10.5"D EXTERIOR LED WALL PACK, UL LISTED FOR WET LOCATIONS, INTEGRAL 0-10V / 100-10% DIMMABLE DRIVER, VISUAL COMFORT WIDE DISTRIBUTION, ARCHITECT TO SELECT FINISH.	SURFACE WALL	LED 3000 LUMENS 4000K 80+ CRI	120/277	LITHONIA SERIES WST



PHOTOMETRIC SITE PLAN LIGHTING
SCALE: 1" = 20'-0"

Software: MSB Corp & Staff, Roeland Park, KS
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Last Modified: Wednesday, August 7, 2019 8:20:30 AM
Lucido Kelsey

PROJECT NAME: JOHNSON & ROE MEDICAL OFFICE BUILDING
LAST CORRECTION BY: DATE: TIME:
PRINTED BY: DATE: TIME:

Charter

August 12, 2019

Colin McKee
Renaissance Infrastructure Consulting
913-258-2929

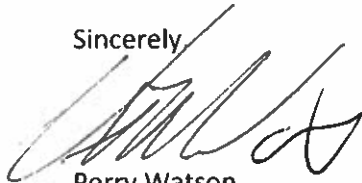
SUBJECT: May Serve Letter

In concern of Charter facilities at the property located near NE corner of Roe Boulevard and Johnson Drive in Mission, Ks, 66205, Charter has existing coax and/or fiber facilities near this location that may provide a possible point-of-connection for available services in the future.

Services for any Commercial or Multi-Family Parcels will be available dependent upon the right-of-entry agreement and entry routing for the respective buildings, as determined by contract. Contact our Commercial Business Class Sales department, at (866)519-1263 to facilitate a request for new commercial service, or your local MDU Sales Department for all residential services. In addition to initiating your request, they can also provide specifics regarding costs and other details associated with obtaining our services in this area at the appropriate point in time.

For future reference, please send all utility coordination, abandonments, encroachments, plat signatures, or serviceability requests, or notices of relocation to west-engineering-relo@charter.com. Please share this information with whoever needs these services.

Sincerely,

A handwritten signature in black ink, appearing to read 'Perry Watson', is written over a light blue horizontal line.

Perry Watson
AVP, Field Operations

Charter

August 12, 2019

Colin McKee
Renaissance Infrastructure Consulting
913-258-2929

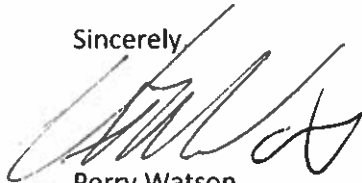
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Sincerely,

A handwritten signature in black ink, appearing to read 'Perry Watson', is written over a light blue horizontal line.

Perry Watson
AVP, Field Operations

August 9, 2019

Mr. Andy Gabbert
Renaissance Infrastructure Consulting
5015 NW Canal Street, Suite 100
Riverside, MO 64150

RE: Sanitary Sewer Availability for the proposed development at - PID# PP72000000 0001, NE corner of Roe Ave and Johnson Dr, Roeland Park, KS.

Dear Mr. Gabbert:

Sanitary sewer service for the proposed development at - PID# PP72000000 0001, NE corner of Roe Ave and Johnson Dr, Roeland Park, KS is available. Relocation of existing sewer main will be required to serve this parcel. A JCW sewer connection permit will also be required to serve the proposed facility.

The sewer main relocation project will be required to be completed prior to the issuance of sewer connection permit.

Sanitary sewer system extensions or modifications required to serve this site must be completed by the developer or owner of the property in accordance with Johnson County Wastewater (JCW) procedures, standards and specifications. JCW review and approval of sewer main project plans are required before any construction may proceed.

Information on the sewer main extension plan review and approval permitting process, including the main extension review fee schedule, is available in the Privately-Financed Sewer Main Projects page under the Development and Permitting section at www.jcw.org. Please see the Procedures for Privately-Financed Gravity Main Projects and Minimum Plan Requirements for Gravity Main Projects documents.

Requirements for JCW commercial permitting are available on the Commercial Permitting page under Permitting in the Development and Permitting section at www.jcw.org. Submit the commercial permit application, plans and supporting information no later than when submitting to the City for building permitting. The connection fee portion of the permit is based on the water meter size for each building. The connection fee schedule is also available on the Commercial Permitting page.

If you have any questions, please contact me at 913-715-8524.

Sincerely,

Jeena John, P.E.
New Development Compliance Engineer



Administrative Offices
Department of Developer Services
10747 Renner Boulevard
Lenexa, KS 66219

913.895.1815
distserv@waterone.org
www.waterone.org

May 25, 2017

Dan McGhee
Shafer, Kline & Warren
11250 Corporate Ave
Lenexa, KS 66219

Re: Water Availability Letter for NEC of Roe Ave and Johnson Dr

Dear Mr. McGhee,

This letter is in reference to the water availability for a proposed site located at the NEC of Roe Ave and Johnson Dr in Roeland Park, KS. At the time of this writing, there are existing 8" water mains located on the west side of Granada Ln and along the north side of the property from Granada Ln to Roe Ave available to serve this property.

If you have further questions, please let me know.

Thank you,

Chris Anderson
Supervisor – Distribution Water Quality & New Services
913-895-5754



SW
9444 Nall Ave
Suite
Overland Park, KS 66207

T: 9133834940
F: 9133834961
www.att.com

August 07, 2019

Colin McKee
Renaissance Infrastructure Consulting
N/A NE corner of Roe Ave and Johnson Dr
Roeland Park, Kansas 66205

Dear Mr. McKee,

This letter is in response to your request for information on the availability of AT&T service at the NE corner of Roe Ave and Johnson Dr.

Attn: Colin McKee

RE: Medical office building @ NE corner of Roe Ave and Johnson Dr, Roeland Park, KS 66205

This letter acknowledges that the above referenced project is located in an area served by AT&T. Any service arrangements for this location will be subject to later discussions and agreements between the developer and AT&T. Please be advised that this letter is not a commitment by AT&T to provide service to the NE corner of Roe Ave and Johnson Dr but an acknowledgement that we have service in this area.

Please contact me at the phone number included in this letter if you have any questions.

Thank you for contacting AT&T.

Sincerely,

Kenneth Anderson
Manager OSP Engineer

A handwritten signature in black ink that reads "Kenneth Anderson". The signature is written in a cursive, flowing style.



Aaron Brown
KCPL
16215 W 108th St
Lenexa, KS 66219
September 12, 2019

Andy Gabbert
Landscape Architect
Renaissance Infrastructure Consulting
5015 NW Canal St, Suite 100
Riverside, MO 64150

Dear Andy Gabbert:

This letter is in reference to the availability of power for the proposed site at the NE corner of Johnson Dr and Roe Ave, Located in Roeland Park, KS. At this time, power service is available to this property.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Aaron Brown', with a long horizontal flourish extending to the right.

Aaron Brown
Engineer II



**Kansas
Gas Service™**

A Division of ONE Gas

7421 West 129th Street
Overland Park, KS 66213
kansasgasservice.com

June 7, 2017

Mr. Dan McGhee
Senior Project Manager
SKW
11250 Corporate Ave., Lenexa, KS 66219

Re: "Will Serve" Letter – NE Corner Johnson Dr. & Roe, Roeland Park, KS

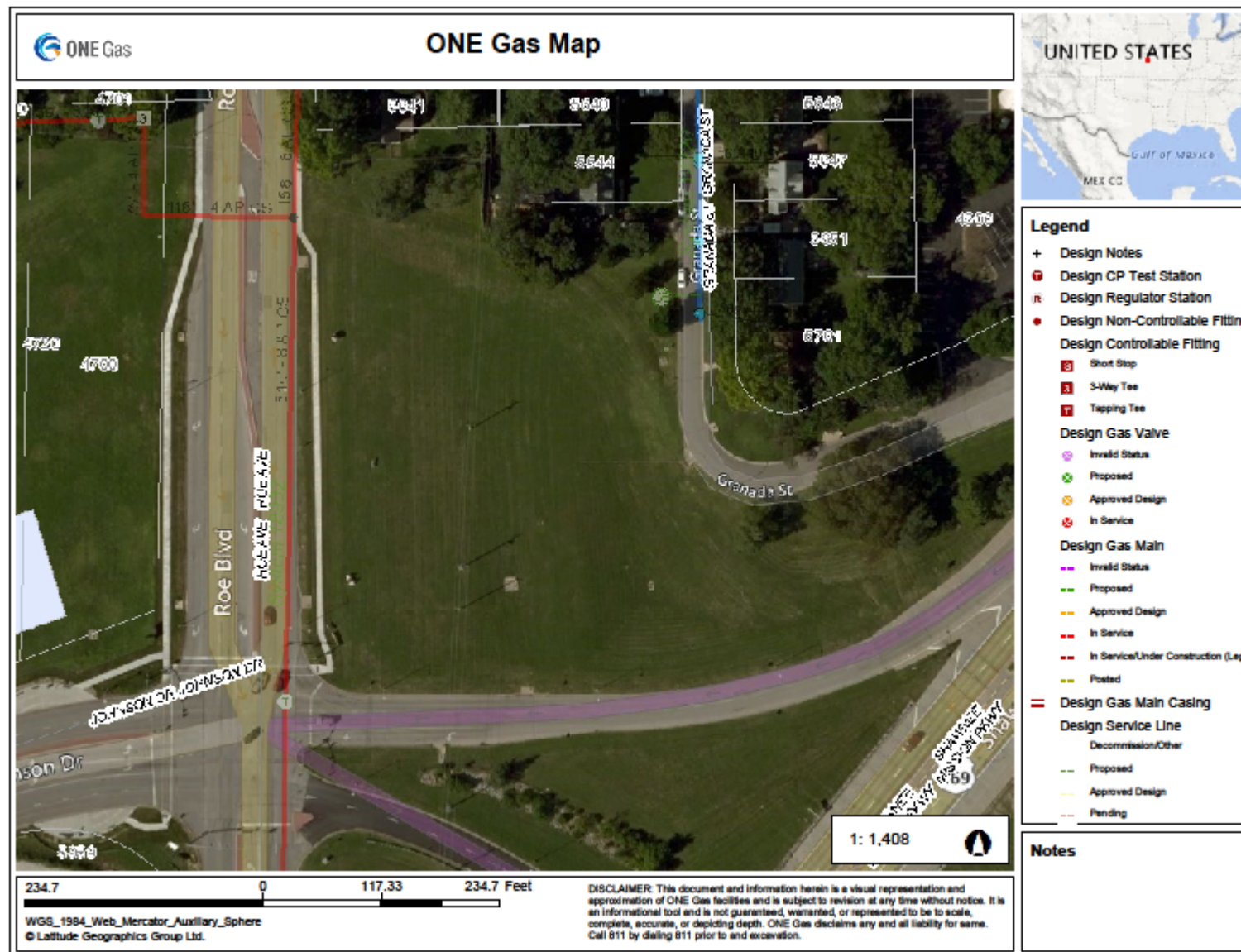
Dear Mr. McGhee:

This letter is to confirm that Kansas Gas Service has gas mains adjacent to the property at NE Corner Johnson Dr. & Roe, Roeland Park, KS. The best route to get service to the site, installation of new gas main, easements, changes to existing pipe location or size, grade changes, location of gas meters, termination of old services, or any cost associated would still need to be determined. Please consult with us prior to finalizing your plans so Kansas Gas Service can determine the best route to provide service to the project, adequate space and safe locations for all gas meters. A map of our facilities is attached for your information.

Feel free to contact me if you have any questions.

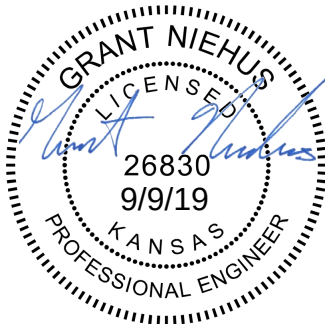
Sincerely,

Bill Ahrens
Project Manager



Traffic Impact Study

Medical Office Building Johnson Dr & Roe Ave Mission, KS



Prepared For:

CBC Real Estate Group
4706 Broadway, Suite 240
Kansas City, Missouri 64112

Prepared By:

Renaissance Infrastructure Consulting
September 2019

September 9, 2019

Mr. Mike Belew
CBC Real Estate Group
4706 Broadway, Suite 240
Kansas City, Missouri 64112

**RE: Medical Office Building Traffic Impact Study
Johnson Dr & Roe Ave
City of Mission, KS**

Dear Mike Belew,

In response to your request, RIC has completed a traffic impact study for the proposed development to be located northeast of Johnson Dr and Roe Ave. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system. The following report documents our analysis and recommendations.

Please do not hesitate to contact us should you have any questions.

Sincerely,

Renaissance Infrastructure Consulting



Grant Niehus, PE, PTOE
Traffic Engineer

Contents

INTRODUCTION	3
PROPOSED DEVELOPMENT	5
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BASELINE TRAFFIC CONDITIONS	6
FUTURE CONDITIONS	6
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OPERATIONAL ANALYSIS.....	7
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INTRODUCTION

Renaissance Infrastructure Consulting (RIC) has completed trip generation calculations and traffic analysis for a proposed Medical Office Building on the northeast corner of Johnson Drive and Roe Avenue. The purpose of this analysis is to assess the impact of the proposed development on the surrounding transportation system. The proposed development will include two stories with a total leasable area of 31,500 square feet and supporting parking. To evaluate the increase of traffic on adjacent streets, the number of trips were estimated for the morning and afternoon peak time periods.



Figure 1-Proposed project location

PROPOSED DEVELOPMENT

The proposed development is located on the northeast corner of Johnson Dr and Roe Ave in Mission, KS. Access to the development will be provided through two driveways, one from Roe Ave. and one from Granada St. On-site parking is included for the development and currently spans across Roeland Park, KS and Mission, KS jurisdictions as shown in **Figure 2**.

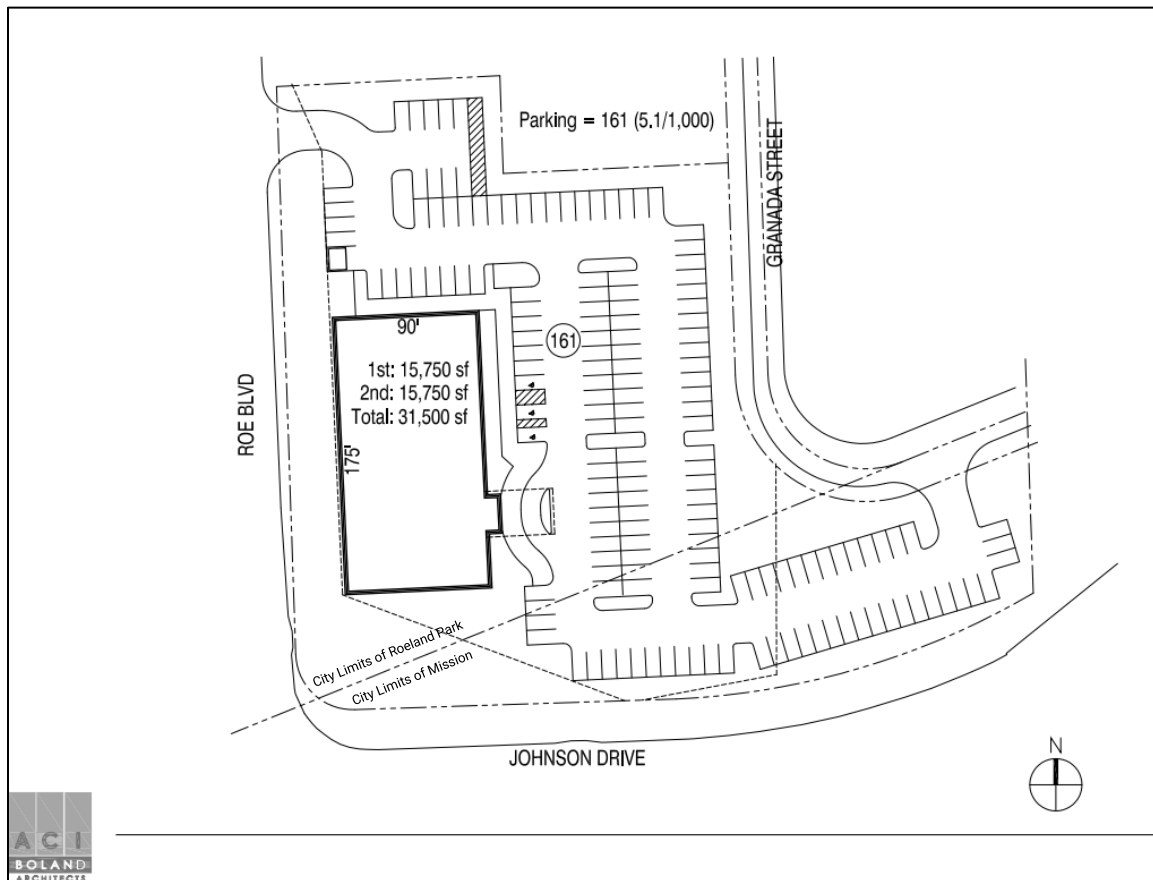


Figure 2- Proposed Development

EXISTING CONDITIONS

Roe Avenue is adjacent to the proposed development to the west and is a 4-lane roadway with a posted speed limit of 35 mph. It is classified as a minor arterial by Mid-America Regional Council's (MARC) Roadway Functional Classification System. Johnson Drive is a 4-lane facility adjacent to the proposed development to the south with a posted speed limit of 30 mph. It is classified as a minor arterial by MARC. Granada Street is adjacent to the development to the northeast and acts as a residential street to the north and connects to Johnson Drive to the east.

Shawnee Mission Parkway is located to the southeast of the development but does not directly run adjacent to the lot. However, the westbound exit off Shawnee Mission Parkway turns into Johnson Drive which runs directly adjacent to the south of the development. Shawnee Mission Parkway is 4-lane divided principal arterial which carries an ADT of approximately 32,600 vehicles. There is an existing traffic signal at the intersection of Roe Ave & Johnson Drive while Granada St & Shawnee Mission Pkwy is controlled by a stop sign on Granada St.

The site location is currently vacant surrounded by residential and offices to the northeast and commercial/retail to the west. There is a television station office located to the northeast of the proposed development, a Commerce Bank to the west, and a community hospital further west. There is also construction currently going on to the southwest of Johnson Drive and Roe that will become the Mission Gateway project. This multi-use project will include over 500,000 square feet of leasable space.

BASELINE TRAFFIC CONDITIONS

To assess the impacts of the proposed development, the intersections listed below were identified for study during the A.M and P.M peak hours of a typical weekday.

- Roe Ave & Johnson Dr
- Commerce Bank Driveway & Roe Ave

Traffic counts for the above-mentioned locations were collected on July 16th, 2019 between the hours of 7:00AM to 9:00AM and 4:00PM to 6:00PM. This data revealed that the weekday peak hours of the adjacent roadway to be from 7:30AM to 8:30AM and 5:00PM to 6:00PM. The existing peak hour traffic volumes are summarized in **Appendix A**.

FUTURE CONDITIONS

Trip generation estimates developed for this study are based on the 10th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). The Manual is the most widely used industry resource for this type of data. The trip generation data are organized by land use types, with more than 170 different categories of land uses. For each category the manual provides a data set for use in estimating the number of vehicle and person trips generated by a site based on its characteristics such as physical size or intensity. Trips may be estimated by direction (entering or exiting the site) and for time periods typically pertaining to a full day (weekday or weekend), peak hours of the adjacent roadway, and peak hours of the particular land use. Used properly, the Trip Generation Manual provides an objective basis for estimating trips generated by a proposed development.

The ITE category “Medical-Dental Office Building” was used to project traffic volumes for the proposed development and the total gross leasable area in square feet was used as the parameter for projecting traffic. The total expected trips by land use is shown in **Table 1**.

Table 1 - Trip Generation									
Land Use	Intensity	ITE Code	Weekday	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
Medical-Dental Office Building	31,500 sq ft	720	1123	80	62	18	109	30	79

The traffic generated by the proposed development was assigned to the adjacent roadway system based on existing traffic patterns and engineering judgement. It is anticipated that 50 percent of traffic arrives from the north and 50 percent arrives from the south. It is expected that a very small amount of traffic uses the driveway on Granada Street and thus has not been included in this analysis. The distributed traffic volumes are included in **Appendix A-3**.

AUXILIARY TURN LANES

The AM peak period is expected to generate the highest amount of northbound right turning traffic into the development on Roe Ave and was analyzed to determine if an auxiliary right turn lane was warranted. Following procedures outlined in KDOT’s Access Management Policy, it was determined that the northbound right turning volume of 31 vehicles per hour did not exceed the required amount of 115 veh/hr with a directional design hourly volume of 700 veh/hr. The southbound left movement on Roe Ave already provides a dedicated left turn lane and thus was not analyzed.

OPERATIONAL ANALYSIS

In order to analyze the traffic impacts, operating conditions were analyzed using SYNCHRO 10, a macroscopic analysis and optimization software. Synchro is based on study procedures outlined in the Highway Capacity Manual, 6th edition. The analysis determines the “Level of Service” of the intersections and is based on factors such as the number and types of lanes, signal timing, traffic volumes, pedestrian activity, etc. This manual, which is used universally by traffic engineers to measure roadway capacity, establishes six levels of traffic service: Level A (“Free Flow”) to Level F (“Fully Saturated”).

Table 2 – Level of Service Criteria

Level of Service	Signalized Intersection (sec/veh)	Unsignalized Intersection (sec/veh)
A	< 10 seconds	< 10 seconds
B	< 20 seconds	< 15 seconds
C	< 35 seconds	< 25 seconds
D	< 55 seconds	< 35 seconds
E	< 80 seconds	< 50 seconds
F	≥ 80 seconds	≥ 50 seconds

Level of Service “D” is considered the minimum acceptable LOS in most areas. However, LOS E is sometimes accepted during peak periods. The above table shows the thresholds for Levels of Service A through F for unsignalized intersections. The analysis focused on the signalized intersection of Johnson Dr & Roe Dr and the unsignalized intersection of Roe Ave and Commerce Bank. Two scenarios were modeled for each time period:

1. Existing conditions
2. Existing conditions plus development

The first scenario modeled existing traffic conditions, while the second scenario modeled traffic conditions with the expected trips generated from the proposed development added to the existing traffic conditions. The results of each scenario are included in **Appendix B**. The signalized Level of Service and control delay of Johnson Dr & Roe Ave is included in **Table 3**. The performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. The Level of Service and 95th percentile queue lengths of each approach for Roe Ave & Commerce Bank Driveway are included in **Table 4**.

**Table 3 – Operating Conditions Summary
Johnson Dr & Roe Ave**

Scenario	AM Peak Hour	PM Peak Hour
Existing	B (18.4)	C (22.8)
Existing + Development	B (18.7)	C (23.3)

**Table 4 – Operating Conditions Summary
Roe Ave & Commerce Bank Driveway**

Scenario	AM Peak Hour				PM Peak Hour			
	NBL	SBL	EB	WB	NBL	SBL	EB	WB
Existing	A (25')		C (25')		B (25')		D (25')	
Existing + Development	A (25')	A (25')	D (25')	D (25')	B (25')	A (25')	E (25')	E (50')

¹ Queue lengths rounded up to nearest 25' interval

² Unsignalized, free-flow movements not included

The Existing + Development scenario showed a minor increase in delay at Johnson Dr & Roe Ave while remaining at an acceptable level of service. The eastbound and westbound exits from Commerce Bank Driveway increased to a level of service “D” and “E” in the AM and PM peak hours, respectively. However, the 95th percentile queue lengths of both exits do not exceed two vehicles. A third scenario which added the PM peak hour volumes for the proposed Gateway development was analyzed but did not significantly impact the results. Data for that scenario was obtained from the City of Mission and is included in **Appendix C**.

INTERSECTION SIGHT DISTANCE

The intersection sight distance design guidelines used for this is based on *AASHTO - A Policy on Geometric Design of Highways and Streets, 7th Edition* (AASHTO Green Book) which was developed to establish a uniform method to determine the necessary sight distance for an entrance constructed by permit.

Using AASHTO’s guidelines and a design speed of 35 mph, the minimum recommended sight distances and field measured sight distances for the proposed driveway on Roe Ave are shown in **Table 5**.

Table 5 – Intersection Sight Distance

	AASHTO Intersection Sight Distance	Measured Intersection Sight Distance
Turning Left	440 ft	>525 ft
Turning Right	335 ft	>600 ft

Intersection sight distance was measured from the perspective of a passenger vehicle exiting the driveway 14.5 ft back from the end of the curb. The available intersection sight distance on

a driveway should provide drivers a sufficient view of the intersecting roadway to allow vehicles to exit the driveway without excessively slowing vehicles traveling at or near the operating speed on the intersecting mainline.

The driveway on Granada Street exceeds the required intersection sight distances of 280 ft and 240 ft for left turning and right turning traffic, respectively.

SUMMARY

RIC completed the preceding study to analyze the traffic impacts associated with the proposed medical office building on the northeast corner of Johnson Drive and Roe Avenue. Based on traffic analysis completed, no improvements outside of those in the site layout are needed. The following summary is provided:

- Access to the site is provided via two unsignalized full-access driveways with one on Roe Avenue and the other on Granada Street.
- The proposed development was estimated to generate a total of 80 new trips in the AM peak hour and 109 new trips in the PM peak hour.
- The signalized intersection of Johnson Drive and Roe Avenue is expected to operate at an acceptable level under the Existing + Development condition.
- Both proposed driveways have acceptable sight triangles for intersection sight distance.
- The proposed westbound driveway approach on Roe Avenue is expected to operate with a Level of Service "E". However, the 95th % queue length is not expected to exceed two car lengths.

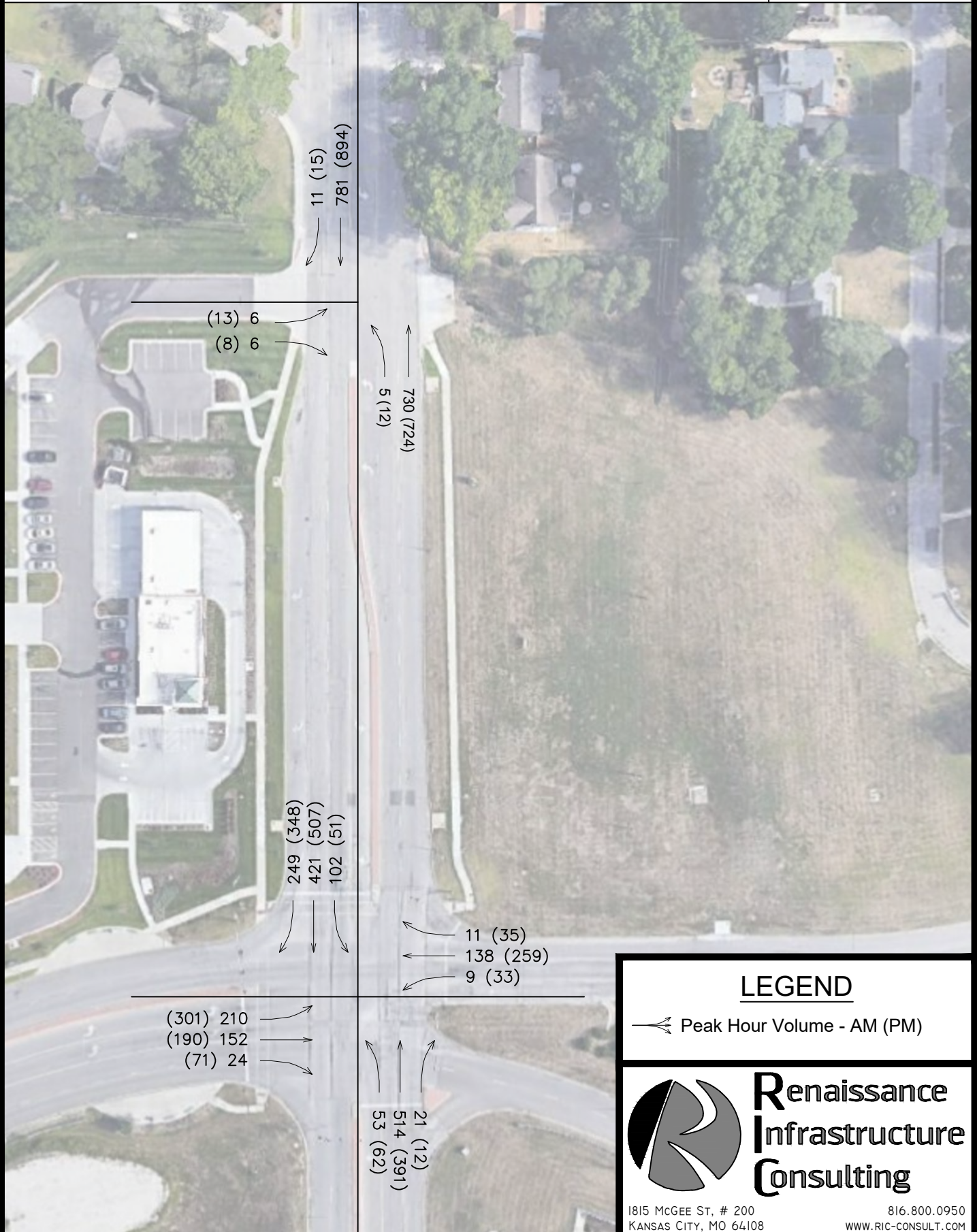
Please do not hesitate to contact us should you have any questions.

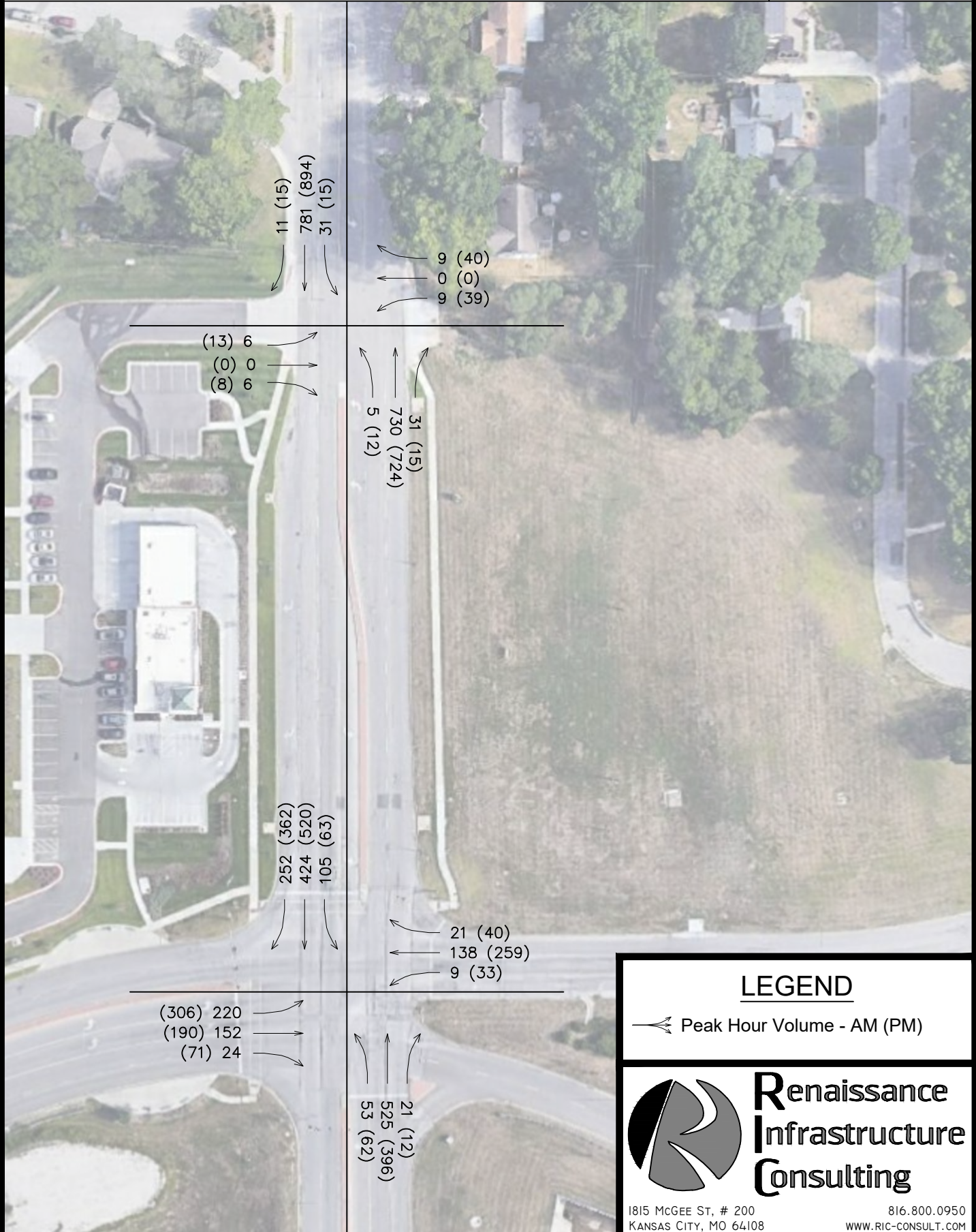
Sincerely,
Renaissance Infrastructure Consulting

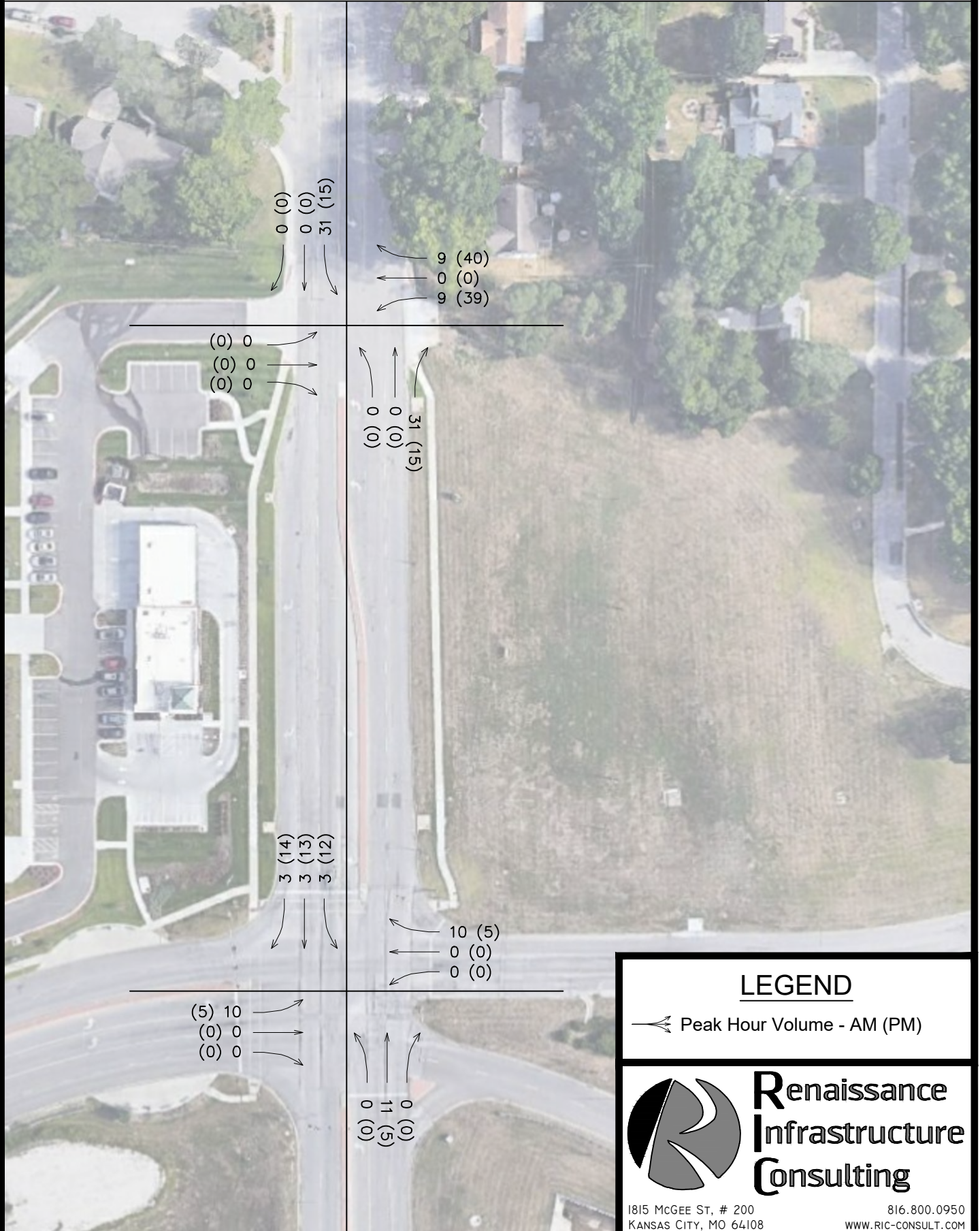


Grant Niehus, PE, PTOE
Traffic Engineer

Appendix A – Turning Movement Counts







Gewalt Hamilton Associates Inc

625 Forest Edge Drive
Vernon Hills, IL, 60061

4900.976 Johnson & Roe

File Name : Johnson Dr & Roe Ave AM

Site Code : 00000000

Start Date : 7/16/2019

Page No : 1

Groups Printed- Lights - Mediums - Articulated - Peds

	From North					From East					From South					From West							
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	28	49	20	0	97	2	31	4	0	37	1	64	7	0	72	2	13	25	0	40	0	246	246
07:15 AM	55	74	21	0	150	1	18	6	0	25	4	97	15	0	116	6	24	30	0	60	0	351	351
07:30 AM	63	100	21	0	184	4	26	5	0	35	4	130	12	0	146	4	36	48	0	88	0	453	453
07:45 AM	69	123	41	0	233	2	36	2	0	40	4	136	15	0	155	8	35	55	0	98	0	526	526
Total	215	346	103	0	664	9	111	17	0	137	13	427	49	0	489	20	108	158	0	286	0	1576	1576
08:00 AM	59	99	22	0	180	3	34	1	0	38	8	136	8	0	152	8	36	49	0	93	0	463	463
08:15 AM	58	99	18	0	175	2	42	1	0	45	5	112	18	0	135	4	45	58	0	107	0	462	462
08:30 AM	37	90	24	0	151	3	36	2	0	41	6	121	3	0	130	4	27	59	0	90	0	412	412
08:45 AM	41	85	13	0	139	5	30	3	0	38	7	81	10	0	98	5	27	37	0	69	0	344	344
Total	195	373	77	0	645	13	142	7	0	162	26	450	39	0	515	21	135	203	0	359	0	1681	1681
Grand Total	410	719	180	0	1309	22	253	24	0	299	39	877	88	0	1004	41	243	361	0	645	0	3257	3257
Apprch %	31.3	54.9	13.8			7.4	84.6	8			3.9	87.4	8.8			6.4	37.7	56					
Total %	12.6	22.1	5.5		40.2	0.7	7.8	0.7		9.2	1.2	26.9	2.7		30.8	1.3	7.5	11.1		19.8	0	100	
Lights	391	698	156		1245	21	242	24		287	38	868	86		992	41	233	351		625	0	0	3149
% Lights	95.4	97.1	86.7	0	95.1	95.5	95.7	100	0	96	97.4	99	97.7	0	98.8	100	95.9	97.2	0	96.9	0	0	96.7
Mediums	19	19	24		62	1	11	0		12	1	9	2		12	0	7	10		17	0	0	103
% Mediums	4.6	2.6	13.3	0	4.7	4.5	4.3	0	0	4	2.6	1	2.3	0	1.2	0	2.9	2.8	0	2.6	0	0	3.2
Articulated	0	1	0		1	0	0	0		0	0	0	0		0	0	0	0		0	0	0	1
% Articulated	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	1	0		1	0	0	0		0	0	0	0		0	0	3	0		3	0	0	4
% Peds	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0.5	0	0	0.1

