

Planning Memorandum

To: Sunfish Lake Mayor and City Council

From: Ryan Krzos, AICP, City Planner

Date: August 26, 2020

Re: Sunfish Lake – Planning Update for the September City Council Meeting
WSB Project No. 015255-000

August Planning Commission Meeting

Draft meeting minutes from the August 19th Planning Commission meeting are included as an attachment to this memorandum. The Planning Commission considered the following requests:

5613 Robert Trail S – Southside Baptist Church

The Planning Commission reviewed a variance request to reduce the required right-of-way setback to facilitate a sign permit request for the property. The request would allow the proposed dynamic display sign to be placed a proposed 25 ft from the right-of-way. The Planning Commission voted 5-0 to recommend conditional approval of a ten (10) ft variance request requiring the sign to be no closer than 40 ft from the right-of-way. A public hearing was scheduled to coincide with City Council's review of the request.

1 Sunfish Lane

The Planning Commission reviewed requests for an amended major site and building plan and an interim use permit for this property. The amended site plan review request would modify the proposed stormwater management facilities. The Planning Commission voted 5-0 to recommend conditional approval of the amended site and building plan review. The interim use request proposes pumping of water from sunfish lake for irrigation purposes. The Planning Commission voted 4-1 to recommend conditional approval of the IUP request. The Planning Commission's recommendation included a modified condition that it is valid through the end of calendar year 2020 and would be subject to renewal thereafter.

Additional Planning Updates

Application Coordination

- Staff has been coordinating with individuals representing the owner of 245 Salem Church Road on plans for a new residence. An application has not yet been submitted but is anticipated in the near future.
- Staff has been working with landowners regarding a potential lot split and combination of the outlot containing the terminus of Windy Hill Road. A formal submittal for review of the minor subdivision is anticipated in the near future.
- City staff issued an incomplete application notice to the owner of 8 Sunfish Ln. The owners submitted an application to construct an accessory structure, which requires a site plan review and conditional use permit for an additional accessory structure. The application

materials provided were insufficiently detailed for verification of compliance with City codes. Additional information and revised plans are required from the applicant in order to schedule the request for City review.

Cc: Catherine Iago, City Clerk
Tim Kuntz, City Attorney
Jeff Sandberg, City Engineer
Mike Andrejka, Building Official
Jim Naves, City Forester
Ron Wasmund, Septic System Inspector
Dave Dreelan, Fire Chief

- DRAFT –
SUNFISH LAKE PLANNING COMMISSION MEETING – AUGUST 19, 2020
7:00 P.M. – ONLINE MEETING

Attendants:

Chair: Tom Hendrickson
Commissioners: Ginny Beckett, Shannon Nelson, Dominick Driano, and Jeannine Naves
City Planner: Ryan Krzos
City Engineer: Jeff Sandberg
City Clerk: Cathy Iago

1. CALL TO ORDER: Chair Hendrickson called the meeting to order at 7:00 p.m.
2. ADOPT AGENDA: Chair Hendrickson asked if there were any additions to the agenda and there was no response.

Commissioner Beckett moved to adopt the agenda as presented, seconded by Commissioner Nelson and carried (5-0)

3. APPROVE MINUTES JULY 15, 2020: Chair Hendrickson asked if there were any additions or corrections to the July 15, 2020 Planning Commission meeting minutes and there was no response.

Commissioner Nelson moved to approve the July 15, 2020 Planning Commission meeting minutes as presented, seconded by Chair Hendrickson and carried. (5-0)

4. RIGHT-OF-WAY SETBACK VARIANCE REQUEST AND SIGN PERMIT REVIEW, SOUTHSIDE BAPTIST CHURCH, 5613 SOUTH ROBERT TRAIL: Chair Hendrickson asked the Planner to review the request and advised that the public hearing on this matter would be conducted at the Council meeting in September. He explained that he would ask for questions and comments from the public after the Planner had reviewed the request.

Planner Krzos referred to his report dated August 12, 2020 and explained that the request is for a right-of-way setback variance to facilitate construction of a dynamic sign on the property located at 5613 South Robert Trail. He stated that Senior Pastor Jerry Brantham had contacted him to request an amendment to the City's signage ordinance to allow the installation of a dynamic sign on the church property. He advised that during the review process of the ordinance amendment, the City Council directed staff to postpone action on this matter until such time as the City could conduct in-person meetings versus online meetings due to the COVID-19 pandemic. Staff was further directed to process signage requests that adhere to the provisions of the proposed signage ordinance amendment. He noted that signage requests normally require only review and approval of an Administrative Permit, however, the church requests a variance to place the new sign 25 ft. from the street right-of-way whereas 50 ft. is the required setback.

The Planner stated that the proposed site is zoned Institutional and the adjacent property to the east, located on Woodridge Lane in Inver Grove Heights is zoned R-1, Single-Family Residential and to the north of the site the properties are zoned Institutional. He noted that although the City was in the process of amending the signage ordinance but could not meet in person due to the COVID virus, Council directed staff to proceed with sign permit requests as long as the application met all the proposed requirements. He advised that the application meets all the proposed requirements with the exception of the 50 ft. setback requirements. He stated that the applicant requested the 25 ft. setback to provide a larger area for snow storage and also to provide better and safer traffic flow on the site. He pointed out that the applicant indicated that placement of the sign closer to the street would increase visibility.

Planner Krzos stated that the City may consider the request based on the need for additional space for snow storage so that the sign is not damaged during plowing and for increased space for traffic flow and safety. He explained that the sign complies with the proposed dimension requirements.

The Planner advised that the signage would normally be approved by staff through an Administrative Permit, however, it is

being reviewed by Planning Commission and Council due to the setback variance portion of the request. He displayed the existing sign and noted that it is visible from the street, therefore, staff did not determine there was no need to grant the variance at 25 ft. He explained that staff determined a 10 ft. variance, placing the sign at 40 ft. from the right-of-way, would be sufficient to accommodate snow storage and traffic flow and safety.

Staff recommends approval of a 10 ft. right-of-way setback variance based on the Findings of Fact and conditions as listed in the Planner's report dated August 12, 2020. He noted that Condition 1 requires that the proposed sign shall be located no closer than 40 ft. from the South Robert Trail right-of-way.

The Planner explained that due to the variance request, which requires review and recommendation by the Planning Commission and Council, the City Code provides an option for a Public Hearing to be held by Council. He explained that because the sign permit is done administratively, and the variance requires a public hearing, Council determined they would conduct the public hearing at the Council meeting prior to taking formal action on this item.

Chair Hendrickson asked if the Commission must still submit a recommendation and the Planner responded yes.

Chair Hendrickson stated that he would open the meeting for comments or questions from the public as a courtesy, but noted that the formal Public Hearing would be held at the September 1, 2020 Council meeting.

Planner Krzos explained that he was told someone from the church would be present, but he was not aware if there was anyone in attendance.

Chair Hendrickson asked if there were any questions or comments from the Commission.

Commissioner Beckett explained that because the church was close to her home, she contacted the neighbors adjacent to the church property and they stated they had no concerns with the request.

Chair Hendrickson pointed out that the Pastor had requested a 25 ft. variance, but staff recommended a 10 ft. variance; he asked if the reduction in the variance would still meet the needs of the church.

Planner Krzos explained that the initial request included a range of setbacks that would work for the sign installation and that the 40 ft. setback was within the range provided by the church.

Commissioner Driano noted that the City is reviewing the request in light of the proposed ordinance change to require a 50 ft. setback and that if this is approved it is likely to be acceptable. He commented that it is his expectation that they will not come back and ask for additional setback.

Chair Hendrickson asked if there were any further questions or comments and there was no response.

Chair Hendrickson moved to approve a 10-ft. right-of-way setback variance for installation of a dynamic sign for Southside Baptist Church, located at 5613 South Robert Trail, based on the Findings of Fact and subject to the conditions as listed in the Planner's report dated August 12, 2020, seconded by Commissioner Naves and carried. (5-0)

5. PUBLIC HEARING: A. MAJOR SITE AND BUILDING PLAN REVIEW AMENDMENT AND INTERIM USE PERMIT, 1 SUNFISH LANE, JOHN JOHANNSEN : Chair Hendrickson asked the Planner if it would be possible to consider the Major Site and Building Plan Review Amendment and the Interim Use Permit as separate items and the Planner responded yes.

Chair Hendrickson opened the public hearing to consider the Major Site and Building Plan Review Amendment for property located at 1 Sunfish Lane and asked the Planner to review his report on this item.

Planner Krzos referred to his report dated August 12, 2020 and explained that that the applicant is requesting an amendment to the major site plan previously approve in 2019. He explained that the property is zoned R-1 Single Family Residential and that the amendment proposes modifications to the grading, drainage and stormwater management plan; Planning Commission and Council review are required for approval.

The Planner stated that the applicant submitted revised civil designs plans which modify surface stormwater management facilities for two basins. He stated the first basin was previously located in the area just north of the attached garage of the new home and requires modification due to State regulations which prohibit infiltration basins within 50 feet of a water well. The primary well for the new home is located nearby the north side of the new garage. He stated that in place of the surface basin, an underground system is proposed consisting of a perforated pipe laid within a bed of gravel to allow for infiltration. He stated the underground infiltration conveyance pipe would empty into a surface infiltration and storage basin to the rear of the residential structure.

Planner Krzos stated the second change would shift the southern portion of the surface basin away from large mature white pine trees adjoining the basin; the City Forester reviewed the proposal and suggested shifting the surface basin approximately 120 ft. further north to shift grading from the root structure of the trees.

The Planner advised that the overall plan includes installing underground pipes to allow runoff from the roof of the home and routing water to the southern basin.

Staff recommends approval based on the fact that the request is in compliance with all Stormwater Management regulations and also based on the Findings of Fact and conditions as listed in the Planner's report dated August 12, 2020. Planner Krzos noted that the applicant must comply with all previous conditions of approval, must obtain the necessary permits and must adhere to all State regulations.

Chair Hendrickson opened the public hearing for questions related to the Major Site and Building Plan Review Amendment.

John Johannsen, applicant, asked the Planner to display the conditions as he had not seen them prior to the meeting.

Planner Krzos displayed the conditions for the public to view and explained that he had emailed the packet of information to the applicant.

Chair Hendrickson asked the City Engineer to comment on the proposed application due to the fact that there was a large amount of information that was technical in nature. He questioned if the Engineer had any concerns and if he was comfortable with the proposed amendment as submitted.

Engineer Sandberg explained that he had been working with the applicant and his contractor for several months and that it is his opinion the amended plan would work better than the plan previously approved and would provide more treatment of the stormwater runoff. He noted that the changes would be more expensive for the applicant, however, he was satisfied that the rates, volume and quality control devices would function better than the previously submitted plan.

Chair Hendrickson asked if there were any questions or comments from the public.

Jim Stowell, 389 Salem Church Road, thanked the Commission and staff for their work on this matter. He noted that he is a 12-year resident in the City and that he had contacted several residents living adjacent to the lake and they would request that no water be pumped from the lake.

Chair Hendrickson explained that the Commission was only considering the amendment to the Major Site and Building Plan review at this time and that Mr. Stowell should hold his comments until discussion of the Interim Use Permit. He asked if anyone had comments or questions relating to the plan amendment and there was no response. He then asked if the Commission had any questions or comments related to the plan amendment and there was no response.

Commissioner Driano moved to recommend approval of the Major Site and Building Plan Review Amendment related to the Stormwater Management Plans based on the Findings of Fact and subject to the conditions as listed in the Planner's report dated August 12, 2020, seconded by Commissioner Nelson and carried. (5-0)

Planner Krzos referred to his report dated August 12, 2020 and explained that the applicant also requested an Interim Use Permit to allow the pumping of water from Sunfish Lake for irrigation of the site at 1 Sunfish Lane. He stated that Interim Use Permits require the same method of review as Conditional Use Permits and require a public hearing and review and recommendation by the Planning Commission and review and consideration by the City Council.

The Planner explained that the applicant proposes to install a submersible pump in the lake to supply water for an irrigation system. He stated that the landscape irrigation system would be fed off well water in addition to the lake water pump. He noted the irrigated areas on the property would be divided between the two irrigation systems, with the irrigation water from the lake pump used for the southern portion of the site at approximately 1.5 acres nearest to the lake. He advised that the lake pump would initially be operated every day until the turf area is established and then every other day or alternatively everyday with half the duration. He explained the lake pump would operate roughly 100 sprinkler heads which are generally rated to utilize 2.5 gallons of water per minute; the typical sprinkler head operation is 40 minutes per day and would be shortened upon establishment of the lawn. He noted that if the watering approaches 10,000 gallons per day or one million gallons in a year, the activity would require a DNR dewatering permit.

Staff recommends approval of the Interim Use Permit for a period of one year based on the Findings of Fact and subject to the conditions as listed in the Planner's report dated August 12, 2020. Krzos noted that the pumping must cease when the outflow from the lake is no longer flowing. He explained that the City Engineer would have the ultimate say as to when the pumping should cease, and if that occurs, notice would be provided to all permit holders to cease pumping from the lake.

Chair Hendrickson opened the meeting for the purpose of a public hearing to consider the request for an Interim Use Permit to allow the pumping of water from Sunfish Lake for irrigation of the site at 1 Sunfish Lane.

Jim Stowell, 389 Salem Church Road, stated that he had contacted the Mayor, City Engineer and Planner and submitted a list of the key issues and concerns expressed during discussions with some of the property owners adjacent to the lake. He reviewed the following items that would support his discussions with most of the property owners adjacent to the lake that he contacted who did not favor issuing the watering permit:

- Larger lawns with fertilizer run-off entering the lake would increase algae bloom, pollute the lake and possibly reduce the "A" lake rating and lead to lower property values;
- If using the pump to water lawns when lake is below water level, it puts citizens in awkward position to Report neighbors;
- If demand to water lawn is present and lake level is too low, what would stop someone from watering;
- In the spirit of water conservation it would be appropriate to require planting of native vegetation, use of rain barrels and Other creative suggestions for lawn maintenance;
- Allowing more pumping puts a larger demand on the lake;
- As the lake level lowers, pump noises are more disruptive to residents on neighboring docks and pumps often require modifications to go out deeper into the lake if they clog;
- There are 32 property owners around the lake and the majority of those contacted do not want pumping of the lake.

Mr. Stowell pointed out that he understands that property owners have rights, however, the majority of persons he contacted prefer to preserve the lake and not allow pumping. He asked where this matter goes from here and noted that Engineer Sandberg advised him the existing Ordinance would most likely be reviewed by Council this fall. He asked that residents be able to provide input to Council, discuss their concerns and outline the reasons they do not support pumping.

Brian Harper, 2190 Charlton Road, stated he agreed with Mr. Stowell's comments and stated that he is a 2-year resident in the City. He explained that he understands the outlet is now in place to maintain the lake level. He indicated that he would prefer keeping the lake water quality as is and his concern relates to fertilizer entering the lake. He noted that some of the water permits may be grandfathered in, however, if the number of pumping permits increases it would have an impact on the lake. He noted that there are other alternatives that could be considered for watering purposes.

Sena Kihir, 331 Salem Church Road, stated she has been a resident for 5 years and that she inherited the pump with the property. She explained that she has a small area of lawn in front of her home and that the pump is useful for watering since there is no city water service. She commented that she was unsure if using her well to water was a viable option. She expressed her support for some type of compromise on this issue and she noted that the lake water levels had been quite high in recent years. She also stated it was her hope that residents would use some type of fertilizer on their lawns that would not increase algae or harm the lake.

Mr. Stowell commented that with the new construction on the lake it appears that the lawns are being installed closer to the lake. He agreed with Dr. Kihitar that the lake level had been high in the past years, however, it was his opinion that even if the water level is high, it could be quickly reduced with several pumps working on the lake. He discussed that fact that Sunfish Lake was a small lake with a maximum depth of only 32 ft. and he encouraged City officials to err on the side of caution when considering pumping permits versus asking residents to police their neighbors pumping activities. He reiterated that the majority of residents he spoke with would support prohibiting pumping of the lake.

Shannon Nelson, 357 Salem Church Road, stated she would speak as a property owner rather than as a Commissioner. She explained that she installed a rain garden her property and that water stays in the garden for a long time. She pointed out that there are six (6) new homes being built on the lake and expressed concern that residents may be pumping water from the lake but that it is not being replenished.

Engineer Sandberg pointed out that the water leaving the lake through the outlet is directed to Mendota Heights. He noted that prior to the new outlet installation residents were complaining that water wasn't going down fast enough. He pointed out that sending the water through the outlet to Mendota Heights does not benefit the residents on Sunfish Lake. He explained that when the outlet is flowing, there should be enough water for residents to water their lawns and that the lake water and wells would be replenished.

The Engineer explained that he had extensive experience in stormwater management and water related regulations and that it was his opinion the pumping would not negatively impact the lake. He explained that in recent years there have been more 100-year rain events and he noted that the Ordinance had been in place since 1989 and provides the capability for the City to restrict pumping when the lake water is not flowing through the outlet.

Mr. Stowell commented that it appears the City is looking for lakeshore residents to monitor and enforce the pumping regulations.

Engineer Sandberg responded that the City would not ask residents to enforce the pumping regulations and that staff would monitor the outlet and send notices to residents to stop pumping when the water level is low.

Chair Hendrickson pointed out that having the Ordinance in place allows the City to enforce the regulations and issue a citation if the residents does not discontinue pumping.

Mr. Stowell expressed concern as to what would happen if permits for pumping were issued to everyone on the lake. He suggested that residents could preserve the lake by planting natural native grasses and using rain barrels versus watering their lawns.

Chair Hendrickson stated that he has lived in the City for 23 years and that it is his opinion using water from the lake for watering lawns is healthier for the environment than pumping from the aquifer. He recalled that there was a lot of discussion prior to adopting the Ordinance which regulates the use by issuance of a permit. He further commented that most harmful fertilizers were outlawed years ago. He suggested that lake residents have the opportunity to petition to Council to change the Ordinance if they are opposed to the pumping. He further explained that the issue this evening is the application for the Interim Use Permit and that the permit would be issued for one year and then reviewed. He stated that the current request falls under the Ordinance guidelines and that he would support recommending approval of the request.

Tom Schehuber, 325 Salem Church Road, pointed out that the City Engineer stated it does no good for water to go from the outlet to Mendota Heights, however, it is his opinion that it does no harm for water to flow naturally to the river. He stated that the lake is a resource and that residents are the stewards of the lake. He calculated the amount of water that would be pumped from the lake if the permit is approved and stated that it would be a tremendous pull on the lake. He noted that he has a sprinkler system that draws from his well and he was advised by the well contractor that there is plenty of water that could be drawn from the well for this purpose. He recommended that the request be denied and that the property owner use the well for watering. He welcomed Mr. Johannsen as a new neighbor on the lake and explained that he supports people enjoying the lake but also wants residents to be good stewards.

Dr. Kihitar questioned how healthy it would be to use well water versus lake water for sprinkling purpose.

Engineer Sandberg explained that he participated in a water study with Dakota County officials and they discussed the fact that the aquifers are getting depleted. He noted that Dakota County encouraged cities to conserve well water and explained that if larger cities continue to use well water at the current rate, it would be harmful. He commented that aquifers are a finite resource.

Dr. Kihtar asked who would determine and guide residents regarding when to use lake water and when to use well water and if the City provides any guidance on the amount of lawn that may be installed on property.

Planner Krzos explained that the Shoreland Management Ordinance regulates the amount of lawn and the distance from the shoreline that must be kept natural.

Dr. Kihtar questioned if the lake levels are high and there is no drought why the residents would not use the lake versus well for watering.

Chair Hendrickson explained that was part of the discussion when the Ordinance was adopted in 1989.

Mr. Stowell pointed out that residents could take water when the lake level is high, but his concern relates to the number of persons that would be allowed to pump and that some people may violate the regulations. He suggested that the City require the installation of more native grasses with new home construction as it appears the new homes are installing more lawn area.

John Lamey, 55 Windy Hill Road, stated he was against issuing the permit. He explained that there are three (3) pumps operating on the lake at this time and if everyone started pumping there would be no lake. He commented that it appears some residents are operating their pumps without a permit and that it is his opinion they are trying to take advantage of the situation. He stated that residents should be aware of the Ordinance regulations and stop taking advantage of this situation.

John Johannsen, 1 Sunfish Lane, explained that he is 100 percent interested in protecting and enhancing the lake. He stated that in his opinion new residents are subject to higher development standards and are protecting the lake better than older homes on the lake. He advised Ms. Nelson that the water standing in her rain garden may be due to the clay soils and that was what prompted him to make changes in the stormwater plan on his property. He noted that he is aware of the fact that he would not be able to pump from the lake unless there is an excess of water and that the current Ordinance regulates the water usage. He explained that he had installed two methods of sprinkling the lawn in the event that he was unable to use the lake for this purpose and that his well water contains treatment so that its use does not stain the concrete areas on his property. He stated he would prefer to use the lake water versus the aquifer. He further stated that his property has steep slopes to the lake and that the lawn would not be installed on the slopes or close to the lake; he noted it was his intent to install native grass and wildflowers. He further explained that the comments from the public are arguments related to policy issues, not his application. He stated that he had complied with the Ordinance by making application for a permit and that the arguments presented this evening should be presented when the Council discusses the Ordinance, not his permit.

Mr. Johannsen also explained that his property is 370 ft. wide and that the pump would be placed near the dock which is 170 ft. from either side of the adjacent properties. He stated the pump is submersible and that the noise should not be discernable. He advised that he would be honorable and would stop pumping if directed to do so by the City staff. He further explained that the landscaped area closest to his home would be watered from his well. He thanked the Commission and staff for their time and explained that the experts who reviewed the application recommended pumping the water from the lake versus the aquifer.

Mr. Stowell thanked Mr. Johannsen for his comments.

Chair Hendrickson asked if there were any further comments from the public and, hearing none, closed the public hearing. He asked if there were any questions or comments from the Commission.

Commissioner Naves asked if the existing permits would be grandfathered in under the existing Ordinance.

Planner Krzos explained that pumping occurred under the guise of the Ordinance from 1989, however, staff has not seen any permits or had any requests for renewals.

Chair Hendrickson recalled that residents were asked to apply for a pumping permit on their property.

Commissioner Naves expressed concern regarding the time it would take for the City to send notification to residents to stop pumping and asked if an email could be sent to expedite the notification. She pointed out that her husband, the City Forester, had operated the valve on the outlet in the past.

Engineer Sandberg explained that the valve on the new outlet will generally stay open. He advised that staff may also be able to email to notify permit holders.

Clerk Iago pointed out that she had been unable to find any record of any permits that were issued for pumping on the lake.

Commissioner Beckett asked if the one year permit was part of the Ordinance.

Planner Krzos explained that the one year permit relates to this request and that staff was unsure if previously issued permits had a time limit attached.

Commissioner Beckett asked if the one year time period would be standard when future permits are considered and the Planner responded yes.

Commissioner Driano, after asking questions of Mr. Stowell and others, said that it appeared the City did not have clear records indicating how many pumps were currently in the lake, whether they were operable, how much water was currently being removed and the other relevant information. Also, it was unclear if there were records of permits granted and if so, the durations of those granted. It was also noted that no studies of lake quality study had been performed when the original ordinance was enacted in 1989 and that no lake studies had been conducted since in the last 30 years. He indicated it would be helpful if the Commission had reliable information whether pumping water from the lake is detrimental or not. While it was discussed that the applicant would be restricted to only pumping "excess" water, Driano noted that it appeared that other landowners may have installed pumps in the lake without the same restrictions as were being suggested for the applicant, leading to a situation in which too much water could be pumped from the lake creating a detrimental effect on the lake. It was suggested that the City contact all lake property owners and notify them of the Ordinance and bring them into compliance, if required.

Commissioner Driano referred to the Interim use Approval Criteria provided in the Planner's report and stated that under paragraph 5 of the heading "New and Existing Uses", that without more information, one could not reasonably conclude that granting the interim use would not have any detrimental effect upon the property values, or the general health, safety and welfare of the surrounding uses and property owners. He did not agree with the Staff's conclusory remarks that "the proposed pumping is not likely to have a detrimental effect on the health, safety or welfare of surrounding residents".

Engineer Sandberg explained that he believes many of the pumps in place now have been put in place without a permit. He advised that he spoke to the former City Engineer, Don Sterna, and was told that Mr. Sterna had only issued one permit in his 22 years with the City. He stated that lake water was not flowing through the outlet today, therefore, if granted a permit today, Mr. Johansson would not be allowed to pump at this time.

Commissioner Driano asked Mr. Stowell if he knows how many pumps are currently operating on the lake.

Mr. Stowell stated that he is aware of four (4) pumps operating on the lake and that three of the four are active.

Engineer Sandberg explained that he was told only one permit was issued and that staff would advise and work with the other property owners who are operating a pump to bring them into compliance.

Chair Hendrickson commented that some of the other property owners could have installed the pump prior to the Ordinance adoption in 1989. He noted that discussion this evening is beyond what the Commission was asked to decide this evening.

Commissioner Nelson suggested that the Commission take action relating to the request since the Ordinance is a bigger issue.

Commissioner Nelson moved to recommend approval of the Interim Use Permit for this year and the applicant could submit a request for renewal next year and that Council consider review of the existing Ordinance to determine if changes are needed, seconded by Chair Hendrickson and carried. (Ayes: 4-Nelson, Hendrickson, Beckett and Naves; Nays: 1-Driano)

Mr. Johannsen thanked the Commission and staff. He suggested that the City should consider advising future applicants who are requesting pumping permits and if they plan to install landscaping areas, they should be able to water that area from the well on the property as an alternative source if the permit regulations change. He questioned why a resident would not be able to use the lake water for sprinkling since the water would eventually run into the lake and the aquifer.

Dr. Kihtar explained that she was unsure if a permit was issued to the previous owner of her home but that she does have a pump and questioned what type of document would have been issued. She commented that at her previous home in St. Paul the City would send reminders if permits needed to be renewed.

Engineer Sandberg asked for clarification that the motion was for the remainder of this year as the staff recommendation was for a one year or 12 calendar months.

Commissioner Nelson stated that the motion was to recommend approval of the permit for the remainder of this year to allow Mr. Johannsen to water and establish the lawn and plantings. She commented that she would prefer further information on the subject in order to make a more informed decision.

Chair Hendrickson explained that was the Commission recommendation, however, Council has the final approval and could extend the length of the permit.

OTHER/NEW BUSINESS: Chair Hendrickson asked if there was any other or new business and there was no response.

ADJOURN: Chair Hendrickson moved to adjourn the meeting at 8:45 p.m., seconded by Commissioner Driano and carried. (5-0)

Respectfully submitted,

Catherine Iago, City Clerk

Planning Memorandum

To: Sunfish Lake Mayor and City Council

From: Ryan Krzos, AICP, City Planner

Date: August 26, 2020
City Council Meeting September 1, 2020

Re: 5613 S Robert Trail (Southside Baptist Church) – Right-of-way Setback Variance
WSB Project No. 16487-000

GENERAL INFORMATION

Applicant:	Jerry Brantham, Senior Pastor, Southside Baptist Church		
Property Owner:	Southside Baptist Temple		
Project Location:	5613 S Robert Trail, PID# 38-03200-52-020		
Existing Land Use / Zoning:	Church; Zoned Institutional District, INS		
Surrounding Land Use Zoning	North:	Church; Zoned Institutional District, INS	
	East:	Residential; City of Inver Grove Heights (E-2, Estate (1.75 acres))	
	South:	Residential; Zoned Single-Family Residential District, R-1	
	West:	Residential and undeveloped; Zoned Single-Family Residential District, R-1	
Comprehensive Plan:	The City of Sunfish Lake (2020) Comprehensive Plan guides this property for Institutional land use.		
Deadline for Agency Action:	Application Date:	06-26-2020	
	60 Days:	08-25-2020	
	Extension Letter Mailed:	N/A	
	120 Days:	10-24-2020	

CONSIDERATIONS RELATED TO THE REQUEST

1. Overview.

Jerry Brantham, Senior Pastor Southside Baptist Church, has applied for a request for a right-of-way setback variance to facilitate construction of a sign on the property located at 5613 S Robert Trail.

The proposed project includes the construction of a dynamic message sign to replace an existing monument sign. In the fall of 2019, the applicant was a part of a request to amend the City's signage ordinance to allow dynamic signage. During the review process of said ordinance amendment the City Council directed staff to postpone action until such time that

in-person meetings continued once public safety concerns were alleviated. Staff was further directed to process signage requests that adhere to the provisions of the proposed ordinance. Signage requests require the review and approval of an Administrative Permit. However, the proposed location of the is 25 feet from the street right-of-way, where 50 feet is required. Therefore, the applicant is seeking a variance from this setback requirement.

Variance requests require review and recommendation by the Planning Commission, followed by City Council review and consideration. The Planning Commission approved a recommendation to approve a 10-foot variance on a 5-0 vote at their August 19, 2020 meeting. The Council may at its option conduct a public hearing on the request. A public hearing was scheduled and notification was published and sent to adjoining land owners for this request.

2. General Zoning Review

The subject site contains an existing church building located within the southwestern corner of the subject property. The proposed dynamic sign would be constructed to the east of the church's parking area. An existing monument sign that would be removed as part of the project is currently in this vicinity. The applicant is requesting that the sign be constructed up to 25 feet from the property line adjoining the S Robert Trail right-of-way. The applicant is proposing the sign be located in this vicinity to allow for snow storage, clearance from the parking lot travel lane, and for visibility. The proposed dynamic signage ordinance requires a minimum of 50 feet from rights-of-way. Below is a summary table of the proposed dimensional requirements for dynamic signage in the INS District. As noted, the sign would comply with all applicable standard with the exception of the right-of-way setback.

	INS Minimum Requirement	Proposed
Minimum Sign Setback: rights-of-way	50 ft.	25 ft.
Minimum Sign Setback: Property lines adjoining R-1 Zoned Property	100 ft.	South: approx. 150 ft. West: approx. 350 ft.
Minimum Sign Setback: Property lines adjoining INS Zoned Property	50 ft.	North approx.. 700 ft.
Maximum Sign Height	10 ft	9 ft - 6.75 in
Maximum Sign Area	50 sf per side	Two-sided; 40 sf ('5x'8') message area per side

3. Ordinance Authority

SECTION 1206.02 VARIANCE PROCEDURES provides the process for review of a regular (non-minor) variance. Regular variance requests require review and recommendation by the Planning Commission, followed by City Council review. The Council may at its option conduct a public hearing on the request.

PROPOSED SECTION 1222.04.B.3.d.(1) INS DISTRICT DYNAMIC SIGN SETBACK REQUIREMENTS establishes a setback of fifty (50) feet from all public rights-of-way for dynamic signage.

4. Variance Criteria

In considering all requests for a variance and in taking subsequent action, the Planning Commission and the Council shall make a finding of fact that the proposed action will not:

- a. Impair an adequate supply of light and air to adjacent property.

The proposed variance would facilitate the construction of a 9.5 ft tall by 8 ft wide "V" shaped monument sign with an electronic message area. The improvements would not impair light or air from reaching adjoining property.

- b. Unreasonably increase the congestion in the public street.

The proposed signage facilitated by the variance would not contribute additional traffic onto surrounding public streets.

- c. Have the effect of allowing any district uses prohibited therein, permit a lesser degree of flood protection than the flood protection elevation for the particular area, or permit standards which are lower than those required by State law.

The proposed variance would not allow for a use that is otherwise prohibited, nor will it allow a lesser degree of flood protection or state permit standards.

- d. Increase the danger of fire or endanger the public safety.

The improvements facilitated by the variance request would not increase fire or public safety risks. The proposed sign would not be in the vision triangle established to maintain visibility for motorists entering and existing from the driveway.

- e. Unreasonably diminish or impair established property values within the neighborhood, or in any way be contrary to the intent of this Title.

Locating the proposed sign closer to the road than what is otherwise permitted would not appreciably change the impacts of the sign on adjoining property values.

- f. Violate the intent and purpose of the Comprehensive Plan.

The subject site is guided for institutional land use by the comprehensive plan. The requested variance would not result in the use of the site in conflict with the Plan's guidance.

- g. Violate any of the terms or conditions of Item 2, below.

See below.

Additionally, a variance from the terms of the Zoning Ordinance shall not be granted unless it can be demonstrated that:

- a. Practical difficulties will result if the variance is denied due to the existence of special conditions and circumstances which are peculiar to the land, structure, or building involved and which are not applicable to other lands, structures or buildings in the same district.
 - (1) Special conditions may include exceptional topographic or water conditions or, in the case of an existing lot or parcel of record, narrowness, shallowness, insufficient area or shape of the property.
 - (2) Practical difficulties caused by the special conditions and circumstances may not be solely economic in nature, if a reasonable use of the property exists under the terms of this Title.
 - (3) Special conditions and circumstances causing practical difficulties shall not be a result of lot size or building location when the lot qualifies as a buildable parcel.

An existing non-dynamic sign is currently located in what appears to be a compliant location with regard to the 50-foot setback. This sign is visible from the street; therefore staff finds that the applicant's rationale to maximize the visibility of the sign would not meet this standard due to the lack of a hardship.

However, the request for the encroaching location also addresses practical difficulties related to providing sufficient area between the parking lot travel lane and the sign for safety reasons and to provide clear area for snow storage between the parking lot surface and the sign. The other institutionally-zoned properties in the City generally do not have site improvements configured in this manner.

- b. Compliance with the requirements of the provisions of this Ordinance would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this Ordinance or deny the applicant the ability to put the property in question to a reasonable use and the proposed variance permits the owner to use the property in a reasonable manner.

Signage for the church is a reasonable use of the property as the ordinance was in the process of being amended to allow the specific type of sign being requested. While denial of the variance would not deprive the owner of the ability to install a sign, it would however, likely result in the need to place the sign in an area near or on the parking lot circulation lane. An alternative setback-complaint location elsewhere on the site would likely result in the sign lacking visibility and visually connectedness with the church building. For example, if the sign was located north of the existing driveway a row of trees, fencing would render the sign less visible and less visually appealing.