Gewalt Hamilton Associates Inc

625 Forest Edge Drive
Vernon Hills, IL, 60061

4900.976 Roe & Commerce Bank Driveway

File Name : Roe & Commerce Bank Driveway

Site Code : 00000000

Start Date : 7/16/2019

Page No : 1

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Gewalt Hamilton Associates Inc

625 Forest Edge Drive
Vernon Hills, IL, 60061

4900.976 Johnson Dr & Roe Ave

File Name : Johnson Dr & Roe Ave PM

Site Code : 00000000

Start Date : 7/16/2019

Page No : 1

Groups Printed- Lights - Mediums - Articulated - Peds

	From North					From East					From South					From West							
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	93	96	13	0	202	7	45	4	0	56	1	65	9	0	75	15	45	65	0	125	0	458	458
04:15 PM	71	71	19	0	161	5	51	9	0	65	3	80	14	0	97	18	40	71	0	129	0	452	452
04:30 PM	76	108	8	0	192	5	62	11	0	78	1	65	14	0	80	11	48	58	0	117	0	467	467
04:45 PM	87	107	11	0	205	10	62	3	0	75	4	84	17	0	105	17	57	60	0	134	0	519	519
Total	327	382	51	0	760	27	220	27	0	274	9	294	54	0	357	61	190	254	0	505	0	1896	1896
05:00 PM	83	128	14	0	225	11	71	12	0	94	2	111	11	0	124	22	45	95	0	162	0	605	605
05:15 PM	92	127	10	0	229	8	67	5	0	80	4	92	18	0	114	22	44	71	0	137	0	560	560
05:30 PM	81	132	13	0	226	8	54	11	0	73	1	103	14	0	118	13	50	64	0	127	0	544	544
05:45 PM	92	120	14	0	226	8	67	5	0	80	5	85	19	0	109	14	51	71	0	136	0	551	551
Total	348	507	51	0	906	35	259	33	0	327	12	391	62	0	465	71	190	301	0	562	0	2260	2260
Grand Total	675	889	102	0	1666	62	479	60	0	601	21	685	116	0	822	132	380	555	0	1067	0	4156	4156
Apprch %	40.5	53.4	6.1			10.3	79.7	10			2.6	83.3	14.1			12.4	35.6	52					
Total %	16.2	21.4	2.5		40.1	1.5	11.5	1.4		14.5	0.5	16.5	2.8		19.8	3.2	9.1	13.4		25.7	0	100	
Lights	661	882	91		1634	60	468	59		587	21	676	116		813	131	370	542		1043	0	0	4077
% Lights	97.9	99.2	89.2	0	98.1	96.8	97.7	98.3	0	97.7	100	98.7	100	0	98.9	99.2	97.4	97.7	0	97.8	0	0	98.1
Mediums	14	5	11		30	1	10	1		12	0	8	0		8	1	8	13		22	0	0	72
% Mediums	2.1	0.6	10.8	0	1.8	1.6	2.1	1.7	0	2	0	1.2	0	0	1	0.8	2.1	2.3	0	2.1	0	0	1.7
Articulated	0	0	0		0	1	0	0		1	0	0	0		0	0	0	0		0	0	0	1
% Articulated	0	0	0	0	0	1.6	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	2	0		2	0	1	0		1	0	1	0		1	0	2	0		2	0	0	6
% Peds	0	0.2	0	0	0.1	0	0.2	0	0	0.2	0	0.1	0	0	0.1	0	0.5	0	0	0.2	0	0	0.1

Gewalt Hamilton Associates Inc

625 Forest Edge Drive
Vernon Hills, IL, 60061

4900.976 Roe & Commerce Bank Driveway

File Name : Roe & Commerce Bank Driveway PM

Site Code : 00000000

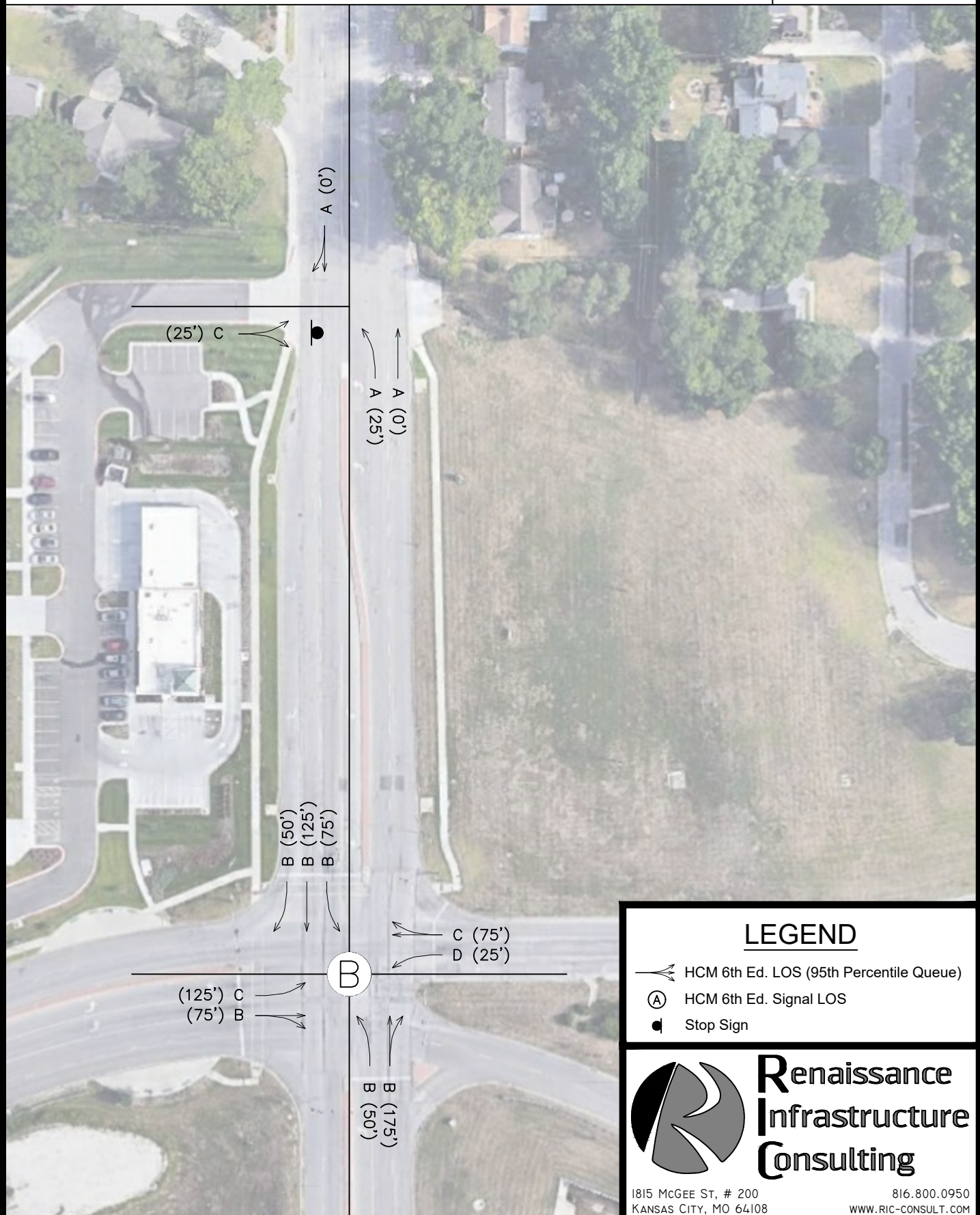
Start Date : 7/16/2019

Page No : 1

Groups Printed- Lights - Mediums - Articulated - Peds

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Appendix B – Operational Analysis



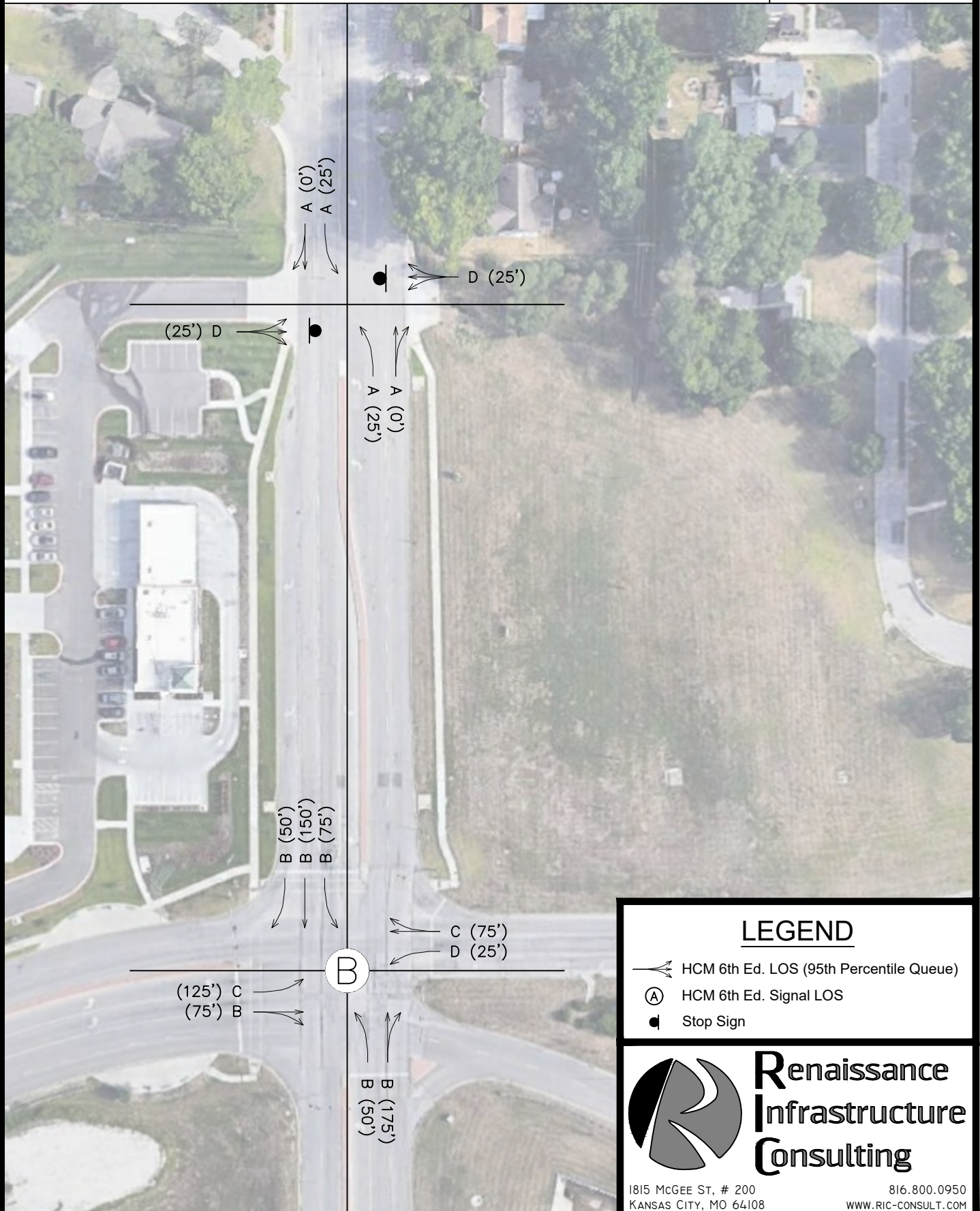
**Renaissance
Infrastructure
Consulting**

1815 McGEE ST, # 200
 KANSAS CITY, MO 64108

816.800.0950
 WWW.RIC-CONSULT.COM

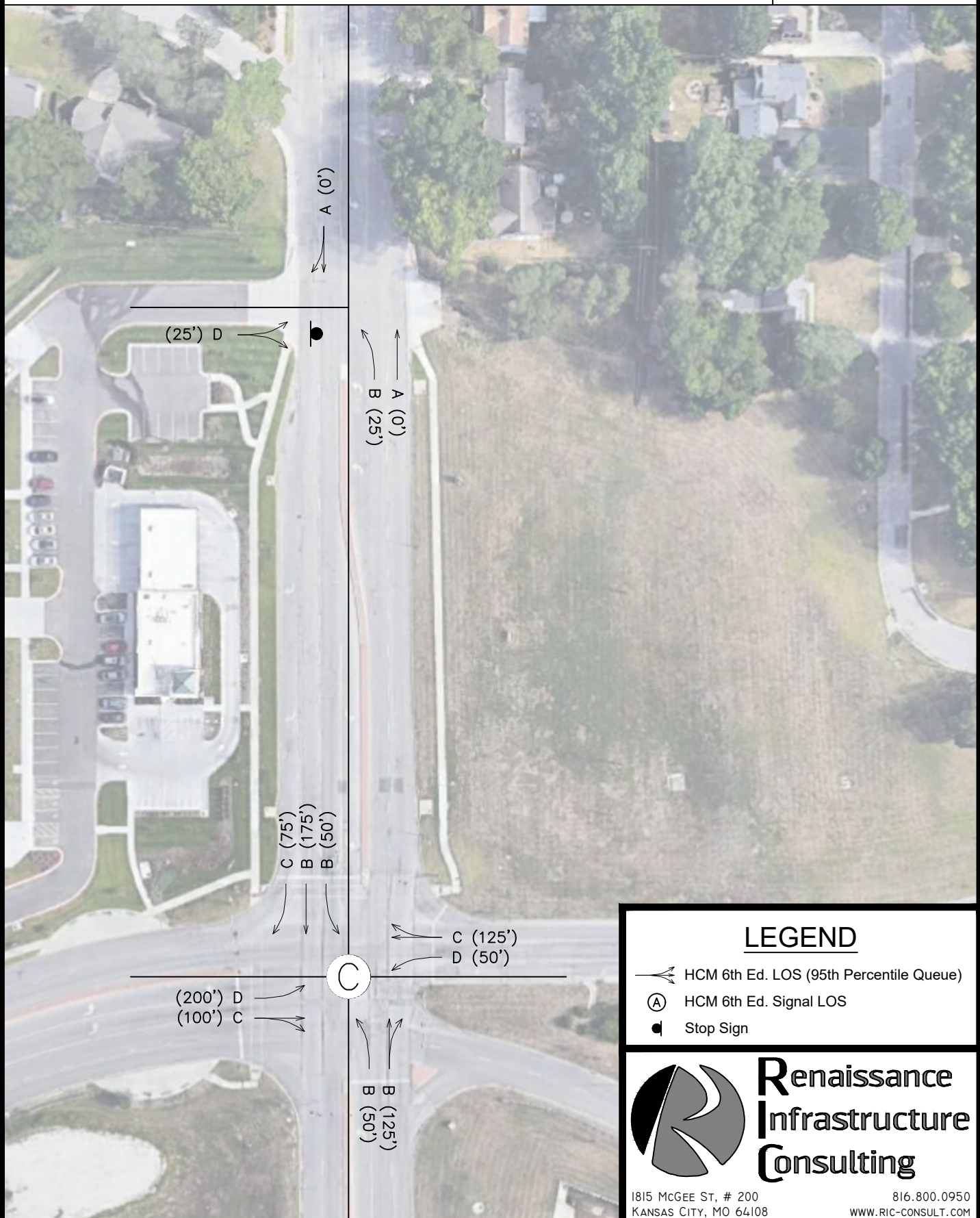
Existing + Development AM Peak Hour Levels of Service

Figure B-2



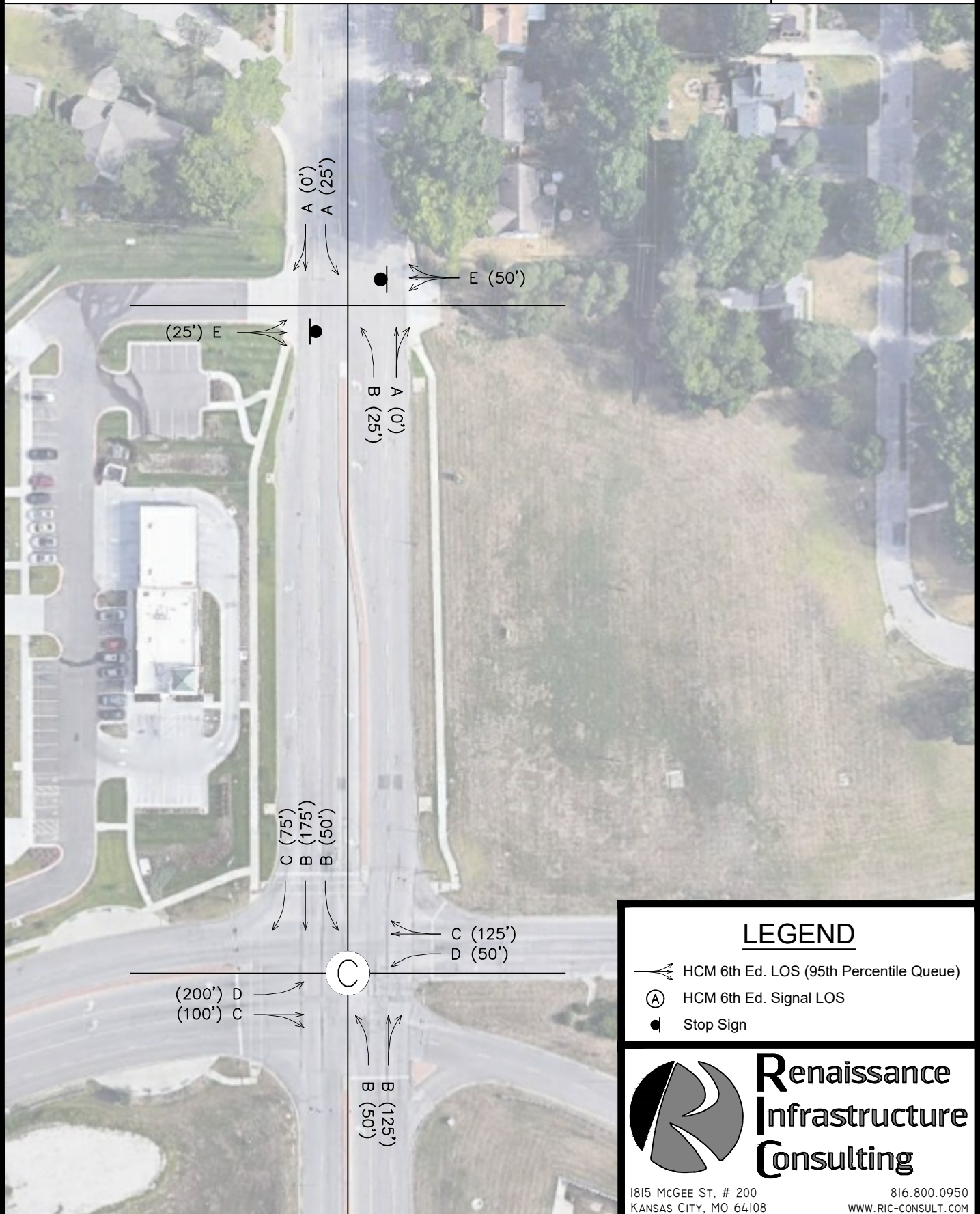
Existing PM Peak Hour Levels of Service

Figure B-3



Existing + Development PM Peak Hour Levels of Service

Figure B-4



3: Roe Ave & Johnson Dr

AM Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	152	24	9	138	11	53	514	21	102	421	249
Future Volume (veh/h)	210	152	24	9	138	11	53	514	21	102	421	249
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	231	167	26	10	152	12	58	565	23	112	463	274
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	359	592	91	23	337	26	363	888	36	373	990	442
Arrive On Green	0.10	0.19	0.19	0.01	0.10	0.10	0.05	0.25	0.25	0.08	0.27	0.27
Sat Flow, veh/h	3510	3138	480	1810	3392	265	1810	3535	144	1810	3610	1610
Grp Volume(v), veh/h	231	95	98	10	80	84	58	288	300	112	463	274
Grp Sat Flow(s),veh/h/ln	1755	1805	1814	1810	1805	1852	1810	1805	1874	1810	1805	1610
Q Serve(g_s), s	3.2	2.3	2.4	0.3	2.1	2.2	1.2	7.3	7.3	2.3	5.5	7.6
Cycle Q Clear(g_c), s	3.2	2.3	2.4	0.3	2.1	2.2	1.2	7.3	7.3	2.3	5.5	7.6
Prop In Lane	1.00		0.26	1.00		0.14	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	359	341	342	23	179	184	363	454	471	373	990	442
V/C Ratio(X)	0.64	0.28	0.29	0.43	0.45	0.46	0.16	0.64	0.64	0.30	0.47	0.62
Avail Cap(c_a), veh/h	549	1411	1418	177	1306	1340	440	1235	1282	444	2540	1133
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.1	17.8	17.8	25.1	21.7	21.7	12.9	17.1	17.1	12.9	15.5	16.2
Incr Delay (d2), s/veh	1.9	0.4	0.5	11.8	1.7	1.8	0.2	1.5	1.4	0.4	0.3	1.4
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	1.3	0.9	0.9	0.2	0.9	1.0	0.4	2.8	2.9	0.8	2.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	18.2	18.3	36.9	23.5	23.5	13.1	18.5	18.5	13.3	15.8	17.7
LnGrp LOS	C	B	B	D	C	C	B	B	B	B	B	B
Approach Vol, veh/h		424			174			646			849	
Approach Delay, s/veh		21.4			24.2			18.0			16.1	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	18.9	6.7	15.7	8.8	20.0	11.2	11.1				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	6.0	35.0	5.0	40.0	5.0	36.0	8.0	37.0				
Max Q Clear Time (g_c+I1), s	4.3	9.3	2.3	4.4	3.2	9.6	5.2	4.2				
Green Ext Time (p_c), s	0.0	3.6	0.0	1.1	0.0	4.1	0.2	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	6	5	730	781	11
Future Vol, veh/h	6	6	5	730	781	11
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	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	7	7	6	820	878	12
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1306	445	890	0	-	0
Stage 1	884	-	-	-	-	-
Stage 2	422	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	154	566	770	-	-	-
Stage 1	369	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	153	566	770	-	-	-
Mov Cap-2 Maneuver	153	-	-	-	-	-
Stage 1	366	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	20.8	0.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	770	-	241	-	-	
HCM Lane V/C Ratio	0.007	-	0.056	-	-	
HCM Control Delay (s)	9.7	-	20.8	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

3: Roe Ave & Johnson Dr

AM Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	231	193	10	164	58	588	112	463	274
v/c Ratio	0.50	0.16	0.07	0.32	0.15	0.57	0.33	0.38	0.38
Control Delay	34.3	17.8	34.9	27.6	11.2	21.9	13.1	17.8	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	17.8	34.9	27.6	11.2	21.9	13.1	17.8	4.1
Queue Length 50th (ft)	42	23	4	28	12	102	23	76	0
Queue Length 95th (ft)	#115	73	21	68	32	164	55	125	45
Internal Link Dist (ft)		931		442		500		359	
Turn Bay Length (ft)	250		160		190		175		290
Base Capacity (vph)	460	2334	148	2175	391	2067	340	2137	1067
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.08	0.07	0.08	0.15	0.28	0.33	0.22	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: Roe Ave & Johnson Dr

AM Existing + Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	152	24	9	138	21	53	525	21	105	424	252
Future Volume (veh/h)	220	152	24	9	138	21	53	525	21	105	424	252
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	242	167	26	10	152	23	58	577	23	115	466	277
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	370	615	94	23	326	49	360	894	36	368	996	444
Arrive On Green	0.11	0.20	0.20	0.01	0.10	0.10	0.05	0.25	0.25	0.08	0.28	0.28
Sat Flow, veh/h	3510	3138	480	1810	3152	469	1810	3539	141	1810	3610	1610
Grp Volume(v), veh/h	242	95	98	10	86	89	58	294	306	115	466	277
Grp Sat Flow(s),veh/h/ln	1755	1805	1814	1810	1805	1816	1810	1805	1875	1810	1805	1610
Q Serve(g_s), s	3.5	2.3	2.4	0.3	2.3	2.4	1.2	7.6	7.6	2.4	5.6	7.8
Cycle Q Clear(g_c), s	3.5	2.3	2.4	0.3	2.3	2.4	1.2	7.6	7.6	2.4	5.6	7.8
Prop In Lane	1.00		0.26	1.00		0.26	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	370	354	355	23	187	188	360	456	474	368	996	444
V/C Ratio(X)	0.65	0.27	0.28	0.43	0.46	0.47	0.16	0.64	0.65	0.31	0.47	0.62
Avail Cap(c_a), veh/h	539	1386	1393	174	1282	1290	435	1143	1188	505	2495	1113
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.4	17.8	17.8	25.5	22.0	22.0	13.1	17.4	17.4	13.1	15.7	16.5
Incr Delay (d2), s/veh	2.0	0.4	0.4	11.9	1.8	1.9	0.2	1.5	1.5	0.5	0.3	1.4
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	1.4	0.9	0.9	0.2	1.0	1.0	0.4	2.9	3.0	0.9	2.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.4	18.2	18.2	37.4	23.7	23.9	13.3	18.9	18.9	13.6	16.0	17.9
LnGrp LOS	C	B	B	D	C	C	B	B	B	B	B	B
Approach Vol, veh/h		435			185			658			858	
Approach Delay, s/veh		21.6			24.5			18.4			16.3	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.1	19.2	6.7	16.2	8.8	20.4	11.5	11.4				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	8.0	33.0	5.0	40.0	5.0	36.0	8.0	37.0				
Max Q Clear Time (g_c+I1), s	4.4	9.6	2.3	4.4	3.2	9.8	5.5	4.4				
Green Ext Time (p_c), s	0.1	3.6	0.0	1.1	0.0	4.1	0.2	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			18.7									
HCM 6th LOS			B									

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	6	0	6	9	0	9	5	730	31	31	781	11
Future Vol, veh/h	6	0	6	9	0	9	5	730	31	31	781	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	2	0	2	2	2	0	0	2	2	0	0
Mvmt Flow	7	0	7	10	0	10	6	820	35	35	878	12
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1376	1821	445	1359	1810	428	890	0	0	855	0	0
Stage 1	954	954	-	850	850	-	-	-	-	-	-	-
Stage 2	422	867	-	509	960	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.54	6.9	7.54	6.54	6.94	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.02	3.3	3.52	4.02	3.32	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	106	77	566	107	78	575	770	-	-	781	-	-
Stage 1	282	335	-	322	375	-	-	-	-	-	-	-
Stage 2	585	368	-	515	333	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	100	73	566	102	74	575	770	-	-	781	-	-
Mov Cap-2 Maneuver	100	73	-	102	74	-	-	-	-	-	-	-
Stage 1	280	320	-	319	372	-	-	-	-	-	-	-
Stage 2	570	365	-	486	318	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	28		28.5		0.1		0.4					
HCM LOS	D		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	770	-	-	170	173	781	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.079	0.117	0.045	-	-				
HCM Control Delay (s)	9.7	-	-	28	28.5	9.8	-	-				
HCM Lane LOS	A	-	-	D	D	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.3	0.4	0.1	-	-				

3: Roe Ave & Johnson Dr

AM Existing + Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	242	193	10	175	58	600	115	466	277
v/c Ratio	0.54	0.16	0.07	0.34	0.15	0.59	0.32	0.37	0.37
Control Delay	36.1	18.4	35.7	27.3	11.2	23.1	12.6	17.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	18.4	35.7	27.3	11.2	23.1	12.6	17.4	4.0
Queue Length 50th (ft)	47	24	4	30	12	110	24	77	0
Queue Length 95th (ft)	#123	73	21	70	32	175	56	126	45
Internal Link Dist (ft)		931		442		500		359	
Turn Bay Length (ft)	250		160		190		175		290
Base Capacity (vph)	449	2276	144	2106	384	1901	379	2084	1049
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.08	0.07	0.08	0.15	0.32	0.30	0.22	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: Roe Ave & Johnson Dr

PM Existing

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	301	190	71	33	259	35	62	391	12	51	507	348
Future Volume (veh/h)	301	190	71	33	259	35	62	391	12	51	507	348
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	324	204	76	35	278	38	67	420	13	55	545	374
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	422	590	213	65	456	62	327	1142	35	420	1133	505
Arrive On Green	0.12	0.23	0.23	0.04	0.14	0.14	0.05	0.32	0.32	0.05	0.31	0.31
Sat Flow, veh/h	3510	2598	938	1810	3195	432	1810	3575	110	1810	3610	1610
Grp Volume(v), veh/h	324	140	140	35	156	160	67	212	221	55	545	374
Grp Sat Flow(s),veh/h/ln	1755	1805	1731	1810	1805	1822	1810	1805	1880	1810	1805	1610
Q Serve(g_s), s	5.8	4.2	4.4	1.2	5.3	5.4	1.6	5.9	5.9	1.3	7.9	13.5
Cycle Q Clear(g_c), s	5.8	4.2	4.4	1.2	5.3	5.4	1.6	5.9	5.9	1.3	7.9	13.5
Prop In Lane	1.00		0.54	1.00		0.24	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	422	410	393	65	258	260	327	576	600	420	1133	505
V/C Ratio(X)	0.77	0.34	0.36	0.54	0.60	0.62	0.20	0.37	0.37	0.13	0.48	0.74
Avail Cap(c_a), veh/h	432	1083	1038	167	1027	1037	368	999	1041	472	1999	892
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.7	21.1	21.1	30.8	26.1	26.2	14.0	17.1	17.1	13.9	18.0	19.9
Incr Delay (d2), s/veh	8.0	0.5	0.5	6.7	2.3	2.4	0.3	0.4	0.4	0.1	0.3	2.2
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	2.8	1.7	1.8	0.6	2.3	2.4	0.6	2.3	2.4	0.5	3.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.7	21.5	21.7	37.5	28.4	28.6	14.3	17.5	17.4	14.0	18.3	22.1
LnGrp LOS	D	C	C	D	C	C	B	B	B	B	B	C
Approach Vol, veh/h		604			351			500			974	
Approach Delay, s/veh		29.2			29.4			17.0			19.5	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	26.8	8.3	20.8	9.5	26.4	13.8	15.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	36.0	6.0	39.0	5.0	36.0	8.0	37.0				
Max Q Clear Time (g_c+l1), s	3.3	7.9	3.2	6.4	3.6	15.5	7.8	7.4				
Green Ext Time (p_c), s	0.0	2.5	0.0	1.7	0.0	4.9	0.0	1.9				
Intersection Summary												
HCM 6th Ctrl Delay			22.8									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	8	12	724	894	15
Future Vol, veh/h	13	8	12	724	894	15
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	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	14	9	13	770	951	16
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1370	484	967	0	-	0
Stage 1	959	-	-	-	-	-
Stage 2	411	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	140	534	720	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	137	534	720	-	-	-
Mov Cap-2 Maneuver	137	-	-	-	-	-
Stage 1	331	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	26.3	0.2		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	720	-	191	-	-	
HCM Lane V/C Ratio	0.018	-	0.117	-	-	
HCM Control Delay (s)	10.1	-	26.3	-	-	
HCM Lane LOS	B	-	D	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	

3: Roe Ave & Johnson Dr

PM Existing



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	324	280	35	316	67	433	55	545	374
v/c Ratio	0.73	0.24	0.21	0.51	0.20	0.37	0.14	0.52	0.51
Control Delay	43.3	18.1	36.9	28.8	12.5	18.6	11.8	21.7	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	18.1	36.9	28.8	12.5	18.6	11.8	21.7	4.9
Queue Length 50th (ft)	66	30	13	58	15	75	12	98	0
Queue Length 95th (ft)	#185	94	49	122	37	119	32	152	52
Internal Link Dist (ft)		931		442		500		359	
Turn Bay Length (ft)	250		160		190		175		290
Base Capacity (vph)	444	2161	171	2085	331	2051	394	2060	1082
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.13	0.20	0.15	0.20	0.21	0.14	0.26	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Roe Ave & Johnson Dr

PM Existing + Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	306	190	71	33	259	40	62	396	12	63	520	362
Future Volume (veh/h)	306	190	71	33	259	40	62	396	12	63	520	362
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	329	204	76	35	278	43	67	426	13	68	559	389
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	422	593	214	65	451	69	323	1149	35	427	1161	518
Arrive On Green	0.12	0.23	0.23	0.04	0.14	0.14	0.05	0.32	0.32	0.05	0.32	0.32
Sat Flow, veh/h	3510	2598	938	1810	3139	480	1810	3576	109	1810	3610	1610
Grp Volume(v), veh/h	329	140	140	35	158	163	67	215	224	68	559	389
Grp Sat Flow(s),veh/h/ln	1755	1805	1731	1810	1805	1814	1810	1805	1880	1810	1805	1610
Q Serve(g_s), s	6.0	4.3	4.5	1.3	5.5	5.6	1.6	6.1	6.1	1.6	8.3	14.4
Cycle Q Clear(g_c), s	6.0	4.3	4.5	1.3	5.5	5.6	1.6	6.1	6.1	1.6	8.3	14.4
Prop In Lane	1.00		0.54	1.00		0.26	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	422	412	395	65	259	261	323	580	604	427	1161	518
V/C Ratio(X)	0.78	0.34	0.36	0.54	0.61	0.62	0.21	0.37	0.37	0.16	0.48	0.75
Avail Cap(c_a), veh/h	422	1059	1016	163	1005	1009	363	978	1018	466	1955	872
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.4	21.5	21.5	31.5	26.7	26.8	14.1	17.4	17.4	13.8	18.1	20.2
Incr Delay (d2), s/veh	9.0	0.5	0.5	6.8	2.3	2.4	0.3	0.4	0.4	0.2	0.3	2.2
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	2.9	1.8	1.8	0.7	2.4	2.5	0.6	2.4	2.5	0.6	3.2	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.4	21.9	22.1	38.3	29.0	29.2	14.4	17.8	17.8	14.0	18.4	22.4
LnGrp LOS	D	C	C	D	C	C	B	B	B	B	B	C
Approach Vol, veh/h		609			356			506			1016	
Approach Delay, s/veh		30.3			30.0			17.3			19.6	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.6	27.3	8.4	21.2	9.5	27.4	14.0	15.6				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	36.0	6.0	39.0	5.0	36.0	8.0	37.0				
Max Q Clear Time (g_c+I1), s	3.6	8.1	3.3	6.5	3.6	16.4	8.0	7.6				
Green Ext Time (p_c), s	0.0	2.6	0.0	1.7	0.0	5.0	0.0	1.9				
Intersection Summary												
HCM 6th Ctrl Delay			23.3									
HCM 6th LOS			C									

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	13	0	8	39	0	40	12	724	15	15	894	15
Future Vol, veh/h	13	0	8	39	0	40	12	724	15	15	894	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	92	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	0	9	41	0	43	13	770	16	16	951	16
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1402	1803	484	1312	1803	393	967	0	0	786	0	0
Stage 1	991	991	-	804	804	-	-	-	-	-	-	-
Stage 2	411	812	-	508	999	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	102	80	534	118	80	612	720	-	-	842	-	-
Stage 1	268	327	-	347	398	-	-	-	-	-	-	-
Stage 2	594	395	-	521	324	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	92	77	534	113	77	612	720	-	-	842	-	-
Mov Cap-2 Maneuver	92	77	-	113	77	-	-	-	-	-	-	-
Stage 1	263	321	-	341	391	-	-	-	-	-	-	-
Stage 2	543	388	-	503	318	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	37.2		37.6		0.3		0.2					
HCM LOS	E		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	720	-	-	134	192	842	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.167	0.438	0.019	-	-				
HCM Control Delay (s)	10.1	0.1	-	37.2	37.6	9.4	-	-				
HCM Lane LOS	B	A	-	E	E	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	2	0.1	-	-				

3: Roe Ave & Johnson Dr

PM Existing + Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	329	280	35	321	67	439	68	559	389
v/c Ratio	0.75	0.24	0.21	0.51	0.21	0.42	0.18	0.53	0.52
Control Delay	44.3	18.1	37.1	28.8	12.7	20.2	12.2	21.8	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	18.1	37.1	28.8	12.7	20.2	12.2	21.8	4.9
Queue Length 50th (ft)	68	31	13	59	15	76	15	102	0
Queue Length 95th (ft)	#188	94	49	123	37	121	38	156	53
Internal Link Dist (ft)		931		442		500		359	
Turn Bay Length (ft)	250		160		190		175		290
Base Capacity (vph)	441	2150	170	2071	320	2043	375	2049	1085
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.13	0.21	0.15	0.21	0.21	0.18	0.27	0.36

Intersection Summary

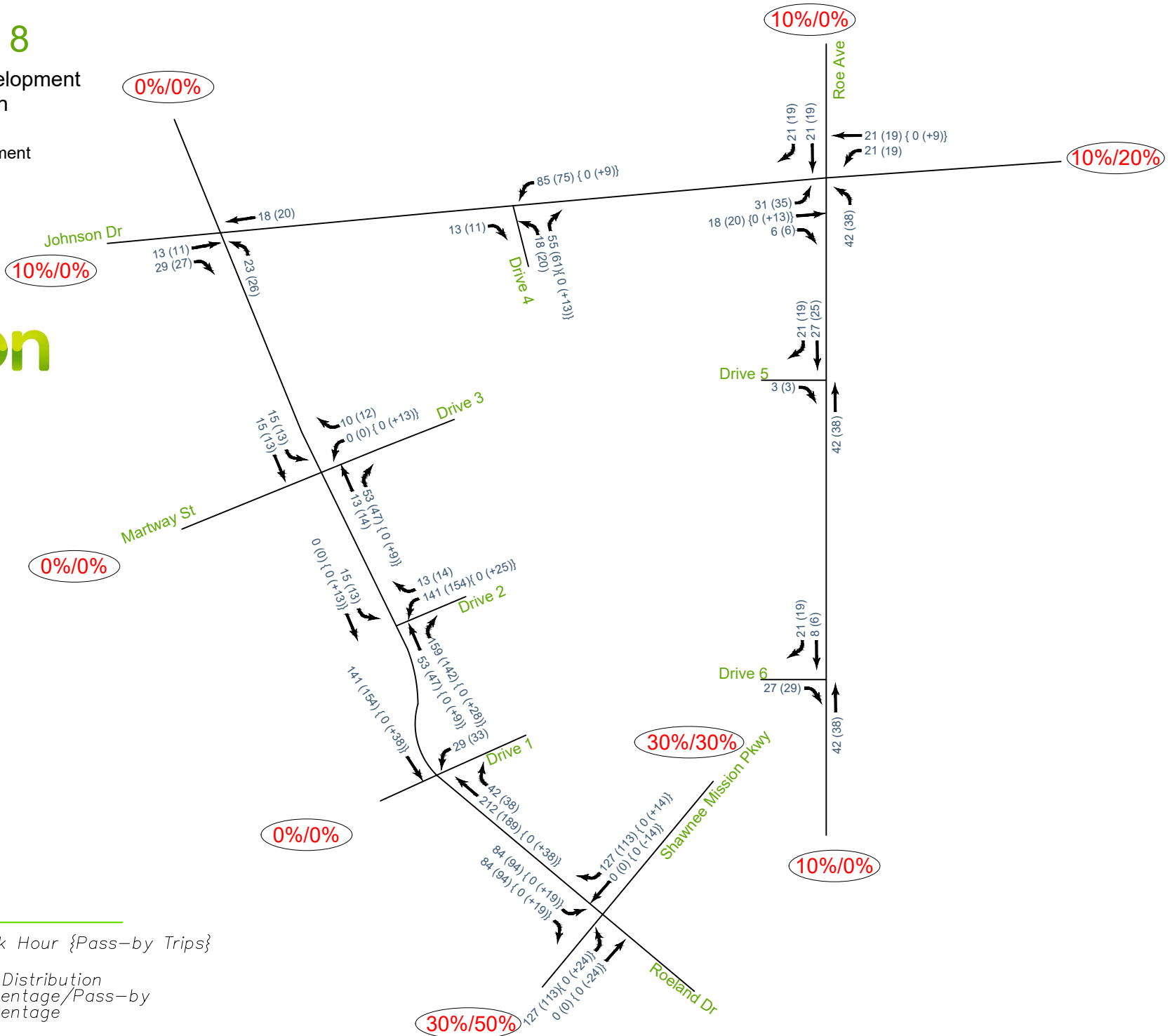
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix C – Gateway Development PM Volumes

FIGURE 8

Proposed Development Trip Distribution

Gateway Development
Mission, KS



3: Roe Ave & Johnson Dr

PM Existing + Development + Gateway

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	341	210	77	52	278	40	100	396	12	63	539	381
Future Volume (veh/h)	341	210	77	52	278	40	100	396	12	63	539	381
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	367	226	83	56	299	43	108	426	13	68	580	410
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	402	561	200	86	470	67	334	1219	37	441	1193	532
Arrive On Green	0.11	0.22	0.22	0.05	0.15	0.15	0.06	0.34	0.34	0.05	0.33	0.33
Sat Flow, veh/h	3510	2607	930	1810	3172	452	1810	3576	109	1810	3610	1610
Grp Volume(v), veh/h	367	154	155	56	169	173	108	215	224	68	580	410
Grp Sat Flow(s),veh/h/ln	1755	1805	1733	1810	1805	1819	1810	1805	1880	1810	1805	1610
Q Serve(g_s), s	7.2	5.1	5.4	2.1	6.1	6.3	2.7	6.2	6.2	1.7	8.9	16.0
Cycle Q Clear(g_c), s	7.2	5.1	5.4	2.1	6.1	6.3	2.7	6.2	6.2	1.7	8.9	16.0
Prop In Lane	1.00		0.54	1.00		0.25	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	402	389	373	86	267	269	334	615	641	441	1193	532
V/C Ratio(X)	0.91	0.40	0.41	0.65	0.63	0.64	0.32	0.35	0.35	0.15	0.49	0.77
Avail Cap(c_a), veh/h	402	957	919	207	957	964	350	931	970	476	1862	831
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.5	23.5	23.6	32.7	27.9	28.0	14.4	17.2	17.2	14.0	18.6	21.0
Incr Delay (d2), s/veh	24.6	0.7	0.7	8.1	2.5	2.6	0.6	0.3	0.3	0.2	0.3	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	4.3	2.2	2.2	1.1	2.7	2.8	1.0	2.4	2.5	0.6	3.5	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	24.2	24.3	40.7	30.4	30.5	14.9	17.5	17.5	14.2	18.9	23.4
LnGrp LOS	E	C	C	D	C	C	B	B	B	B	B	C
Approach Vol, veh/h		676			398			547			1058	
Approach Delay, s/veh		41.0			31.9			17.0			20.4	
Approach LOS		D			C			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.7	29.8	9.3	21.0	10.4	29.1	14.0	16.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	36.0	8.0	37.0	5.0	36.0	8.0	37.0				
Max Q Clear Time (g_c+I1), s	3.7	8.2	4.1	7.4	4.7	18.0	9.2	8.3				
Green Ext Time (p_c), s	0.0	2.6	0.0	1.9	0.0	5.1	0.0	2.1				
Intersection Summary												
HCM 6th Ctrl Delay			26.6									
HCM 6th LOS			C									

3: Roe Ave & Johnson Dr

PM Existing + Development + Gateway



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	367	309	56	342	108	439	68	580	410
v/c Ratio	0.86	0.30	0.29	0.52	0.34	0.40	0.18	0.53	0.53
Control Delay	55.5	21.7	37.4	29.3	14.8	20.3	12.5	22.1	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	21.7	37.4	29.3	14.8	20.3	12.5	22.1	4.9
Queue Length 50th (ft)	79	51	22	66	26	77	16	108	0
Queue Length 95th (ft)	#221	108	69	131	57	125	40	168	55
Internal Link Dist (ft)		931		442		500		359	
Turn Bay Length (ft)	250		160		190		175		290
Base Capacity (vph)	425	1972	219	1998	318	1969	383	1976	1069
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.16	0.26	0.17	0.34	0.22	0.18	0.29	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	13	0	8	39	0	40	12	759	15	15	932	0
Future Vol, veh/h	13	0	8	39	0	40	12	759	15	15	932	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	92	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	0	9	41	0	43	13	807	16	16	991	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1453	1872	496	1369	1864	412	991	0	0	823	0	0
Stage 1	1023	1023	-	841	841	-	-	-	-	-	-	-
Stage 2	430	849	-	528	1023	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	93	73	525	107	74	595	706	-	-	816	-	-
Stage 1	256	316	-	330	383	-	-	-	-	-	-	-
Stage 2	579	380	-	507	316	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	84	70	525	102	71	595	706	-	-	816	-	-
Mov Cap-2 Maneuver	84	70	-	102	71	-	-	-	-	-	-	-
Stage 1	251	310	-	324	376	-	-	-	-	-	-	-
Stage 2	528	373	-	489	310	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	40.3		42.9			0.3			0.2			
HCM LOS	E		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	706	-	-	124	176	816	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.18	0.478	0.02	-	-				
HCM Control Delay (s)	10.2	0.1	-	40.3	42.9	9.5	-	-				
HCM Lane LOS	B	A	-	E	E	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	2.3	0.1	-	-				

Sep 9, 2019

Re: CBC Medical Office Building – City of Mission TIS Comments

In response to the comments that we have received from the City of Mission dated September 5, 2019, we have provided the following responses.

1. Please label the City Limit line across the development site on Figure 2 (Proposed Development), as stated in the paragraph at the top of Page 5.

Added city limit label to Figure 2

2. Please clarify the morning and peak hour times described in the “Baseline Traffic Conditions” section. We assume that 7:30 to 8:30 a.m. and 5:00 to 6:00 p.m. were intended, but the begin/end times listed are confusing? Please also include the “raw” traffic count reports within the study Appendix so that independent confirmation of these peak times is possible.

Clarified times when traffic counts were collected and the respective peak hour. Also added raw traffic count data in Appendix A

3. Please clarify the statement on Page 8 that the HCM methodology for Two-Way Stop Controlled (TWSC) intersections does not provide an overall intersection Level of Service result.

Clarified the HCM TWSC Level of Service description with the following, “The performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements.”

4. The site-generated traffic volumes from the updated TIS report for “The Gateway Development” are being provided along with these comments. Please utilize this updated data from June 2019 (which should be slightly reduced overall for this development’s benefit) and re-evaluate the analyses and conclusions for the third development scenario which included this adjacent development’s traffic volumes through the study intersections.

Updated third scenario and included updated site-generated volumes for “The Gateway Development”

5. In Table 5, the AASHTO Intersection Sight Distance for a left-turning vehicle from the minor approach onto a 35-mph roadway is 390 feet, not 415 feet as listed.

Updated left turning intersection sight distance for a 5-lane facility using a passenger car per the following table.

Design Vehicle	Time Gap (seconds) needed for Major Road CrossSection Consisting of:					
	2-Lanes	3-Lanes	4-Lanes	5-Lanes	6-Lanes	7-Lanes
Passenger Car	7.5	8.0	8.0	8.5	8.5	9.0
Single-Unit Truck	9.5	10.2	10.2	10.9	10.9	11.6
Combination Truck	11.5	12.2	12.2	12.9	12.9	13.6
Note: Time gaps are for a stopped vehicle to turn left onto a major road with no median storage and minor road approach grades of 3 percent or less. For minor road approach grades in excess of 3 percent, add 0.2 seconds to the time gap for each percent of grade.						

Exhibit 16 Time Gap for Case B1 – Left-Turn from Stop
(2011 AASHTO, Expanded Table 9-5, 9-37)

- Please relabel Figure A-2 as “Existing + Development Traffic” estimates or projections, rather than counts, which should be reserved for the actual existing conditions. Also, please recalculate the traffic assignments for all southbound movements and the eastbound left-turn maneuver at the Roe Avenue / Johnson Drive study intersection. The total calculated volumes for these movements are incorrect during the projected PM peak hour, based on the addition of the Figure A-1 traffic counts and the Figure A-3 estimated development trip generation volumes.

Relabeled Figure A-2 and updated projections

- On Figure B-2 for the “Existing + Development Levels of Service” during the AM Peak Hour, the eastbound and westbound movements at the private drives onto Roe Avenue should both be LOS “D” to match the accompanying analysis and the intersection summary provided in Table 4.

Updated Figure B-2’s LOS for E/W at the private drives

- Please relocate the Synchro analysis worksheets for the “PM Existing + Development + Gateway” scenario into Appendix C, as described on Page 9.

Added PM Existing + Development + Gateway” Synchro reports into Appendix C

- Replace the “Development Peak Hour Volumes (Figure 6)” in Appendix C for The Gateway Development with the updated June 2019 traffic volume figures being provided.

Updated Appendix C to include updated June 2019 traffic projections for the Gateway Development

Storm Water Drainage Study

Sunflower Medical Offices

Roe Boulevard & Johnson Drive, Roeland Park Kansas

Prepared:
July 2019
Revised:
September 2019

Prepared by:



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816.800.0950



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General Information

A. Project Description

Sunflower Medical Offices are located at Northwest corner of Roe Boulevard and Johnson Drive in Roeland Park, Johnson county, Kansas. The property is approximately 2.7acre, located in the northeast corner of section 09, Township 12 south, Range 25 east. The proposed development includes the construction of a Medical Office Building with a combined total floor area of approximately 31 thousand square feet along with supporting parking and drive areas. According to the Flood Insurance Rate Map (FIRM) panel number 2009C0024G, revised August 3, 2009, the property lies within OTHER FLOOD AREAS, ZONE X, defined as areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. No base flood elevations have been determined. See Exhibit A for a site location map. See Exhibit B for FEMA FIRM Map.

B. Soil Classification

Soil classifications published by the United States Department of Agriculture/Natural Resources Conservation Service (USDA/NRCS) website for Johnson County, KS on September 12, 2018 indicate the existing site is made up of the following soil type:

Table 1: Storm Analysis Table

Map Unit Symbol	Map Unit Name	HSG
7545	Sharpsburg-Urban land complex, 4 to 8 percent slopes	c

See Exhibit C for a detailed soil report.

Methodology

This study was prepared in accordance with the provisions of “Section 5600 – Storm Drainage Systems and Facilities” (February 16, 2011) of the Kansas City Metropolitan Chapter of the American Public Works Association (APWA) and the “Manual of Best Management Practices for Stormwater Quality” (October 2012) of the Mid-America Regional Council (MARC). Pre and post development runoff were determined using the curve number method described in SCS (now NRCS) Technical Release No. 55 “Urban Hydrology for Small Watersheds” (2nd Edition, June 1986) as provided for in Sub-section 5602.2. The analyses were performed using the Type II 24-hour storm distribution for 1% (100 year), 10% (10 year) and 100% (1 year) annual probability storm events. The rainfall depths used in the analyses corresponding to those events are shown in the following table 2.

Portions of this study also utilizes information and methodology from the “Preliminary Stormwater Study for Commerce Bank & Embree Hospital” prepared by Olsson Associates and approved in July of 2016. This study analyzes the site directly west of this proposed development and contains relevant analysis due to the adjacency of the two developments.

Table 2: Storm Analysis Table

Storm	Percent	Rainfall Depth (in)
1 Year	100%	3.0
10 Year	10%	5.4
100 Year	1%	7.9

Existing Conditions Analysis

The existing 2.7acre site consist of urban undeveloped zone that was previously a portion of the Johnson Drive and Roe Avenue interchange. The north boundary consists of single-family houses. To the East, West and South, the property is surrounded by paved roads as follow: Granada Lane, Roe Avenue and Johnson Drive. At the time of analysis, the site contained public interchange ramps. Due to the earthwork and construction that had taken place on-site, the Hydrologic soil group was assumed to be D for existing conditions.

The site is composed by one sub-basin which drain to one discharge points located at the perimeter of the property. Exhibit D shows the location of the sub basin and discharge point on the property. The site generally drains to the southwest to an area inlet with a 36" discharge. This pipe flows to the southwest off site and is marked as Discharge Point A.

Curve numbers (CN) used in the TR55 existing conditions analysis were taken from Subsection 2602.2 of the APWA. A CN 84 of was utilized for the undeveloped areas as the site was previously a compacted urban interchange. A CN of 98 was used for the impervious area. Time of concentration calculations were performed using TR55 methodology. Table 3 gives a summary of the results of the existing conditions analysis for all sub-basins. Detailed calculations can be found within Exhibit E.

Table 3: Existing Conditions – Sub-basins

Sub-Basin	Area (Ac.)	CN	Time of Concentration (min)	Downstream Discharge	Q 1-year (cfs)	Q 10-year (cfs)	Q 100-year (cfs)
A1	2.7	88	13.96	Point A	5.33	11.53	20.62

Table 4 gives a summary of the Discharge Points for the 100%, 10%, and 1% annual probability storm events.

Table 4: Existing Conditions – Discharge Points

Name	Q 1-year (cfs)	Q 10-year (cfs)	Q 100-year (cfs)
Point A	5.33	11.53	20.62

Proposed Conditions Analysis

The proposed development will consist of a 2-story medical office building and associated parking features. The site will be regraded and leveled to support this new proposed function. A new storm drainage system will be constructed to

collect stormwater on site and route it out to new stormwater quality BMPs or off site into the existing stormwater system to the south of the site.

The table below shows the summary of the proposed hydrological properties as well as the peak flows generated for each design storm.

Name	Weighted CN Value	Total Area (ac)	Q 1-year (cfs)	Q 10-year (cfs)	Q 100-year (cfs)
Point A	91	2.7	7.3	14.8	22.4

Detention

The proposed development is situated within subarea RC-040 of the Rock Creek watershed in northeast Johnson County. The Olsson Associates report indicates that the existing watershed at this point contains 1766.4 acres of which 737.08 acres is impervious area. This equates to 41.73% impervious area. The Olsson Associates report also states that the 100year peak flow at a point approximately 1,075ft downstream of the proposed site is 5,763 cfs according to the 2012 FEMA LOMAR for Rock Creek.

The proposed medical office at the northeast corner of Roe Ave and Johnson Drive will contribute 0.86ac of additional impervious surface to the Rock Creek watershed. This additional area brings the total impervious area of the upstream watershed of 41.78%. Further, the proposed 100-year peak flow leaving the site is increased by 2.00cfs. This equates to an increase of 0.035% increase from the existing peak flow of the watershed. Finally, as the Olsson Associates reports states, the site is generally in the lower reaches of the Rock Creek tributary. Detention within the lower portions of a watershed have an adverse effect on total peak-flow. Peak-flow from the overall watershed aligns with the attenuated peak-flow from the site therefore increasing the overall peak-flow within the stream.

Due to the minor increase of impervious area, peak flow, and the location the proposed development has on the overall watershed, no detention is required for this development

BMP Analysis

Improvements to the property will increase impervious surface area compared to existing conditions, thus proposed improvements qualify the project to meet

water quality requirements with stormwater treatment facilities (STFs). STFs on the site are proposed to mitigate post-construction runoff pollutant levels. The MARC BMP Manual was utilized to measure the Level of Service (LS) and Value Rating (VR) required for an undeveloped site. The required LS for this site is 5.0. Water quality treatment calculations are available in the Exhibit H.

The STF systems detailed below satisfy water quality treatment requirements for the project as determined by MARC BMP Manual calculations. Site construction documents will fully detail the construction and landscape specifications for all BMPs. The property owner shall be responsible for long term maintenance and upkeep of storm water treatment facilities. As required by Section 15-515 of Ordinance No. 809 of Roeland Park, the owner must complete an annual certification inspection of the stormwater management systems and is subject to City inspection at least once every three years.

A combination of STFs is proposed for the development and will include the following STFs with corresponding VRs:

- Native Vegetation (9.25)
- Rain Garden (9.0)
- Inlet Inserts (4.0).

Calculations, STF drainage maps and other information are available in the Exhibit H.

Summary

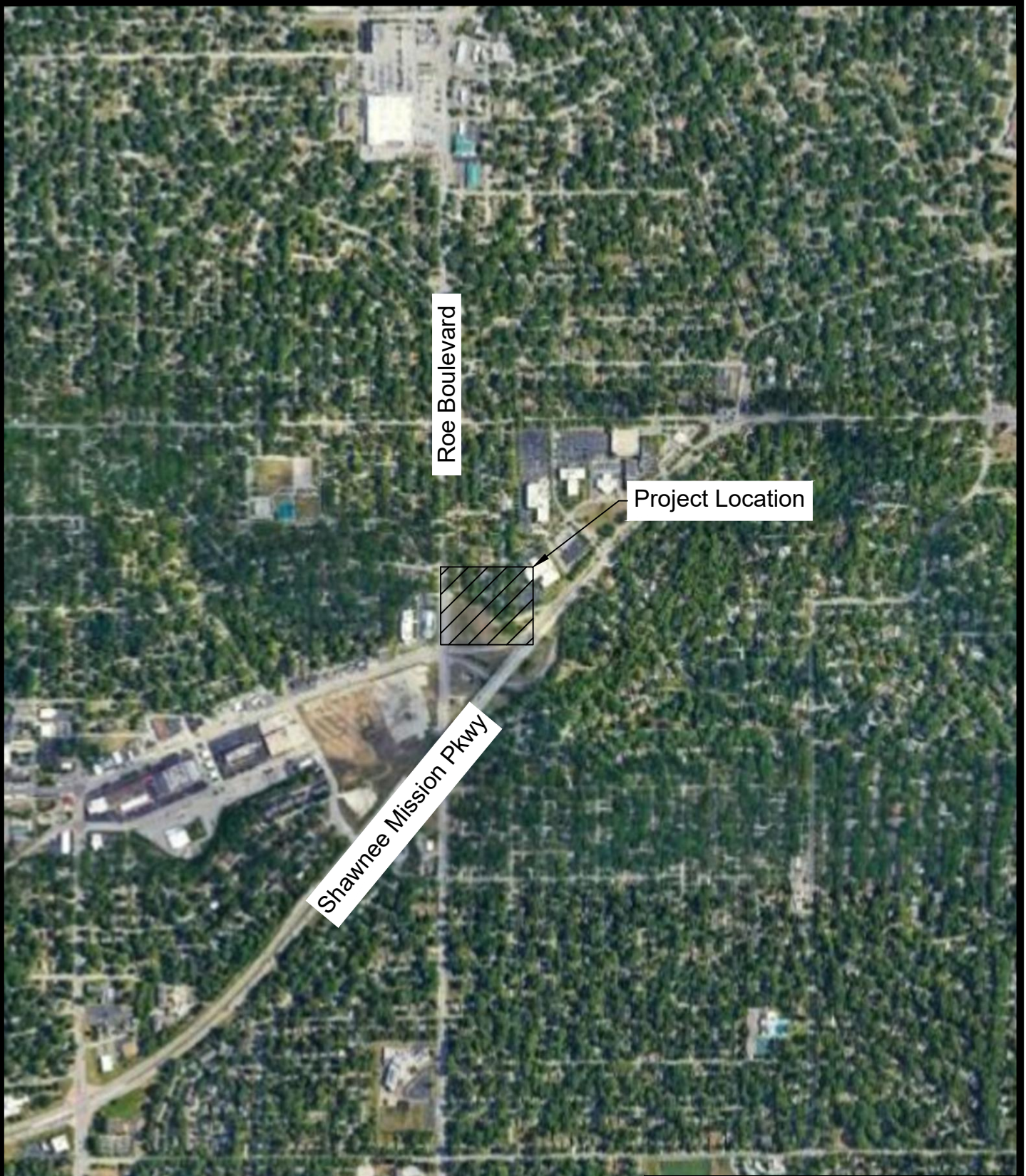
The proposed development has a negligible increase of total peak flow and impervious area when compared to the upstream watershed of Rock Creek. Due to this minor increase, as well as the site being located in the lower reaches of the watershed, no detention is required. The proposed development will be installing native vegetation, pervious pavement, and raingardens to capture the “first flush” of stormwater for treatment and retention. This BMP package complies with the 2012 MARC Level of Service calculations for the site.

Regards,

Dustin Burton, P.E.
Renaissance Infrastructure Consulting

EXHIBIT A

SITE LOCATION MAP



Roe Boulevard

Project Location

Shawnee Mission Pkwy

Site Location Map

Scale: 1"=1000'



**Renaissance
Infrastructure
Consulting**

132 ABBIE AVENUE
KANSAS CITY, KANSAS 66103

913.317.9500
WWW.RIC-CONSULT.COM

EXHIBIT B

FEMA FIRM REPORT

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was Kansas State Plane North Zone (FIPS zone 1501). The **horizontal datum** was NAD 83, GRS 80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information about the **bench marks** shown on this map, please contact the Automated Information Mapping System (AIMS) at (913) 715-1600, or visit their website at <http://aims.jocogov.org/>.

Base map information shown on this FIRM was provided for Johnson County by Analytical Surveys, Inc. The vector data was derived from Aerial Photography, dated 1998-2000 and captured at a resolution of .5 feet.

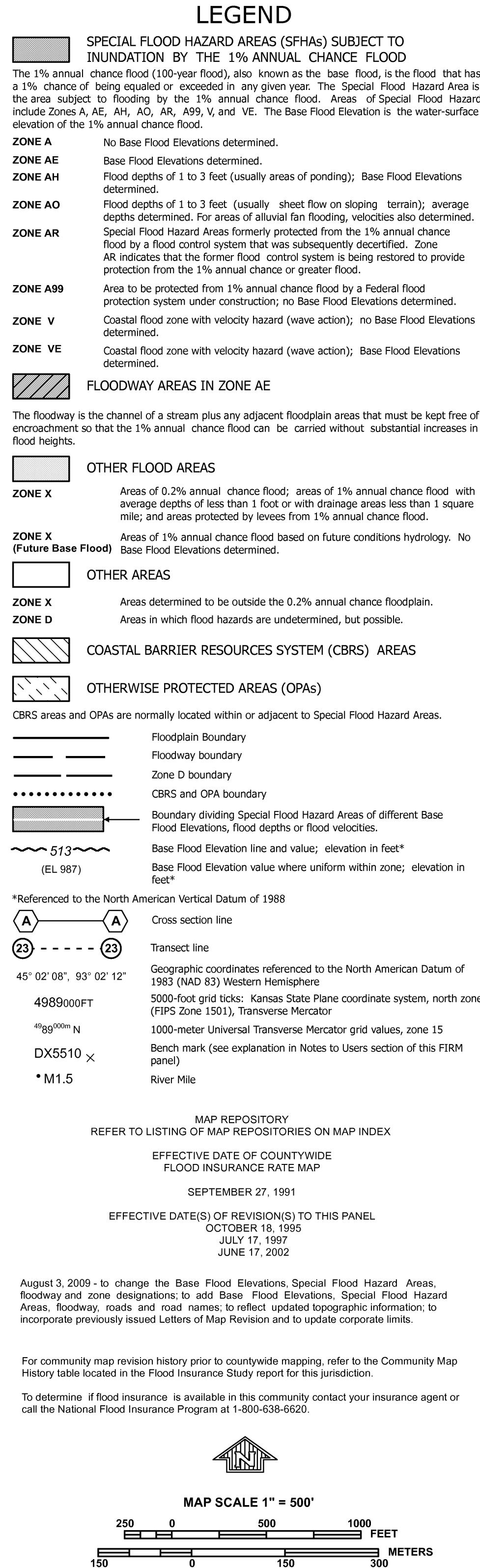
This map reflects more detailed up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and their website at <http://www.msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



COMMUNITY	NUMBER	PANEL	SUFFIX
FAIRWAY, CITY OF	205185	0024	G
MISSION HILLS, CITY OF	200171	0024	G
MISSION, CITY OF	200170	0024	G
OVERLAND PARK, CITY OF	200174	0024	G
PRAIRIE VILLAGE, CITY OF	200175	0024	G
ROELAND PARK, CITY OF	200176	0024	G



MAP NUMBER
20091C0024G

MAP REVISED
AUGUST 3, 2009

Federal Emergency Management Agency

EXHIBIT C

NRCS WEB SOIL SURVEY



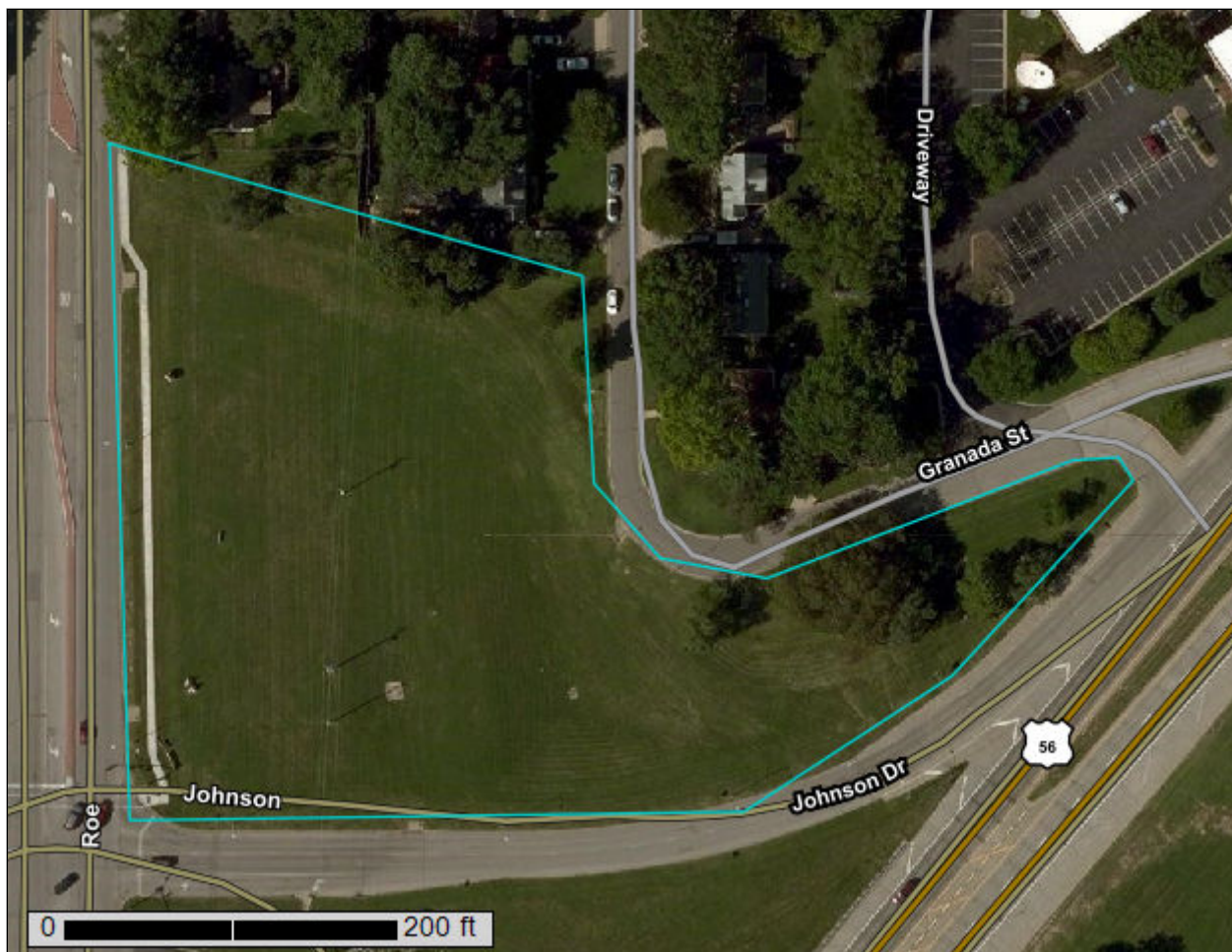
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Johnson County, Kansas**



July 26, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

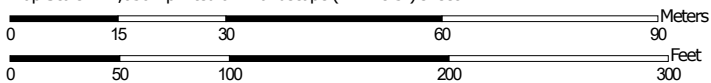
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:1,050 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Johnson County, Kansas
Survey Area Data: Version 17, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2014—Sep 7, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7545	Sharpsburg-Urban land complex, 4 to 8 percent slopes	3.2	100.0%
Totals for Area of Interest		3.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Johnson County, Kansas

7545—Sharpsburg-Urban land complex, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: tq4z

Elevation: 1,000 to 1,300 feet

Mean annual precipitation: 31 to 47 inches

Mean annual air temperature: 45 to 64 degrees F

Frost-free period: 185 to 255 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Sharpsburg and similar soils: 55 percent

Urban land: 45 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Hillslopes

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Silty and clayey loess

Typical profile

A - 0 to 9 inches: silt loam

AB - 9 to 13 inches: silty clay loam

Bt - 13 to 35 inches: silty clay loam

BC - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: About 36 to 40 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: Loamy Upland (PE 30-37) (R106XY015KS)

Hydric soil rating: No

Description of Urban Land

Setting

Landform: Hillslopes

Down-slope shape: Convex

Across-slope shape: Convex

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission

rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group

Custom Soil Resource Report

index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Custom Soil Resource Report

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Johnson County, Kansas														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
7545—Sharpsburg-Urban land complex, 4 to 8 percent slopes														
Sharpsburg	55	C	0-9	Silt loam	CL	A-7, A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	100-100 -100	95-98-1 00	33-43 -46	12-18-1 9
			9-13	Silty clay loam, silt loam	CH, CL	A-7-6, A-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	100-100 -100	95-98-1 00	39-45 -52	17-21-2 5
			13-35	Silty clay loam, silty clay	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	100-100 -100	95-98-1 00	49-53 -57	26-28-3 0
			35-60	Silty clay loam, silt loam	CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	100-100 -100	95-98-1 00	36-41 -45	17-20-2 3

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
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- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

EXHIBIT D

EXISTING DRAINAGE MAP

EXHIBIT E

EXISTING CONDITIONS ANALYSIS

Project Description

File Name Storm Analysis Existing.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Existing	2.69	88.37	7.90	6.51	17.52	20.96	0 00:13:57

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Existing

Input Data

Area (ac) 2.69
Weighted Curve Number 88.37
Rain Gage ID 100yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pasture, grassland, or range, Fair	1.85	D	84.00
Paved parking & roofs	0.84	D	98.00
Composite Area & Weighted CN	2.69		88.37