- c. The special conditions and circumstances causing the practical difficulties do not result from the actions of the applicant.

The existing site was developed in 1977 by the Southside congregation. While the driveway was configured by the church, the need to address snow storage and clearance does not result from their action.

- d. Granting the variance requested will not confer on the applicant any special privilege that is denied by this Ordinance to other lands, structures or buildings in the same district under the same conditions.

The resulting variance would not be a special privilege denied to other property owners. The conditions creating the hardship are unique to the subject property.

- e. The request is not a use variance.

The variance request would not allow for a use of the property that is otherwise prohibited. The City is in the process of amending the Ordinance to allow dynamic message signage.

- f. The variance requested is the minimum variance necessary to accomplish the intended purpose of the applicant.

Staff finds that the hardships related to snow storage and vehicle clearance created by the right-of-way setback requirement in this instance would be alleviated without allowing an encroachment the full 25 ft distance requested. Accordingly, staff finds that the purpose of the variance could reasonably be achieved by allowing the sign no closer than 40 feet from the right-of-way. Therefore, staff recommends that the setback variance allow no more than 10 addition feet closer to the right-of-way.

- g. The request does not create an inconvenience to neighboring properties and uses.

The nearest residential properties across Robert Trail are setback a significant distance from the sign and have significant vegetation between the sign and the buildings. Residences to the south similarly have vegetation between the buildings and the sign. No residences are located near the site to the north. Therefore, no inconveniences to neighboring properties are likely to be generated as the sign would not be largely visible to those residents.

- h. The variance requested is in harmony with the purpose and intent of the Ordinance.

The general purpose and intent of the Zoning Ordinance is to promote the general health, safety and welfare of the community. The proposed variance request and the resulting right-of-way setback encroachment is not likely to threaten the health, safety, and welfare for residents or occupants of adjoining properties.

- i. The variance requested is consistent with the Comprehensive Plan.

The subject site is guided for institutional land use by the comprehensive plan. The requested variance would not result in the use of the site in conflict with the Plan's guidance.

- j. The variance requested will not alter the essential character of the locality.

The City is in the process of amending the Ordinance to allow this type of signage. The requested variance relates to the distance between the proposed sign and the right-of-way line. The essential character of the neighborhood is not anticipated to be impacted; provided the sign is setback no further than that which is sufficient to alleviate the hardship related to snow storage and clearance from the parking lot circulation lanes.

RECOMMENDATION

Based on the foregoing considerations and applicable ordinances, staff and the Planning Commission recommend conditional approval of a variance to reduce the right-of-way setback by ten (10) feet to 40 feet subject to the following findings of fact and conditions of approval:

Findings of Fact:

1. The address of the subject property is as follows:

5316 ROBERT TRAIL S
SUNFISH LAKE, MN 55118
2. The planning report dated August 12, 2020 prepared by WSB is incorporated herein by reference.
3. Requests for variances require Planning Commission review and City Council approval.
4. The Sunfish Lake Planning Commission reviewed the applicant's request for variance for a reduction in the right-of-way setback at the August 19, 2020 Planning Commission meeting.
5. Upon review of the planning report and application information, the Planning Commission found that the proposed variance, if limited to a ten (10) foot reduction, meets Ordinance requirements. The following findings support the Planning Commission's recommendation for approval:
 - a. The request would not impair an adequate supply of light and air to adjacent property.
 - b. The request would not unreasonably increase the congestion in the public street.
 - c. The request would not have the effect of allowing any district uses prohibited therein, permit a lesser degree of flood protection than the flood protection elevation for the particular area, or permit standards which are lower than those required by State law.
 - d. The request would not increase the danger of fire or endanger the public safety.
 - e. The request would not unreasonably diminish or impair established property values within the neighborhood, or in any way be contrary to the intent of this Title.
 - f. The request would not violate the intent and purpose of the Comprehensive Plan.
 - g. The request would not violate any of the terms or conditions of Section 1206.01(C)(2)

Conditions of Approval:

1. The proposed sign shall be located no closer than 40 feet from the Robert Trail S right-of-way.
2. No additional building or structure encroachment into the setback area is authorized through approval of the requested variance.
3. The applicant must obtain all other permits as may be required including building permits.
4. The applicant shall comply with all applicable federal, state, and local laws, rules and ordinances.
5. The applicant must adhere to and remain in compliance with the requirements of this Resolution, applicable performance standards, and such other requirements as may apply.
6. All conditions of the variance must be complied with, shall run with the land, and shall not in any way be affected by the subsequent sale, lease or other change from current ownership of the Property.
7. This Resolution is subject to the condition that all representations, written and oral, made by the Applicant and its agents and representatives to the City contained in

and concerning the Applicant's application for the variance must have been true, complete and accurate at the time they were made, and that they remain true and accurate for the duration of the development.

8. By undertaking the activities approved by the requests, the applicant agrees to all conditions.

Subject Site



Street View of Vicinity of Proposed Signage



**CITY OF SUNFISH LAKE
DAKOTA COUNTY, MINNESOTA**

RESOLUTION NO. 20-XX

**RESOLUTION APPROVING A VARIANCE FOR THE PROPERTY LOCATED AT
5613 ROBERT TRAIL SOUTH, SUNFISH LAKE, DAKOTA COUNTY, MINNESOTA.**

WHEREAS, Jerry Brantham, Senior Pastor, Southside Baptist Church, submitted an application for a right-of-way setback variance to facilitate construction of a sign on the property located at 5613 Robert Trail South, With PID 38.03200.52.020; and

WHEREAS, City staff reviewed the application and outlined their review comments in a planning report dated August 12, 2020 prepared by WSB; and

WHEREAS, the Sunfish Lake Planning Commission reviewed the variance application along with the referenced staff report at their August 19, 2020 meeting and approved a motion to recommend to the City Council approval of the variance on a vote of 5-0; and

WHEREAS, the following findings support the Planning Commission recommendation for approval:

1. The address of the subject property is as follows:

5316 ROBERT TRAIL S
SUNFISH LAKE, MN 55118

2. The planning report dated August 12, 2020 prepared by WSB is incorporated herein by reference.
3. Requests for variances require Planning Commission review and City Council approval.
4. The Sunfish Lake Planning Commission reviewed the applicant's request for variance for a reduction in the right-of-way setback at the August 19, 2020 Planning Commission meeting.
5. Upon review of the planning report and application information, the Planning Commission found that the proposed variance, if limited to a ten (10) foot reduction, meets Ordinance requirements. The following findings support the Planning Commission's recommendation for approval:
 - a. The request would not impair an adequate supply of light and air to adjacent property.
 - b. The request would not unreasonably increase the congestion in the public street.
 - c. The request would not have the effect of allowing any district uses prohibited therein, permit a lesser degree of flood protection than the flood protection elevation for the particular area, or permit standards which are lower than those required by State law.

- d. The request would not increase the danger of fire or endanger the public safety.
- e. The request would not unreasonably diminish or impair established property values within the neighborhood, or in any way be contrary to the intent of this Title.
- f. The request would not violate the intent and purpose of the Comprehensive Plan.
- g. The request would not violate any of the terms or conditions of Section 1206.01(C)(2)

WHEREAS, the Sunfish Lake City Council held a public hearing at their September 1, 2020 meeting and reviewed the variance application, along with the referenced staff report; and

NOW THEREFORE BE IT RESOLVED THAT the City Council of the City of Sunfish Lake hereby approves a right-of-way setback variance of ten (10) feet for 5613 Robert Trail S with the following conditions:

- 1. The proposed sign shall be located no closer than 40 feet from the Robert Trail S right-of-way.
- 2. No additional building or structure encroachment into the setback area is authorized through approval of the requested variance.
- 3. The applicant must obtain all other permits as may be required including building permits.
- 4. The applicant shall comply with all applicable federal, state, and local laws, rules and ordinances.
- 5. The applicant must adhere to and remain in compliance with the requirements of this Resolution, applicable performance standards, and such other requirements as may apply.
- 6. All conditions of the variance must be complied with, shall run with the land, and shall not in any way be affected by the subsequent sale, lease or other change from current ownership of the Property.
- 7. This Resolution is subject to the condition that all representations, written and oral, made by the Applicant and its agents and representatives to the City contained in and concerning the Applicant's application for the variance must have been true, complete and accurate at the time they were made, and that they remain true and accurate for the duration of the development.
- 8. By undertaking the activities approved by the requests, the applicant agrees to all conditions.

This resolution is adopted by the City Council of the City of Sunfish Lake this 1st day of September 2020.

Dan O'Leary, Mayor

Attest:

Catherine Iago, City Clerk

June 1th, 2020

City of Sunfish Lake. (City Planner)

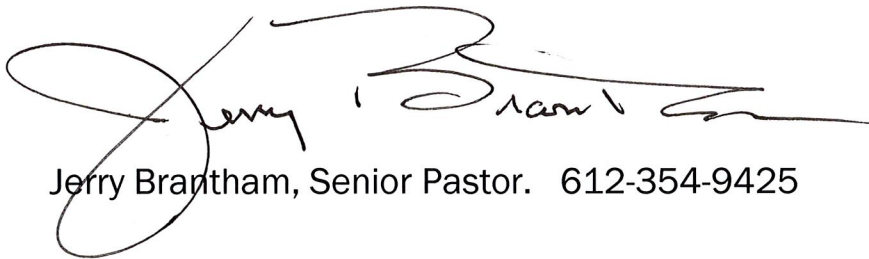
Ryan Krzos

Ryan,

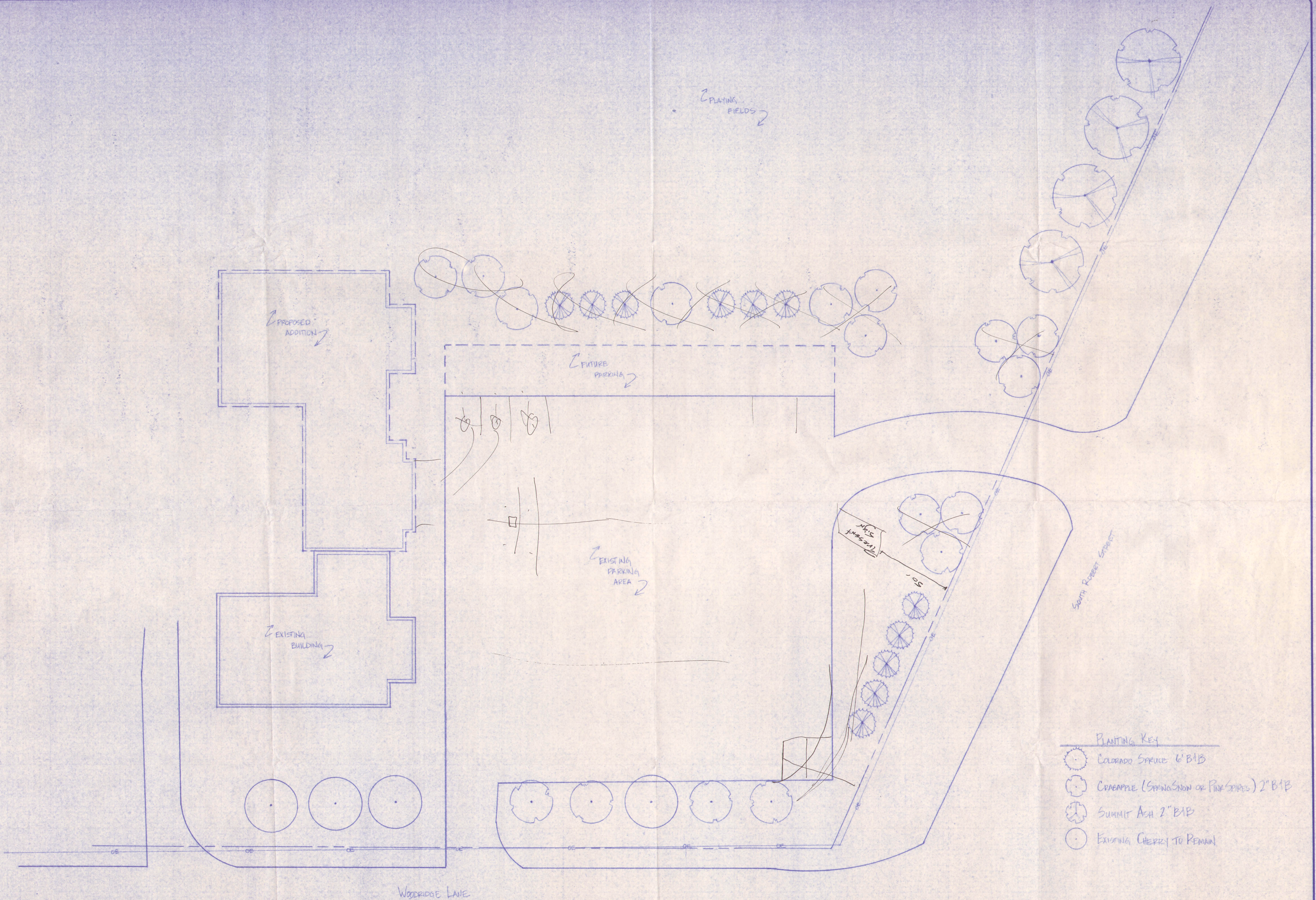
Enclose is a the application to put up a new sign for Southside Baptist Church. There is a picture of the sign. We would like to move the sign a little closer to the road. Right now it sits at 50 feet but that places it too close to the parking lot. The snow plow pushes snow near and under it during the winter. If we could move it a little bit east it would be more readable on the road from both directions and get it away from the lot. 25 feet it would be great.

Thank you for considering our request.

Respectfully

A handwritten signature in dark ink, appearing to read "Jerry Brantham". The signature is fluid and cursive, with a large loop at the beginning and a long, sweeping tail.

Jerry Brantham, Senior Pastor. 612-354-9425



- PLANTING KEY
- Colorado Spruce 6" B1B
 - Crabapple (Spring Snow or Pink Spire) 2" B1B
 - Summit Ash 2" B1B
 - Existing Cherry To Remain

SCALE 1" = 20'

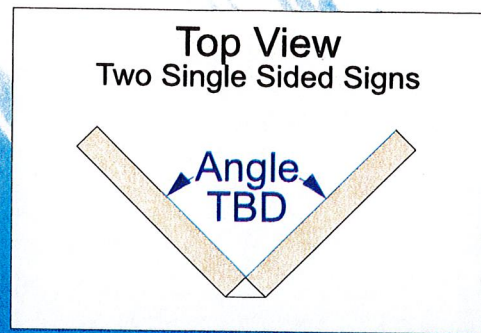
NORTH

4

SHEET OF 1

DESIGNER TIM LESTER
DRAWN TIM LESTER
DATE 20 MAY 95
REVISED

SOUTHSIDE BAPTIST CHURCH
TREE PLANTING / GREENING PLAN
SUNNYSIDE LAKE, MN



NOTE: Final choice of texture and pole covering options TBD between you, and your city, and your sign installer.

TekStar Color 10mm 64x224
CABINET SIZE: 5'x8'



ORIGINAL DESIGN DO NOT DUPLICATE

PH. 1-800-237-3928 FAX 1-800-485-4280

1/2"=1' Sk: 909937-3e Cust: 1054807
 6/16/2020 O/gWinch PROPOSAL

Paint: ALMOND Draft: WHITE
 Cowling vinyl: 4", 4", 4" Black

GRAPHICS DISCLAIMER: This custom artwork is not intended to provide an exact match for ink, vinyl, paint, or LED color. Brickwork and masonry are not included in the proposal; Cornerstone products are an exception. Measurements shown are approximations; final product dimensions may vary. LED images shown are simulated to replicate optimum viewing distance. Your sign was designed for an illuminated graphic. Sketches are based off of this premise. Non-illumination during daylight hours may result in graphics of varying appearance.

Approved as shown:

Sign _____

Date _____

Approved with listed changes:

Sign _____

Date _____

LED CAPABILITIES: 1 to 8 Rows, 2.8" to 25.2" characters.
 This sign can display video clips, animations and static images, with access to an extensive graphics library.



Planning Memorandum

To: Sunfish Lake Mayor and City Council

From: Ryan Krzos, AICP, City Planner

Date: August 26, 2020
City Council Meeting September 1, 2020

Re: 1 Sunfish Lane – Major Site Plan Amendment Review and Interim Use Permit
WSB Project No. 13724-000

GENERAL INFORMATION

Applicant/
Property Owner: John Johansson

Project Location: 1 Sunfish Lane, PID# 38-11850-01-020

Existing Land Use / Residential; Zoned Single-Family Residential Zoning District, R-1
With Shoreland Overlay District

Surrounding Land Use/Zoning:

North:	Residential; Zoned Single-Family Residential District, R-1 with Shoreland Overlay District
East:	Residential; Zoned Single-Family Residential District, R-1 with Shoreland Overlay District
South:	Sunfish Lake
West:	Residential; Zoned Single-Family Residential District, R-1 with Shoreland Overlay District

Comprehensive Plan: The City of Sunfish Lake (2020) Comprehensive Plan guides this property for Rural Residential land use.