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

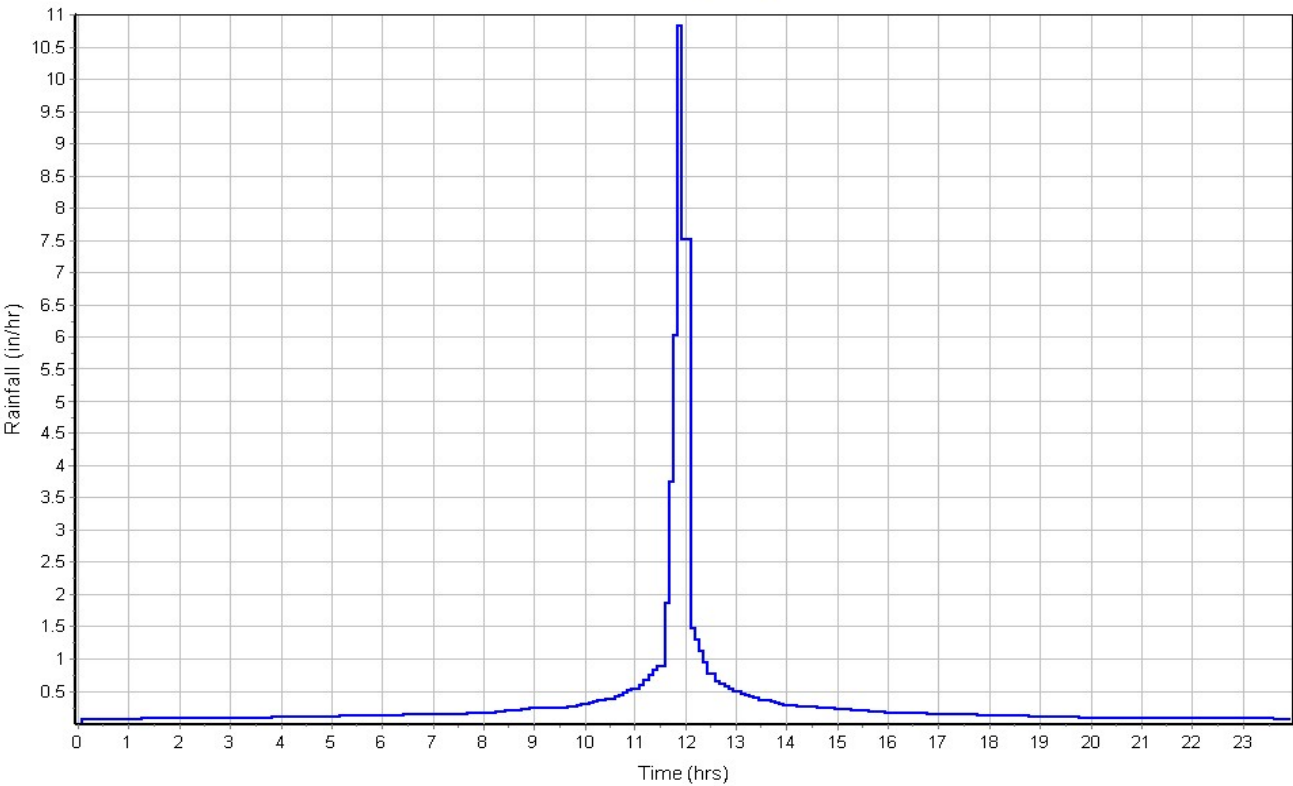
Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	9.24	0.00	0.00
Shallow Concentrated Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Flow Length (ft) :	334	267	0.00
Slope (%) :	4.5	.5	0.00
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	3.42	1.44	0.00
Computed Flow Time (min) :	1.63	3.09	0.00
Total TOC (min)	13.96		

Subbasin Runoff Results

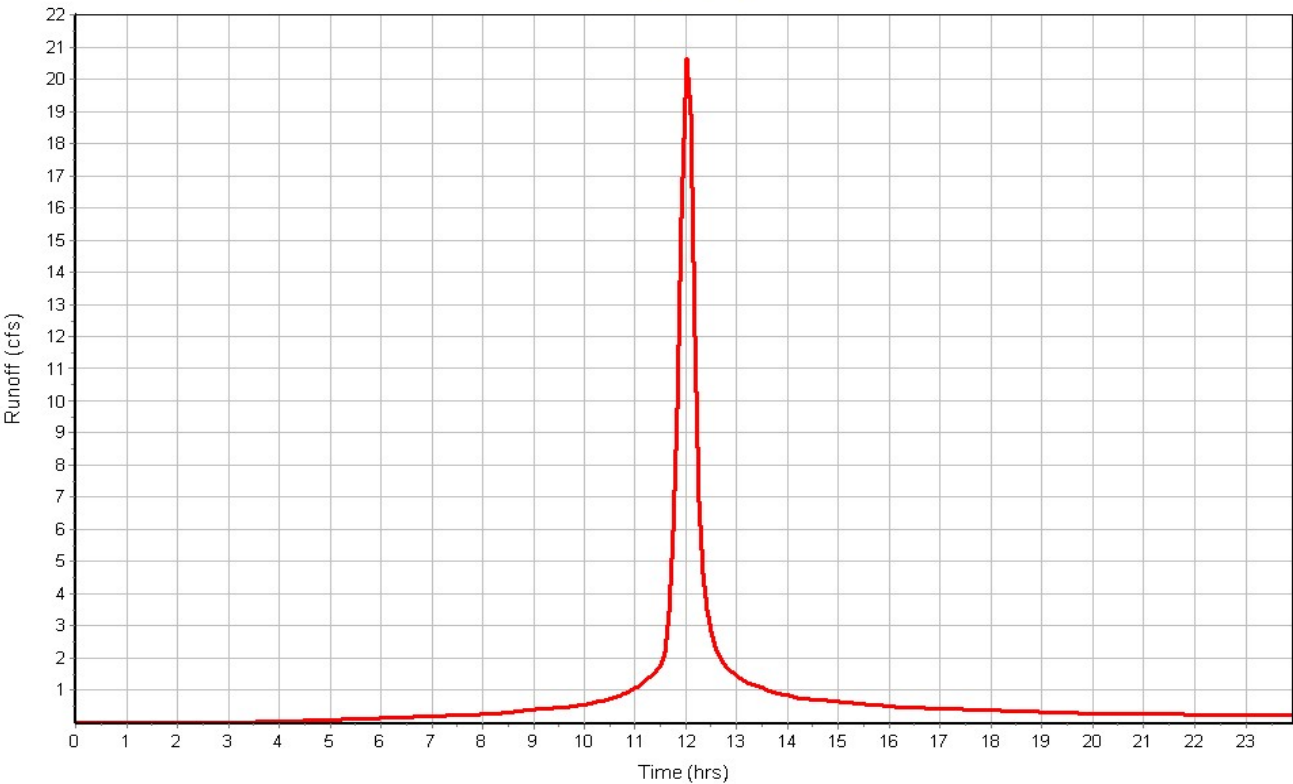
Total Rainfall (in)	7.90
Total Runoff (in)	6.51
Peak Runoff (cfs)	20.96
Weighted Curve Number	88.37
Time of Concentration (days hh:mm:ss)	0 00:13:58

Subbasin : Existing

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name Storm Analysis Existing.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Existing	2.69	88.37	5.40	4.09	11.00	13.48	0 00:13:57

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Existing

Input Data

Area (ac) 2.69
Weighted Curve Number 88.37
Rain Gage ID 10yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pasture, grassland, or range, Fair	1.85	D	84.00
Paved parking & roofs	0.84	D	98.00
Composite Area & Weighted CN	2.69		88.37

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

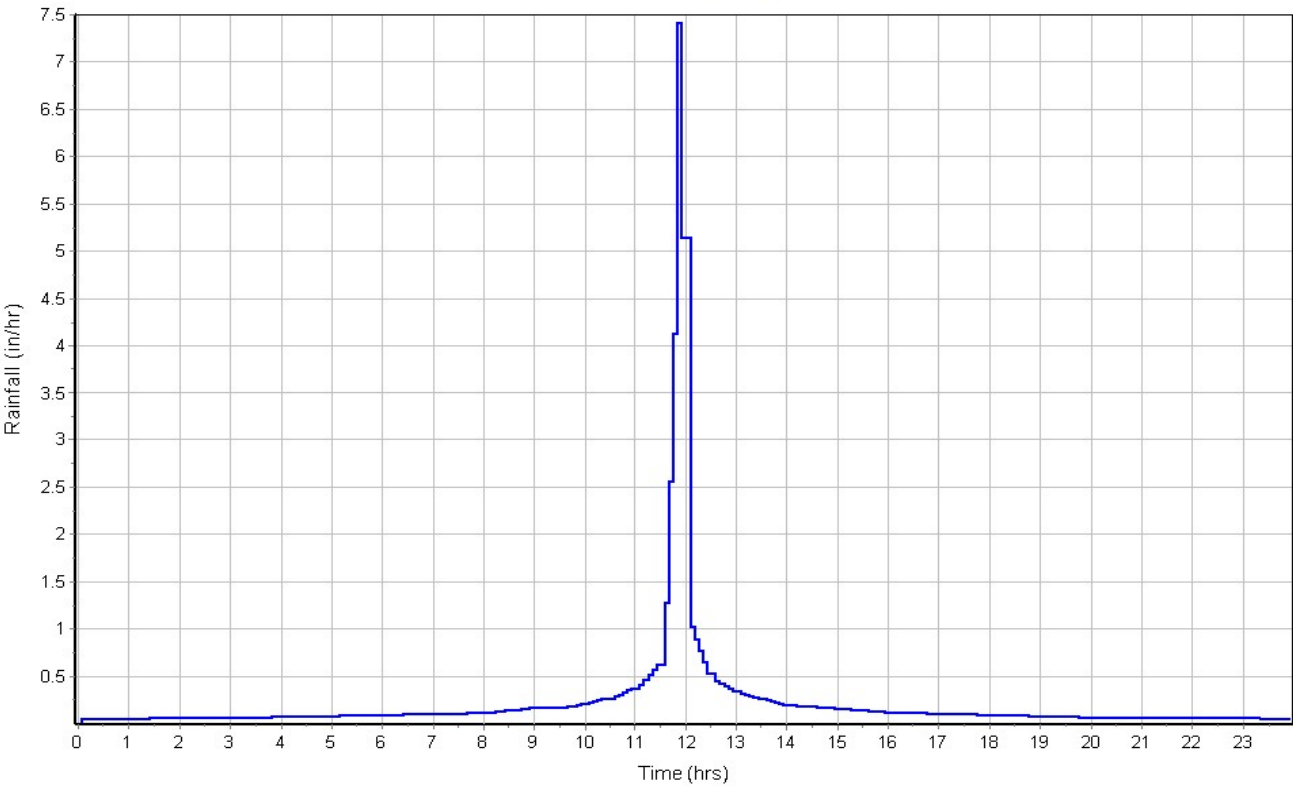
	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	9.24	0.00	0.00
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	334	267	0.00
Slope (%) :	4.5	.5	0.00
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	3.42	1.44	0.00
Computed Flow Time (min) :	1.63	3.09	0.00
Total TOC (min)	13.96		

Subbasin Runoff Results

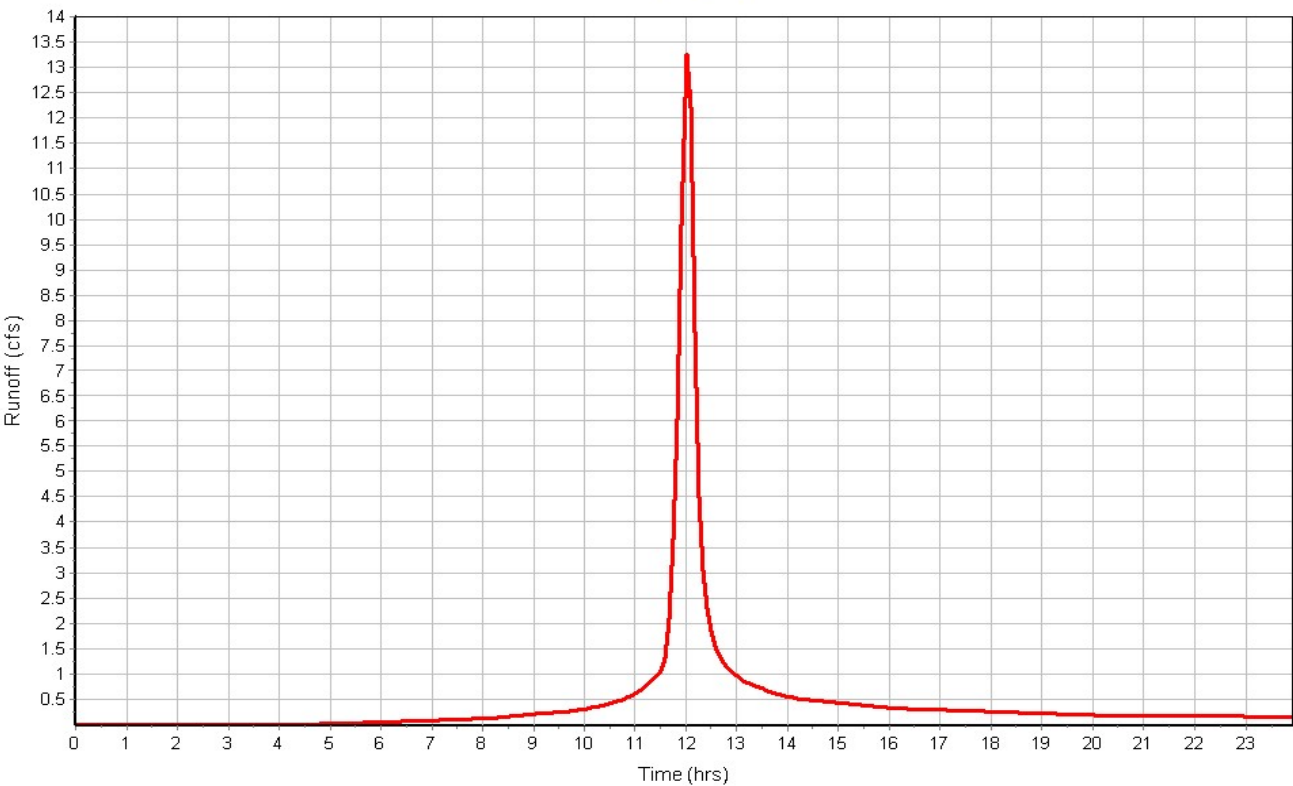
Total Rainfall (in)	5.40
Total Runoff (in)	4.09
Peak Runoff (cfs)	13.48
Weighted Curve Number	88.37
Time of Concentration (days hh:mm:ss)	0 00:13:58

Subbasin : Existing

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Existing	2.69	88.37	5.40	4.09	11.00	13.48	0 00:13:57

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Existing

Input Data

Area (ac) 2.69
Weighted Curve Number 88.37
Rain Gage ID 10yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pasture, grassland, or range, Fair	1.85	D	84.00
Paved parking & roofs	0.84	D	98.00
Composite Area & Weighted CN	2.69		88.37

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

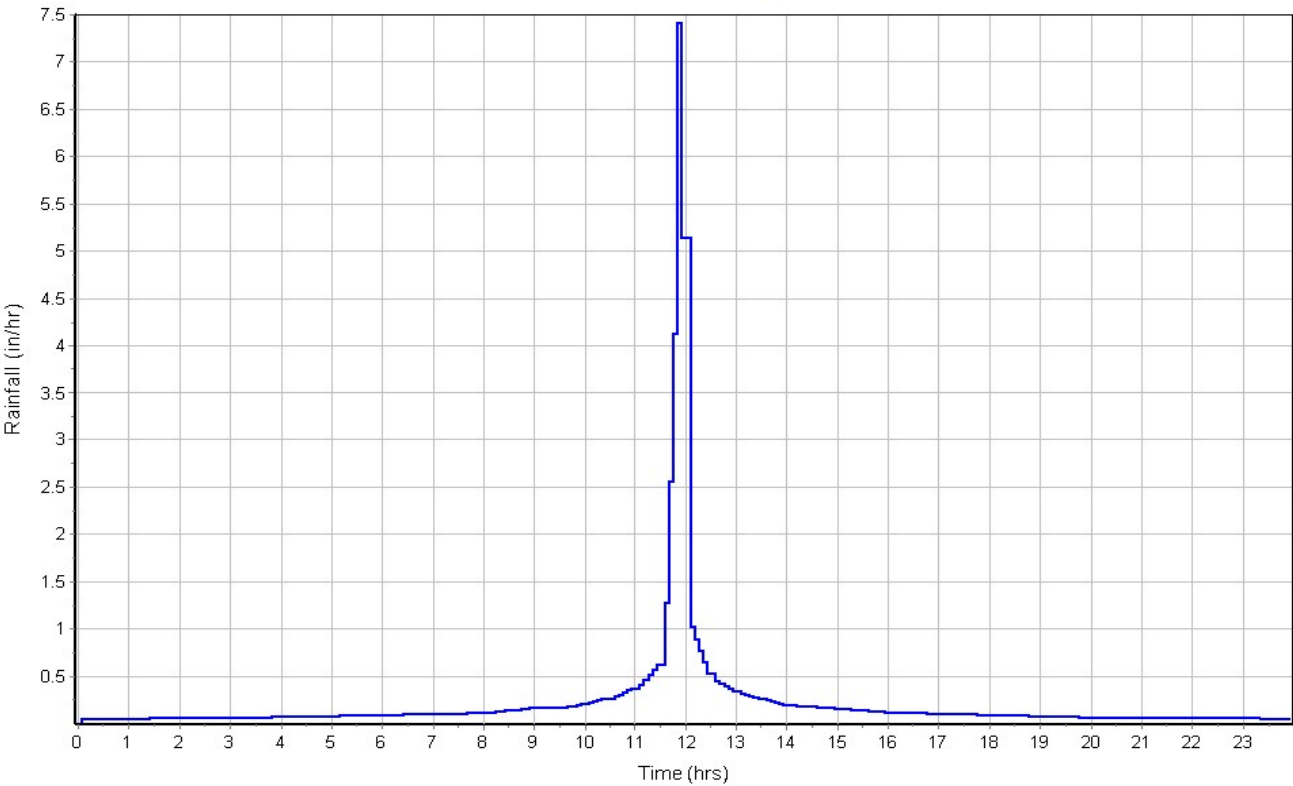
Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	9.24	0.00	0.00
Shallow Concentrated Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Flow Length (ft) :	334	267	0.00
Slope (%) :	4.5	.5	0.00
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	3.42	1.44	0.00
Computed Flow Time (min) :	1.63	3.09	0.00
Total TOC (min)	13.96		

Subbasin Runoff Results

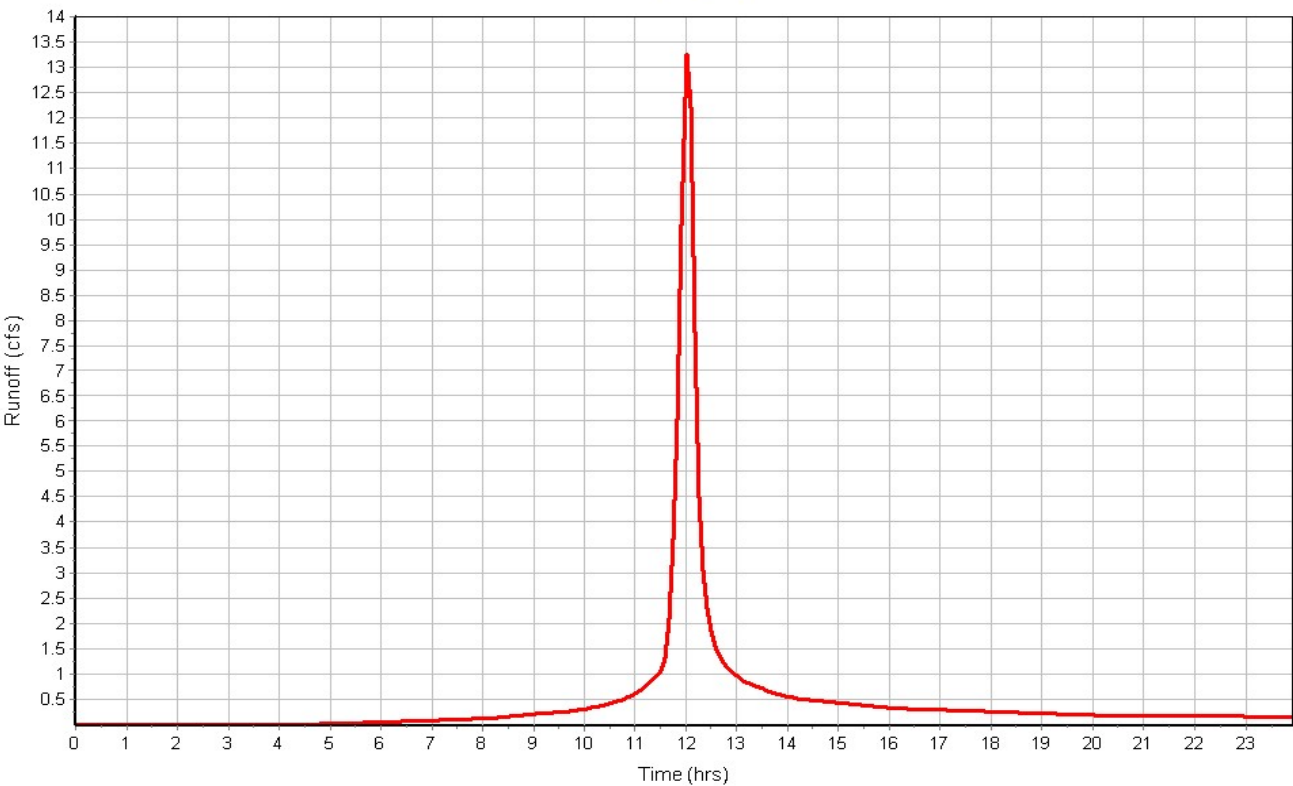
Total Rainfall (in)	5.40
Total Runoff (in)	4.09
Peak Runoff (cfs)	13.48
Weighted Curve Number	88.37
Time of Concentration (days hh:mm:ss)	0 00:13:58

Subbasin : Existing

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name Storm Analysis Existing.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Existing	2.69	88.37	7.90	6.51	17.52	20.96	0 00:13:57

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Existing

Input Data

Area (ac) 2.69
Weighted Curve Number 88.37
Rain Gage ID 1yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pasture, grassland, or range, Fair	1.85	D	84.00
Paved parking & roofs	0.84	D	98.00
Composite Area & Weighted CN	2.69		88.37

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$
R = Aq / Wp
 $T_c = (L_f / V) / (3600 \text{ sec/hr})$

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

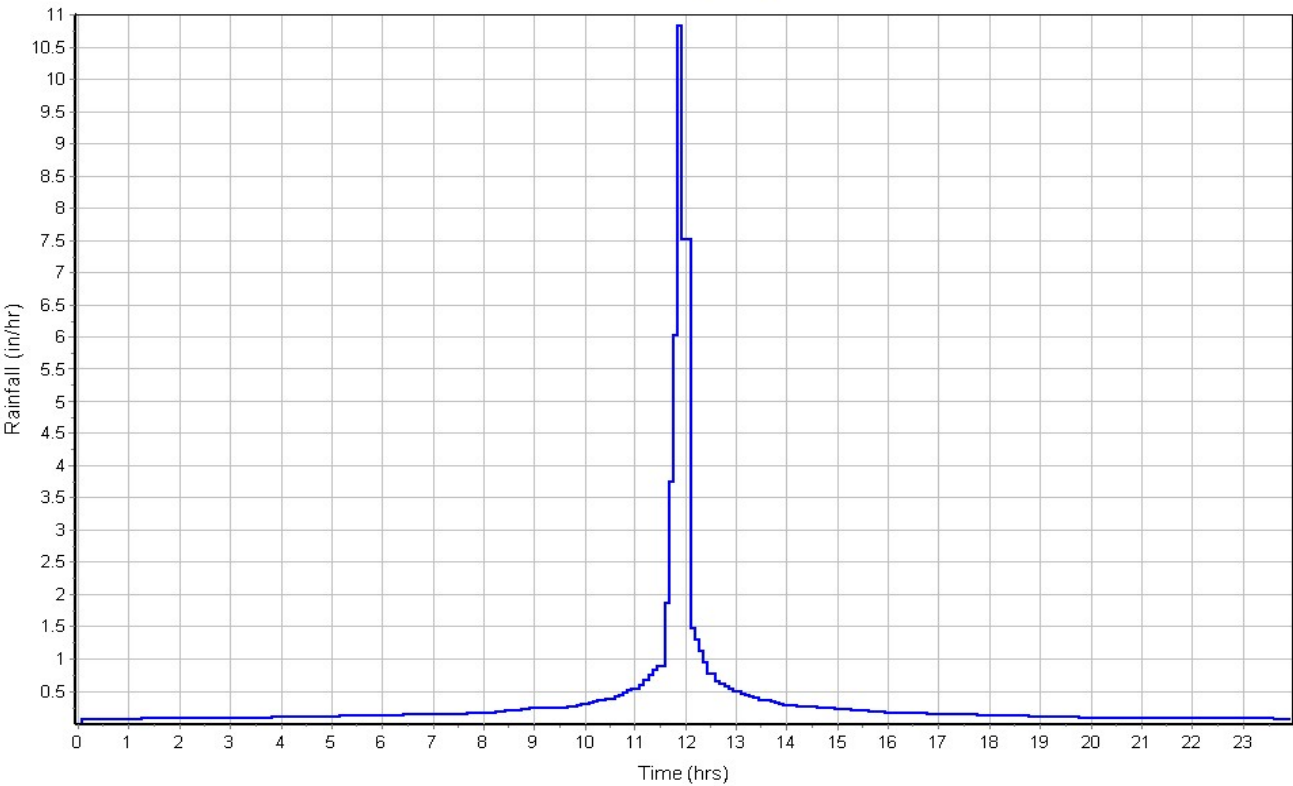
Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	9.24	0.00	0.00
Shallow Concentrated Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Flow Length (ft) :	334	267	0.00
Slope (%) :	4.5	.5	0.00
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	3.42	1.44	0.00
Computed Flow Time (min) :	1.63	3.09	0.00
Total TOC (min)	13.96		

Subbasin Runoff Results

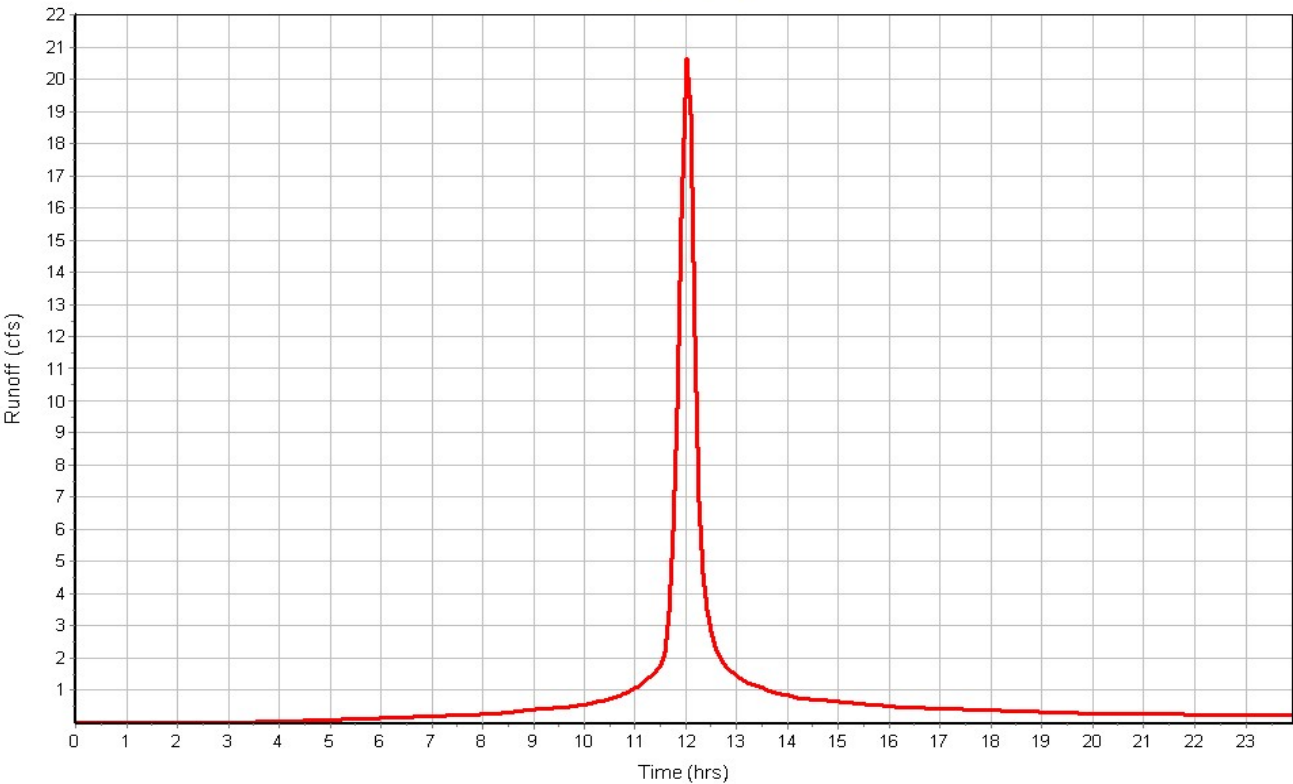
Total Rainfall (in)	7.90
Total Runoff (in)	6.51
Peak Runoff (cfs)	20.96
Weighted Curve Number	88.37
Time of Concentration (days hh:mm:ss)	0 00:13:58

Subbasin : Existing

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Existing	2.69	88.37	7.90	6.51	17.52	20.96	0 00:13:57

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-01	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Existing

Input Data

Area (ac) 2.69
Weighted Curve Number 88.37
Rain Gage ID 1yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pasture, grassland, or range, Fair	1.85	D	84.00
Paved parking & roofs	0.84	D	98.00
Composite Area & Weighted CN	2.69		88.37

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{2/3})) * (S_f^{0.5}) / n$
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

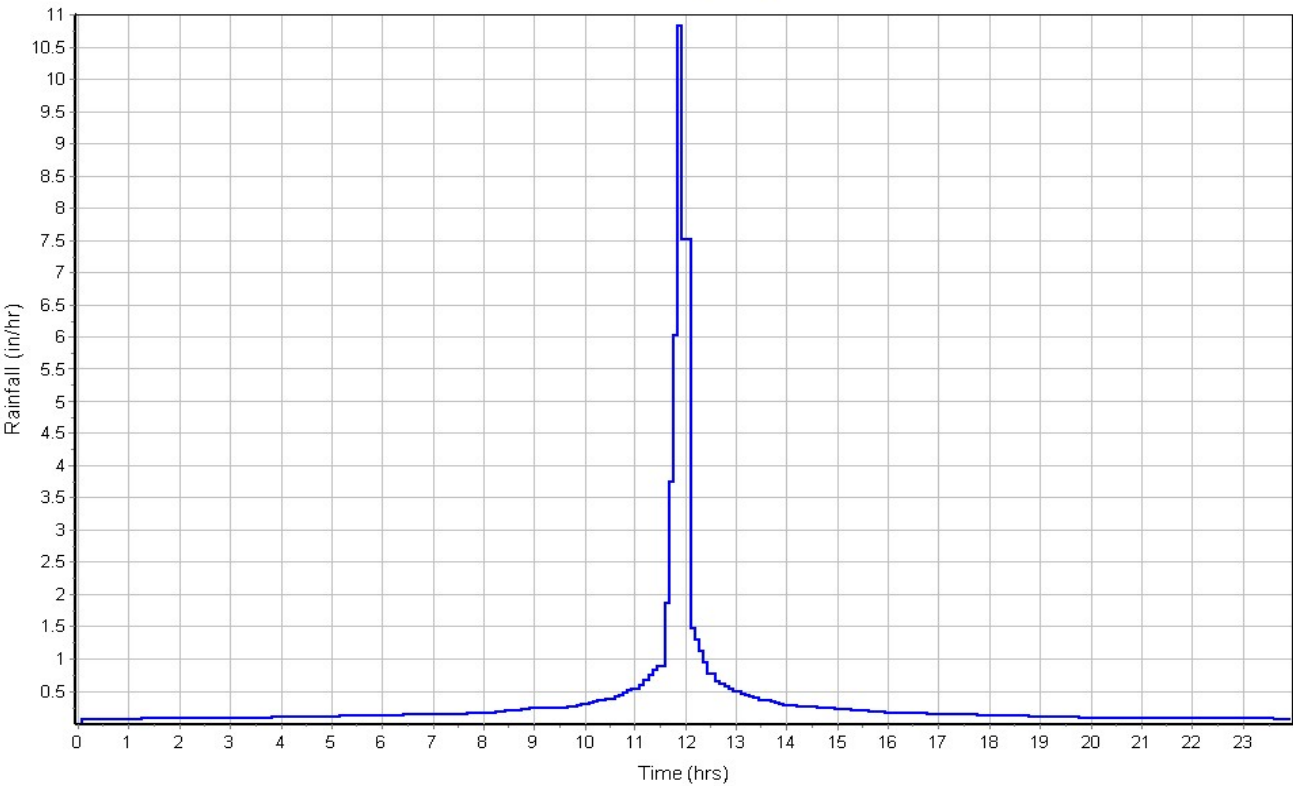
	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	9.24	0.00	0.00
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	334	267	0.00
Slope (%) :	4.5	.5	0.00
Surface Type :	Unpaved	Paved	Unpaved
Velocity (ft/sec) :	3.42	1.44	0.00
Computed Flow Time (min) :	1.63	3.09	0.00
Total TOC (min)	13.96		

Subbasin Runoff Results

Total Rainfall (in)	7.90
Total Runoff (in)	6.51
Peak Runoff (cfs)	20.96
Weighted Curve Number	88.37
Time of Concentration (days hh:mm:ss)	0 00:13:58

Subbasin : Existing

Rainfall Intensity Graph



Runoff Hydrograph

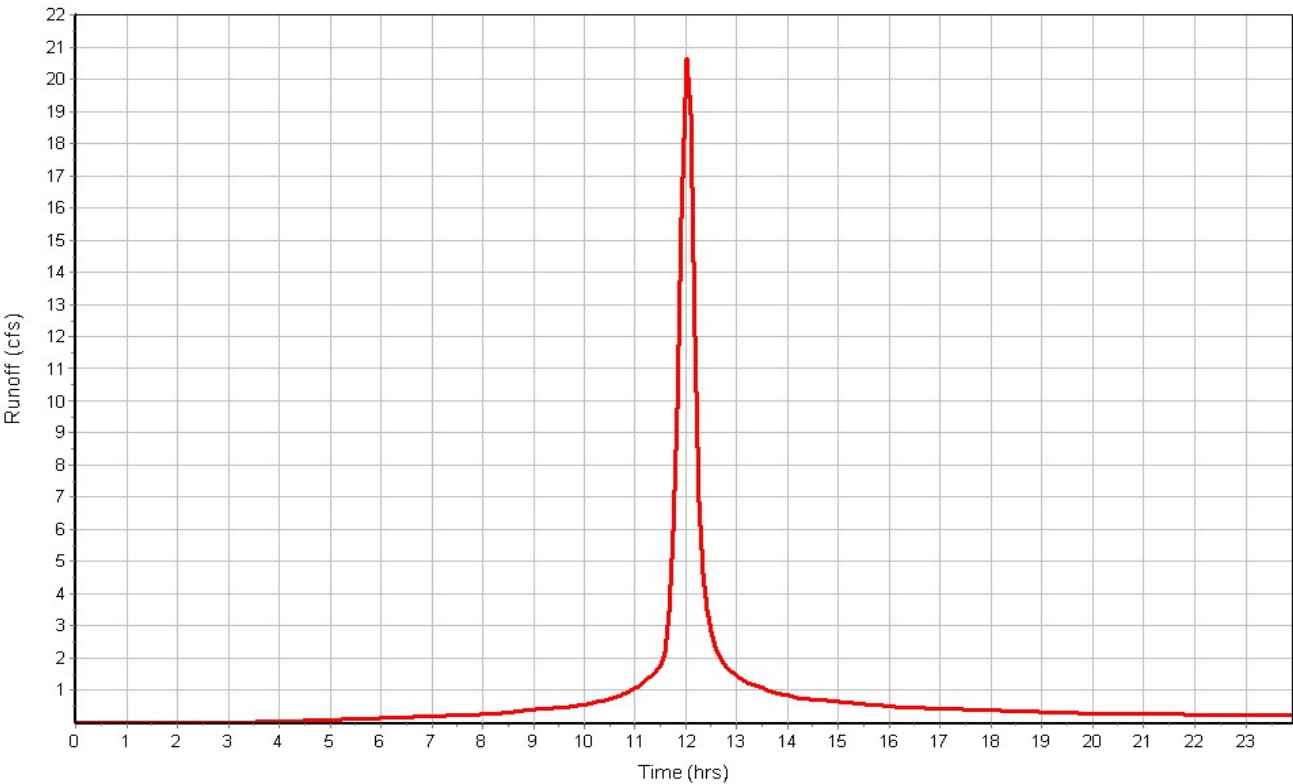


EXHIBIT F

PROPOSED DRAINAGE MAP

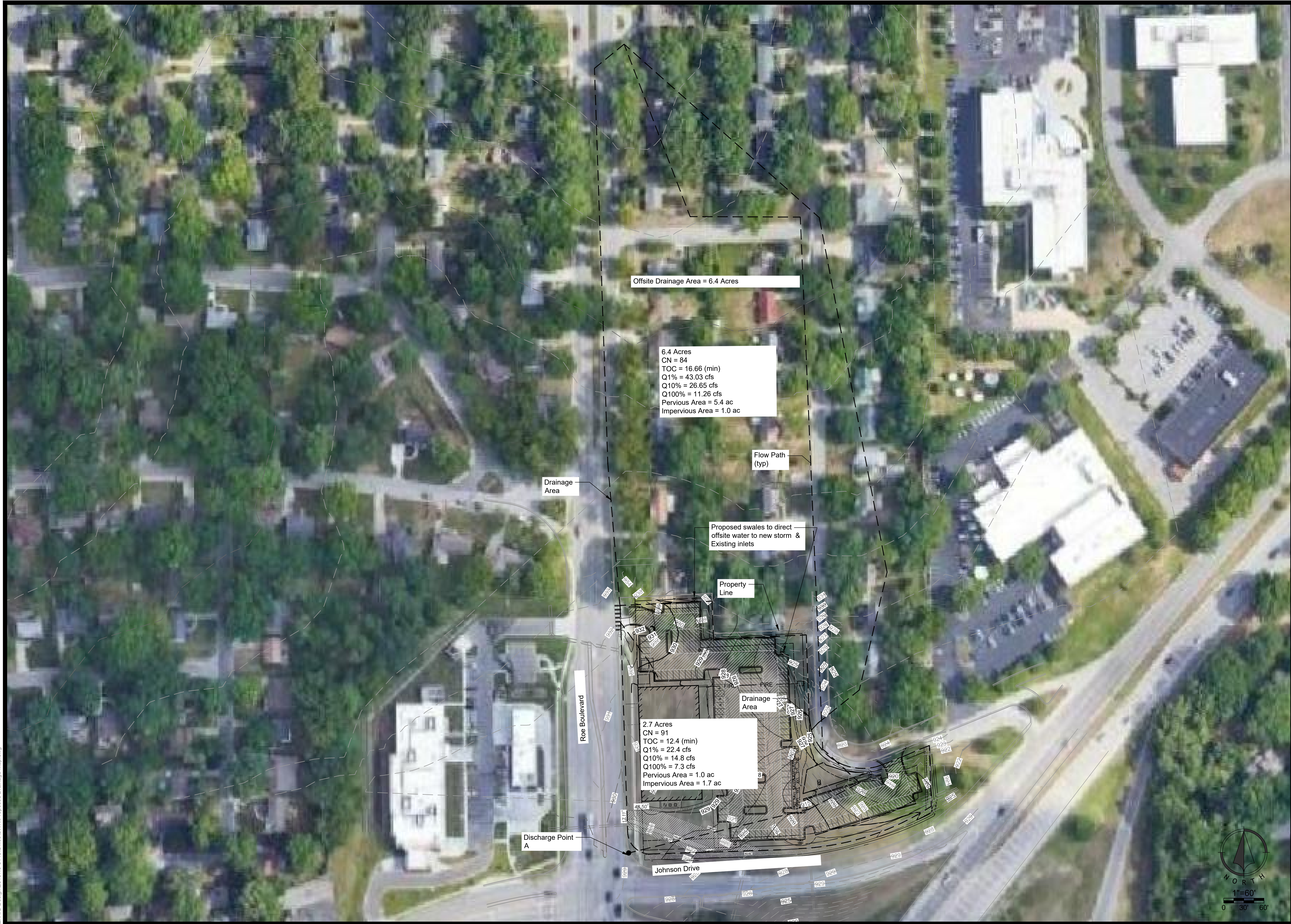
[illegible]

EXHIBIT G

PROPOSED CONDITIONS ANALYSIS

Project Description

File Name Storm Analysis Future.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Future	2.70	91.48	3.00	2.11	5.71	7.34	0 00:12:25

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-02	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Future

Input Data

Area (ac) 2.70
Weighted Curve Number 91.48
Rain Gage ID 1yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	1.70	C	98.00
Pasture, grassland, or range, Fair	0.40	D	84.00
Meadow, non-grazed	0.60	D	78.00
Composite Area & Weighted CN	2.70		91.48

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{(2/3)}) * (S_f^{0.5})) / n$
 $R = A_q / W_p$
 $T_c = (L_f / V) / (3600 \text{ sec/hr})$

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

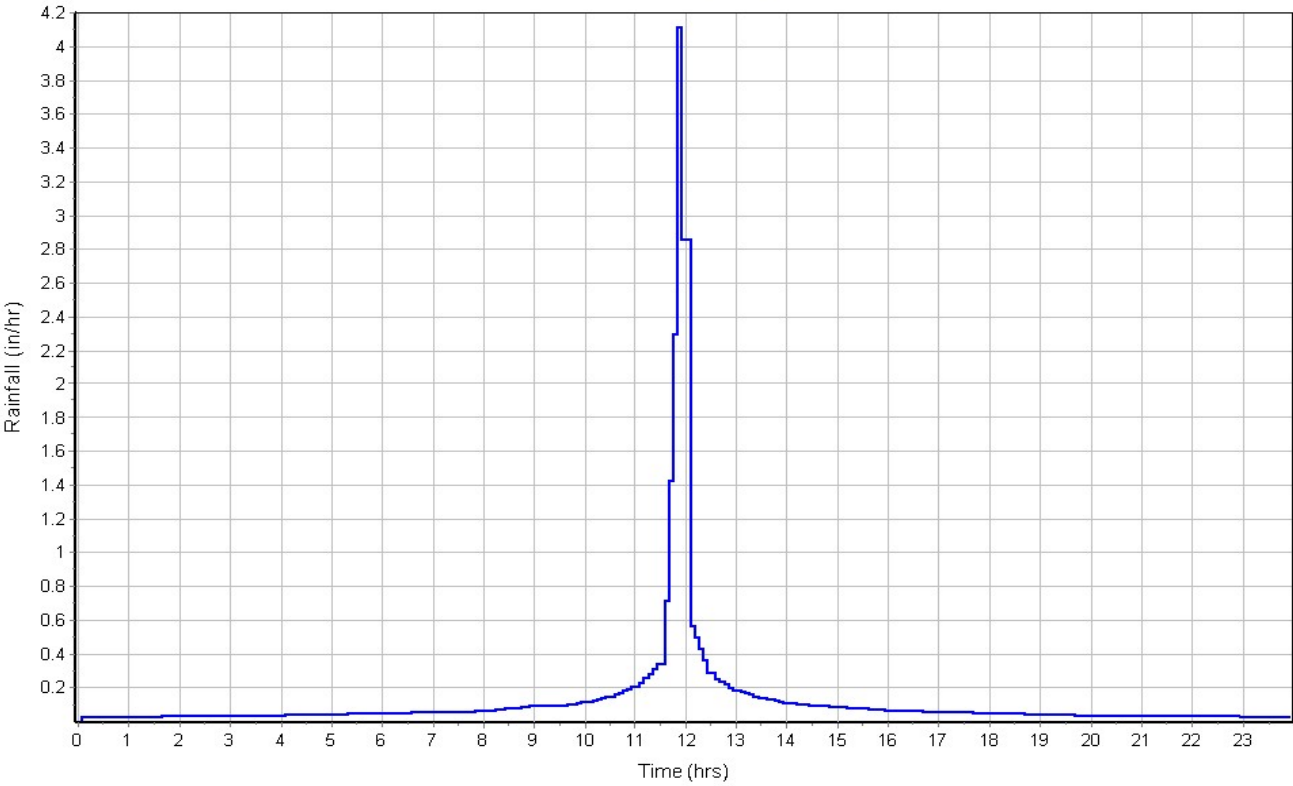
	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	7.00	0.00	0.00
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	383	276	0.00
Slope (%) :	2	.5	0.00
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.87	1.44	0.00
Computed Flow Time (min) :	2.22	3.19	0.00
Total TOC (min)	12.42		

Subbasin Runoff Results

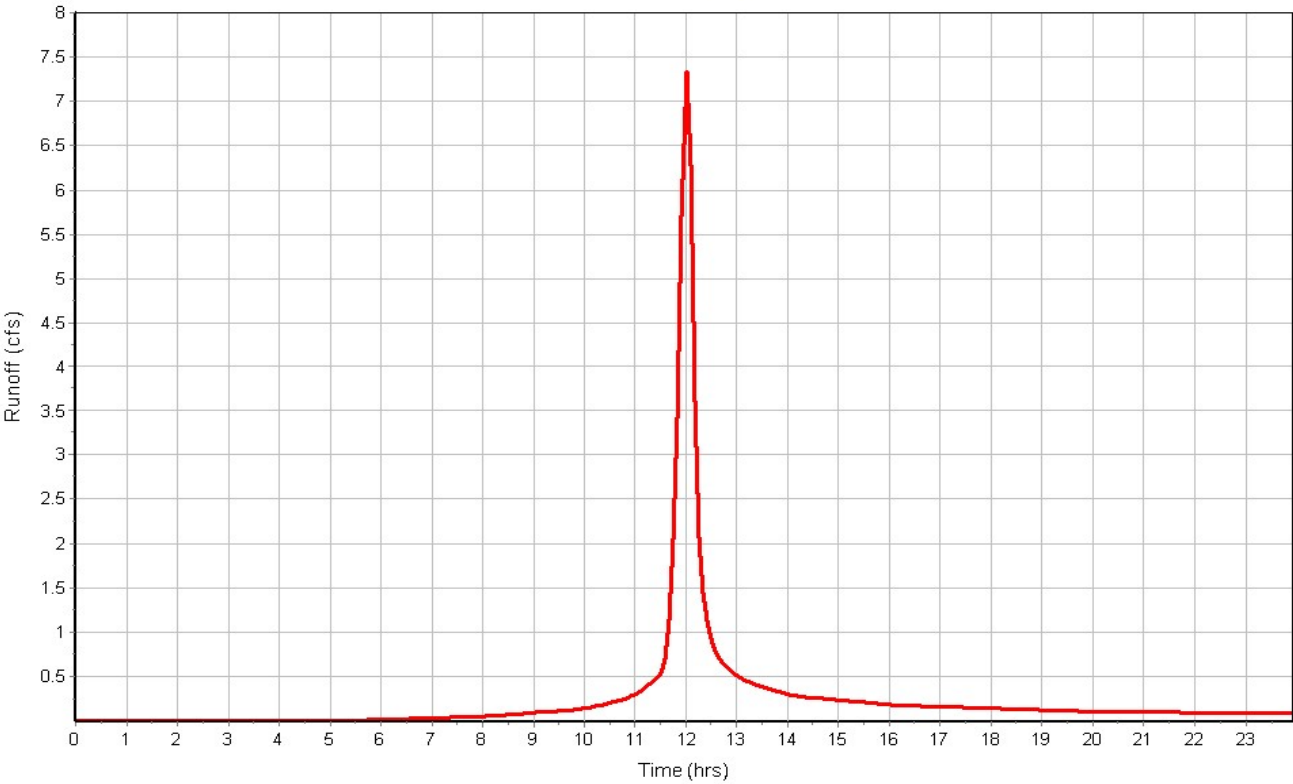
Total Rainfall (in)	3.00
Total Runoff (in)	2.11
Peak Runoff (cfs)	7.34
Weighted Curve Number	91.48
Time of Concentration (days hh:mm:ss)	0 00:12:25

Subbasin : Future

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name Storm Analysis Future.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Future	2.70	91.48	5.40	4.42	11.94	14.81	0 00:12:25

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-02	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Future

Input Data

Area (ac) 2.70
Weighted Curve Number 91.48
Rain Gage ID 10yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	1.70	C	98.00
Pasture, grassland, or range, Fair	0.40	D	84.00
Meadow, non-grazed	0.60	D	78.00
Composite Area & Weighted CN	2.70		91.48

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{(2/3)}) * (S_f^{0.5})) / n$
 $R = A_q / W_p$
 $T_c = (L_f / V) / (3600 \text{ sec/hr})$

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

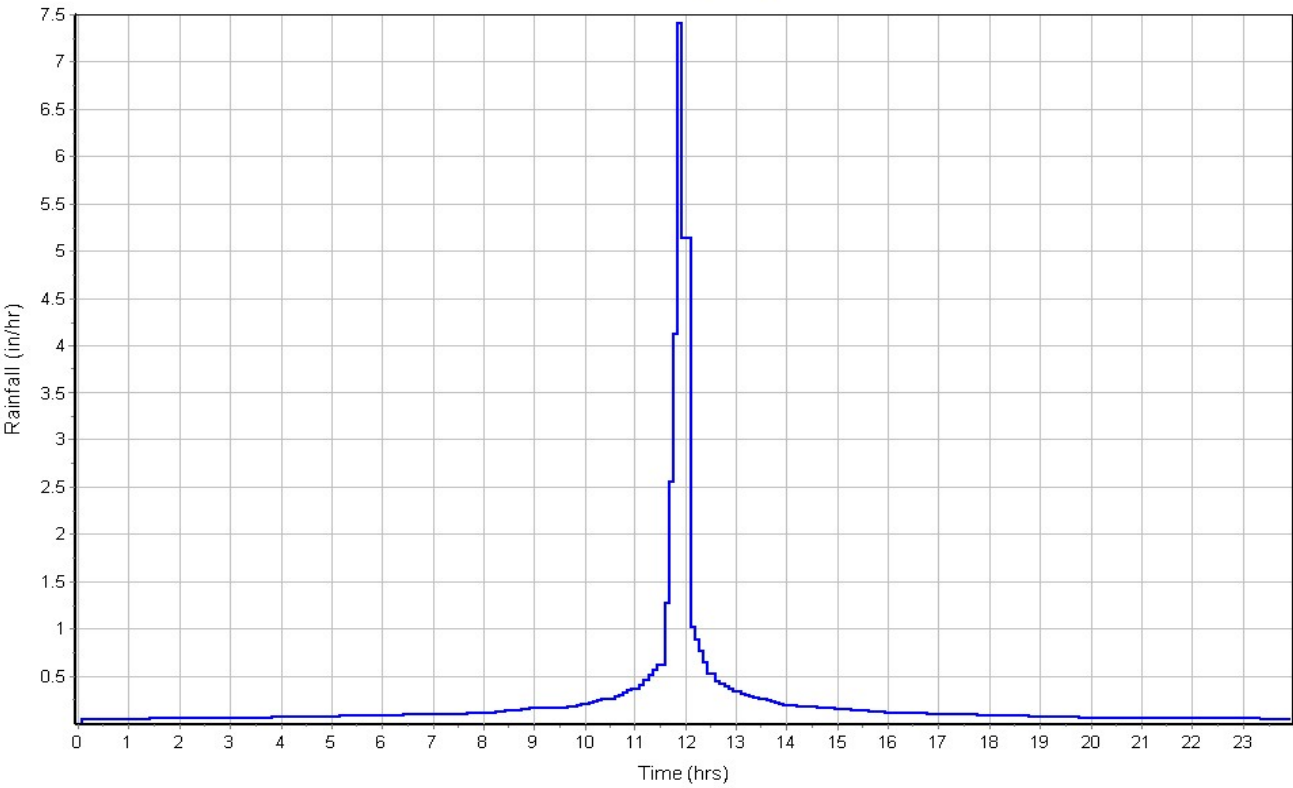
	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.15	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.60	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	7.00	0.00	0.00
	Subarea	Subarea	Subarea
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	383	276	0.00
Slope (%) :	2	.5	0.00
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.87	1.44	0.00
Computed Flow Time (min) :	2.22	3.19	0.00
Total TOC (min)	12.42		

Subbasin Runoff Results

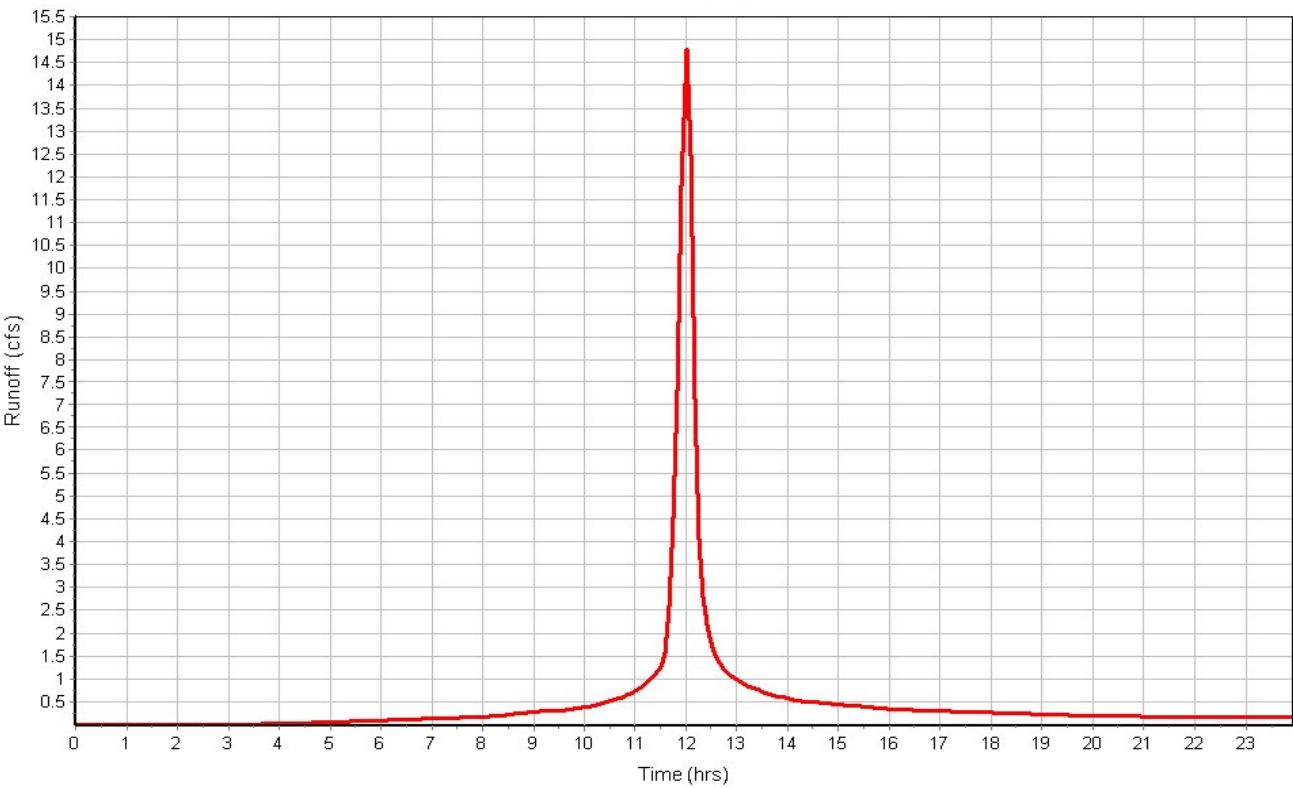
Total Rainfall (in)	5.40
Total Runoff (in)	4.42
Peak Runoff (cfs)	14.81
Weighted Curve Number	91.48
Time of Concentration (days hh:mm:ss)	0 00:12:25

Subbasin : Future

Rainfall Intensity Graph



Runoff Hydrograph



Project Description

File Name Storm Analysis Future.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods .. NO

Analysis Options

Start Analysis On Jul 25, 2019 00:00:00
End Analysis On Jul 26, 2019 00:00:00
Start Reporting On Jul 25, 2019 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 3
Subbasins..... 1
Nodes..... 1
 Junctions 0
 Outfalls 1
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 0
 Channels 0
 Pipes 0
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100yr	Time Series	100 yr	Intensity	inches	Kansas	Johnson	100	7.90	SCS Type II 24-hr
2	10yr	Time Series	10 yr	Intensity	inches	Kansas	Johnson	10	5.40	SCS Type II 24-hr
3	1yr	Time Series	1 yr	Intensity	inches	Kansas	Johnson	1	3.00	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area	Weighted Curve Number	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Future	2.70	91.48	7.90	6.88	18.58	22.46	0 00:12:25

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Out-02	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : Future

Input Data

Area (ac) 2.70
Weighted Curve Number 91.48
Rain Gage ID 100yr

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	1.70	C	98.00
Pasture, grassland, or range, Fair	0.40	D	84.00
Meadow, non-grazed	0.60	D	78.00
Composite Area & Weighted CN	2.70		91.48

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

$V = (1.49 * (R^{(2/3)}) * (S_f^{0.5})) / n$
 $R = A_q / W_p$
 $T_c = (L_f / V) / (3600 \text{ sec/hr})$

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

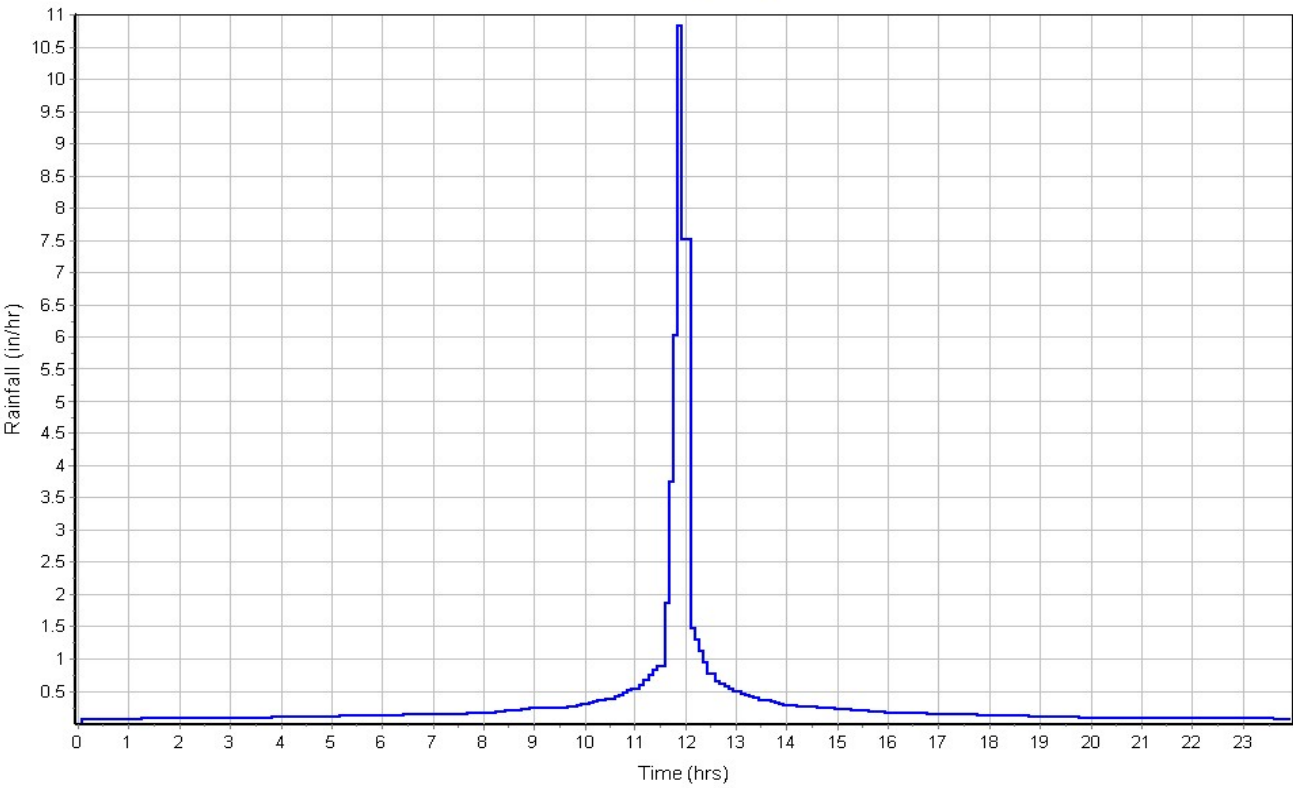
Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
	.15	0.00	0.00
	50	0.00	0.00
	1	0.00	0.00
	3.60	0.00	0.00
Manning's Roughness :	0.12	0.00	0.00
Flow Length (ft) :	7.00	0.00	0.00
Slope (%) :			
2 yr, 24 hr Rainfall (in) :			
Velocity (ft/sec) :			
Computed Flow Time (min) :			
Shallow Concentrated Flow Computations	Subarea	Subarea	Subarea
	A	B	C
	383	276	0.00
	2	.5	0.00
	Paved	Paved	Unpaved
	2.87	1.44	0.00
Flow Length (ft) :	2.22	3.19	0.00
Slope (%) :			
Surface Type :			
Velocity (ft/sec) :			
Computed Flow Time (min) :			
Total TOC (min)	12.42		

Subbasin Runoff Results

Total Rainfall (in)	7.90
Total Runoff (in)	6.88
Peak Runoff (cfs)	22.46
Weighted Curve Number	91.48
Time of Concentration (days hh:mm:ss)	0 00:12:25

Subbasin : Future

Rainfall Intensity Graph



Runoff Hydrograph

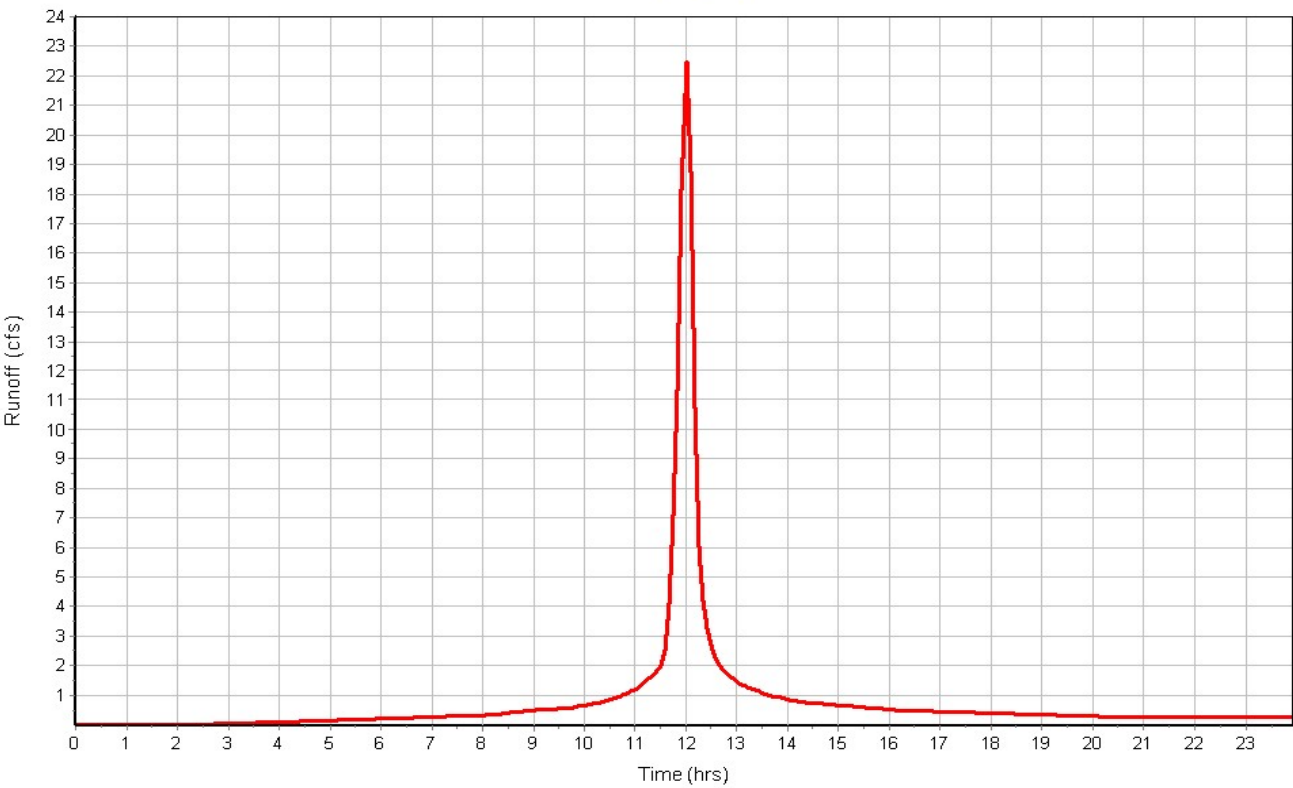


EXHIBIT H
BMP ANALYSIS



WORKSHEET 1: REQUIRED LEVEL OF SERVICE - UNDEVELOPED SITE

Project: 19-0143 Medical Office Building
Location: Roeland Park, Kansas

By: CMK Date: 8/6/2019
Checked: Date:

1. Runoff Curve Number

A. Predevelopment CN

Cover Description	Soil HSG	CN	Area (ac.)	Product of CN x Area
Pasture, Fair	D	84.0	1.9	155.4
Parking lots, roofs, streets w/ sewer, water, etc	C	98.0	0.8	82.3
Totals:			2.7	237.7

Area-Weighted CN = total product/total area =

88.0

B. Postdevelopment CN

Cover Description	Soil HSG ¹	CN	Area (ac.)	Product of CN x Area
Pasture, Fair	D	84.0	0.4	33.6
Parking lots, roofs, streets w/ sewer, water, etc	C	98.0	1.7	166.6
Native grass	D	78.0	0.6	46.8
Totals:			2.7	247.0

¹ Postdevelopment CN is one HSG higher for all cover types except preserved vegetation, absent documentation showing how postdevelopment soil structure will be preserved.

Area-Weighted CN = total product/total area =

91.0

C. Level of Service (LS) Calculation

Predevelopment CN: 88

Postdevelopment CN: 91

Difference: 3

LS Required (see scale at right): 5



WORKSHEET 2: DEVELOP MITIGATION PACKAGE(S) THAT MEET THE REQUIRED LS

Project 19-0143 Medical Office Building

By:

Date:

7/31/2019

Location Roeland Park, Kansas

Checked:

Date:

Sheet 1 of 1

1. Required LS (New Development, Wksht 1) or Total VR (Redevelopment, Wksht 1A):

5.00

Note: Various BMPs may alter CN of proposed development, and LS; recalculate both if applicable.

2. Proposed BMP Option Package No. 1

Cover/BMP Description	Treatment Area	VR	Product of VR x Area
Native Vegetation	0.6	9.3	5.7
Rain Garden	0.4	9.0	3.6
Pavement	0.6	-	-
Proprietary System	1.1	4.0	4.4
.			
Total²:	2.7	Total:	13.7

***Weighted VR:** 5.1 = total product/total area

¹ VR calculated for final BMP only in Treatment Train

² Total treatment area cannot exceed 100 percent of the actual site area

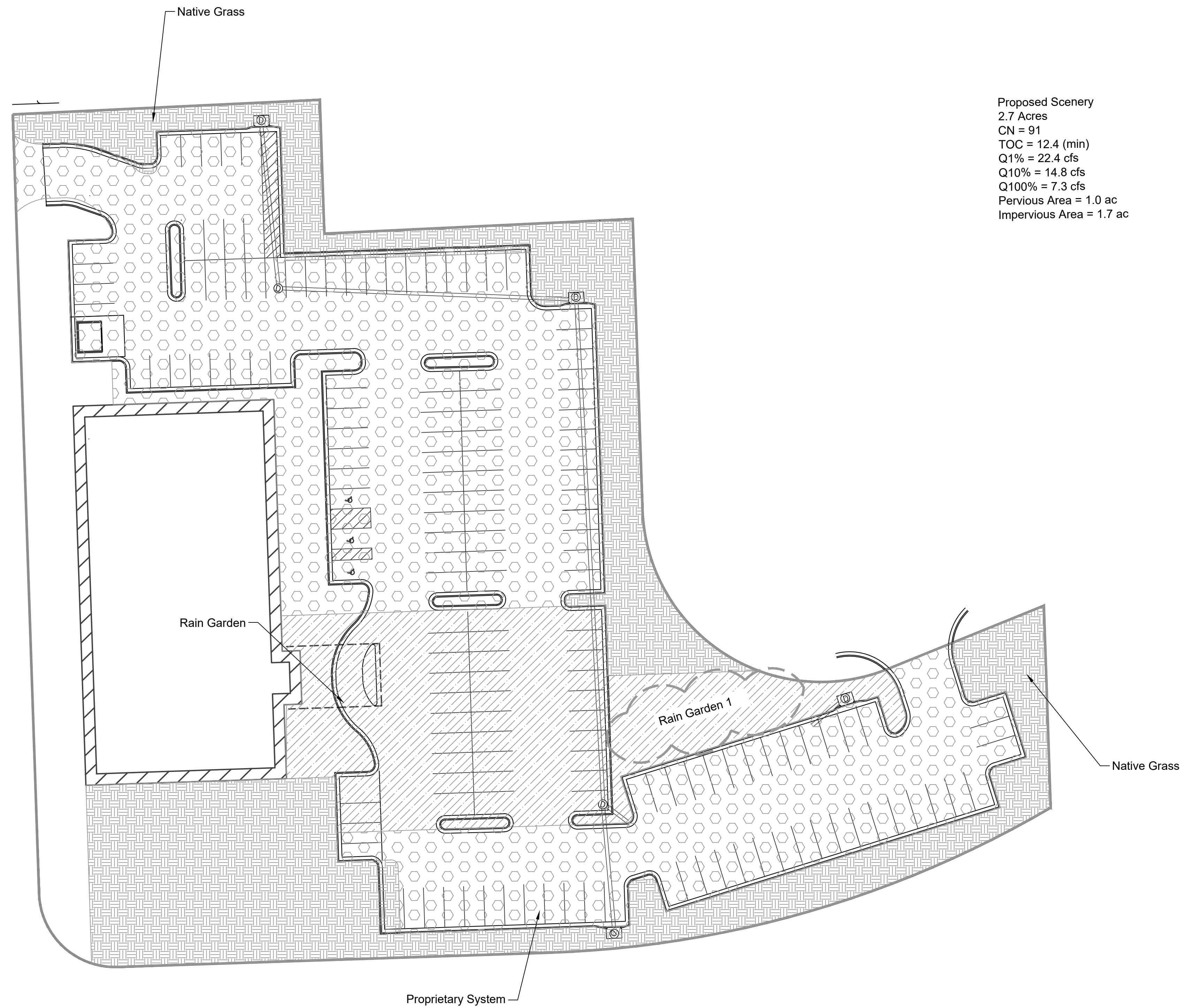
* Blank in Redevelopment

Meets required LS (Yes/No)?