Deadline for Agency Action:

Application Date:	07-24-2020
60 Days:	09-22-2020
Extension Letter Mailed:	N/A
120 Days:	11-21-2020

CONSIDERATIONS RELATED TO THE REQUEST

1. Overview.

John Johansson is requesting an amendment to the previously approved major site plan review for 1 Sunfish Lane. The amendment proposes modifications to the grading and drainage and stormwater management plan. Requests for amended site and building plan review are administered in a manner similar to the requirements for a new site and building plan approval, which requires Planning Commission review and City Council approval.

Additionally, the applicant is requesting an interim use permit to allow the pumping of water from Sunfish Lake for irrigation of the site. Interim Use permits are reviewed in the manner

prescribed for conditional use permits which requires a public hearing, review and recommendation from the Planning Commission followed by review and consideration by the City Council.

At the August 19, 2020 Planning Commission, the applications were reviewed, and public hearings were conducted. The draft minutes of the meeting are included as an attachment to the September Planner's report. The Planning Commission approved a motion to recommend approval of the amended site plan on a 5-0 vote subject to the recommended conditions of approval recommended by staff that are applicable to the amended site plan. On a separate motion approved on a 4-1 vote, the Planning Commission recommends approval of the Interim Use Permit, subject to Staff's recommended conditions, with a modification to allow the permit with an initial valid date through December 31, 2020. Staff has prepared separate Resolutions for the two requests.

Comments on the request submitted via email to the City Planner are included as an attachment to this memorandum.

2. General Review – Amended Site Plan Review

The applicant is requesting approval of revised civil design plans modifying stormwater management facilities previously approved in 2019 in conjunction with review of the new home. Those approved civil design plans proposed two surface stormwater management basins. The first basin previously was in the area just north of the attached garage of the new home. This basin requires modification due to State regulations which prohibit infiltration basins within 50 feet of a water well. The primary well for the new home is located nearby the north side of the new garage. Accordingly, in place of the surface basin an underground system is proposed consisting of a perforated pipe laid within a bed of gravel to allow for infiltration.

The underground infiltration conveyance pipe would empty into a surface infiltration and storage basin to the rear of the residential structure. This surface basin is located in roughly the same location as the surface basin identified in the approved 2019 plans. However, the new design proposes a shift in the southern portion of the surface basin away from large, mature white pine trees adjoining the basin. Based feedback from the City Forrester, the applicant shifted the surface basin roughly ten feet further north to shift grading from the root structure of the white pines.

Additional modifications to the overall plan include installing underground pipe to collect water from the gutters on the house and routing them to the southern basin.

3. General Review – Interim Use Permit

The applicant also proposes to install a submersible pump in the lake to supply water for an irrigation system. The landscape irrigation system would be fed off well water in addition to the lake water pump. The irrigated areas on the property would be divided between the two irrigation systems. The irrigation water from the lake pump would irrigate the southern portion of the site (approximately) 1.5 acres nearest to the lake.

The water pump would be a 7.5 Horsepower pump manufactured by Flint & Walling which would be installed adjacent to the dock serving the property. In the proposed dock location, the pump would be at least 150 feet from the adjoining lakefront property on both the east and west sides of the property. The pump would be placed in the lake in the Spring and removed in the Fall. Noise from the pump is anticipated to minimal given the submersible style of pump. However, it should be noted that the zoning ordinance requirements related to noise require continual compliance.

The pump would initially be operated every day while the turf area is establishing. Once the lawn is established the pump would likely be operated every other day or alternatively everyday with half the duration. The lake pump would operate roughly 100 sprinkler heads. The heads are generally rated to utilize 2.5 gallons of water per minute. The typical sprinkler head operation duration is 40 minutes per day – which would be shortened upon establishment of the lawn. When the turf is established, typical watering schedules call for irrigation every other day or less based upon natural rainfall events. It should be noted that 100 sprinkler heads at 2.5 gpm for 40 minutes could approach 10,000 gallons per day or one million gallons in a year. If this amount is pumped every day the activity would require a DNR dewatering permit.

Pursuant to requirements related to DNR notification for Zoning Permits in the Shoreland Overlay District area, staff provided notice to the Area Hydrologist. The DNR's water appropriations team provided the following comments based on the applicant's submittal:

"If the two irrigation systems in Sunfish Lake are not connected then they do not need to have a DNR Water Appropriation Permit. However, if they do connect the systems, then they need a DNR Water Appropriation Permit.

If they are using the well for the water supply of the home, this could push the well over the volume that is needed for the DNR Water Appropriation Permit. The plumbing Code states that a luxury home needs to have a water supply capable of supplying 150 gallons of water per day per person. If we consider an average household to be about 2.7 people, then the addition 148,000 gallons of house hold water use would push them over 1.0 million gallons per year to 1.149 million gallons per year.

If they're constructing two wells, we would ask them for a "Water Use Data Statement" for the use of the lake water and wells."

It should be noted that staff recommends conditions for any and all approvals requiring compliance with all applicable State and Federal rules, and that all applicable permits be obtained. The City has invited DNR representatives to the September 1st City Council meeting to provide an opportunity for questions regarding permitting procedures and requirements.

4. Ordinance Authority

SECTION 1107.02 WATER USE PERMIT REQUIRED states that a water use permit must be obtained from the City Council to engage in pumping of any lake, stream, wetland or natural or man-made pond.

SECTION 1107.03 INTERIM USE states that water use permits are considered as an interim use.

SECTION 1205.02 INTERIM USE PROCEDURES states that interim use requests are to be processed according to the standards and procedures for a conditional use permit as established by Section 1204.

SECTION 1204.02 CONDITIONAL USE PERMIT PROCEDURES provides the process for review of a conditional use permit which requires public notice and notification, a public hearing, and review and recommendation by the Planning Commission, followed by review and consideration by the City Council.

SECTION 1208.06 AMENDED SITE PLAN APPROVAL PROCEDURES state an amended site and building plan may be applied for and administered in a manner similar to the requirement for a new site and building plan approval.

5. Site Plan Review Criteria

The Planning Commission, as its basis of recommendation, and the City Council, as its basis for decision on major projects, shall evaluate the effects of the proposed site and building plans. This review shall include, but is not limited to the following, with staff's comments provided in *italics*:

A. Whether the proposed improvements are compatible and in harmony with the existing structures in the surrounding community.

The proposed modified stormwater facilities would not conflict with the appearance of structures and residential property in the vicinity.

B. Whether the proposed improvements preserve the character and nature of the surrounding community, including the natural landscape and woodland characteristics of the community.

The proposed amended site plan does not impact the residential structure or accessory structures. The proposed modified improvements aid in the preservation of several existing significant trees and do not result in the removal of any additional trees.

C. Whether the proposed improvements are not constructed of unsightly, improper or unsuitable materials.

The proposed plan modification would not result in any changes to the building. Proposed stormwater conveyance facilities associated with this request will be located underground, and thus will not be visible. Surface infiltration basins will be modified in size and location but would not be constructed out of unsightly or improper materials.

D. Whether the proposed improvements will not materially adversely affect any natural resources in the community, except when there is no feasible and prudent alternative to the proposed location of the improvements. For purposes of this clause, "natural resources" shall include, but not be limited to, all mineral, animal, botanical, air, water, land, timber, soil, quietude, recreational, historical, scenic and aesthetic resources.

The proposed improvements were adjusted to aid in the preservation of a number of existing significant white pines trees in the project area

E. Whether the proposed site and improvements shall have an appearance that will not have an adverse effect upon adjacent residential properties.

The proposed revisions to the drainage and stormwater facilities will be largely imperceptible to adjoining property and thus are likely to have minimal visual impact.

F. Whether the proposed site improvement complies with drainage requirements, as provided in Section 1216.04 of this Ordinance.

Compliance with the City's drainage standards is achieved with the revised stormwater management design.

G. Whether the proposed site and improvements are consistent with the purposes of this Ordinance and the Property Owner Reference & Development Guide Manual, as established by City Council resolution.

The purpose of the Zoning Ordinance is to protect the health, safety, and general welfare of the community. Modification of the previously approved plans to accommodate the

modified stormwater design is not anticipated to have negative impact on health, safety, or general welfare of the community.

6. Interim Use Approval Criteria

The Interim Use permit section of Ordinance requires proposed new uses to comply with the following criteria with staff's comments provided in *italics*:

New Uses

1. Conforms to all zoning regulations as otherwise applicable.

The proposed water pump and pumping activities would conform to applicable Zoning Ordinance provisions provided the equipment is screened from view. Noise from the pump is not anticipated to exceed Ordinance standards due to the type of pump being utilized, and the proximity to adjoining properties.

2. The date or event that will terminate the use can be identified with certainty.

The proposed water pumping use would occur indefinitely or until irrigation is no longer needed. Staff is recommending conditions of approval requiring that the pumping cease when lake levels are such that the outlet stops flowing, and that the use is subject to annual renewal.

3. The existence of the use will not impose additional costs on the public if it is necessary for the public to take the property in the future; and

The proposed water pump is a temporary site element that is to be removed during winter months. Accordingly, the use would not result in additional cost should the public take the property in the future.

4. The user agrees to any conditions that the City Council deems appropriate for permission of the use.

Agreement from the applicant to adhere to the conditions of approval is a recommended condition of this request.

New and Existing Uses

1. Shall maintain harmony and compatibility with surrounding uses and with the architectural character and design standards of existing uses and development.

The proposed water pumping would be compatible with surrounding residential land uses provided the pump is adequately screened as is required by code, and the equipment maintains compliance with noise limitations prescribed by the Zoning Ordinance. The water drawn pump is to be used for lawn irrigation. Lawn irrigation systems are commonplace in residential settings.

2. Conforms with all performance standards contained in this Ordinance (i.e., parking, noise, etc.).

The proposed water pumping use is anticipated to comply with all applicable performance standards contained in the Zoning Ordinance including provisions primarily related to noise, odor, dust, and lighting. Continual compliance with these provisions is required.

3. Shall have no detrimental effect upon the property values or the general health, safety, and welfare of the surrounding uses and property owners.

Staff is recommending conditions of approval requiring the cessation of pumping when there is no outflow from the lake outlet. This will ensure that the activity does not

contribute to excessive draw on the lake in periods of low lake levels. Persistent low lake level creates the potential for erosion of property values, which are generally correlated to the amount and quality of lake frontage.

The proposed water pumping is not likely to have a detrimental effect on the health, safety, or welfare of surrounding residents.

4. Traffic generated by the use does not overburden or exceed the capabilities of streets and other public services and facilities, including parks, schools, streets and utilities serving the area.

The proposed water pumping use would have no impact on traffic or other public services.

RECOMMENDATION

Based on the foregoing considerations and applicable ordinances staff and the Planning Commission recommend conditional approval of the amended site and building plan and Interim Use Permit for water pumping subject to the following findings of fact and conditions of approval:

Findings of Fact:

1. The address of the subject property is as follows:

1 SUNFISH LANE
SUNFISH LAKE, MN 55118
2. A request for a major site and building plan review was review by the City Council and conditionally approved by Resolution Number 19-17 on July 9, 2019.
3. The applicant has submitted applications for an amended site plan and an interim use permit for the pumping of water from Sunfish Lake.
4. The planning report detailing the applicant's proposal for an amended site plan and interim use dated August 12, 2020 prepared by WSB is incorporated herein by reference.
5. A request for an amended site and building plan review may be applied for and administered in a manner similar to that required for a new site and building plan approval, which requires Planning Commission review and City Council approval.
6. Interim Use Permit requests may be applied for and administered in a manner similar to that required for a Conditional Use Permit, which requires Planning Commission review and City Council approval
7. The Sunfish Lake Planning Commission reviewed the applicant's request for an amended major site and building plan and interim use permit approval and conducted public hearings at the August 19, 2020 Planning Commission meeting.
8. Upon review of the planning report and application information, the Planning Commission found that the proposed amended site and building plan request meets Ordinance requirements. The following findings support the Planning Commission's recommendation for approval:

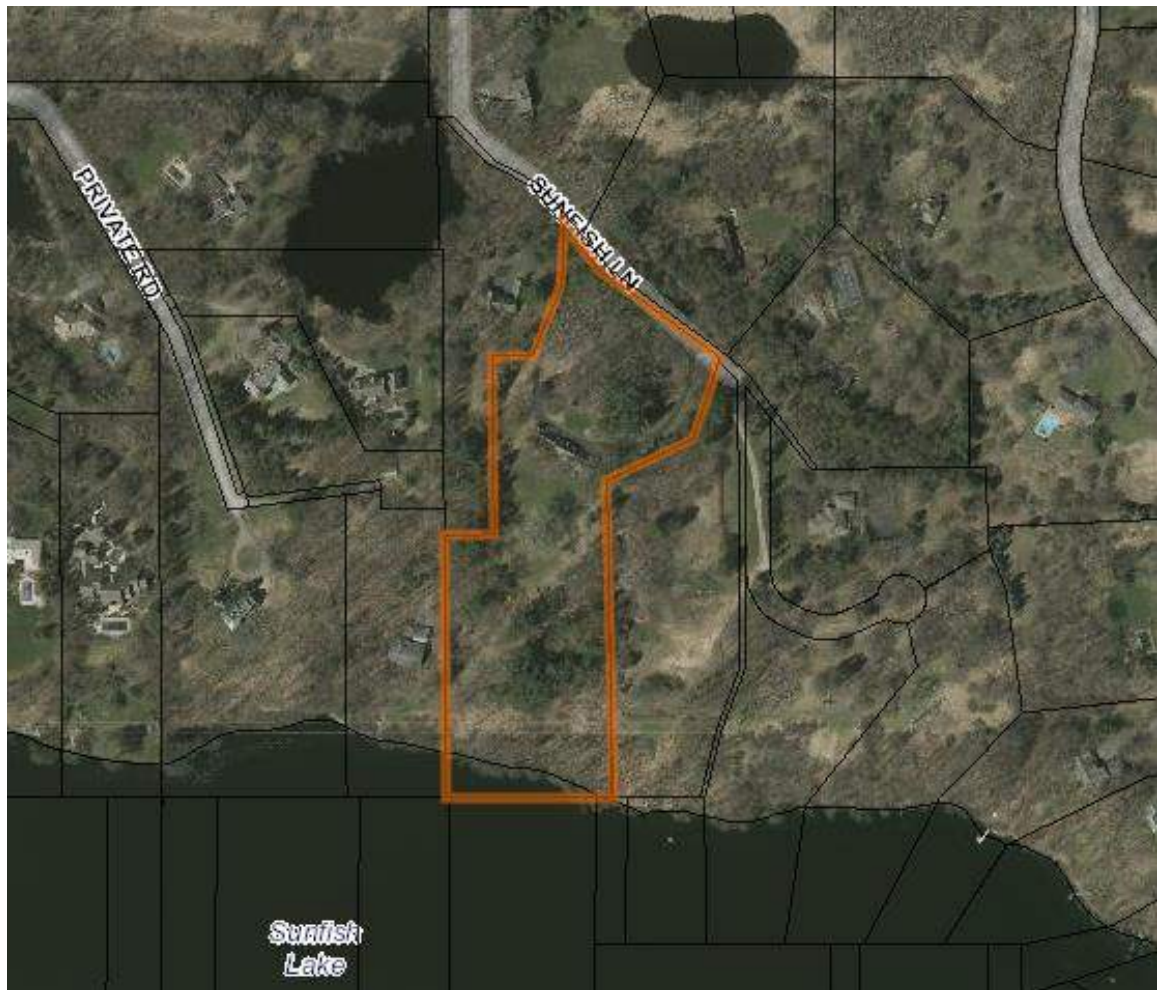
- a. The subject property and proposed development meet R-1 and Shoreland Overlay District requirements, and impervious surface standards.
 - b. The proposed development addresses Ordinance requirements pertaining to grading, drainage and stormwater management, landscaping, and screening.
 - c. The development meets other applicable Zoning Ordinance criteria.
9. Upon review of the planning report and application information, the Planning Commission found that the proposed interim use permit request meets Ordinance requirements. The following finding support the Planning Commission's Recommendation for approval:
- a. The proposed water pumping conforms to all zoning regulations as otherwise applicable as presented.
 - b. The date or event that will terminate the use can be identified with certainty.
 - c. The existence of the use will not impose additional costs on the public if it is necessary for the public to take the property in the future; and
 - d. The user agrees to any conditions that the City Council deems appropriate for permission of the use.
 - e. The use maintains harmony and compatibility with surrounding uses and with the architectural character and design standards of existing uses and development.
 - f. The use conforms with all performance standards contained in this Ordinance.
 - g. The use will have no detrimental effect upon the property values or the general health, safety, and welfare of the surrounding uses and property owners.
 - h. No traffic is generated by the use and it does not overburden or exceed the capabilities of streets and other public services and facilities, including parks, schools, streets and utilities serving the area.

Conditions of Approval:

1. Construction shall occur in conformance with the plans presented at the August 19, 2020 Planning Commission meeting.
2. There shall be no use of bobcats, graders or other similar machinery within 100 feet of the lakeshore, without prior engineering and forestry approval in writing.
3. Vegetation within the buffer zone established by ordinance from the lakeshore shall remain as is. Removal of invasive species in the buffer zone may occur with written approval from the City provided a sufficient plantings and stabilization measures approved by the City Engineer and City Forrester are immediately implemented.
4. As required in Section 1243.04(A)(2), mowed lawns within 100 feet of the ordinary high water mark may only be permitted in an area which encompasses up to twenty (20) percent of the shore impact zone.
5. Water Pumping shall occur in accordance with the information presented at the August 19, 2020 Planning Commission meeting.
6. All water pumping equipment shall be screened from view to the greatest extent possible.
7. The Interim Use Permit shall be subject to annual renewal and is initially valid through December 31, 2020.
8. No water pumping shall occur when there is no outflow from the lake outlet. The City Engineer and/or their designee shall be consulted to determine if and when these conditions occur
9. The conditions of the Site and Building and Conditional Use Permit approvals granted by City Council on July 9, 2019 established in Resolution number 19-17 shall remain in effect where not superseded by this approval.
10. The applicant must obtain all other permits as may be required.

11. The applicant shall comply with all applicable federal, state, and local laws, rules and ordinances.
12. The applicant must adhere to and remain in compliance with the requirements of this Resolution, applicable performance standards, and such other requirements as may apply.
13. All conditions of the site plan review and Interim Use Permit must be complied with, shall run with the land, and shall not in any way be affected by the subsequent sale, lease or other change from current ownership of the Property.
14. This Resolution is subject to the condition that all representations, written and oral, made by the Applicant and its agents and representatives to the City contained in and concerning the Applicant's application for the Interim Use Permit and site plan review must have been true, complete and accurate at the time they were made, and that they remain true and accurate for the duration of the development.
15. By undertaking the activities approved by the requests, the applicant agrees to all conditions.

Subject Site



**CITY OF SUNFISH LAKE
DAKOTA COUNTY, MINNESOTA**

RESOLUTION NO. 20-XX

**RESOLUTION APPROVING AN INTERIM USE PERMIT FOR THE PROPERTY
LOCATED AT 1 SUNFISH LANE, SUNFISH LAKE, DAKOTA COUNTY,
MINNESOTA.**

WHEREAS, John Johannson, submitted an application for an Interim Use Permit to allow the pumping of water from Sunfish Lake for site irrigation purposes on the property located at 1 Sunfish Lane, legally described as:

Lot 2, Block 1, Arcadia, Dakota County, Minnesota

With PID 38.11850.01.020; and

WHEREAS, a request for an interim use permit may be applied for and administered in a manner similar to that required for a conditional use permit approval, which requires Planning Commission review and City Council approval.

WHEREAS, City staff reviewed the application and outlined their review comments in a planning report dated August 12, 2020 prepared by WSB; and

WHEREAS, the Sunfish Lake Planning Commission held a public hearing at their August 19, 2020 meeting and reviewed the Interim Use Permit application, along with the referenced staff report; and

WHEREAS, upon hearing the staff presentations, applicant testimony, and public testimony, the Planning Commission closed the public hearing and recommend to the City Council approval of the Interim Use Permit on a vote of 4-1; and

WHEREAS, the following findings support the Planning Commission recommendation for approval:

1. The address of the subject property is as follows:

1 SUNFISH LANE
SUNFISH LAKE, MN 55118

2. The applicant has submitted an application for an interim use permit for the pumping of water from Sunfish Lake.
3. The planning report detailing the applicant's proposal for an amended site plan and interim use dated August 12, 2020 prepared by WSB is incorporated herein by reference.

4. Interim Use Permit requests may be applied for and administered in a manner similar to that required for a Conditional Use Permit, which requires Planning Commission review and City Council approval
5. The Sunfish Lake Planning Commission reviewed the applicant's request for an interim use permit approval and a conducted public hearing at the August 19, 2020 Planning Commission meeting.
6. Upon review of the planning report and application information, the Planning Commission found that the proposed interim use permit request meets Ordinance requirements. The following findings support the Planning Commission's Recommendation for approval:
 - a. The proposed water pumping conforms to all zoning regulations as otherwise applicable as presented.
 - b. The date or event that will terminate the use can be identified with certainty.
 - c. The existence of the use will not impose additional costs on the public if it is necessary for the public to take the property in the future; and
 - d. The user agrees to any conditions that the City Council deems appropriate for permission of the use.
 - e. The use maintains harmony and compatibility with surrounding uses and with the architectural character and design standards of existing uses and development.
 - f. The use conforms with all performance standards contained in this Ordinance.
 - g. The use will have no detrimental effect upon the property values or the general health, safety, and welfare of the surrounding uses and property owners.
 - h. No traffic is generated by the use and it does not overburden or exceed the capabilities of streets and other public services and facilities, including parks, schools, streets and utilities serving the area.

WHEREAS, the Sunfish Lake City Council considered the application for the Interim Use Permit at their meeting on September 1, 2020 and agrees with the findings of the Planning Commission.

NOW THEREFORE BE IT RESOLVED THAT the City Council of the City of Sunfish Lake hereby approves the interim use permit at 1 Sunfish Lane with the following conditions:

1. Construction shall occur in conformance with the plans presented at the August 19, 2020 Planning Commission meeting.
2. There shall be no use of bobcats, graders or other similar machinery within 100 feet of the lakeshore, without prior engineering and forestry approval in writing.
3. Vegetation within the buffer zone established by ordinance from the lakeshore shall remain as is. Removal of invasive species in the buffer zone may occur with written approval from the City provided a sufficient plantings and stabilization measures approved by the City Engineer and City Forrester are immediately implemented.
4. As required in Section 1243.04(A)(2), mowed lawns within 100 feet of the ordinary high water mark may only be permitted in an area which encompasses up to twenty (20) percent of the shore impact zone.
5. Water Pumping shall occur in accordance with the information presented at the August 19, 2020 Planning Commission meeting.

6. All water pumping equipment shall be screened from view to the greatest extent possible.
7. The Interim Use Permit shall be subject to annual renewal and is initially valid through December 31, 2020.
8. No water pumping shall occur when there is no outflow from the lake outlet. The City Engineer and/or their designee shall be consulted to determine if and when these conditions occur
9. The conditions of the Site and Building and Conditional Use Permit approvals granted by City Council on July 9, 2019 established in Resolution number 19-17 shall remain in effect where not superseded by this approval.
10. The applicant must obtain all other permits as may be required.
11. The applicant shall comply with all applicable federal, state, and local laws, rules and ordinances.
12. The applicant must adhere to and remain in compliance with the requirements of this Resolution, applicable performance standards, and such other requirements as may apply.
13. All conditions of the Interim Use Permit must be complied with, shall run with the land, and shall not in any way be affected by the subsequent sale, lease or other change from current ownership of the Property.
14. This Resolution is subject to the condition that all representations, written and oral, made by the Applicant and its agents and representatives to the City contained in and concerning the Applicant's application for the Interim Use Permit review must have been true, complete and accurate at the time they were made, and that they remain true and accurate for the duration of the development.
15. By undertaking the activities approved by the requests, the applicant agrees to all conditions.

This resolution is adopted by the City Council of the City of Sunfish Lake this 1st day of September 2020.

Dan O'Leary, Mayor

Attest:

Catherine Iago, City Clerk

**CITY OF SUNFISH LAKE
DAKOTA COUNTY, MINNESOTA**

RESOLUTION NO. 20-XX

**RESOLUTION APPROVING AN AMENDMENT TO A MAJOR SITE AND BUILDING
PLAN REVIEW FOR THE PROPERTY LOCATED AT 1 SUNFISH LANE, SUNFISH
LAKE, DAKOTA COUNTY, MINNESOTA.**

WHEREAS, A request for a major site and building plan review for the property located at 1 Sunfish Lane was reviewed by the City Council and conditionally approved by Resolution Number 19-17 on July 9, 2019.

WHEREAS, John Johansson, submitted an application for an amended major site and building plan review to modify the proposed stormwater management system detailed in the previously reviewed plans for the property located at 1 Sunfish Lane, legally described as:

Lot 2, Block 1, Arcadia, Dakota County, Minnesota

With PID 38.11850.01.020; and

WHEREAS, a request for an amended site and building plan review may be applied for and administered in a manner similar to that required for a new site and building plan approval, which requires Planning Commission review and City Council approval.

WHEREAS, City staff reviewed the application and outlined their review comments in a planning report dated August 12, 2020 prepared by WSB; and

WHEREAS, the Sunfish Lake Planning Commission held a public hearing at their August 19, 2020 meeting and reviewed the amended major site and building plan application, along with the referenced staff report; and

WHEREAS, upon hearing the staff presentations, applicant testimony, and public testimony, the Planning Commission closed the public hearing and recommend to the City Council approval of the amended major site and building plan on a vote of 5-0; and

WHEREAS, the following findings support the Planning Commission recommendation for approval:

1. The address of the subject property is as follows:

1 SUNFISH LANE
SUNFISH LAKE, MN 55118

2. A request for a major site and building plan review was review by the City Council and conditionally approved by Resolution Number 19-17 on July 9, 2019.

3. The applicant has submitted an application for an amended site plan.
4. The planning report detailing the applicant's proposal for an amended site plan dated August 12, 2020 prepared by WSB is incorporated herein by reference.
5. A request for an amended site and building plan review may be applied for and administered in a manner similar to that required for a new site and building plan approval, which requires Planning Commission review and City Council approval.
6. The Sunfish Lake Planning Commission reviewed the applicant's request for an amended major site and building plan and conducted a public hearing at the August 19, 2020 Planning Commission meeting.
7. Upon review of the planning report and application information, the Planning Commission found that the proposed amended site and building plan request meets Ordinance requirements. The following findings support the Planning Commission's recommendation for approval:
 - a. The subject property and proposed development meet R-1 and Shoreland Overlay District requirements, and impervious surface standards.
 - b. The proposed development addresses Ordinance requirements pertaining to grading, drainage and stormwater management, landscaping, and screening.
 - c. The development meets other applicable Zoning Ordinance criteria.

WHEREAS, the Sunfish Lake City Council considered the application for the amended major site and building plan at their meeting on September 1, 2020 and agrees with the findings of the Planning Commission.

NOW THEREFORE BE IT RESOLVED THAT the City Council of the City of Sunfish Lake hereby approves the amended major site and building plan modifying the proposed stormwater management facility at 1 Sunfish Lane with the following conditions:

1. Construction shall occur in conformance with the plans presented at the August 19, 2020 Planning Commission meeting.
2. There shall be no use of bobcats, graders or other similar machinery within 100 feet of the lakeshore, without prior engineering and forestry approval in writing.
3. Vegetation within the buffer zone established by ordinance from the lakeshore shall remain as is. Removal of invasive species in the buffer zone may occur with written approval from the City provided a sufficient plantings and stabilization measures approved by the City Engineer and City Forrester are immediately implemented.
4. As required in Section 1243.04(A)(2), mowed lawns within 100 feet of the ordinary high water mark may only be permitted in an area which encompasses up to twenty (20) percent of the shore impact zone.
5. The conditions of the Site and Building and Conditional Use Permit approvals granted by City Council on July 9, 2019 established in Resolution number 19-17 shall remain in effect where not superseded by this approval.
6. The applicant must obtain all other permits as may be required.

7. The applicant shall comply with all applicable federal, state, and local laws, rules and ordinances.
8. The applicant must adhere to and remain in compliance with the requirements of this Resolution, applicable performance standards, and such other requirements as may apply.
9. All conditions of the site plan review as amended must be complied with, shall run with the land, and shall not in any way be affected by the subsequent sale, lease or other change from current ownership of the Property.
10. This Resolution is subject to the condition that all representations, written and oral, made by the Applicant and its agents and representatives to the City contained in and concerning the Applicant's application for the site plan review must have been true, complete and accurate at the time they were made, and that they remain true and accurate for the duration of the development.
11. By undertaking the activities approved by the requests, the applicant agrees to all conditions.

This resolution is adopted by the City Council of the City of Sunfish Lake this 1st day of September 2020.

Dan O'Leary, Mayor

Attest:

Catherine Iago, City Clerk

Narrative – Irrigation pumping form Sunfish Lake

This narrative supplements the Interim Use permit application for the proposed irrigation of portions of the property at 1 Sunfish Lane with water drawn from Sunfish Lake.

The applicant proposes to install a submersible pump in the lake. The pump would be a high quality 7.5 HP pump manufactured by Flint & Walling. The pump would be installed adjacent to, and perhaps under, the dock serving the property. The pump would be placed in the lake in the Spring and removed in the Fall to be stored in a heated environment over the winter.

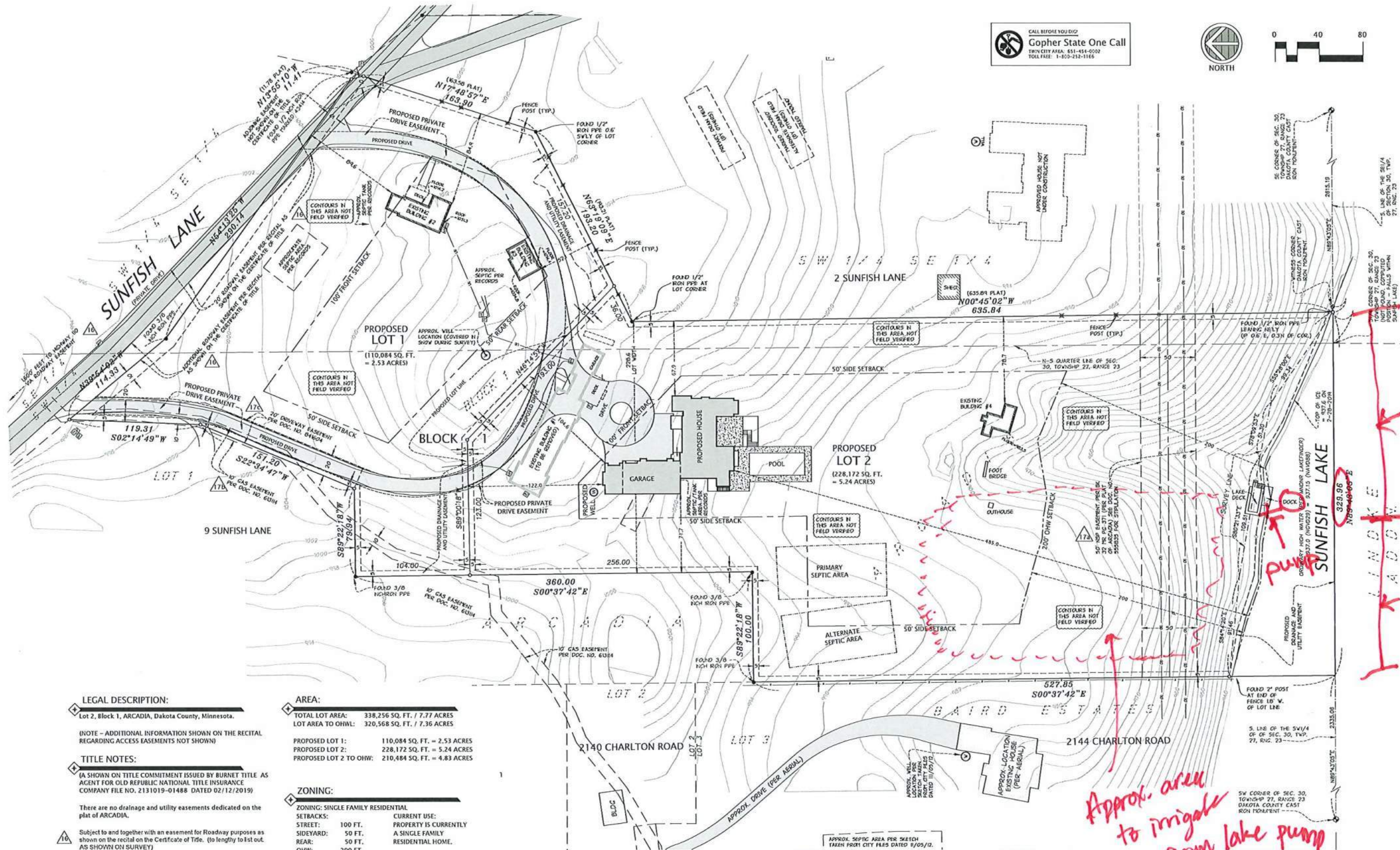
Because the pump would be entirely submersed in the lake, the noise from the pump would be virtually imperceptible. For reference, the dock is located approximately in the middle of the subject property – which has a lake frontage of 329 lineal feet. As such, the pump would be at least 150 feet from the adjoining lakefront property on both the east and west sides of the property. Even though there would be virtually no audible noise from the pump, there is added protection in that the pump would be installed a significant distance from any adjoining property owner.

Upon installing new grass and sod, the pump would initially be operated everyday – for a duration that would vary based upon natural rainfall events. Upon the establishment of the grass and sod, the pump would likely be operated every other day. Alternatively, the applicant could operate the pump every day but for roughly a 50% duration – as the sprinkled areas could be zoned and irrigated on opposing, alternating days.

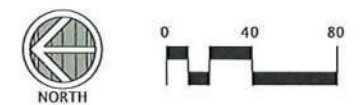
The applicant is also installing a landscape irrigation system within the new home – to be fed off the newly drilled water well. This well water will be treated for iron removal prior to irrigation use. The irrigated areas on the property would be divided between the two irrigation systems. The irrigation water from the lake pump would irrigate the southern portion of the site- nearest to the lake. It is estimated that the ground area to be irrigated by lake water is in the range of 1.5 acres of irrigation land area. The irrigation system fed by the well would likewise irrigate roughly 1.5 acres of irrigation land area.