Yes

(If No, or if additional options are being tested, proceed below)

BMP Analysis

[illegible]

LEGEND

Native Vegetation Area = 0.6 ac	
Rain Garden Area = 0.4 ac	
Proprietary System Area = 1.1 ac	

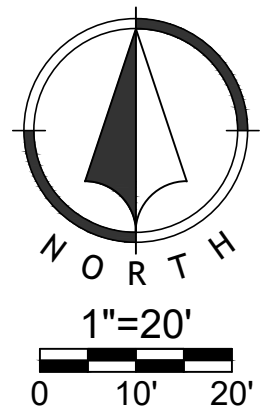


EXHIBIT J

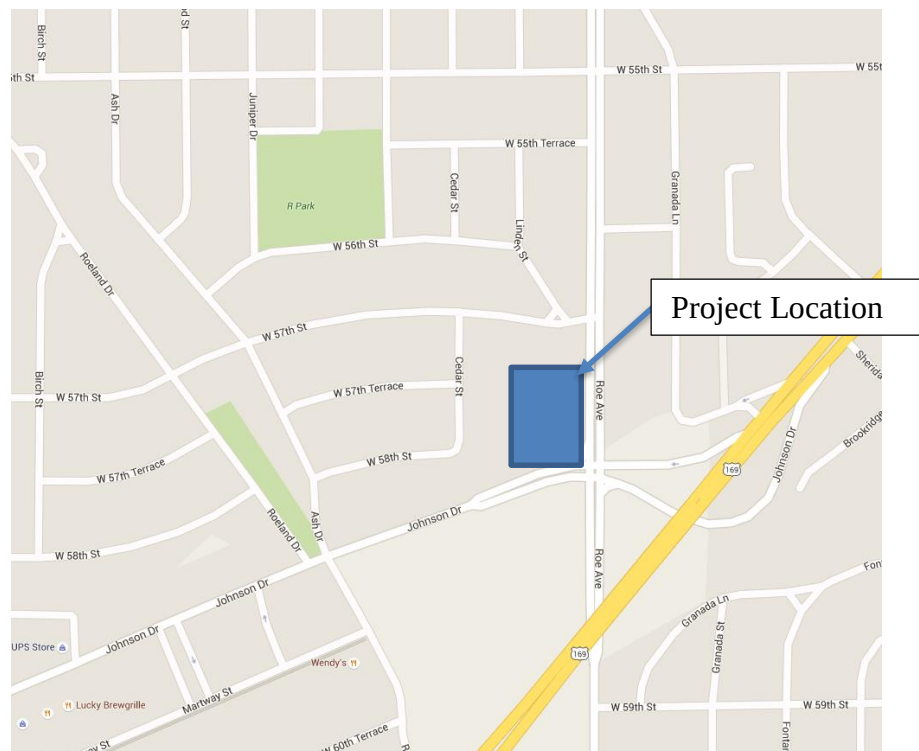
COMMERCE BANK & EMBREE
HOSPITAL STORMWATER REPORT

PRELIMINARY STORMWATER STUDY

COMMERCE BANK & EMBREE HOSPITAL ROELAND PARK, KS

PREPARED FOR:
COMMERCE BANK AND EMBREE

PREPARED BY:
OLSSON ASSOCIATES
1300 BURLINGTON ST. STE. 100
KANSAS CITY, MO 64116



JULY 2016
OA PROJECT NUMBER: 016-1960

Commerce Bank & Embree
Stormwater Report

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TABLES

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- Table 2 – Existing Peak Flows
- Table 3 – Proposed Peak Flows

APPENDICES

- Appendix A: Figures
- Appendix B: FEMA LOMR/ Soils Report
- Appendix C: Supporting Information & Calculations

Commerce Bank & Embree Stormwater Report

GENERAL INFORMATION

This micro stormwater management study is being submitted on behalf of Commerce Bank and Embree for the proposed Commerce Bank and Hospital in Roeland Park, Kansas.

Project Location and Description

The proposed site lies within the northwest ¼ of Section 9, Township 12 South, Range 25 East, in Johnson County, Roeland Park, Kansas and includes approximately 2.65 acres. The site is located at the northwest corner of Johnson Drive and Roe Boulevard (See Appendix A for Site Maps).

Study Purpose and Criteria

The purpose of this study is to explain that the proposed development of the Commerce Bank and Embree Hospital sites are in conformance with the City of Roeland Park Ordinances and Procedures. This document utilizes the Standard Specifications and Design Criteria, "Division V – Design Criteria, Section 5600 - Storm Drainage Systems and Facilities" of the American Public Works Association, Kansas City Metropolitan Chapter (APWA) adopted February 15, 2006 and the Mid-America Regional Council, Manual of Best Management Practices For Stormwater Quality October 2012, referred to hereafter as "2012 MARC BMP Manual". This study will analyze the post-development peak stormwater discharges from the site to ensure there are no adverse impacts on downstream receiving stormwater systems or properties and discuss best management practices to mitigate impacts to storm water quality.

FEMA Flood Classification

The site is classified as a "Zone X" Area according to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Johnson County, Kansas and Incorporated Areas Map Number 20091C0024G dated August 3, 2009 with Revision to Reflect LOMR Effective February 8, 2012. According to the FEMA FIRM, Zone X corresponds to areas determined to be outside the 0.2% annual chance floodplain. See the FEMA LOMR in Appendix B. No FEMA permitting or submittals will be required for this site.

Soils Descriptions

Soil classifications were obtained from the Natural Resource Conservation Service's website by utilizing the Web Soil Survey feature. The site soil composition and classification can be viewed in the chart below. These soil properties are shown in Table 1.

Commerce Bank & Embree

Stormwater Report

Table 1: Soil Classifications

Soil Description	Hydrologic Soil Group
Sharpsburg Urban land complex	C

A more detailed printout from the online Web Soil Survey is included in Appendix B.

HYDROLOGIC/HYDRAULIC ANALYSES

Existing Conditions Analysis

Per the Preliminary Stormwater Study, the existing conditions of the site will be analyzed per the conditions in the Northeast Johnson County Watershed Study of November 20, 2006. At the time of analysis, the site contained public interchange ramps that connected Johnson Drive and Roe Avenue. Due to the earthwork and construction that had taken place on-site, the Hydrologic soil group was assumed to be D for existing conditions. The site generally drains to the southeast to an area inlet that connects to a 36" RCP (Outfall A) that flows east under Roe Boulevard, eventually combining with Rock Creek. The site is part of the Rock Creek watershed. See the exhibit in Appendix A which shows existing drainage boundaries and impervious area. The values used for the calculation were attained from the 2012 MARC BMP Manual. The existing conditions will generate a runoff of 26.37 cfs for the 100-year storm event (See Appendix C for Calculations). Pre-development flows are summarized in Table 2.

Table 2: Existing Peak Flows

	WEIGHTED CN VALUE	TOTAL AREA	1-YR STORM (CFS)	10-YR STORM (CFS)	100-YR STORM (CFS)
Outfall A	87	2.65	7.70	16.87	26.37

Proposed Conditions Analysis

The proposed development will consist of a hospital building, a bank and associated parking facilities. Drainage patterns for the proposed conditions will remain similar to the existing conditions. The site will drain overland to proposed storm sewer designed to fully convey the 100-year storm event. Detailed storm sewer design information will be included in the storm sewer plans. The weighted CN value for proposed onsite conditions was found to be 90. (See Appendix A Figure 3 for proposed conditions). The values used for the calculation were attained from the 2012 MARC BMP Manual. The proposed conditions will

Commerce Bank & Embree Stormwater Report

generate a runoff of 27.21 cfs for the 100-year storm event (See Appendix C for Calculations).

Table 3: Proposed Peak Flows

	WEIGHTED CN VALUE	TOTAL AREA	1-YR STORM (CFS)	10-YR STORM (CFS)	100-YR STORM (CFS)
Outfall A	90	2.65	8.66	17.81	27.21

STORMWATER TREATMENT REQUIREMENTS

Detention

Using the Northeast Johnson County Watershed Study, the subarea for this site and all upstream subareas in the Rock Creek watershed were analyzed (see appendix for Subarea Map). The total area from subarea RC-040 and all upstream subareas is 1766.4 acres with 737.08 acres impervious. This results in 41.73% impervious area. After the proposed site is improved, an additional 0.62 acres of impervious area will be added to make the total impervious area 41.78%.

The existing flow for the 100 year storm approximately 1,075 feet upstream of Sheridan Drive is 5,763 cfs (see appendix for FEMA LOMR). With the proposed improvements to the Commerce Bank and Embree site an increase of 0.84 cfs will be added to the 100 year storm. This adds 0.01% to the existing flow for the 100 year storm event.

The project site is approximately 600 feet from Rock Creek. At the point the project site contributes to the creek, it is very low in the tributary area. Detaining sub-watersheds that are low in the overall tributary area has the effect of increasing the time of concentration for that sub-watershed. This results in more flow being added to the overall tributary area's peak flows, actually increasing peak runoff rates and volumes that will occur farther downstream. The best solution is to get the peak flows from the project site into the creek and downstream ahead of the total tributary area's peak flows.

Therefore, although we are aware of downstream flooding, the addition of 0.01% of flow for the 100 year storm event and an increase in 0.05% of impervious area will be insignificant, and detaining this water could increase the peak flow downstream. Because of these factors, the increase in 0.99 acres of impervious area is negligible and detention for this site will not be required.

Commerce Bank & Embree

Stormwater Report

BMP Analysis

Improvements to the property will increase impervious surface area compared to existing conditions, thus proposed improvements qualify the project to meet water quality requirements with stormwater treatment facilities (STFs). STFs on the site are proposed to mitigate post-construction runoff pollutant levels. The MARC BMP Manual was utilized to measure the Level of Service (LOS) and Value Rating (VR) required for an undeveloped site. The required LOS for this site is 5.0. Water quality treatment calculations are available in the Appendix.

The STF systems detailed below satisfy water quality treatment requirements for the project as determined by MARC BMP Manual calculations. Site construction documents will fully detail the construction and landscape specifications for all BMPs. The property owner shall be responsible for long term maintenance and upkeep of storm water treatment facilities. As required by Section 15-515 of Ordinance No. 809 of Roeland Park, the owner must complete an annual certification inspection of the stormwater management systems and is subject to City inspection at least once every three years.

A combination of STFs is proposed for the development and will include the following STFs with corresponding VRs:

- Native Vegetation (9.25)
- Bioretention (8.50)
- Proprietary Systems (4.0).

A Value Rating of 4.0 was used for Proprietary Systems in accordance with TRI/Environmental, Inc.'s study entitled, "Large-Scale Sediment Retention Device Testing: Representing Exposure to 'Post Construction' Sediment Load" of *Flexstorm PC Inlet Filters*. The study determined the *Flexstorm PC Inlet Filter* showed a downstream TSS concentration of 30 mg/L at maximum sediment levels. Using the Value Rating Calculations in Table 4.5 of the MARC BMP Manual the Water Quality Value Rating "A" would fall under the Value Rating of 2. The Oils/Floatables Reduction Rating "D" would remain at 2 equaling a total Value Rating of 4 for the Proprietary System.

Utilizing the above STFs, the site's Level of Service calculates to 5.0, meeting the required LOS of 5. Calculations, STF drainage maps and other information are available in the Appendix.

CONCLUSIONS AND RECOMMENDATIONS

There are no floodplain issues, stream setbacks needed or Section 404 permitting required. The 10 year storm will be routed through private storm sewer and will connect to existing public storm sewer following the existing drainage pattern for the site. The slight increase in impervious area is a negligible amount and detention will not be required for the site. A comprehensive package of BMP's has been provided to ensure that stormwater quality will be maintained.

Commerce Bank & Embree Stormwater Report

Based on the information provided herein, we request approval of this preliminary stormwater management study for improvements proposed with the Commerce Bank and Embree development.

If you have any questions or comments or need additional information, please do not hesitate to contact me at (816) 587-4320

OLSSON ASSOCIATES

Appendix A

Maps

Appendix B

FEMA Flood Classification Firmette/Soils Report

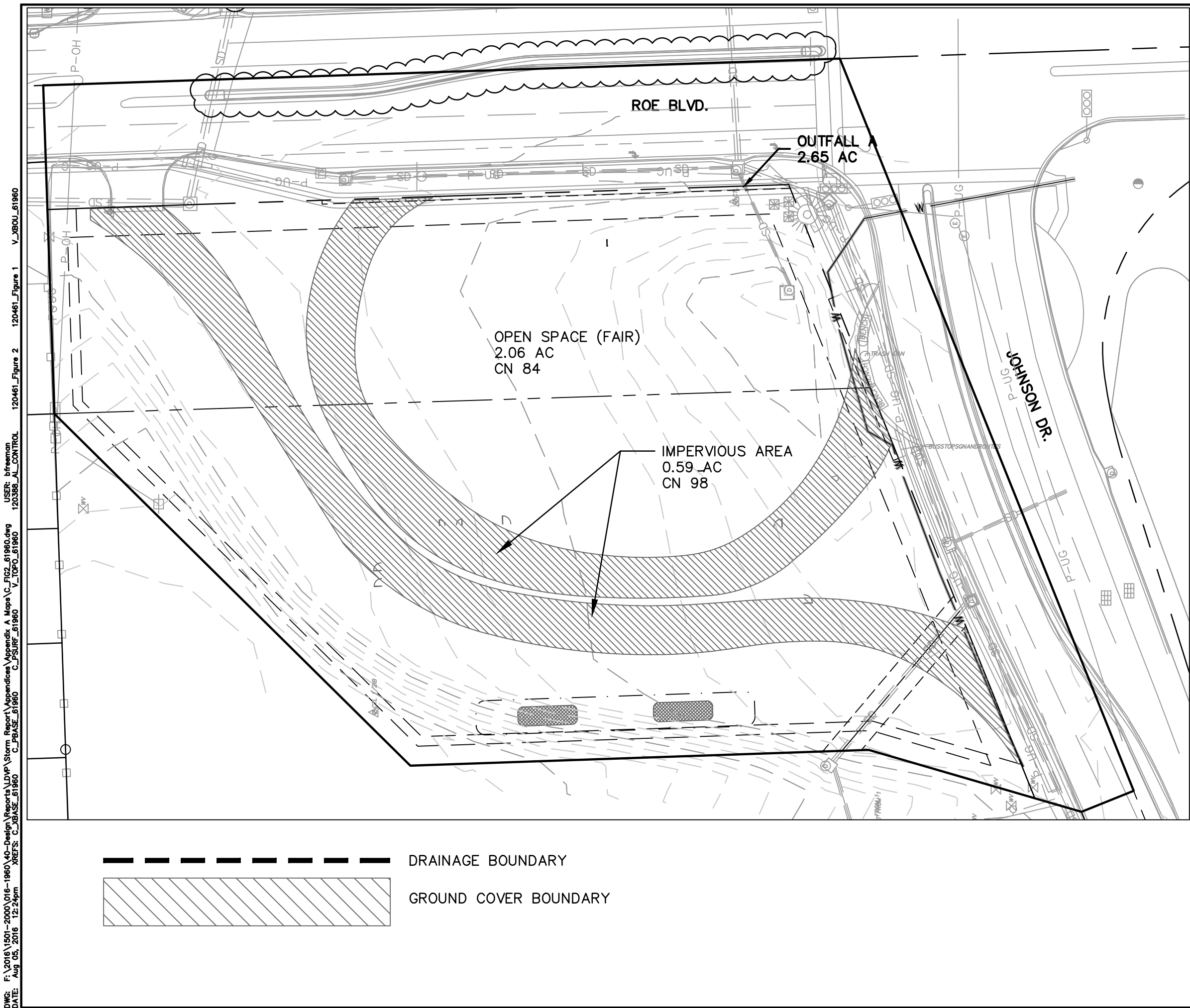
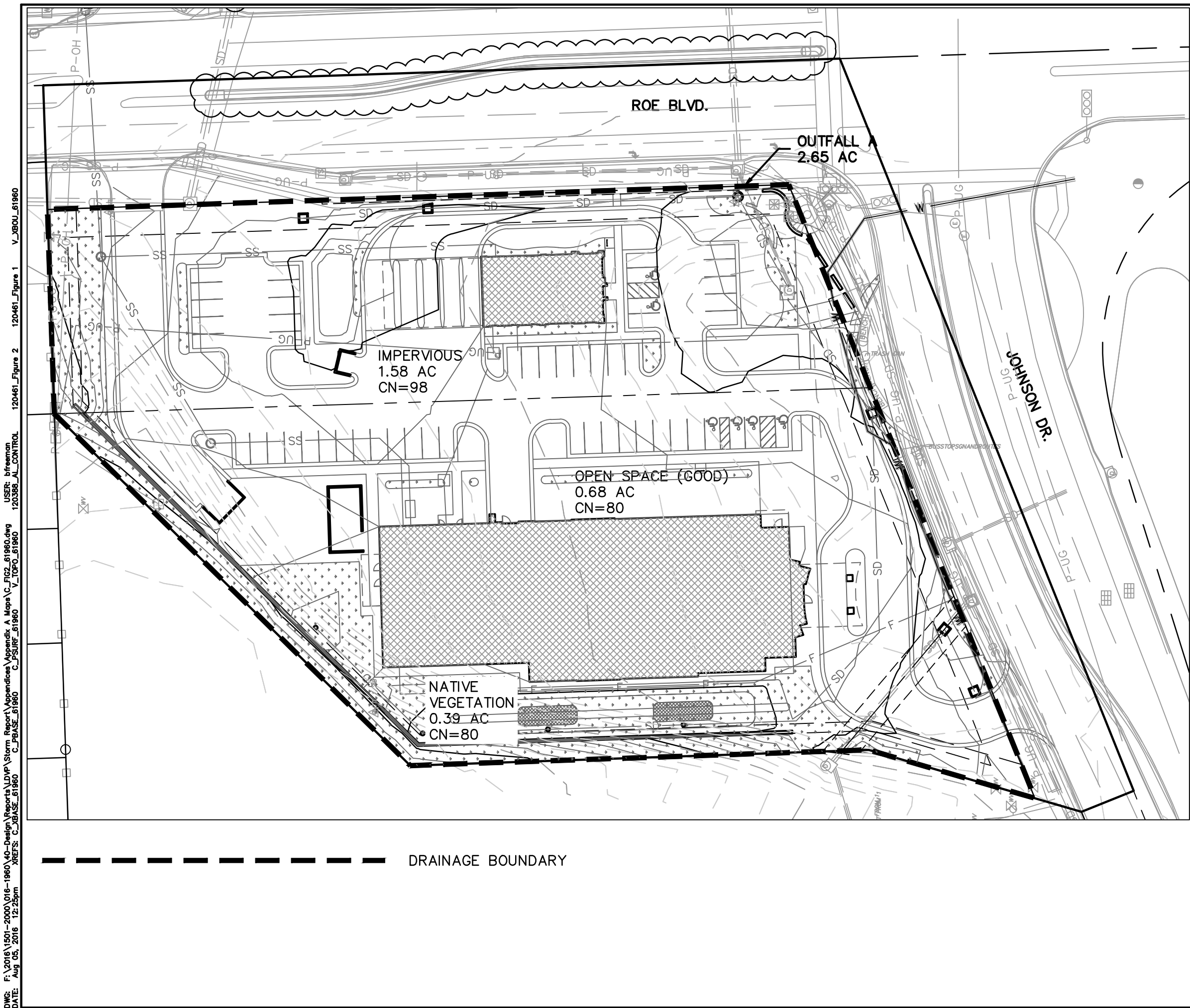


FIGURE 1 EXISTING CONDITIONS COMMERCE BANK AND EMBREE JOHNSON DR. & ROE BLVD. ROELAND PARK, KS	REV. NO.	DATE	REVISIONS DESCRIPTION
			REVISIONS
			2016

drawn by:	JK
checked by:	DR
approved by:	DR
project no.:	016-1960
drawing no.:	FIGURES



OLSSON[®]
ASSOCIATES

OLSSON ASSOCIATES, CIVIL ENGINEERING
MISSOURI CERTIFICATE OF AUTHORITY #
1251 NW Branchiff Parkway, Suite 50 TEL 816.361.1177
Kansas City, MO 64116 FAX 816.361.1888 www.olsonassociates.com

FIGURE 2
PROPOSED CONDITIONS
COMMERCE BANK AND EMBREE
JOHNSON DR. & ROE BLVD.

ROELAND PARK, KS

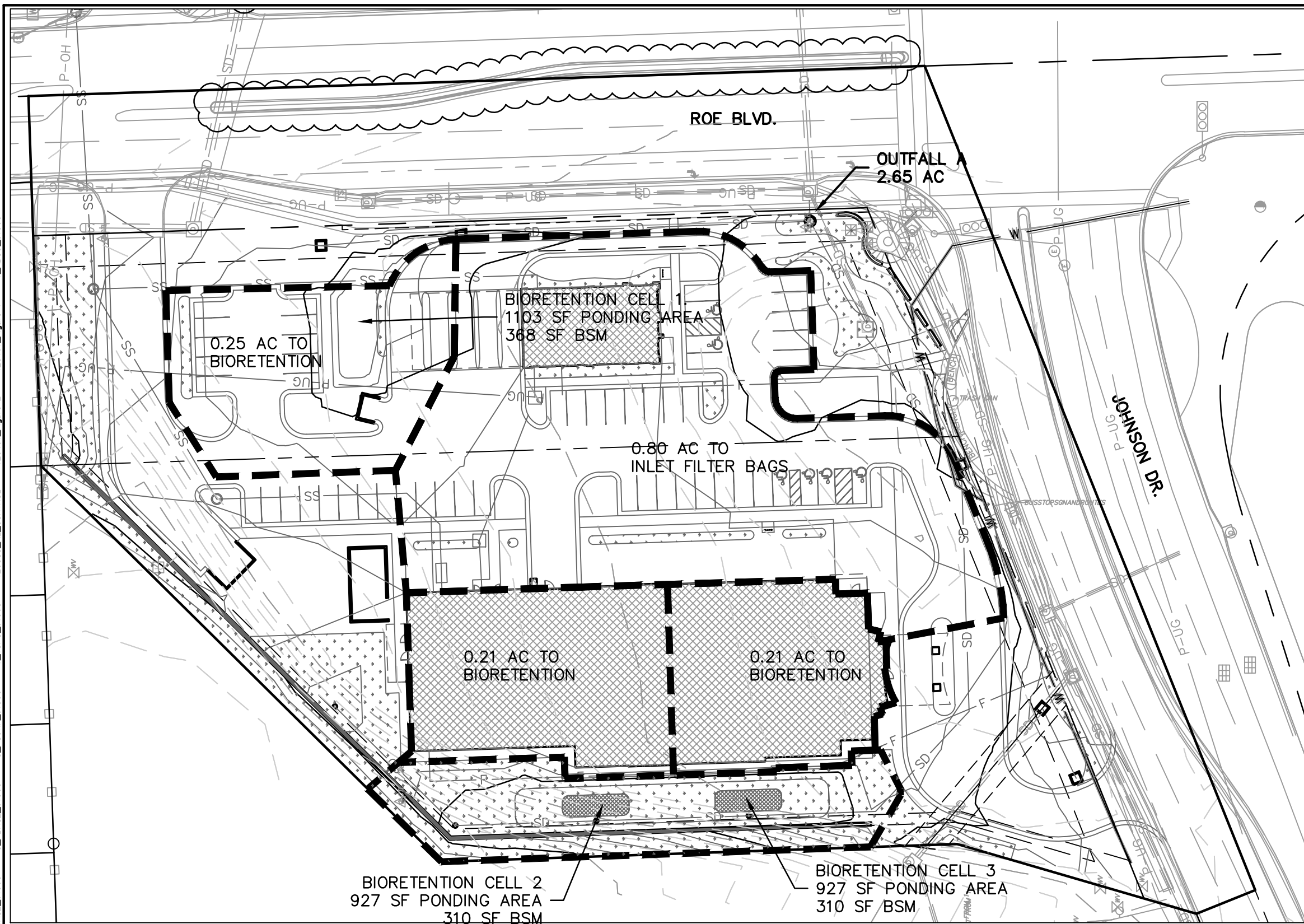
2016

drawn by: BF
checked by: DR
approved by: DR
project no.: 016-1960
drawing no.: FIGURES

REV. NO. DATE REVISIONS DESCRIPTION

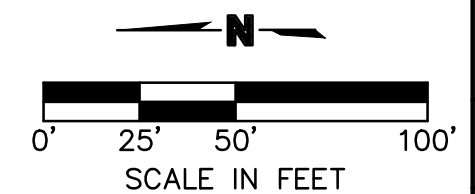
REVISIONS

SHEET
FIG 2



DRAINAGE BOUNDARY

NATIVE VEGETATION – 0.47 AC



drawn by: _____ JK checked by: _____ DE approved by: _____ DE project no.: _____ 016-1960 drawing no.: _____ FIGURES	FIGURE 3 BMP PLAN		REV. NO.	DATE	REVISIONS DESCRIPTION
ROELAND PARK, KS		2016	REVISIONS		

SHEET

FIG 3



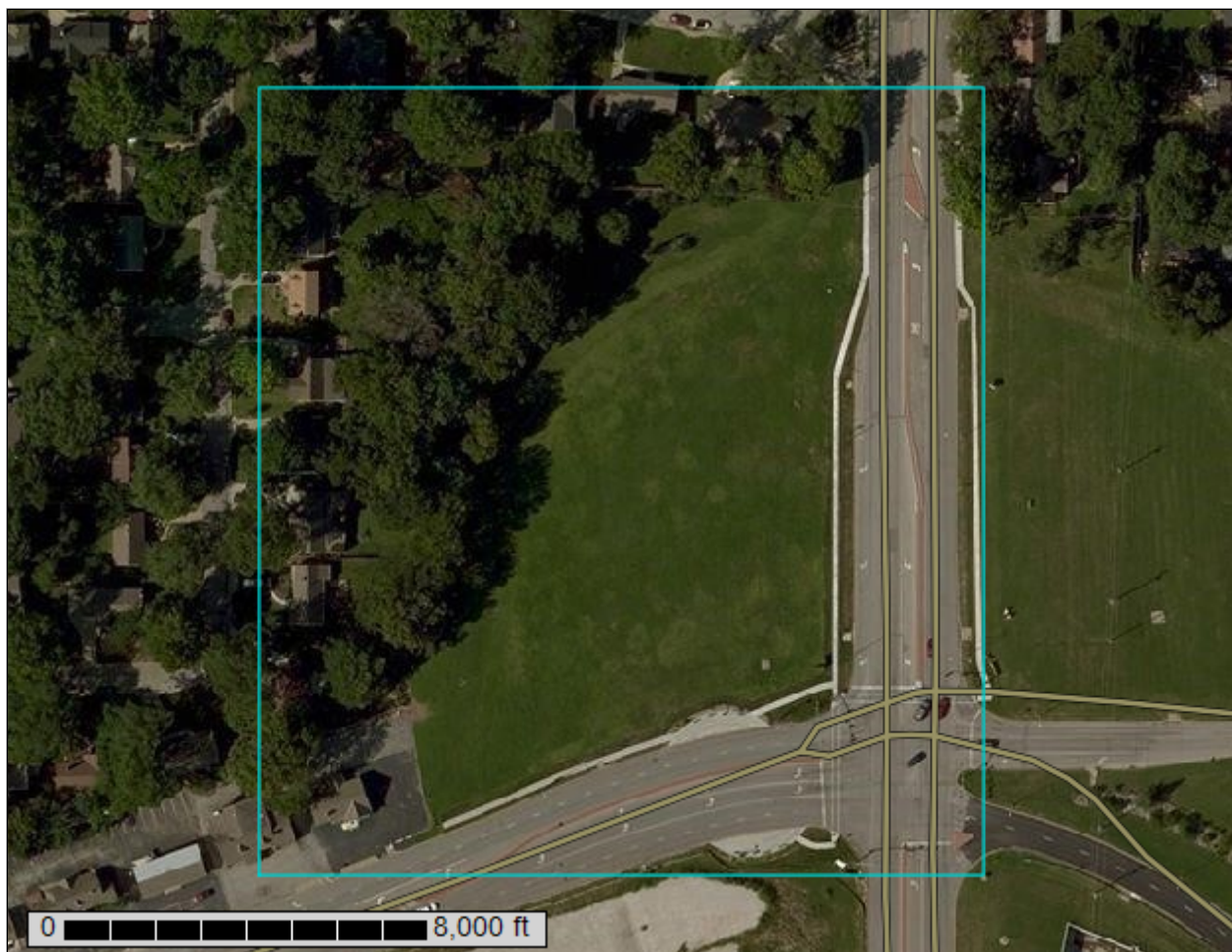
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Johnson County, Kansas**



July 11, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

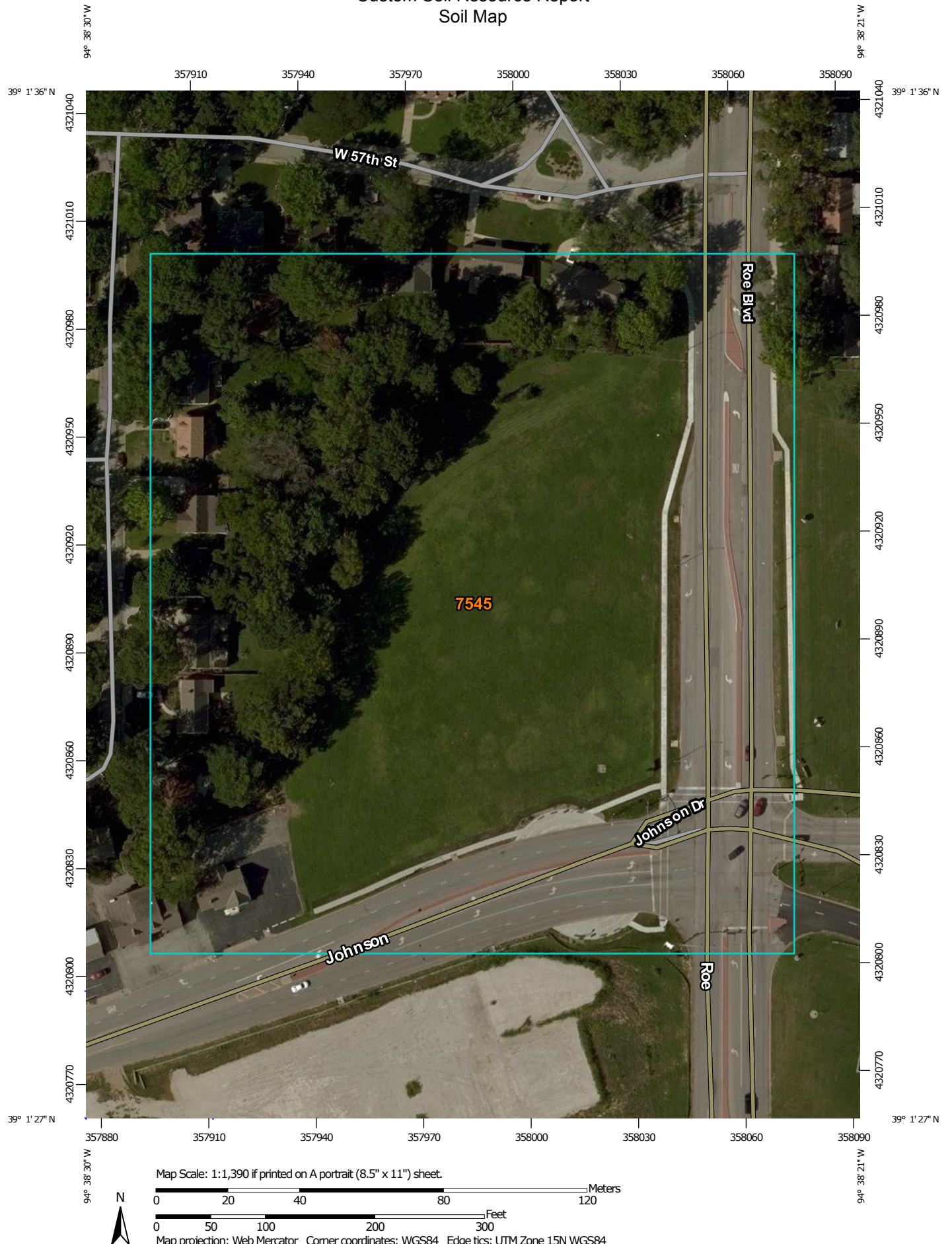
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Johnson County, Kansas
Survey Area Data: Version 14, Sep 9, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2014—Sep 7, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Johnson County, Kansas (KS091)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7545	Sharpsburg-Urban land complex, 4 to 8 percent slopes	8.7	100.0%
Totals for Area of Interest		8.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Johnson County, Kansas

7545—Sharpsburg-Urban land complex, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: tq4z

Elevation: 1,000 to 1,300 feet

Mean annual precipitation: 31 to 47 inches

Mean annual air temperature: 45 to 64 degrees F

Frost-free period: 185 to 255 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Sharpsburg and similar soils: 55 percent

Urban land: 45 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Hillslopes

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Silty and clayey loess

Typical profile

A - 0 to 9 inches: silt loam

AB - 9 to 13 inches: silty clay loam

Bt - 13 to 35 inches: silty clay loam

BC - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: About 36 to 40 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: Loamy Upland (PE 30-37) (R106XY015KS)

Description of Urban Land

Setting

Landform: Hillslopes

Down-slope shape: Convex

Across-slope shape: Convex

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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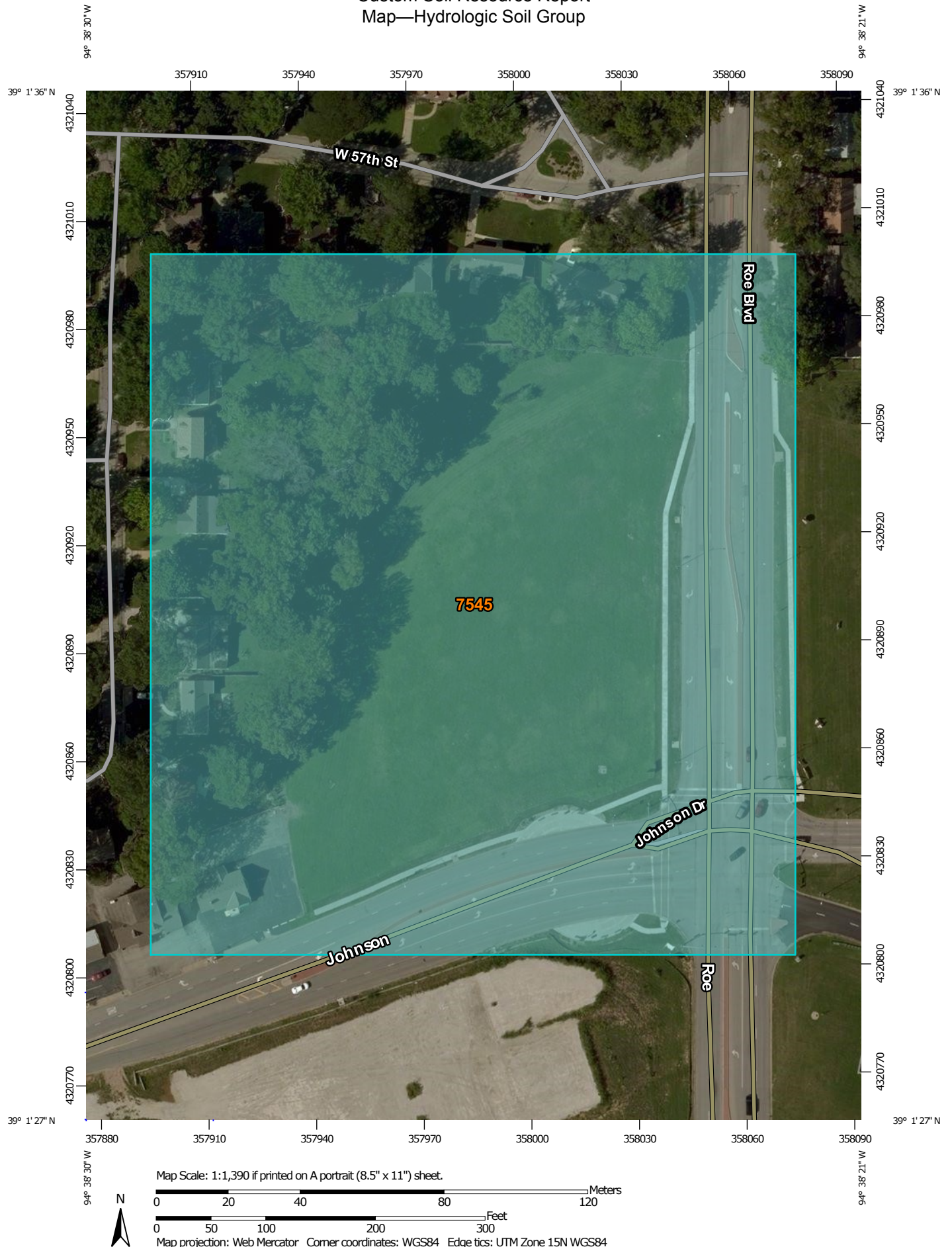
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

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Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Johnson County, Kansas (KS091)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
7545	Sharpsburg-Urban land complex, 4 to 8 percent slopes	C	8.7	100.0%
Totals for Area of Interest			8.7	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Federal Emergency Management Agency

Washington, D.C. 20472

JUN 15 2012

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Adrienne Foster
Mayor, City of Roeland Park
4600 West 51st Street
Roeland Park, KS 66205

IN REPLY REFER TO:

Case No.: 11-07-3422P
Community Name: City of Roeland Park, KS
Community No.: 200176
Effective Date of
This Revision: November 7, 2012

91 7108 2133 3938 6364 7080

Dear Mayor Foster:

The Flood Insurance Study Report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Kansas City, Missouri, at (816) 283-7002, or the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Siamak Esfandiary, Ph.D., P.E., CFM,
Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: Mr. Curtis Talcott, P.E.
Larkin Group, Inc.
9200 Ward Parkway, Suite 400
Kansas City, MO 64114

Mr. Mike Flickinger,
Building Inspector
4600 West 51st Street
Roeland Park, KS 66205

Mr. Tom Morey, CFM
Kansas Dept. of Agriculture
109 SW 9th St. 2nd Floor
Topeka, KS 66612