The lake pump would operate roughly 100 sprinkler heads. The heads are generally rated to utilize 2.5 gallons of water per minute. The longest a sprinkler head is typically operated per day is 40 minutes – to be adjusted to shorter duration upon establishment of the newly planted turf areas. When the turf is established, typical watering schedules call for irrigation on every other day – or less based upon natural rainfall events.

It is also of note that the applicant is planning on installing a turf grass in the area to be irrigated by lake water that is primarily a natural fescue-based grass. There are some areas that are primarily in the shade – and thus the combination of the fescue grasses, and shade varieties can aid in reducing irrigation volume once the turf is established.



CALL BEFORE YOU DIG!
Gopher State One Call
TWINCITY AREA: 651-454-6002
TOLL FREE: 1-800-252-1166



1 SUNFISH LANE
SUNFISH LAKE, MINNESOTA

CONTACT:
John J. Johannson
Welsh Companies/Colliers
International
4350 Baker Road, Suite 400
Minnetonka, MN 55343
952-897-7750 - phone
612-817-2302 - cell
John.Johannson@colliers.com
JJohannson@welshco.com

COUNTY/CITY:
DAKOTA COUNTY
CITY OF SUNFISH LAKE

REVISIONS:

DATE	REVISION
2-21-19	PRELIMINARY
2-28-19	ISSUED
3-04-19	REVISED
3-27-19	ADD SEPTIC/WELL
4-05-19	PRELIM PLAT ISSUE

CERTIFICATION:
I hereby certify that this plan was prepared by me, or under my direct supervision, and that I am a duly Licensed Land Surveyor under the laws of the state of Minnesota.
[Signature]
Daniel L. Thummes Registration Number: 25718
Date: 02-21-19

PROJECT LOCATION:
1 SUNFISH LANE
PID#38-03000-83-020

Suite #200
1970 Northwestern Ave.
Stillwater, MN 55082
Phone 651.275.8969
dan@cssurvey.net

CORNERSTONE
LAND SURVEYING, INC.

PRELIMINARY PLAT
JOHANNSON ADDITION

LEGAL DESCRIPTION:

Lot 2, Block 1, ARCADIA, Dakota County, Minnesota.

(NOTE - ADDITIONAL INFORMATION SHOWN ON THE RECITAL REGARDING ACCESS EASEMENTS NOT SHOWN)

TITLE NOTES:

(A SHOWN ON TITLE COMMITMENT ISSUED BY BURNET TITLE AS AGENT FOR OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY FILE NO. 2131019-01488 DATED 02/12/2019)

There are no drainage and utility easements dedicated on the plat of ARCADIA.

Subject to and together with an easement for Roadway purposes as shown on the recital on the Certificate of Title. (to length to list out. AS SHOWN ON SURVEY)

Easement in favor of Northern States Power Company per Book 32 of M.R. Page 371. Subject to Stipulation & Order Filed January 3, 2005 as Document No. T555835 Stipulation for Dismissal with Prejudice and Order for Entry of Judgment and Partial Judgment Northern States Power Company, PPL VS Paul and Shannon Burke, et al Dfs. (AS SHOWN ON SURVEY)

Gas Line Easement per Document No. 613114. (AS SHOWN ON SURVEY)

Driveway easement per Document No. 841604. (AS SHOWN ON SURVEY)

BENCHMARKS

ELEVATIONS BASED ON INFORMATION AS SHOWN ON THE MNDOT GEODETIC WEBSITE. SURVEY DISK 1918 K WITH AN ELEVATION OF 931.31 WAS USED TO ESTABLISH VERTICAL CONTROL FOR THIS SURVEY (NAVD 88)

AREA:

TOTAL LOT AREA: 338,256 SQ. FT. / 7.77 ACRES
LOT AREA TO OHWL: 320,568 SQ. FT. / 7.36 ACRES

PROPOSED LOT 1: 110,084 SQ. FT. = 2.53 ACRES
PROPOSED LOT 2: 228,172 SQ. FT. = 5.24 ACRES
PROPOSED LOT 2 TO OHWL: 210,484 SQ. FT. = 4.83 ACRES

ZONING:

ZONING: SINGLE FAMILY RESIDENTIAL
SETBACKS:
STREET: 100 FT.
SIDEYARD: 50 FT.
REAR: 50 FT.
OHWL: 200 FT.
CURRENT USE:
PROPERTY IS CURRENTLY A SINGLE FAMILY RESIDENTIAL HOME.

SURVEY NOTES:

- BEARINGS ARE BASED ON COORDINATES SUPPLIED BY THE DAKOTA COUNTY SURVEYORS OFFICE. BEARINGS ARE DIFFERENT THAN SHOWN ON THE RECORDED PLAT OF ARCADIA. ALL INTERIOR ANGLES MATCH THE RECORDED PLAT ANGLES OR REFLECT MEASURED DISTANCES TO FOUND IRON MONUMENTS.
- UNDERGROUND UTILITIES SHOWN WERE NOT RESEARCHED OR LOCATED AS PART OF THIS SURVEY. THERE MAY BE SOME UNDERGROUND UTILITIES, GAS, ELECTRIC, ETC. NOT SHOWN OR LOCATED.
- ELEVATIONS IN EXISTING AROUND EXISTING IMPROVEMENTS AND PROPOSED IMPROVEMENT AREAS ARE BASED ON FIELD MEASUREMENT. SUPPLEMENTAL CONTOURS SHOWN OUTSIDE OF THESE AREAS ARE BASED ON LIDAR DATA ACQUIRED FROM THE MNTOPD WEBSITE AND WERE NOT FIELD VERIFIED.
- EXCESSIVE SNOW AND ICE AT THE TIME OF THIS SURVEY MAY HAVE HINDERED OUR ABILITY TO LOCATE OBVIOUS IMPROVEMENTS.
- TREE LOCATION/ID WILL BE PROVIDED AS A SEPARATE DOCUMENT UPON TREE ID AFTER SPRING LEAF OUT.

UNDERGROUND UTILITIES NOTES:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THIS SURVEY HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. GOPHER STATE ONE CALL LOCATE TICKET NUMBER(S) 190570762 SOME MAPS WERE RECEIVED, WHILE OTHER UTILITIES DID NOT RESPOND TO THE LOCATE REQUEST. ADDITIONAL UTILITIES OF WHICH WE ARE UNAWARE MAY EXIST.

FLOOD INFORMATION:

THIS PROPERTY LIES WITHIN ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON NON-PRINTED FEMA FLOOD INSURANCE RATE MAP NUMBER 27037C0040E HAVING AN EFFECTIVE DATE OF 12/02/2011.

EXISTING IMPROVEMENT AREAS:

(IN SQUARE FEET)
BUILDING #1 = 3,675
DECK/STAIRS = 414
BUILDING #2 = 1,206
DECK/STAIRS = 278
BUILDING #3 = 660
BUILDING #4 = 574
FOOT BRIDGE = 29
OUTHOUSE = 18
LAKE DECK/STAIRS = 383
DOCK = 130
BITUMINOUS DRIVEWAY = 14,446
PAVERS/MISC = 269
TOTAL IMPROVEMENTS = 22,082
SQ.FT. = 6.89% (5% OF OHW AREA)

LEGEND

- FOUND CAST IRON MONUMENT
- FOUND MONUMENT (AS NOTED)
- SET IRON PIPE MARKED WITH MN LICENSE NO. 25718
- CABLE TV FEDESTAL
- ELECTRIC METER
- ELECTRIC TRANSFORMER
- GUY WIRE
- POWER POLE
- GAS METER
- TELEPHONE FEDESTAL
- SANITARY CLEANOUT
- WATER WELL
- MAIL BOX
- BUILDING LINE
- BITUMINOUS SURFACE
- CONCRETE SURFACE
- UNDERGROUND TELEPHONE
- OVERHEAD UTILITY
- UNDERGROUND GAS
- FENCE
- TREES

EASEMENT DETAIL

DRAINAGE AND UTILITY EASEMENTS ARE SHOWN THUS: (NOT TO SCALE)

Being 10.00 feet in width and adjoining public ways and being 5.00 feet in width and adjoining lot lines and boundary lines, unless otherwise shown on this plat.

Narrative – refined stormwater plan

Please find attached the refined stormwater plans and utility drawings for 1 Sunfish Lane, prepared by Pierce Pini and Associates, Inc – the engineer of record for this project. These plans have been refined to address site specific items – while still satisfying all municipal and state standards as to treatment, retention, and volume control for Stormwater. These refined plans actually greatly exceed some of the required capacities as to volume and capacity.

The underlying approved drawings from November 2019 identified two surface basins. The first such basin was planned to be a surface storm basin in the area just north of the newly constructed attached garage of the new home. This basin requires refinement due to State regulations which prohibit infiltration basins within 50' of a water well. The primary well for the new home is located nearby the north side of the new garage. As such, this northern surface basin has now been designed to lie outside of the prohibited radius of 50' from the well – and is set as an underground system consisting of a 100 lineal foot section of 36" perforated HDPE pipe laid within a cavity bed of gravel to allow for infiltration.

This initial section of perforated infiltration pipe then connects in a solid pipe running along the east side of the home, through the mandated 50' clearance from the water well, to a second subterranean section of 190 lineal feet of perforated HDPE pipe laid into a cavity bed of gravel to allow for an additional infiltration field.

Finally, the underground infiltration pipe empties into a large surface infiltration and storage basin in the backyard of the new home (south of the new structure). This surface basin is located in nearly the same location as the surface basin identified in the approved plans from November 2019. There is a slight shift in the southern extremity of the surface basin away from large, mature white pine trees adjoining the basin. Based upon a tour and feedback from the City of Sunfish Lake Forrester, the applicant has agreed to shift the surface basin roughly 10' further north to shift primary grading activity and grade cuts away from the root structure of these magnificent, historic white pines. Photos of these majestic trees are attached.

The overflow and rate control out of this southern basin is designed to the same engineering standards as the plans approved in November 2019.

Some other enhancements of the overall plan include installing underground pipe to collect water from the gutters on the house and routing them to the southern basin.

The other components of the underlying approved drawings remain intact – including the installation of catch basins on the north side of the house to collect storm water from within the access driveways and main drive area serving the garage for the house. The plan has also been refined to identify the retaining walls within the property – such walls were identified previously – but the refined plan more accurately depicts their exact location.

The ability to protect and retain roughly 7 large white pines is a very welcome result of the refined plan. Additionally, disbursing some of the required infiltration in multiple locations around the property is beneficial in that it encourages infiltration over a wider geographic area – rather than concentrating on

only one isolated area entirely within the larger southern surface basin. The clay-based soils which are typical to Sunfish Lake can prove slow to infiltrate and thus can result in periods of storm basins remaining wet following rain events.

The applicant can painfully represent that these refinements are not an effort to shave cost out of the project. On the contrary, these refinements result in substantial additional cost. The benefit is that this plan results in a more appropriate, functional, and reliable system.

Thank you for your consideration.

John Johansson

612-817-2302.



PIERCE PINI &
ASSOCIATES

9298 CENTRAL AVENUE NE,
SUITE 312
BLAINE, MN 55434
TEL 763.537.1311
FAX 763.537.1354

JOHANNSON RESIDENCE
1 SUNFISH LANE
SUNFISH LAKE, MINNESOTA

I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly Licensed ENGINEER under the laws of the State of Minnesota.

For: PIERCE PINI & ASSOCIATES, INC.

By: RHONDA S. PIERCE

Name: Rhonda S. Pierce

Date: 09/20/2019 Reg. No. 41333

Issued for	Date
A ISSUED FOR PERMIT	09/20/2019
B DESIGN REVIEW	09/30/2019
C DESIGN REVIEW	10/10/2019
D DESIGN REVIEW	11/01/2019
E DESIGN REVIEW	11/05/2019
F OWNER REVIEW	06/19/2020
G SITE REFINEMENTS	06/26/2020
H OWNER REVIEW	07/02/2020
J CITY SUBMITTAL	07/31/2020

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Comm. No. 19-087

Drawn: DPM/JAH

Checked: RSP

Date: 09/20/2019

PERMIT DRAWINGS

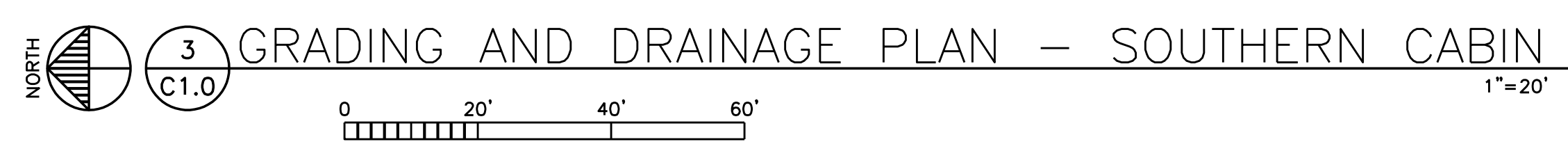
Drawing Title

GRADING, DRAINAGE AND
EROSION CONTROL PLAN

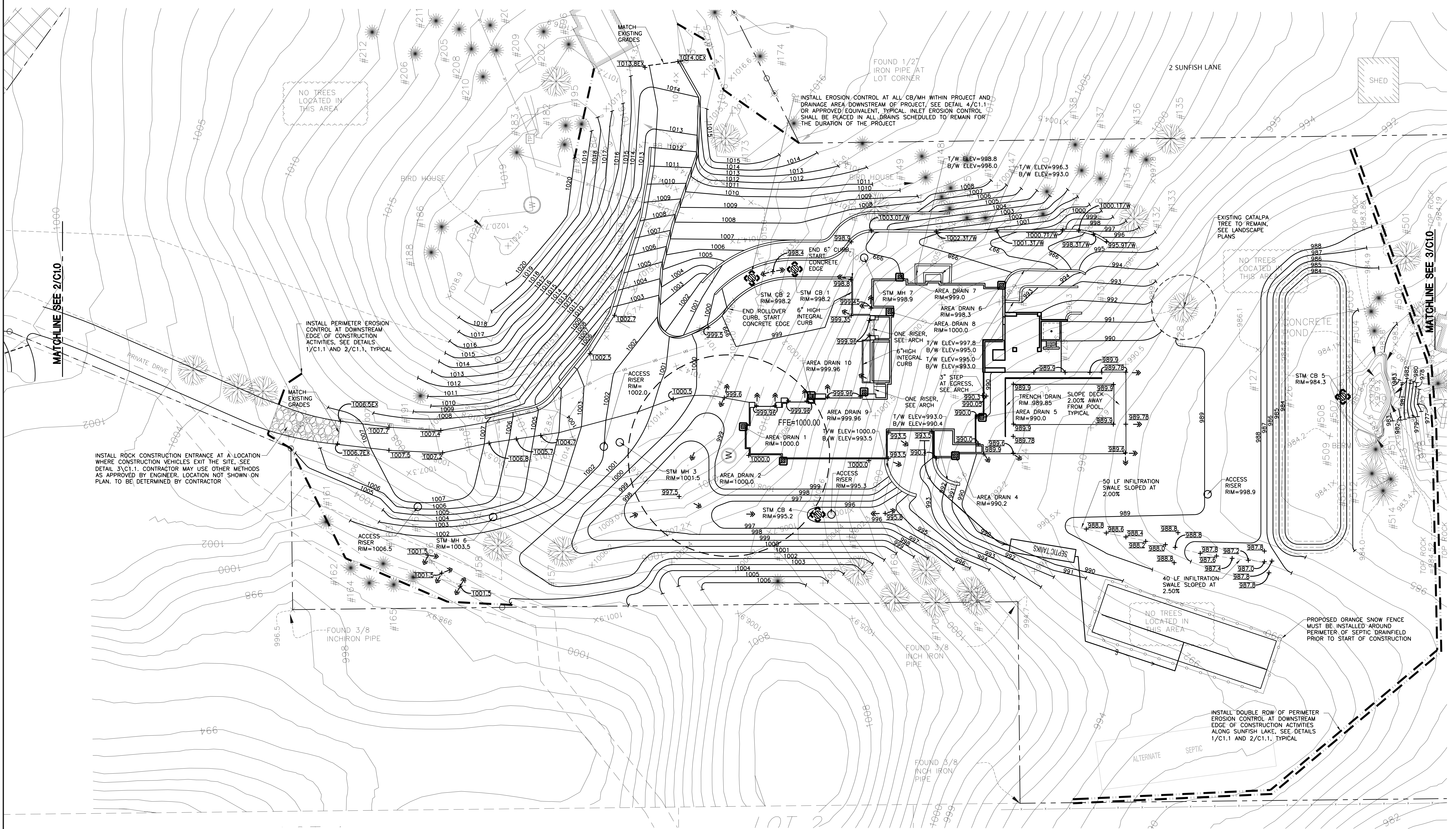
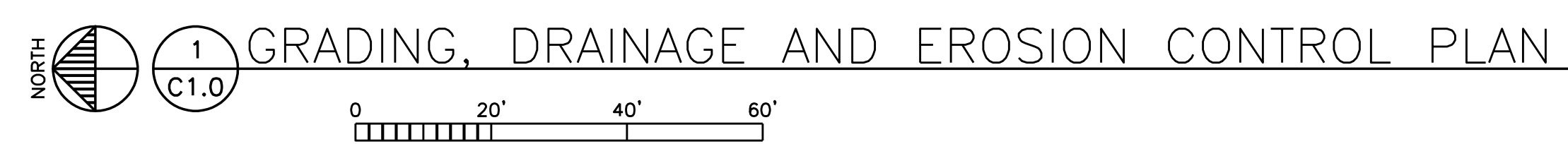
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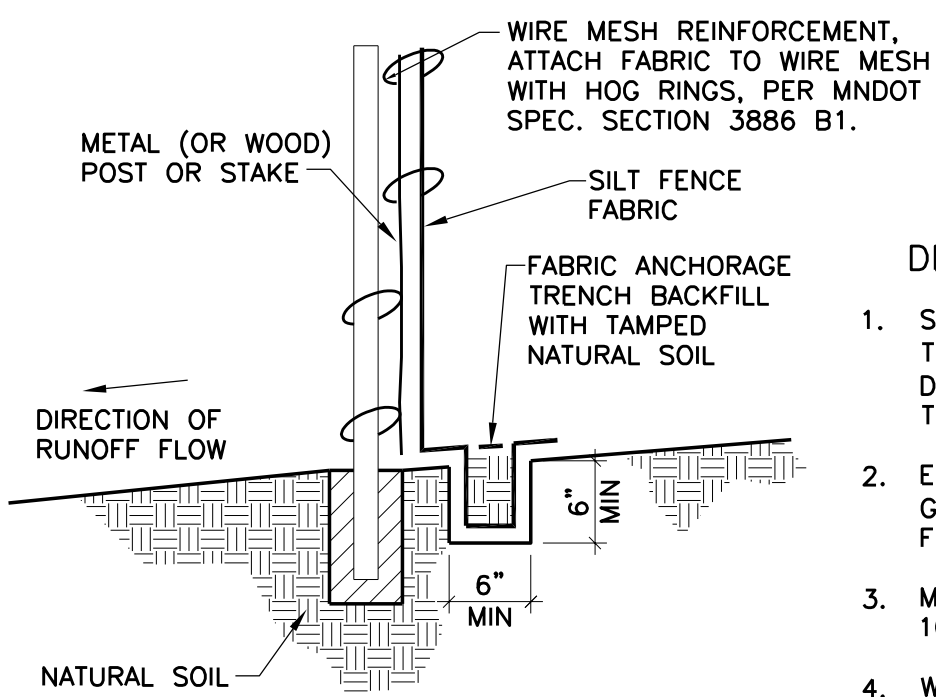
2 GRADING AND DRAINAGE PLAN — NORTH DRIVEWAY

3 GRADING AND DRAINAGE PLAN — SOUTHERN CABIN



1 GRADING, DRAINAGE AND EROSION CONTROL PLAN





- DESIGN RECOMMENDATIONS
1. SILT FENCES SHOULD BE INSTALLED ON THE CONTOUR (AS OPPOSED TO UP AND DOWN A HILL) AND CONSTRUCTED SO THAT FLOW CANNOT BYPASS THE ENDS.
 2. ENSURE THAT THE DRAINAGE AREA IS NO GREATER THAN 1/4 ACRE PER 100 FT OF FENCE.
 3. MAKE THE FENCE STABLE FOR THE 10-YEAR PEAK STORM RUNOFF.
 4. WHERE ALL RUNOFF IS TO BE STORED BEHIND THE SILT FENCE, ENSURE THAT THE MAXIMUM SLOPE LENGTH BEHIND THE FENCE DOES NOT EXCEED THE SPECIFICATIONS SHOWN IN TABLE 1.

NOTE: SILT FENCE SHALL FOLLOW MNDOT SPEC. SECTION 3886.

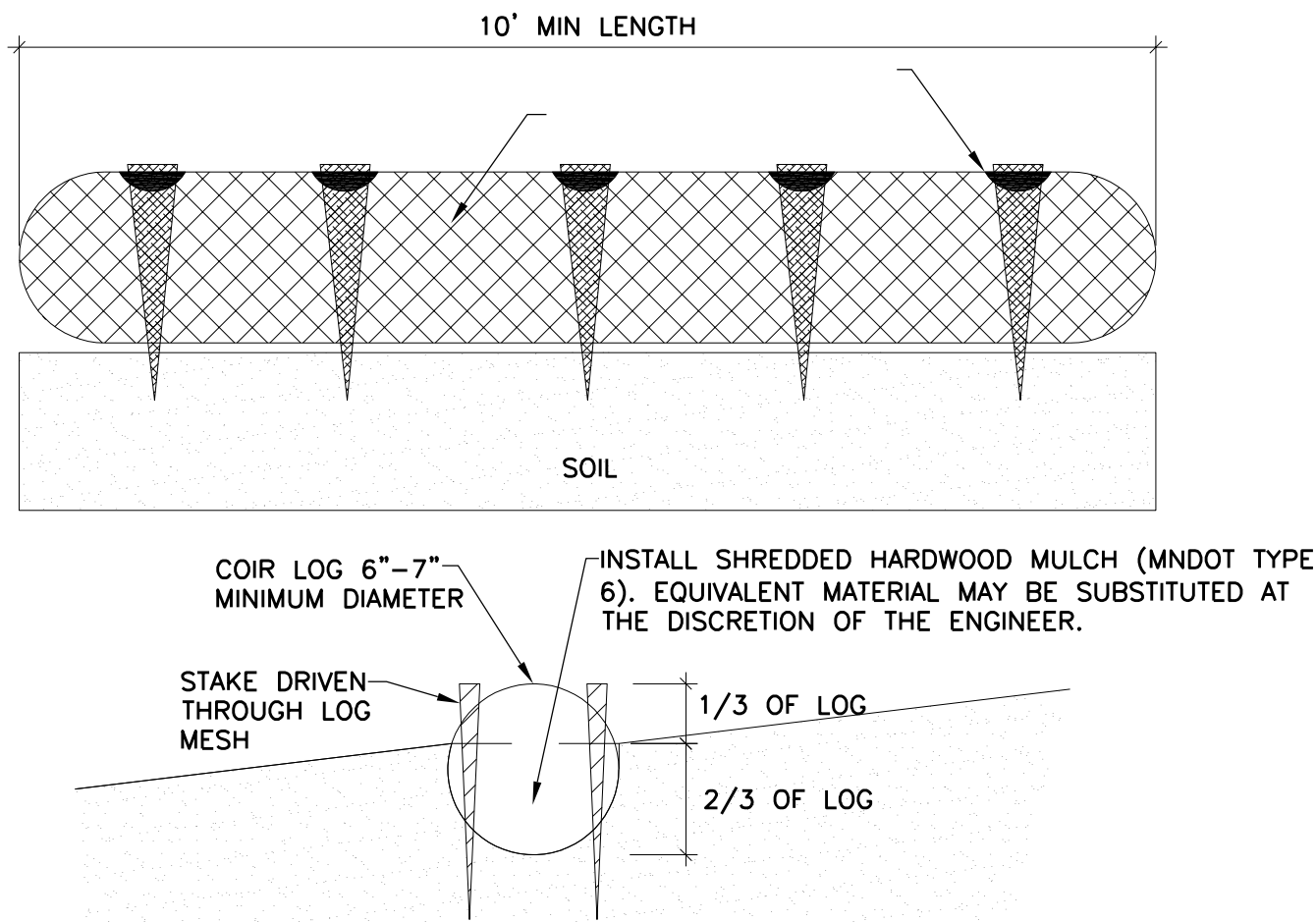
FIGURE 1 TYPICAL INSTALLATION FOR SILT FENCE

TABLE 1 MAXIMUM SLOPE LENGTH AND SLOPE FOR WHICH SILT FENCE IS APPLICABLE

SLOPE H:V	PERCENT	BY CALCULATION		BY ACCEPTED DESIGN PRACTICES
		SILT FENCE STORAGE EQUALS 2 FT FOR A 100-YEAR EVENT	SILT FENCE STORAGE EQUALS 2 FT FOR A 2-YEAR EVENT OR 3 FT FOR A 100-YEAR EVENT	
100:1	1%	400 FT	900 FT	100 FT
50:1	2%	200 FT	450 FT	75 FT
25:1	4%	100 FT	225 FT	75 FT
20:1	5%	80 FT	180 FT	75-50 FT
17:1	6%	67 FT	150 FT	50 FT
12.5:1	8%	50 FT	112 FT	50 FT
10:1	10%	40 FT	90 FT	50-25 FT
5:1	20%	20 FT	45 FT	25-15 FT
4:1	25%	16 FT	36 FT	15 FT
3:1	33%	12 FT	27 FT	15 FT
2:1	50%	8 FT	18 FT	15 FT

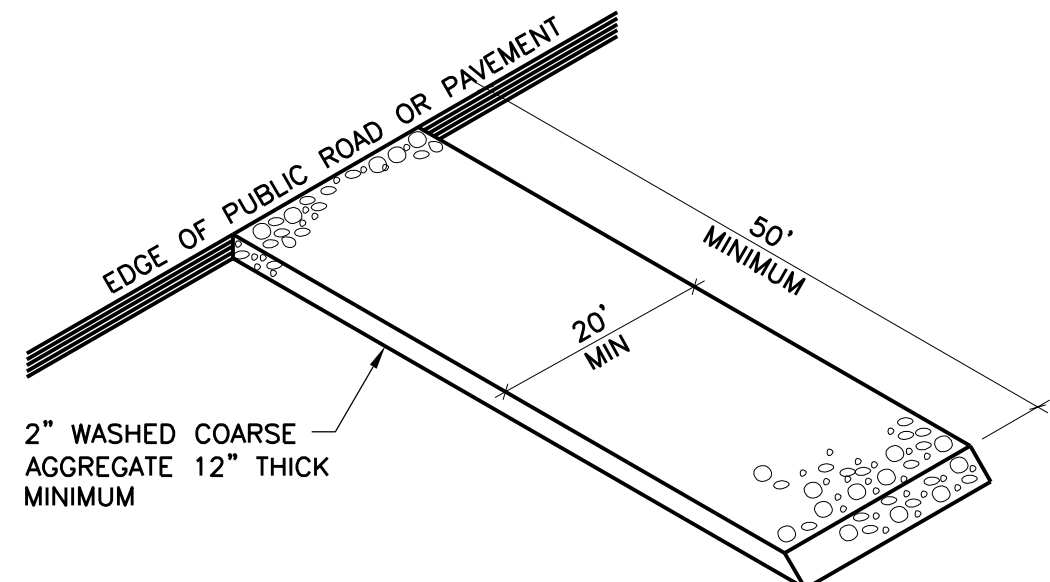
1 HEAVY DUTY SILT FENCE DETAIL

C1.1 NO SCALE



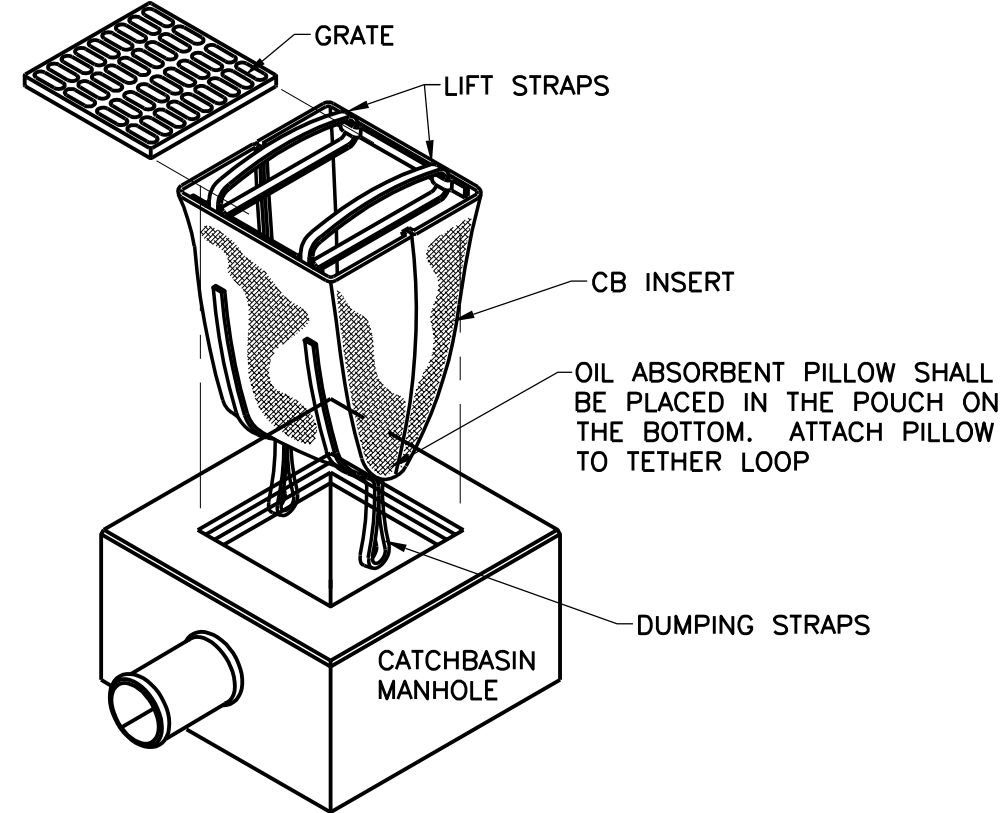
2 COIR LOG

C1.1 NO SCALE



3 GRAVEL CONSTRUCTION ENTRANCE

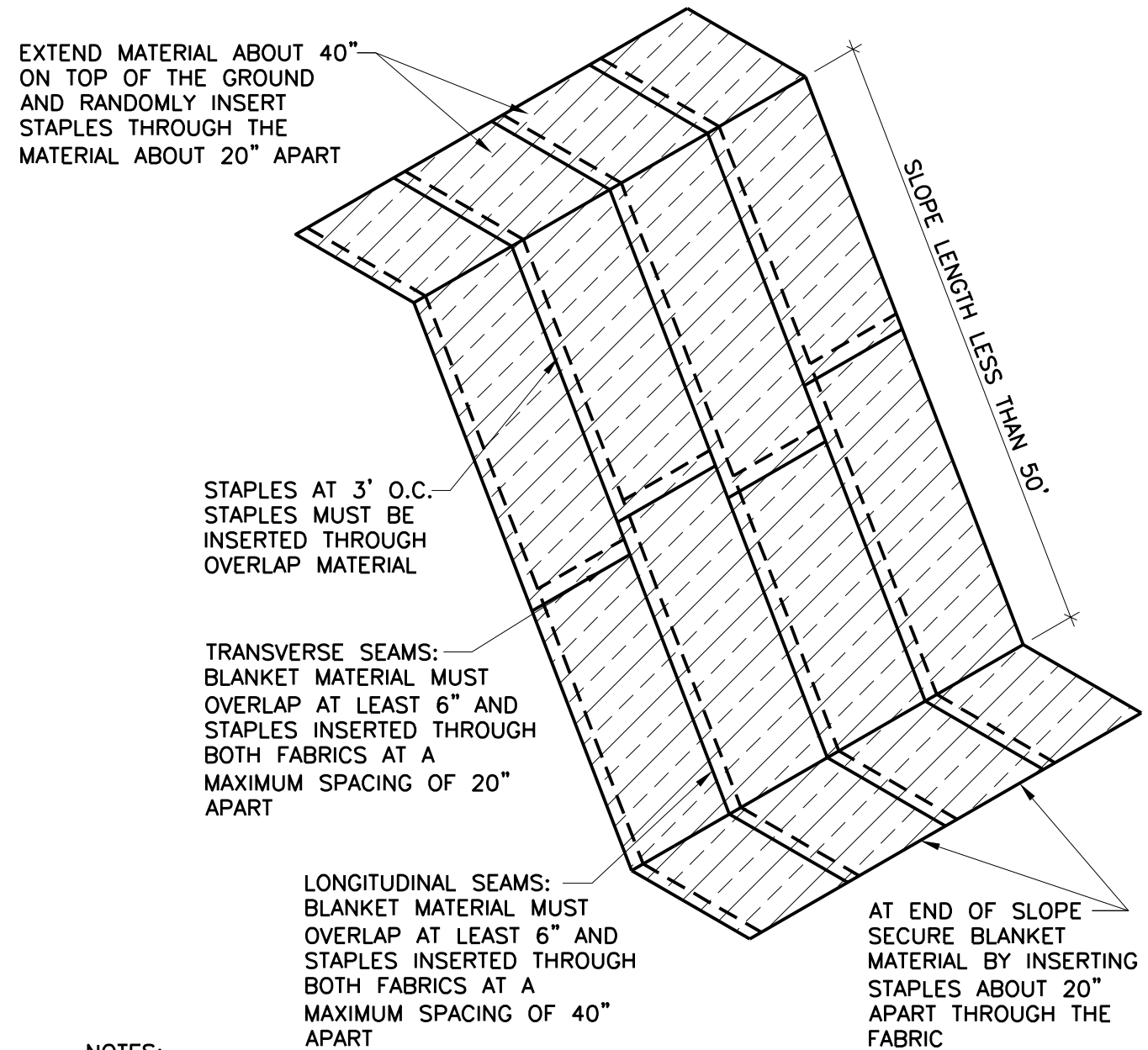
C1.1 NO SCALE



1. OIL ABSORBENT PILLOW SHALL BE REMOVED AND REPLACED WHEN NEAR SATURATION.
2. USE DANDY® BAG II AS MANUFACTURED BY DANDY® PRODUCTS, INC.
3. AN EQUIVALENT CATCHBASIN EROSION CONTROL INSERT METHOD OR PRODUCT MAY BE USED WITH PRIOR APPROVAL FROM ENGINEER.