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Roeland Park Johnson County Kansas	CHANNELIZATION CULVERT OTHER	FLOODWAY HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 200176		
IDENTIFIER	RC12-14 Storm Drainage Improvements	APPROXIMATE LATITUDE & LONGITUDE: 39.032, -94.641 SOURCE: Other DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 20091C0009G DATE: August 3, 2009 TYPE: FIRM* NO.: 20091C0024G DATE: August 3, 2009		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 03, 2009 PROFILE(S): 348P FLOODWAY DATA TABLE: 6 SUMMARY OF DISCHARGES TABLE: 3	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) & REVISED REACH(ES)

See Page 2 for Additional Flooding Sources

Rock Creek Tributary D - from just upstream of West 55th Street to approximately 90 feet downstream of Juniper Street

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Rock Creek Tributary D	Zone AE	Zone AE	NONE	YES
	BFEs	BFEs	NONE	YES
	Zone AE	Zone AO	YES	NONE
	Floodway	Floodway	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Siamak Esfandiary, Ph.D., P.E., CFM, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

11-07-3422P

102-D-A



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

Rock Creek Tributary D - from just upstream of West 55th Street to approximately 90 feet downstream of Juniper Street

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Rock Creek Tributary D	Zone X (unshaded)	Zone X (unshaded)	YES	YES
* BFEs - Base Flood Elevations				

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

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Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

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Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Robert G. Bissell
Director, Mitigation Division
Federal Emergency Management Agency, Region VII
9221 Ward Parkway, Suite 300
Kansas City, MO 64114-3372
(816) 283-7002

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

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Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NAVD 88)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Rock Creek Tributary D	approximately 100 feet upstream of Sherwood Drive	961	958	20091C0009G

A notice of changes will be published in the *Federal Register*. This information will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Legal Record*
 Dates: July 3, 2012 and July 10, 2012

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Siamak Esfandiary, Ph.D., P.E., CFM, Program Specialist
 Engineering Management Branch
 Federal Insurance and Mitigation Administration

Table 3 - Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (square miles)	10-Percent- Annual- Chance	Peak Discharges (cubic feet per second)			
			2-Percent- Annual- Chance	1-Percent-Annual- Chance		0.2-Percent- Annual-Chance
				Existing	Future	
REVISED TO REFLECT LOMR EFFECTIVE: November 7, 2012						
NORTH BRANCH INDIAN CREEK TRIBUTARY B						
Approximately 1,150 feet upstream of the confluence with North Branch Indian Creek	1.64	1,969	3,013	3,552	3,682	4,753
At Westgate Road	1.20	1,775	2,706	3,125	3,238	4,071
Approximately 550 feet upstream of Hauser Street	1.07	1,675	2,494	2,887	2,998	3,767
PICKERING CREEK						
At West 159th Street	3.89	1,485	3,879	4,622	5,840	6,471
At West 167th Street	1.49	798	2,316	2,752	3,593	3,821
PICKERING CREEK TRIBUTARY A						
At the confluence of Pickering Creek Tributary AA	1.34	1,179	2,545	2,938	3,534	3,871
Approximately 3,200 feet upstream of the confluence of Pickering Creek Tributary AA	0.80	699	1,591	1,845	2,279	2,449
ROCK CREEK						
Approximately 1,100 feet upstream of the confluence with Brush Creek	4.47	4,684	7,552	8,103	*	10,418
Just upstream of the confluence of Rock Creek Tributary B	3.56	4,515	6,906	7,386	*	9,319
Approximately 1,075 feet upstream of Sheridan Drive	2.76	3,673	5,552	5,894	*	7,329
At the confluence of Rock Creek Tributary G	0.44	850	1,275	1,357	*	1,718
At Lamar Avenue	0.26	420	639	681	*	867
ROCK CREEK TRIBUTARY A						
At Shawnee Mission Parkway	0.53	916	1,409	1,506	*	1,967
At West 53rd Street	0.26	466	735	787	*	1,020
Approximately 1,300 feet upstream of West 52nd Place	0.16	292	456	488	*	629
ROCK CREEK TRIBUTARY B						
At Shawnee Mission Parkway	0.13	199	314	336	*	435
ROCK CREEK TRIBUTARY D						
At West 55th Street	0.28	467	685	781	*	1,008
Approximately 200 feet downstream of West 54th Terrace	0.25	413	605	690	*	891
Approximately 250 feet downstream of Sherwood drive	0.21	349	511	582	*	751
Approximately 300 feet downstream of Juniper Street	0.17	288	421	480	*	619

* Data not available

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION				
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	EXISTING CONDITIONS (FEET NAVD)	FUTURE CONDITIONS (FEET NAVD)	EXISTING CONDITIONS WITHOUT FLOODWAY (FEET NAVD)	EXISTING CONDITIONS WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
ROCK CREEK (CONTINUED)									
H	10,838 ¹	365	1,719	2.6	932.5	*	932.5	932.5	0.0
I	12,154 ¹	298	793	3.9	936.2	*	936.2	936.2	0.0
J	12,873 ¹	245	751	3.7	944.2	*	944.2	944.3	0.1
K	13,571 ¹	137	425	6.1	948.0	*	948.0	948.0	0.0
L	15,008 ¹	39	167	12.5	956.9	*	956.9	957.0	0.1
ROCK CREEK TRIBUTARY A					AREA REVISED BY LOMR DATED MAY 28, 2010				
A	830 ²	80	287	5.1	891.1	*	891.1	891.1	0.0
B	1,672 ²	54	102	7.7	902.4	*	902.4	902.5	0.1
C	2,716 ²	83	138	3.6	924.5	*	924.5	924.7	0.2
ROCK CREEK TRIBUTARY B									
A	1,008 ²	25	30	5.6	913.9	*	913.9	914.0	0.1
B	1,667 ²	17	25	6.7	932.2	*	932.2	932.6	0.4
ROCK CREEK TRIBUTARY D									
A	308 ³	18	72	9.5	932.8	*	932.8	933.4	0.6
B	902 ³	50	196	3.5	944.3	*	944.3	944.3	0.0
C	1,446 ³	27	75	7.8	948.1	*	948.1	948.1	0.0
D	2,196 ³	34	66	7.3	958.6	*	958.6	958.6	0.0

¹Feet above confluence with Brush Creek

²Feet above confluence with Rock Creek

³Feet above West 55th Street

*Data not available

**REVISED TO
REFLECT LOMR
EFFECTIVE: November 7, 2012**

REVISED AREA

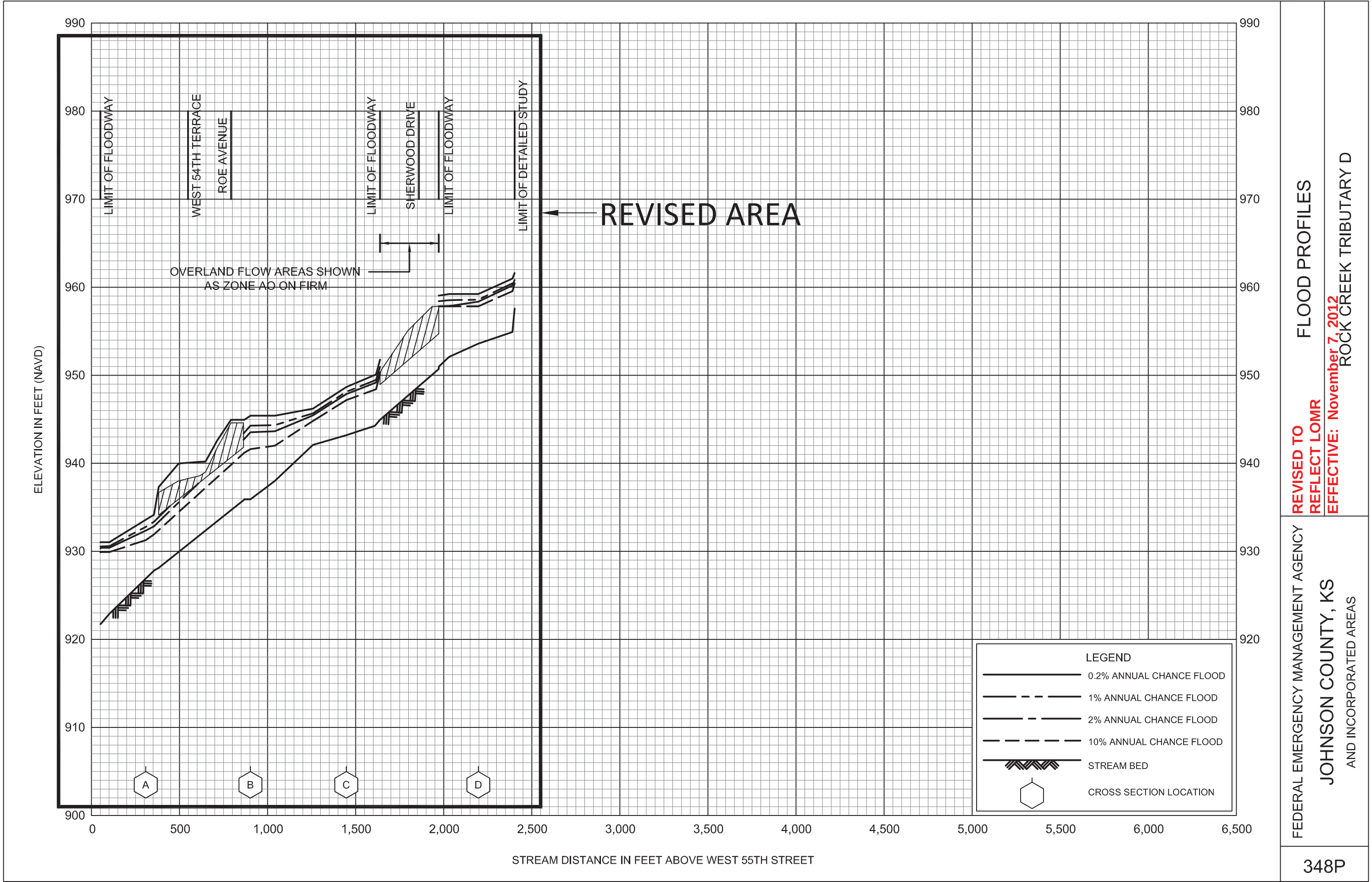
TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

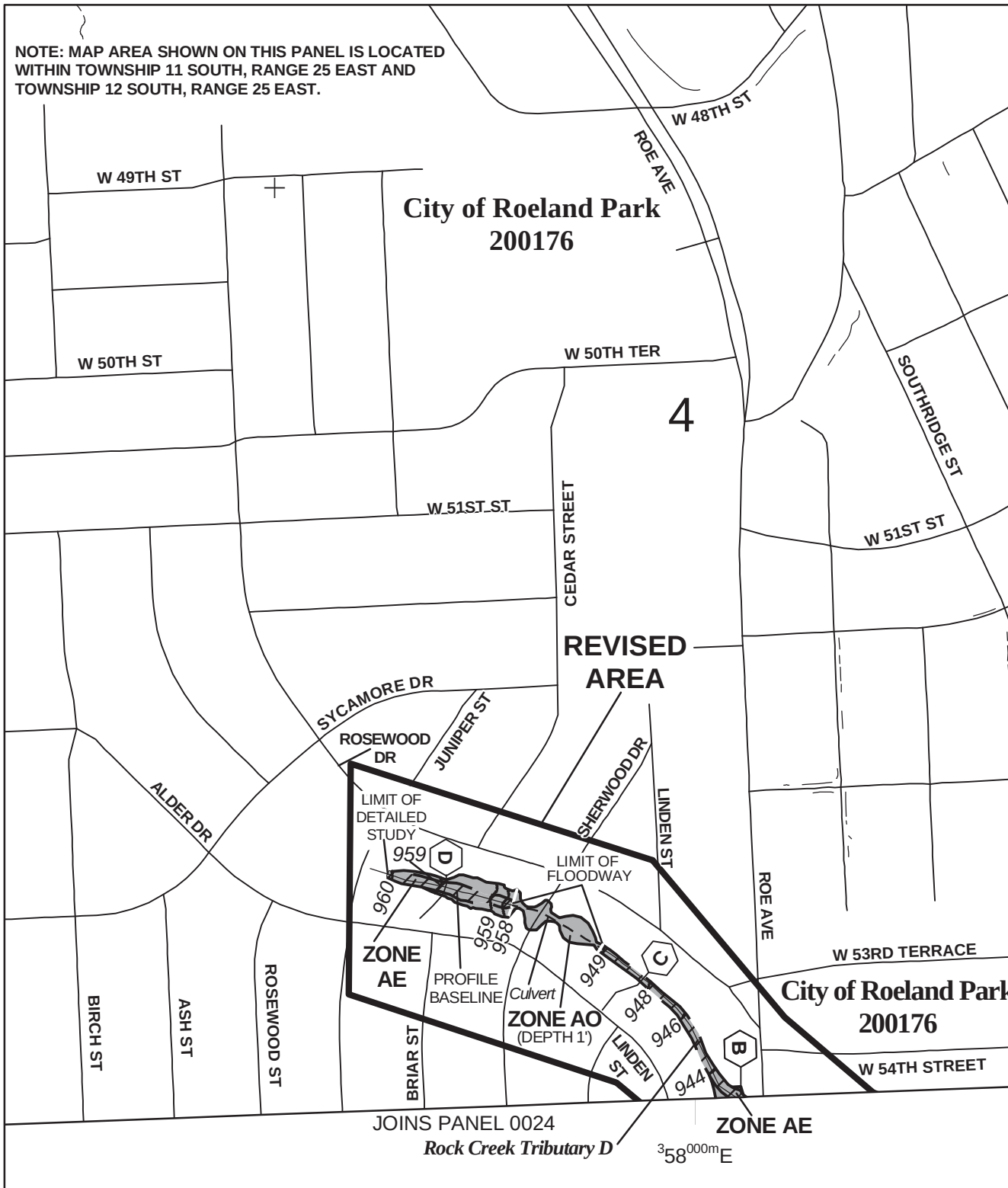
**JOHNSON COUNTY, KS
AND INCORPORATED AREAS**

FLOODWAY DATA

**ROCK CREEK – ROCK CREEK TRIBUTARY A – ROCK
CREEK TRIBUTARY B – ROCK CREEK TRIBUTARY D**



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED
WITHIN TOWNSHIP 11 SOUTH, RANGE 25 EAST AND
TOWNSHIP 12 SOUTH, RANGE 25 EAST.



Legend

-  1% annual chance (100-Year) Floodplain
-  1% annual chance (100-Year) Floodway
-  0.2% annual chance (500-Year) Floodplain



MAP SCALE 1" = 500'



NFIP

PANEL 0009G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP
JOHNSON COUNTY,
KANSAS
AND INCORPORATED AREAS

PANEL 9 OF 161

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FAIRWAY, CITY OF	205185	0009	G
MISSION, CITY OF	200170	0009	G
ROELAND PARK, CITY OF	200176	0009	G

**REVISED TO
REFLECT LOMR
EFFECTIVE:
November 7, 2012**

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

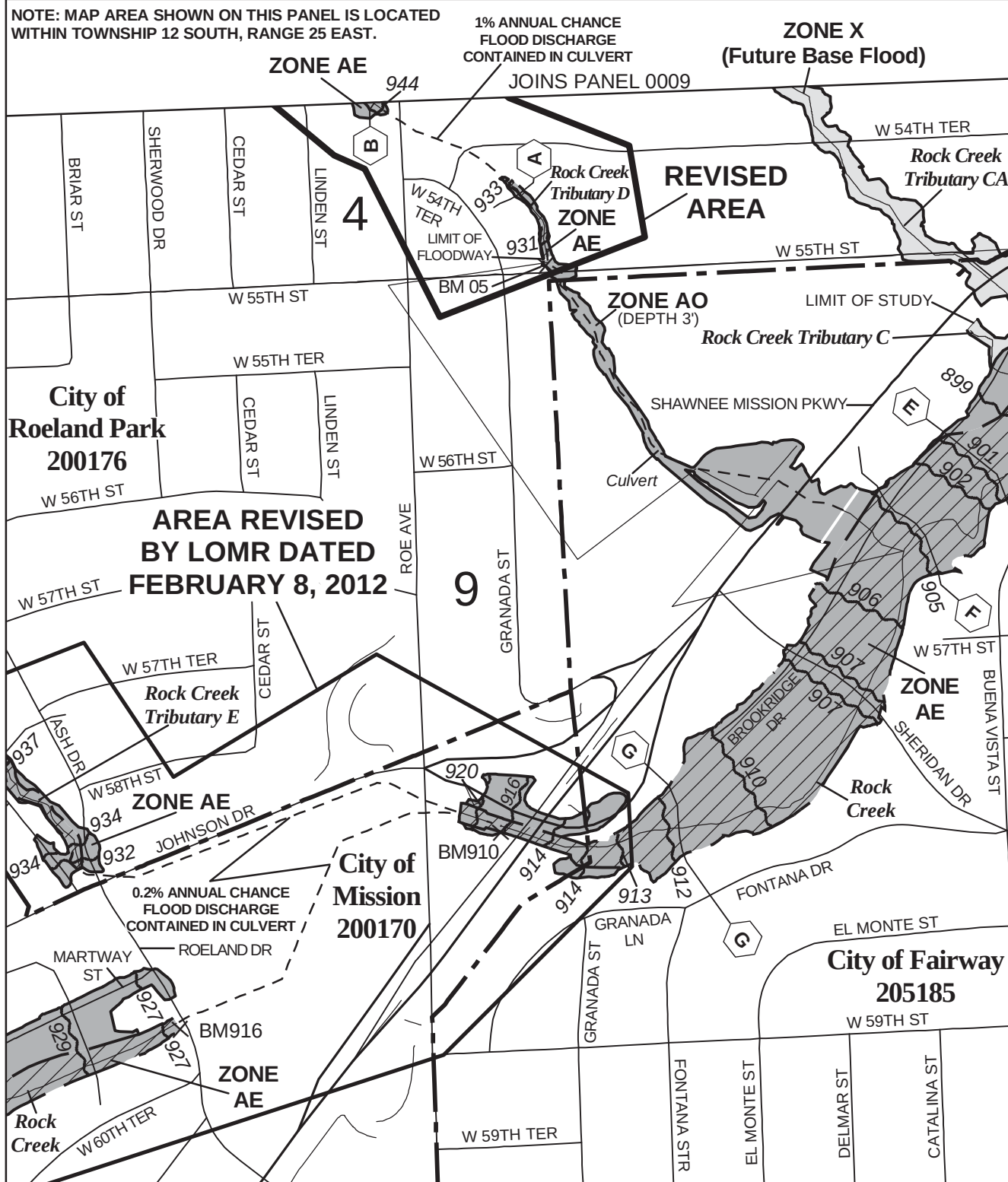


MAP NUMBER
20091C0009G

MAP REVISED
AUGUST 3, 2009

Federal Emergency Management Agency

**NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED
WITHIN TOWNSHIP 12 SOUTH, RANGE 25 EAST.**

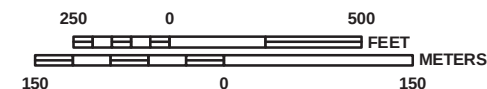


Legend

-  1% annual chance (100-Year) Floodplain
-  1% annual chance (100-Year) Floodway
-  0.2% annual chance (500-Year) Floodplain



MAP SCALE 1" = 500'



NEIR

PANEL 0024G

FIRM

FLOOD INSURANCE RATE MAP JOHNSON COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 24 OF 161

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
FAIRWAY, CITY OF	205185	0024	G
MISSION HILLS, CITY OF	200171	0024	G
MISSION, CITY OF	200170	0024	G
OVERLAND PARK, CITY OF	200174	0024	G
PRAIRIE VILLAGE, CITY OF	200175	0024	G
ROELAND PARK, CITY OF	200176	0024	G

**REVISED TO
REFLECT LOMR
EFFECTIVE:
November 7, 2012**

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
20091C0024G
MAP REVISED
AUGUST 3, 2009

Federal Emergency Management Agency

Appendix C

Supporting Information & Calculations

WORKSHEET 1: REQUIRED LEVEL OF SERVICE - UNDEVELOPED SITE
Project : Commerce Bank and Embree

Location: Roeland Park, KS

By:
Date:

8/5/2016

Checked:
Date:
1. Runoff Curve Number
A. Predevelopment CN

Cover Description	Soil HSG	CN	Area (ac.)	Product of CN x Area
Pasture (Fair)	D	84	2.06	173.04
Impervious - Pavement & Buildings	D	98	0.59	57.82
		0		0
		0		0
		0		0
		0		0
Totals:			2.65	230.86

Area-Weighted CN = total product/total area =

87.116981

87

B. Postdevelopment CN

Cover Description	Soil HSG	CN	Area (ac.)	Product of CN x Area
Parking Lot	D	98	1.19	116.62
Building Coverage	D	98	0.39	38.22
Open space (turf), good	D	80	0.60	48
Native Grass	D	78	0.47	36.66
		0		0
		0		0
Totals:			2.65	240

Area-Weighted CN = total product/total area =

90.377358

90

C. Level of Service (LS) Calculation

Predevelopment CN: 87

Postdevelopment CN: 90

Difference: 3

LS Required: 5

Change in CN LS

17+ 8

7 to 16 7

4 to 6 6

1 to 3 5

0 4

-7 to -1 3

-8 to -17 2

-18 to -21 1

-22 - 0

WORKSHEET 2: DEVELOP MITIGATION PACKAGE(S) THAT MEET THE REQUIRED LS
Project : Commerce Bank and Embree

Location: Roeland Park, KS

By: 0

Date: 8/5/2016

Checked: 0

1. Required LS (from Table 1 or 1A or Worksheet 1 or 1A, as appropriate): 5 **VR =** 13.25

2. Proposed BMP Option Package No. 1

<u>Plan ID</u>	<u>BMP #</u>	<u>Cover/BMP Description</u>	<u>Treatment Area</u>	<u>VR from Table 5 or 6</u>	<u>Product of VR x Area</u>
	1	Native Vegetation	0.47	9.25	4.35
	2	Bioretention	0.67	8.50	5.70
	3	Catch Basin Inserts	0.80	4.00	3.20
	4				0.00
	5				0.00
	6				0.00
	7				0.00
		Untreated Area	0.71		0.00
Total:			2.65	VR	13.24
				Total:	5.0

Meets required LS (Yes/No)?
☒ **YES** (if No, or if additional options are being tested, proceed below)

3. Proposed BMP Option Package No. 2

<u>Plan ID</u>	<u>BMP #</u>	<u>Cover/BMP Description</u>	<u>Treatment Area</u>	<u>VR from Table 5 or 6</u>	<u>Product of VR x Area</u>
	1			0.00	0.00
	2			0.00	0.00
	3			0.00	0.00
	4			0.00	0.00
	5				
	6			0.00	0.00
				0.00	0.00
			0.00	Total:	0.00

Meets required LS (Yes/No)?
☐ **NO** (if No, or if additional options are being tested, proceed below)

Design Procedure Form: Bioretention WQ1
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

I. Basin Water Quality Volume

Step 1: Tributary area to bioretention area, A_T (ac) A_T (ac) = 0.25

Step 2: Calculate WQ_V using methodology in Section 6 WQ_V (ac) = 0.03

IIa. Pretreatment

Step 1: Specify type of inflow to Bioretention facility Inflow Type = 2.00
Type 1 = sheet flow
Type 2 = concentrated or channelized

Step 2: Pretreatment no

Step 3: Proceed to Part IIb, IIc, or IId for design guidance on different pretreatment options

IIb. Vegetated Pretreatment Strip

Step 1: Type of land cover contributing area: Land cover type =
Type 1 = Impervious (e.g., parking lot)
Type 2 = Pervious (e.g., residential lawn)

Step 2: Maximum inflow approach length, $L_{Approach}$ (ft) $L_{Approach}$ (ft) =

Step 3: Average slope of pretreatment strip, S_{VS} (%) S_{VS} (%) =
Maximum slope of 6%

Step 4: Vegetated pretreatment strip minimum length, L_{FS} (ft) L_{FS} (%) =
From table 8.2

IIb. Vegetated Pretreatment Strip

Step 1: Percent imperviousness of contributing area, % imp % imp =

Step 3: Average slope of vegetated channel, S_{VC} (%) S_{VC} (%) =
Maximum slope of 6%

Step 4: Vegetated pretreatment channel minimum length, L_{FC} (ft) L_{FC} (%) =
From table 8.3

Design Procedure Form: Bioretention WQ1
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

IId. Other Pretreatment Devices

Other methods of pretreatment may be utilized upstream of a bioretention facility to settle out suspended solids and reduce runoff velocity. Several proprietary devices are available that will achieve these results. Most such devices install below ground and accept inflow from a piped stormwater management system or from sufrac sheet flow via drop inlets. These devices should be selected and sized based on site specific conditions for each project.

III. Planting Soil Bed and Ponding Area

- Step 1: Planting bed soil depth, d_f (ft) d_f (ft) = 2.50
(d_f should be between 2.5 feet and 4 feet)
- Step 2: Coefficient of permeability for planting soil bed, k (ft/day) k (ft/day) = 1.00
(k should be at least 1 ft/day)
- Step 3: Maximum ponding depth, h_{max} (ft) h_{max} (ft) = 1.00
(h_{max} should be between 0.25 ft and 1.0 ft)
- Step 4: Average height of water above bioretention bed, h_{avg} (ft) h_{avg} (ft) = 0.50
 $h_{avg} = h_{max}/2$
- Step 5: Time required for WQ_V to filter through the planting soil bed, t_f (days) t_f (days) = 2.50
(t_f of 1 to 3 days is recommended)
- Step 6: Required filter bed surface area, A_f (ft²) A_f (ft²) = 367.59
 $A_f = (WQ_V * d_f) / (k * t_f * (h_{avg} + d_f))$
- Step 7: Approximate filter bed length, L_f (ft) L_f (ft) = 40.00
assuming a length to width ratio of 2:1
(L_f should be at least 40 ft)
- Step 8: Approximate filter bed width, W_f (ft) W_f (ft) = 9.19
assuming a length to width ratio of 2:1
(W_f should be at least 15 ft, and optimally half of L_f)
- Step 9: Required Ponding Area, A_p (ft²) A_p (ft²) = 1102.78
 $A_p = WQ_V / h_{max}$

Design Procedure Form: Bioretention WQ1
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

IV. Underdrain

Step 1:	Underdrain pipe diameter, D_U (in) (D_U should be at least 4 inches)	D_U (in) = <u>4.00</u>
Step 2:	Depth of gravel blanket, Z_{gravel} (in) (Z_{gravel} should be at least 8 inches, and at least 2 inches greater than D_U)	Z_{gravel} (in) = <u>8.00</u>
Step 3:	Set underdrain perforation diameters to 0.375 inches	D_{perf} (in) = <u>0.38</u>
Step 4:	Longitudinal center-to-center underdrain perforation spacing, S_{perf} (in)	S_{perf} (in) = <u>6.00</u>
Step 5:	Number of perforations per row (around circumference of underdrain) (n_{perf} should be at least 4)	n_{perf} (in) = <u>4.00</u>
Step 6:	Are transverse collector pipes required perpendicular to main pipe? (Yes, if width of bioretention area is greater than 10 feet)	Yes/No = <u>No</u>
Step 7:	Underdrain transverse collector pipe spacing center-to-center, S_U (ft) (S_U should be a maximum of 10 feet)	S_U (ft) = <u>10.00</u>
Step 8:	Required number of underdrain transverse collector pipes, n_{pipe}	n_{pipe} = <u>0.00</u>
Step 9:	Pipe grade, G_{pipe} (%), for main pipe and transverse collector pipes (G_{pipe} should be at least 0.5%)	G_{pipe} (%) = <u>0.50</u>
Step 10:	Providing at least one cleanout per pipe run?	Yes/No = <u>Yes</u>

V. Overflow

The bioretention overflow shall be designed to safely pass runoff flows from events up to and including the 1 percent event unless the facility is designed with a bypass around the facility for larger storm events. If the 1 percent event is to pass through the facilities, the maximum velocity shall be kept below 3 feet per second to avoid erosion of the soil matrix. If facilities are designed with a bypass, it shall be designed to safely pass runoff flows from events up to and including the 1 percent event. The overflow shall be designed as vegetated or stabilized channel of a yard inlet catch basin. Vegetated or stabilized channels shall be designed using one of the methods presented in APWA Section 5603 and shall conform to the design criteria presented in APWA Section 5607. Methods presented in APWA Section 5604 shall be used for inlet design.

Design Procedure Form: Bioretention WQ1

Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

VI. Vegetation

Describe mix and density of vegetation to be placed in the bioretention facility. Follow specifications given under Plant Materials in Appendix A. It is beneficial to plant variable types and species of plants in a bioretention facility. Such variability prevents single-species susceptibility to disease and insect infestation and provides a more aesthetic appearance. Native species should be used because they are more likely to thrive in the local climate. A minimum of three native species of shrubs and three native species of trees recommended. Plants should also be selected for their ability to withstand extended dry conditions (which are likely to occur in parking lot island bioretention facilities) and periodic inundation.

Design Procedure Form: Bioretention WQ2
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

I. Basin Water Quality Volume

Step 1: Tributary area to bioretention area, A_T (ac) A_T (ac) = 0.21

Step 2: Calculate WQ_V using methodology in Section 6 WQ_V (ac) = 0.02

IIa. Pretreatment

Step 1: Specify type of inflow to Bioretention facility Inflow Type = 2.00
Type 1 = sheet flow
Type 2 = concentrated or channelized

Step 2: Pretreatment no

Step 3: Proceed to Part IIb, IIc, or IId for design guidance on different pretreatment options

IIb. Vegetated Pretreatment Strip

Step 1: Type of land cover contributing area: Land cover type =
Type 1 = Impervious (e.g., parking lot)
Type 2 = Pervious (e.g., residential lawn)

Step 2: Maximum inflow approach length, $L_{Approach}$ (ft) $L_{Approach}$ (ft) =

Step 3: Average slope of pretreatment strip, S_{VS} (%) S_{VS} (%) =
Maximum slope of 6%

Step 4: Vegetated pretreatment strip minimum length, L_{FS} (ft) L_{FS} (%) =
From table 8.2

IIb. Vegetated Pretreatment Strip

Step 1: Percent imperviousness of contributing area, % imp % imp =

Step 3: Average slope of vegetated channel, S_{VC} (%) S_{VC} (%) =
Maximum slope of 6%

Step 4: Vegetated pretreatment channel minimum length, L_{FC} (ft) L_{FC} (%) =
From table 8.3

Design Procedure Form: Bioretention WQ2**Main Worksheet**

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

IId. Other Pretreatment Devices

Other methods of pretreatment may be utilized upstream of a bioretention facility to settle out suspended solids and reduce runoff velocity. Several proprietary devices are available that will achieve these results. Most such devices install below ground and accept inflow from a piped stormwater management system or from sufrac sheet flow via drop inlets. These devices should be selected and sized based on site specific conditions for each project.

III. Planting Soil Bed and Ponding Area

- Step 1: Planting bed soil depth, d_f (ft) d_f (ft) = 2.50
(d_f should be between 2.5 feet and 4 feet)
- Step 2: Coefficient of permeability for planting soil bed, k (ft/day) k (ft/day) = 1.00
(k should be at least 1 ft/day)
- Step 3: Maximum ponding depth, h_{max} (ft) h_{max} (ft) = 1.00
(h_{max} should be between 0.25 ft and 1.0 ft)
- Step 4: Average height of water above bioretention bed, h_{avg} (ft) h_{avg} (ft) = 0.50
 $h_{avg} = h_{max}/2$
- Step 5: Time required for WQ_V to filter through the planting soil bed, t_f (days) t_f (days) = 2.50
(t_f of 1 to 3 days is recommended)
- Step 6: Required filter bed surface area, A_f (ft²) A_f (ft²) = 308.78
 $A_f = (WQ_V * d_f) / (k * t_f * (h_{avg} + d_f))$
- Step 7: Approximate filter bed length, L_f (ft) L_f (ft) = 30.00
assuming a length to width ratio of 2:1
(L_f should be at least 40 ft)
- Step 8: Approximate filter bed width, W_f (ft) W_f (ft) = 10.29
assuming a length to width ratio of 2:1
(W_f should be at least 15 ft, and optimally half of L_f)
- Step 9: Required Ponding Area, A_p (ft²) A_p (ft²) = 926.34
 $A_p = WQ_V / h_{max}$

Design Procedure Form: Bioretention WQ2
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

IV. Underdrain

Step 1:	Underdrain pipe diameter, D_U (in) (D_U should be at least 4 inches)	D_U (in) = <u>4.00</u>
Step 2:	Depth of gravel blanket, Z_{gravel} (in) (Z_{gravel} should be at least 8 inches, and at least 2 inches greater than D_U)	Z_{gravel} (in) = <u>8.00</u>
Step 3:	Set underdrain perforation diameters to 0.375 inches	D_{perf} (in) = <u>0.38</u>
Step 4:	Longitudinal center-to-center underdrain perforation spacing, S_{perf} (in)	S_{perf} (in) = <u>6.00</u>
Step 5:	Number of perforations per row (around circumference of underdrain) (n_{perf} should be at least 4)	n_{perf} (in) = <u>4.00</u>
Step 6:	Are transverse collector pipes required perpendicular to main pipe? (Yes, if width of bioretention area is greater than 10 feet)	Yes/No = <u>No</u>
Step 7:	Underdrain transverse collector pipe spacing center-to-center, S_U (ft) (S_U should be a maximum of 10 feet)	S_U (ft) = <u>10.00</u>
Step 8:	Required number of underdrain transverse collector pipes, n_{pipe}	n_{pipe} = <u>0.00</u>
Step 9:	Pipe grade, G_{pipe} (%), for main pipe and transverse collector pipes (G_{pipe} should be at least 0.5%)	G_{pipe} (%) = <u>0.50</u>
Step 10:	Providing at least one cleanout per pipe run?	Yes/No = <u>Yes</u>

V. Overflow

The bioretention overflow shall be designed to safely pass runoff flows from events up to and including the 1 percent event unless the facility is designed with a bypass around the facility for larger storm events. If the 1 percent event is to pass through the facilities, the maximum velocity shall be kept below 3 feet per second to avoid erosion of the soil matrix. If facilities are designed with a bypass, it shall be designed to safely pass runoff flows from events up to and including the 1 percent event. The overflow shall be designed as vegetated or stabilized channel of a yard inlet catch basin. Vegetated or stabilized channels shall be designed using one of the methods presented in APWA Section 5603 and shall conform to the design criteria presented in APWA Section 5607. Methods presented in APWA Section 5604 shall be used for inlet design.

Design Procedure Form: Bioretention WQ2

Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

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Design Procedure Form: Bioretention WQ3
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

I. Basin Water Quality Volume

Step 1: Tributary area to bioretention area, A_T (ac) A_T (ac) = 0.21

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Maximum slope of 6%

Step 4: Vegetated pretreatment strip minimum length, L_{FS} (ft) L_{FS} (%) =
From table 8.2

IIb. Vegetated Pretreatment Strip

Step 1: Percent imperviousness of contributing area, % imp % imp =

Step 3: Average slope of vegetated channel, S_{VC} (%) S_{VC} (%) =
Maximum slope of 6%

Step 4: Vegetated pretreatment channel minimum length, L_{FC} (ft) L_{FC} (%) =
From table 8.3

Design Procedure Form: Bioretention WQ3
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

IId. Other Pretreatment Devices

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- Step 8: Approximate filter bed width, W_f (ft) W_f (ft) = 10.29
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Design Procedure Form: Bioretention WQ3
Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

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Design Procedure Form: Bioretention WQ3

Main Worksheet

Project: Commerce Bank & Embree
Location: Roeland Park, KS
Designer: JJK

Date: 8/5/2016
Company: Olsson Associates
Checked: DLE

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Hydrograph Return Period Recap

Hydrow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	7.709	-----	-----	-----	16.87	-----	22.96	26.37	EX. SITE
2	SCS Runoff	-----	8.656	-----	-----	-----	17.81	-----	23.84	27.21	PROPOSED SITE
Proj. file: New.gpw										Monday, 07 / 11 / 2016	

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

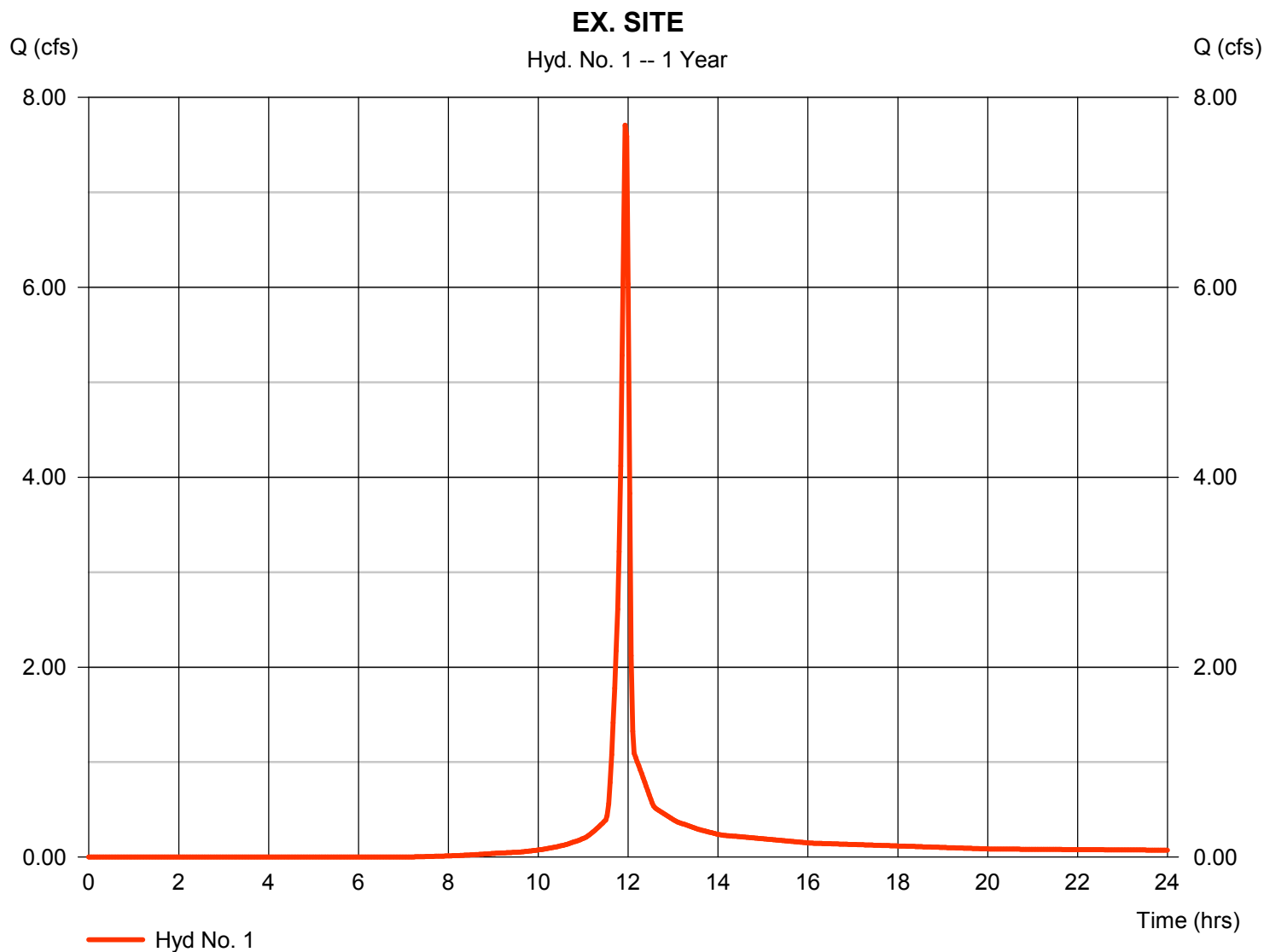
Monday, 07 / 11 / 2016

Hyd. No. 1

EX. SITE

Hydrograph type = SCS Runoff
 Storm frequency = 1 yrs
 Time interval = 2 min
 Drainage area = 2.650 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.00 in
 Storm duration = 24 hrs

Peak discharge = 7.709 cfs
 Time to peak = 11.93 hrs
 Hyd. volume = 15,684 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

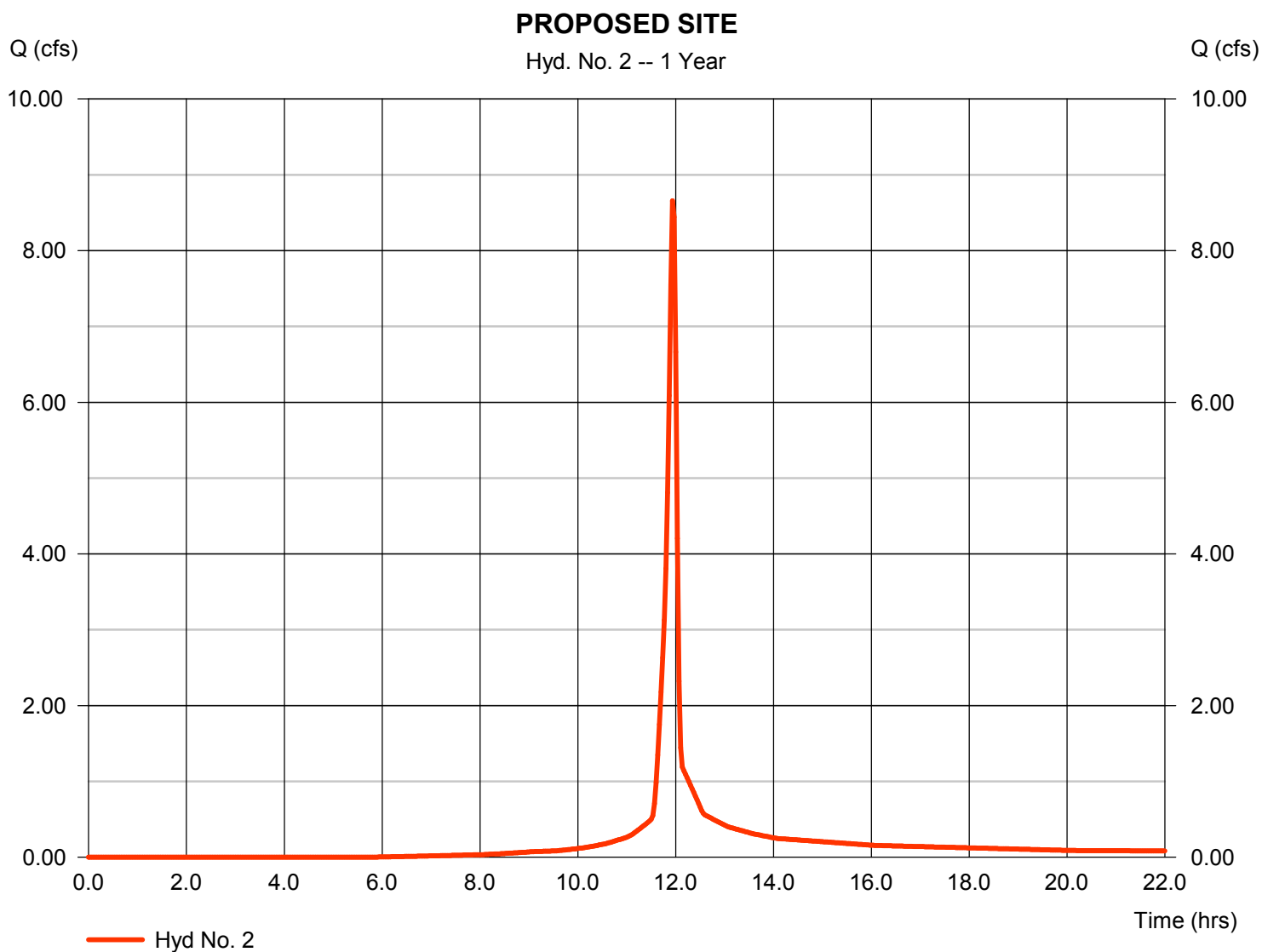
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 07 / 11 / 2016

Hyd. No. 2

PROPOSED SITE

Hydrograph type	= SCS Runoff	Peak discharge	= 8.656 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 17,893 cuft
Drainage area	= 2.650 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

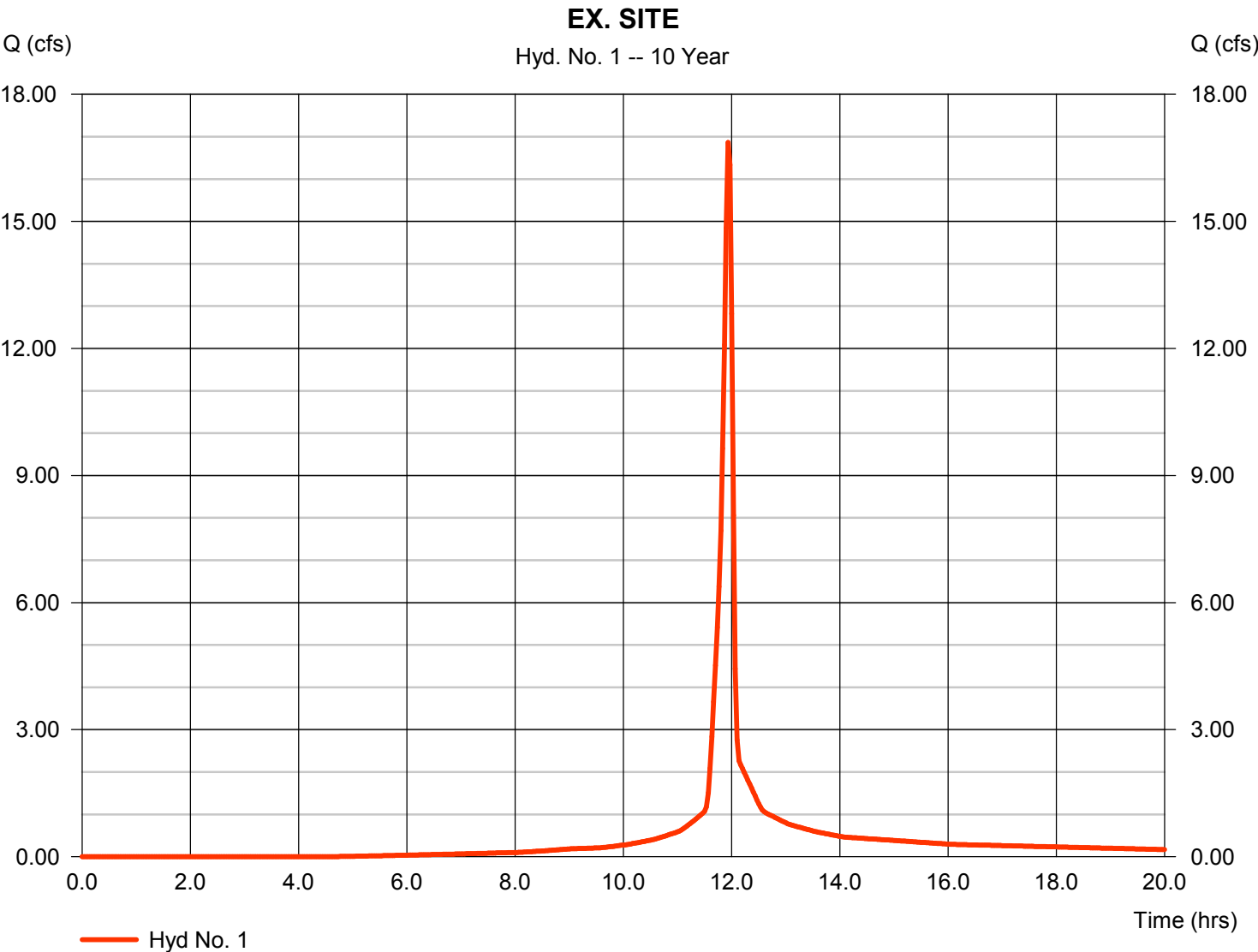


Hydrograph Report

Hyd. No. 1

EX. SITE

Hydrograph type	= SCS Runoff	Peak discharge	= 16.87 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 35,581 cuft
Drainage area	= 2.650 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

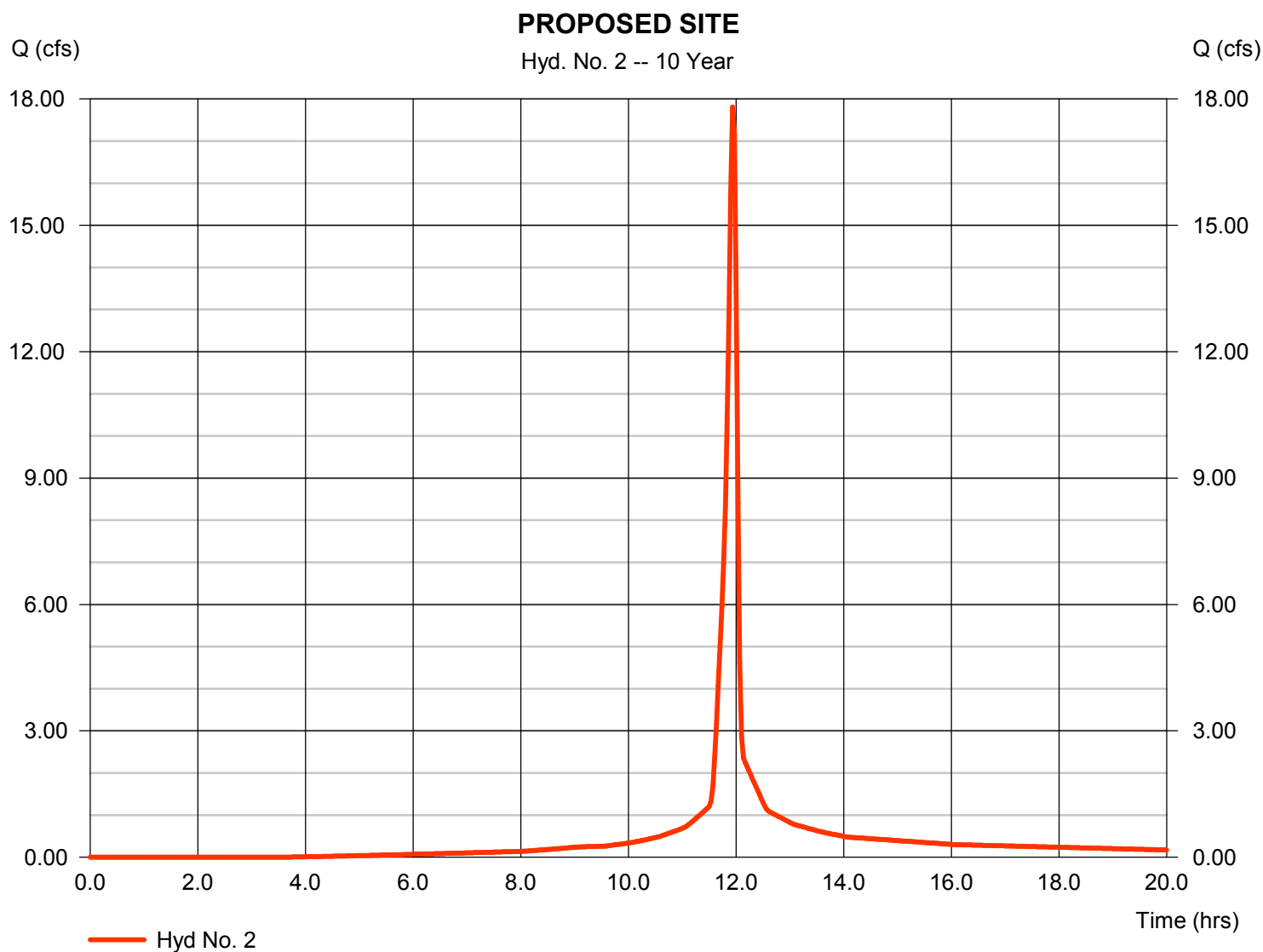
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 07 / 11 / 2016

Hyd. No. 2

PROPOSED SITE

Hydrograph type	= SCS Runoff	Peak discharge	= 17.81 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 38,445 cuft
Drainage area	= 2.650 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

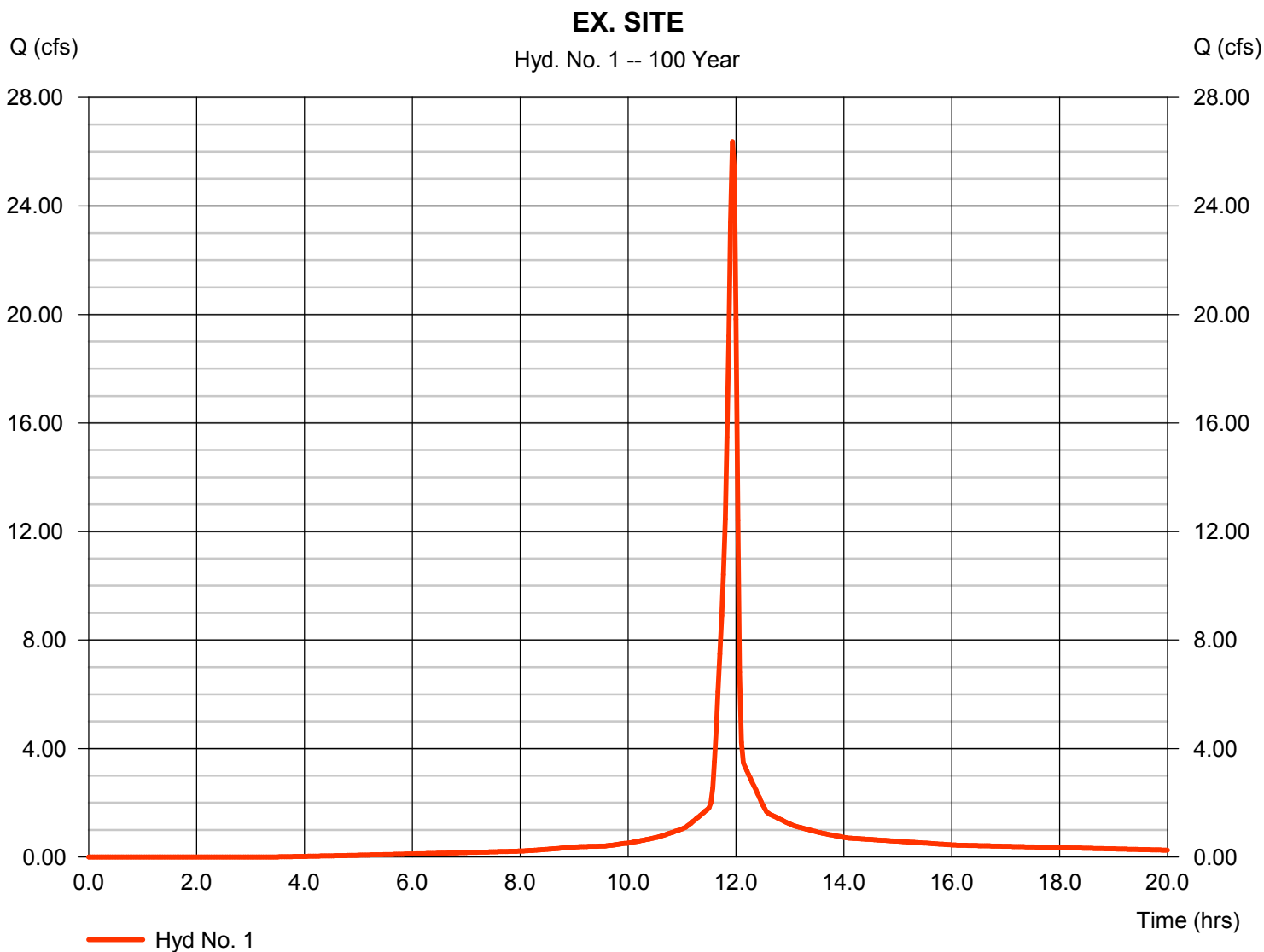
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 07 / 11 / 2016

Hyd. No. 1

EX. SITE

Hydrograph type	= SCS Runoff	Peak discharge	= 26.37 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 57,288 cuft
Drainage area	= 2.650 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

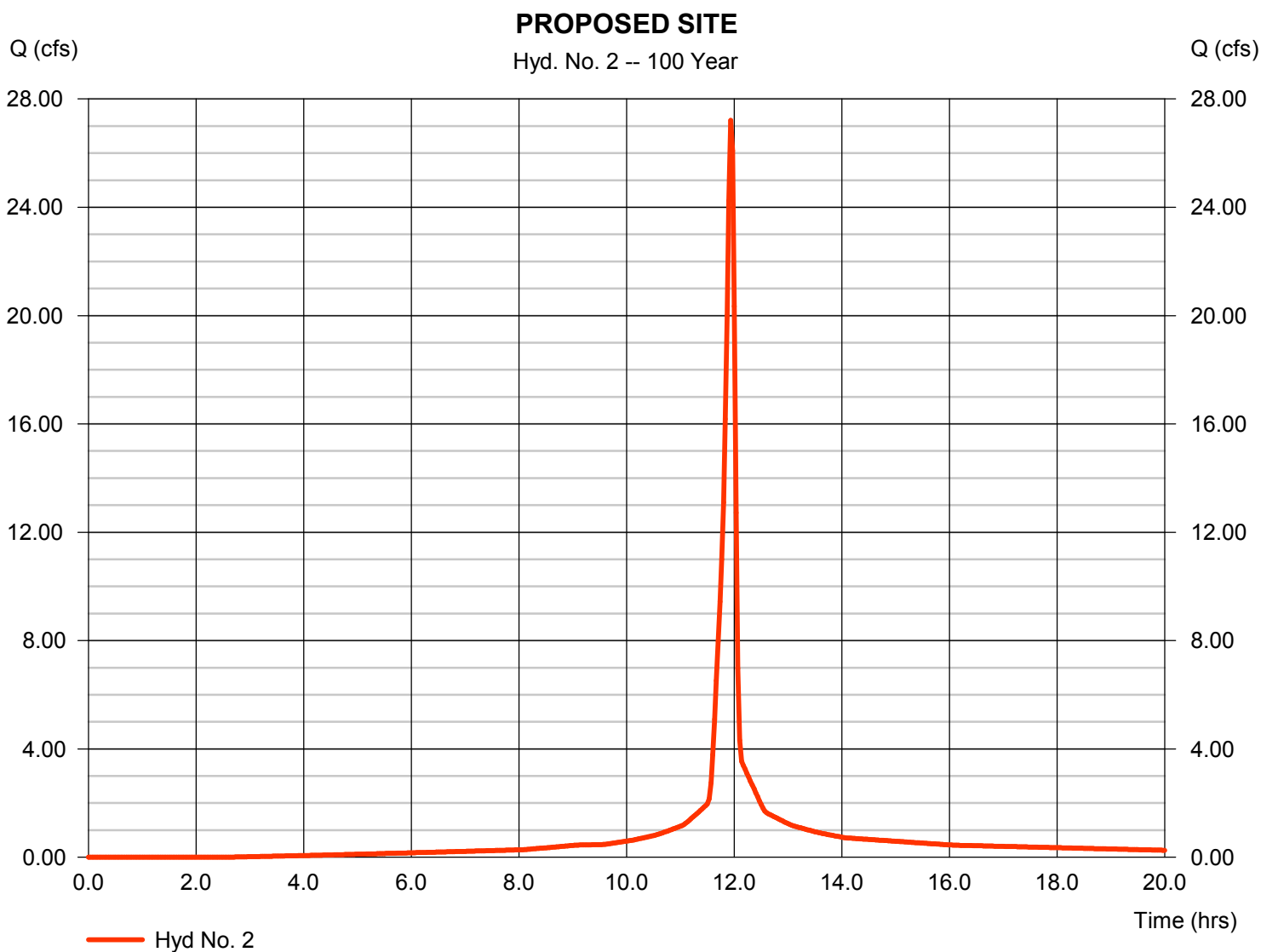
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 07 / 11 / 2016

Hyd. No. 2

PROPOSED SITE

Hydrograph type	= SCS Runoff	Peak discharge	= 27.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 60,487 cuft
Drainage area	= 2.650 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



August 29, 2019

John Jacobson
Building Official
City of Roeland Park Kansas

Re: **Preliminary Development and Final Development Plan Review**

Mr. Jacob,

The preliminary development and final development plan sheet sets have been revised and resubmitted for your approval.

Architectural

Since the land sale agreement gives the City architectural approval authority, we have shared the renderings with the City Council, below are some of the comments they have shared:

- “Design does not offend but does not inspire. As for materials, metal panel will help balance out the cost of the brick/stone.”
[Re-worked design to better utilize the context of the surrounding buildings. Discussions with Planning would indicate we are moving in the right direction.](#)
- “This seems to be a barely decorated box. The protruding "eyebrow" on each corner in dark gray is apparently becoming outdated already - it does NOT fit with the idea of "timeless." The "eyebrow" looks stuck on to the side of the building.”
[Revised design has tried to account for these concerns.](#)
- “Other than the eyebrow, there is no relief to the box. No setbacks or undulations to break up the long flat surfaces. The only minor interest comes from the use of various materials.”
[Attempted greater variations in relief of façade & materials with the latest design.](#)
- “Provision for an architectural “spire” on the south end of the project to provide a gateway to the city that would coincide with the architectural elements to the west.”
[Provided increased height and entrance at SW corner. Gateway element will be formed through a combination of building & landscape.](#)
- “The building looks a little generic. Not really exciting for our gateway. Pull some of the elements from hospital/bank with the stone, etc.”
[Re-worked design to better utilize the context of the surrounding buildings.](#)
- “The west and east elevations are long runs, add a sun screen to the storefront systems it would give a nice architectural element while providing solar control.”
[Additional sun control at windows has been provided as requested.](#)

Comments provided by the City Administrator:

- Replace EFIS areas with stone slate, similar to style used on Commerce Bank.
[EIFS has been reduced and similar materials to adjacent architecture has been provided.](#)
- Add window treatments to provide shade as well as architectural detail to the building.
[Window treatments provided as requested.](#)
- Add setbacks and/or bump outs to break up the east and west elevations.
[More articulation in the façade has been provided as requested.](#)
- Add a focal point at the SW or south elevation to add prominence/uniqueness to the building.
This is the City's southern Gateway, we want the building to add to the feel of a gateway.
[Additional interest has been provided at the SW corner. Gateway to be provided in combination with building & landscape elements at that corner.](#)
- The area south of the building should be designed to serve as display for public art and employ landscaping and seating to provide a park like setting for the public/patrons/staff of the facility.
[It is our intention to provide this as requested. We are continuing to work on a shaded employee seating area on the south side that will incorporate similar construction elements as seen on the building.](#)
- Add trees that flower (crabapple or pink dogwoods) or have dramatic colors (crimson maple, autumn blaze maple) to add character to the site.
[Plan Revised to include Spring Snow Crabapple and Blackgum](#)
- The easement for the City Monument sign should be located at the SW corner of the site (refer to sketch).
[Plan has been revised](#)
- Alignment of the underground power should be moved to the east boarder of the site.
[There are no future improvements desired that would cause the need to relocate the power further to the east and as such, the additional cost to push it further to the east would like to be avoided.](#)
- Sanitary sewer re-alignment should be moved to the east boarder of the site.
[As previously discussed at project meeting, the Sanitary sewer location is driven by comments provided by JCW.](#)
- Screening to the north should employ vegetation vs. a fence.
[Plan has been revised to show evergreen screening along the northern property line](#)
- Mature trees should be saved if possible.
[The landscape plan points out all trees to be saved. It is our intention to save all trees where possible.](#)

Site and Utility

- 1) Incorporate 8' sidewalks on the south and east ends of the project located 1' inside of the ROW. Reflect a 5' Sidewalk along project limits on Granada. The City Engineer is working on alignment of the sidewalk along Granada as well.
[Plan has been revised along Johnson Dr. Room for the Granada improvements are provided when that improvement happens.](#)
- 2) The extension of public sidewalks is requested under 16-1416 and can be mandated by PC at development approval.

-
- Sidewalks have been extended to both Roe and the new sidewalk along Johnson
- 3) FDP requires finished grades/contours.
Contours labeled in the grading plan.
 - 4) Will this be the actual name of the plat? PDP and FDP should match platted name.
The name was updated: Sunflower Medical.
 - 5) Property lines and ownership should be shown within 400' (south and west).
A sheet showing utilities and property lines within 400' was added to both PDP and FDP.
 - 6) Dimensions of road surface and location in the ROW and any pertinent structure size should be shown within 400'.
A sheet showing utilities and property lines within 400' was added to both PDP and FDP.
 - 7) Signature block for PC chair and City Engineer.
Signature blocks were added to title sheets.
 - 8) Structure of maintenance agency.
The maintenance of this property will be by a third party and currently in discussions with the owner and developer. All agreements will be shared with the City and/or recorded as required.
 - 9) Final letters of utility availability.
Utility Letters have been provided
 - 10) Easements for utilities through the site as well proposed vacations on the FDP.
Easements added to the drawings.
 - 11) Exterior building material sample boards.
A material sample board will be provided prior to Planning Commission. All materials are called out in the building elevations as well.
 - 12) Curb cut widths and radii.
Ruch widths and dimensions were added.
 - 13) Building setback lines.
Building setback lines shown in the General Layout Plan
 - 14) Size of signage and location.
A signage plan sheet will be provided
 - 15) Proof of filing post action.
Certified mailings we mailed on August 27th and cards will be provided as we get them.
 - 16) Pedestrian interconnectivity should exist between the public walks and the building access points as well as access to the public art display location.
As previously stated, sidewalks have been incorporated internally to provide interconnectivity throughout the site, the public art display and public realm sidewalks.
 - 17) Differential paving for pedestrian and vehicle intersections.
The NW intersection (Roe Entry) has been striped. This is an existing entry and pavers can not be added. The SE intersection (Granada) is not being provided at this time as there are no sidewalks existing. At the time Granada is improved, a paver crosswalk will be provided.
 - 18) Provide Fire Department equipment accessibility report per email sent from this office on 8/23/19 and developed under FD specific criteria sent in that email.
A sheet with FD accessibility was added to both PFP and FDP.

Public Improvements- Daniel G. Miller, P.E. City Engineer

Final Development Plan Comments:

1. Provide an 8-ft wide sidewalk, extending from Roe Boulevard to Granada Street along the Johnson Drive (off ramp) frontage. Provide accessible route from public sidewalk to perimeter building sidewalk.
[Plan Revised](#)
2. Granada Lane is currently 20.5-ft wide (back of curb to back of curb). Development will be responsible for costs associated with widening the street to 26-ft back of curb to back of curb section adjacent to the development this cost will be approved by the City Engineer and deposited with the City to be used in completing the improvements in the future. The cost of installing a 5-ft wide sidewalk along Granada adjacent to the site will also be deposited with the City. A 5-ft easement adjacent to Granada Lane shall be provided for future sidewalk improvement.
[As noted in our meeting, we are working with the City on the best route to satisfy this requirement.](#)
3. Verify existing sanitary sewer main sizes at southwest and south side of proposed development. The Commerce Bank development extended an 8-inch sanitary sewer, however, a 6-inch sewer is identified on the survey. Each manhole has a stub to support a sanitary sewer main relocation. See attached as-built.
[The Sanitary Sewers were verified based on existing sewers.](#)
4. Add dimensions of proposed sign easement to General Layout sheet callout and to Site Dimension Plan. Adjust sign easement location so it does not encroach into existing permanent sanitary sewer easement.
[The sign easement was moved.](#)
5. Add callout and delineate proposed sidewalk easement for sidewalk along Roe Boulevard that encroaches into subject property.
[Callout was added to proposed sidewalk easement.](#)
6. Show utility easements for proposed utility relocations and existing utilities to remain.
[Utility easements were added.](#)
7. Clarify proposed storm sewer infrastructure in vicinity of the rain garden. Per drainage study, it's understood a portion of the parking lot will be routed to the rain garden for water quality treatment.
[Storm structure was added in the rain garden.](#)

Drainage Study

Delineate and identify the offsite drainage area to the north that will be collected and routed through the proposed site stormwater infrastructure and/or routed north of the parking lot improvements. Drainage improvements need to be coordinated with landscape plan improvements along property line.

The offsite drainage area was added on both proposed and existing situations.

Construction Document Related Comments (for future Building Permit Submittal):

Development design engineer is responsible for preparing sanitary sewer main relocation plans and accompanying documents for review and approval by Johnson County Wastewater.

JCW sheet set was submitted.

Design engineer is responsible for coordinating with Kansas City Power and Light for relocation of overhead facilities to underground facilities as depicted on Final Development Plans.

RIC has been working with KCPL on service and relocation.

Signage /Accessibility

1. Identify accessible parking space sign locations. Identify accessible ramp locations and provide enlarged grading plan to verify proposed accessible parking and loading areas are less than 2%.
Spot elevations were added to the grading sheet.
3. Directional signage / pavement marking may be necessary near the first bay of parking off Roe Boulevard, to facilitate internal traffic circulation.
Right turn pavement marking was added.

RENAISSANCE INFRASTRUCTURE CONSULTING

Andy Gabbert, PLA, ASLA
Project Manager

Legal Descriptions

City of Roeland Park Portion

All of Lots 1 thru 4 and all of Lots 24 thru 26, ROSELAND COURT, a platted subdivision, together with all that part of the Northeast Quarter of Section 9, Township 12 South, Range 25 East, all in the City of Roeland Park, Johnson County, Kansas, together being more particularly described as follows:

Commencing at the Northwest corner of said Northeast Quarter; thence South 01°55'22" East, along the West line of said Northeast Quarter, a distance of 1,222.46 feet to a point on the Westerly extension of the North line of said Lot 4; thence North 87°16'50" East, along said North line's Westerly extension, a distance of 40.00 feet to the Northwest corner of said Lot 4, said point also being the Point of Beginning; thence continuing North 87°16'50" East, along said North line, a distance of 137.74 feet to the Northeast corner of said Lot 4; thence South 01°55'37" East, along the East line of said Lot 4, a distance of 60.00 feet to the Southeast corner of said Lot 4, said point also being the Northwest corner of said Lot 24; thence North 87°16'50" East, along the North line of said Lot 24, a distance of 138.39 feet to the Northeast corner of said Lot 24, said point being on the West right-of-way line of Granada Street (platted as Walnut Street), as it now exists; thence South 01°55'37" East, along said West right-of-way line, a distance of 130.27 feet; thence Southeasterly, continuing along said West right-of-way line, along a curve to the left having a radius of 80.00 feet and a central angle of 69°44'18", for an arc length of 97.37 feet to a point on the centerline of vacated US Highway 50, as said centerline was established on said plat of ROSELAND COURT; thence South 68°05'59" West, along said vacated US Highway 50 centerline, a distance of 335.65 feet; thence Northwesterly, departing said centerline, along a non-tangent curve to the right having an initial tangent bearing of North 53°43'21" West, a radius of 34.00 feet, and a central angle of 51°47'59", for an arc length of 30.74 feet to a point on the East right-of-way line Roe Boulevard, as it now exists; thence North 01°55'22" West, along said East right-of-way line, a distance of 349.43 feet to the Point of Beginning, containing 84,966 square feet, or 1.951 acres, more or less.

City of Mission Portion

All that part of the Northeast Quarter of Section 9, Township 12 South, Range 25 East, in the City of Mission, Johnson County, Kansas, more particularly described as follows:

Commencing at the Northwest corner of said Northeast Quarter; thence South 01°55'22" East, along the West line of said Northeast Quarter, a distance of 1,222.46 feet to a point on the Westerly extension of the North line of Lot 4, ROSELAND COURT, a subdivision in the City of Roeland Park, Johnson County, Kansas; thence North 87°16'50" East, along said North line's Westerly extension, a distance of 40.00 feet to the Northwest corner of said Lot 4, said point being on the East right-of-way line of Roe Boulevard, as it now exists; thence South 01°55'22" East, along said East right-of-way line, a distance of 349.43 feet; thence Southeasterly, departing said East right-of-way line, along a curve to the left having a radius of 34.00 feet, and a central angle of 51° 47' 59", for an arc length of 30.74 feet to a point on the centerline of vacated US Highway 50, as said centerline was established on said plat of ROSELAND COURT, said point being the Point of Beginning; thence North 68°05'59" East, along said centerline, a distance of 335.65 feet to a point on the South right-of-way line of Granada Street, as it now exists; thence easterly, along said South right-of-way line, along a non-tangent curve to the left having an initial tangent bearing

of South $71^{\circ}39'55''$ East, a radius of 80.00 feet, and a central angle of $40^{\circ}23'03''$, for an arc length of 56.39 feet; thence North $67^{\circ}56'55''$ East, continuing along said South right of way line, a distance of 75.47 feet to a point on the East line of said plat of ROSELAND COURT; thence South $01^{\circ}55'37''$ East, along said East line and its Southerly extension, a distance of 90.54 feet; thence Southwesterly, along a non-tangent curve to the right having an initial tangent bearing of South $59^{\circ}37'01''$ West, a radius of 475.00 feet, and a central angle of $28^{\circ}29'02''$, for an arc length of 236.14 feet; thence South $88^{\circ}06'03''$ West a distance of 193.98 feet; thence Northwesterly, along a curve to the right having a radius of 34.00 feet, and a central angle of $38^{\circ}10'36''$, for an arc length of 22.65 feet to the Point of Beginning, containing 32,250 square feet, or 0.740 acres, more or less.