4 CB INSERT EROSION CONTROL

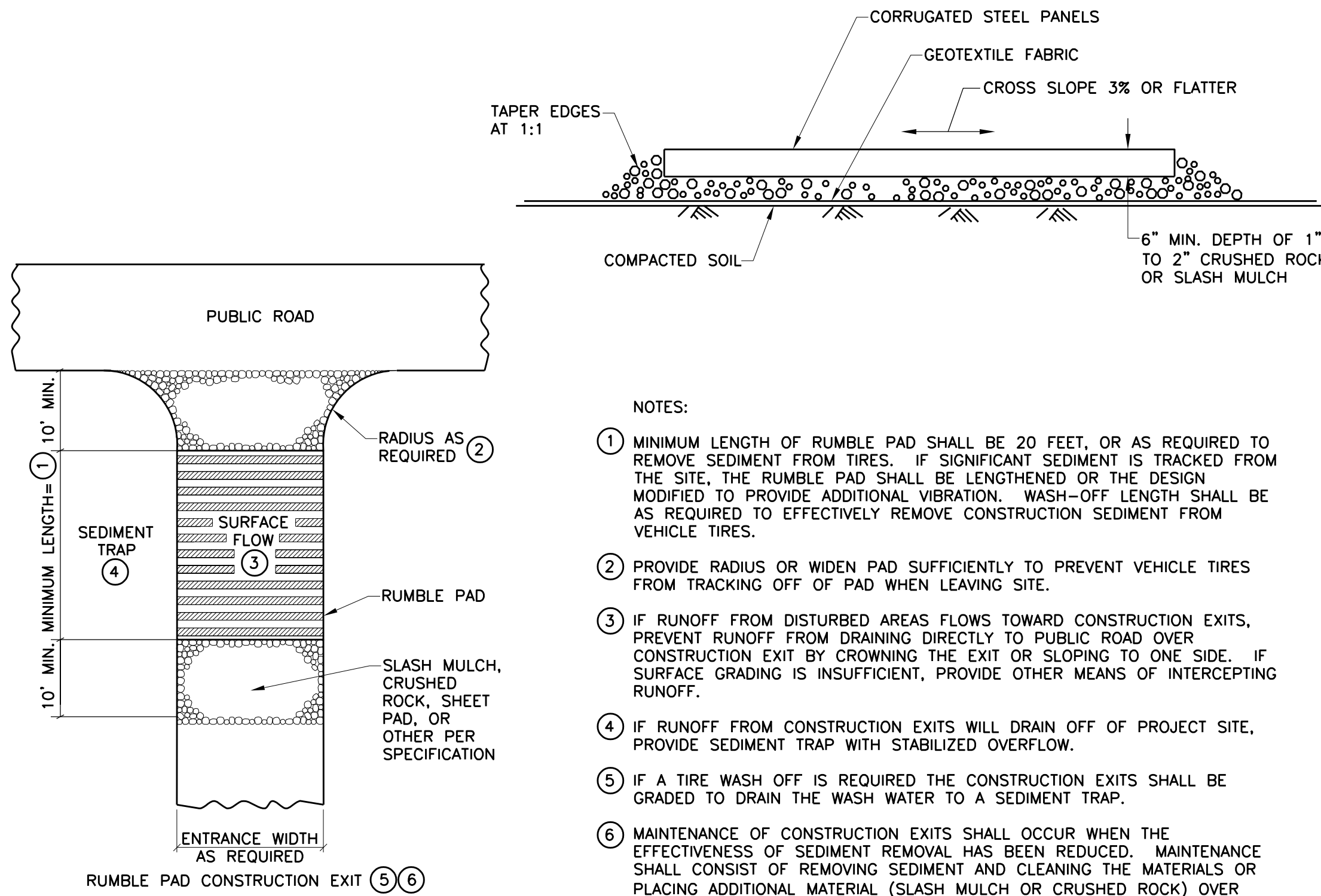
C1.1 NO SCALE



- NOTES:
1. EROSION CONTROL BLANKET TO BE CATEGORY 4-COCONUT 2S FOR SLOPES GREATER THAN 5:1 AND SIDES AND BOTTOM OF ALL DRAINAGE SWALES AND PONDING AREAS AND CATEGORY 2-STRAW 2S FOR ALL SLOPES LESS THAN 5:1 PER MNDOT SPEC. SECTION 3885.
 2. INSTALL PER MNDOT SPEC. SECTION 2575

5 EROSION CONTROL BLANKET

C1.1 NO SCALE

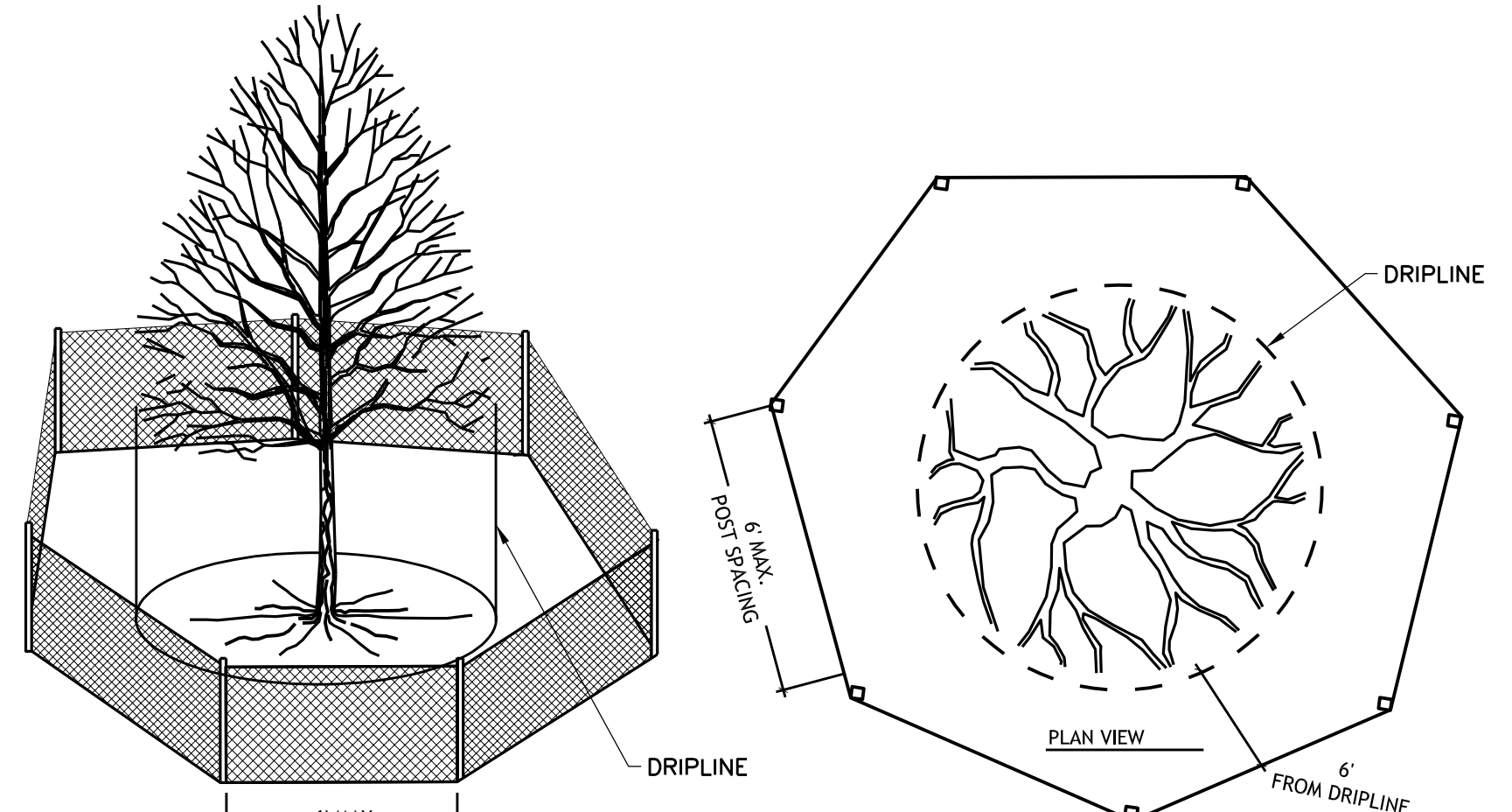


- NOTES:
- 1 MINIMUM LENGTH OF RUMBLE PAD SHALL BE 20 FEET, OR AS REQUIRED TO REMOVE SEDIMENT FROM TIRES. IF SIGNIFICANT SEDIMENT IS TRACKED FROM THE SITE, THE RUMBLE PAD SHALL BE LENGTHENED OR THE DESIGN MODIFIED TO PROVIDE ADDITIONAL VIBRATION. WASH-OFF LENGTH SHALL BE AS REQUIRED TO EFFECTIVELY REMOVE CONSTRUCTION SEDIMENT FROM VEHICLE TIRES.
 - 2 PROVIDE RADIUS OR WIDEN PAD SUFFICIENTLY TO PREVENT VEHICLE TIRES FROM TRACKING OFF OF PAD WHEN LEAVING SITE.
 - 3 IF RUNOFF FROM DISTURBED AREAS FLOWS TOWARD CONSTRUCTION EXITS, PREVENT RUNOFF FROM DRAINING DIRECTLY TO PUBLIC ROAD OVER CONSTRUCTION EXIT BY CROWNING THE EXIT OR SLOPING TO ONE SIDE. IF SURFACE GRADING IS INSUFFICIENT, PROVIDE OTHER MEANS OF INTERCEPTING RUNOFF.
 - 4 IF RUNOFF FROM CONSTRUCTION EXITS WILL DRAIN OFF OF PROJECT SITE, PROVIDE SEDIMENT TRAP WITH STABILIZED OVERFLOW.
 - 5 IF A TIRE WASH OFF IS REQUIRED THE CONSTRUCTION EXITS SHALL BE GRADED TO DRAIN THE WASH WATER TO A SEDIMENT TRAP.
 - 6 MAINTENANCE OF CONSTRUCTION EXITS SHALL OCCUR WHEN THE EFFECTIVENESS OF SEDIMENT REMOVAL HAS BEEN REDUCED. MAINTENANCE SHALL CONSIST OF REMOVING SEDIMENT AND CLEANING THE MATERIALS OR PLACING ADDITIONAL MATERIAL (SLASH MULCH OR CRUSHED ROCK) OVER SEDIMENT FILLED MATERIAL TO RESTORE EFFECTIVENESS.

6 RUMBLE PAD CONSTRUCTION EXIT

C1.1 NO SCALE

- TREE PROTECTION NOTES:
- 1) ALL TREE PROTECTION FENCING AND EROSION CONTROL FENCING SHALL BE INSTALLED ACCORDING TO THE PLANS PRIOR TO ANY DEMOLITION, AFTER DEMOLITION OR AS NECESSARY. TREE PROTECTION FENCING MAY BE RELOCATED WITH APPROVAL FROM THE LANDSCAPE ARCHITECT. ALL TREE PROTECTION FENCING AND EROSION CONTROL DEVICES SHALL BE MAINTAINED FOR THE DURATION OF THE CONSTRUCTION PERIOD.
 - 2) CONTRACTOR SHALL NOT STORE ANY MATERIALS OR PARK ANY VEHICLES IN TREE PROTECTION ZONES. THE FENCE SHALL PREVENT TRAFFIC MOVEMENT AND THE PLACEMENT OF TEMPORARY FACILITIES, EQUIPMENT, STOCKPILES AND SUPPLIES FROM HARMING VEGETATION WITHIN THE LIMITS OF PROTECTION.
 - 3) THE CONTRACTOR SHALL CLEANLY CUT ALL ROOTS EXPOSED BY GRADING AS DIRECTED BY THE LANDSCAPE ARCHITECT.
 - 4) THE CONTRACTOR SHALL USE DESIGNATED CONSTRUCTION ENTRANCES AND STAGING AREAS.



7 TREE PROTECTION DETAIL

C1.1 NO SCALE

PIERCE PINI & ASSOCIATES

9298 CENTRAL AVENUE NE,
SUITE 312
BLAINE, MN 55434
TEL 763.537.1311
FAX 763.537.1354

JOHANNSON RESIDENCE

1 SUNFISH LANE
SUNFISH LAKE, MINNESOTA

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For: PIERCE PINI & ASSOCIATES, INC.

By: RHONDA S. PIERCE

Name: Rhonda S. Pierce

Date: 09/20/2019 Reg. No. 41333

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D DESIGN REVIEW	11/01/2019
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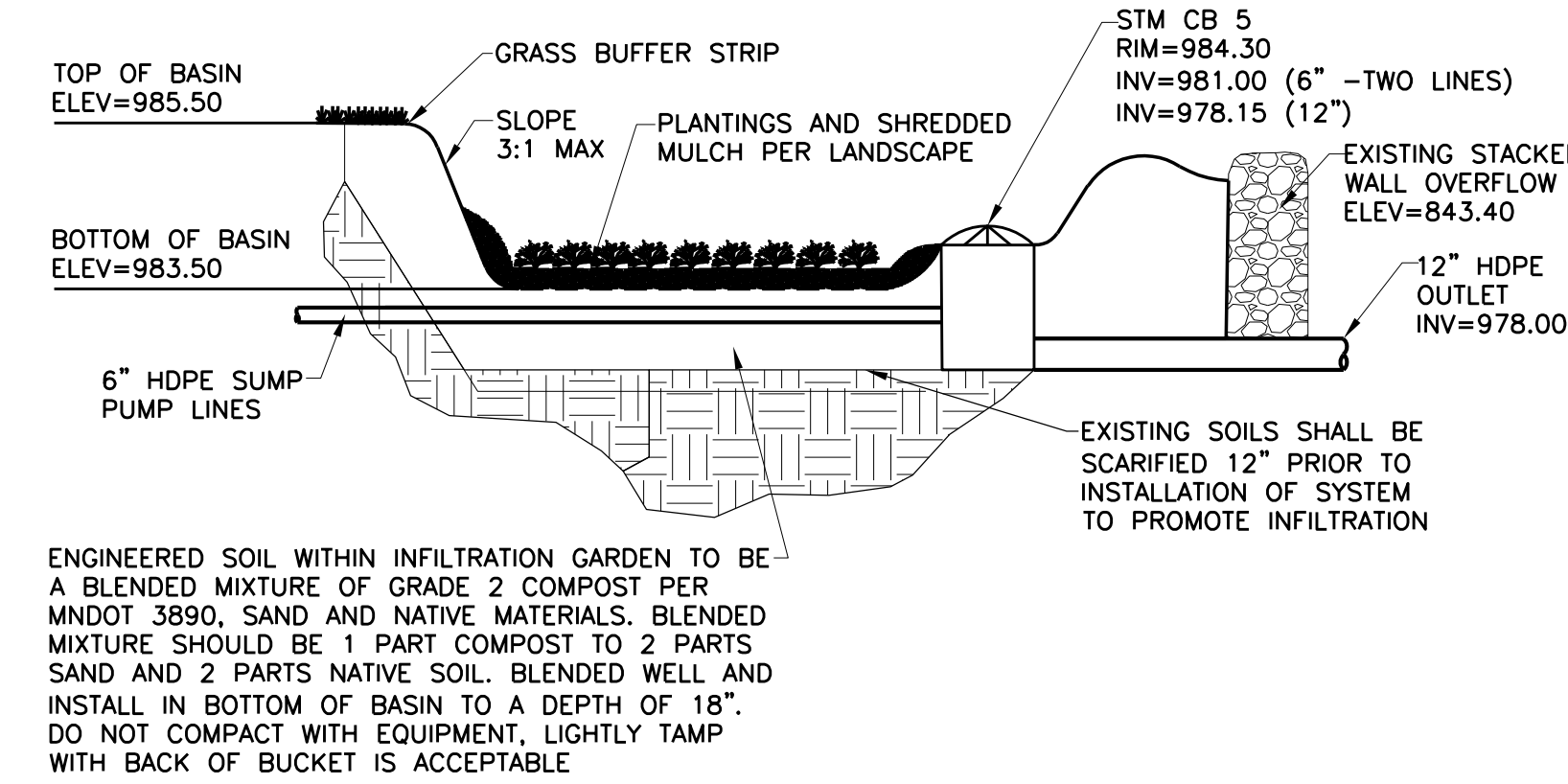
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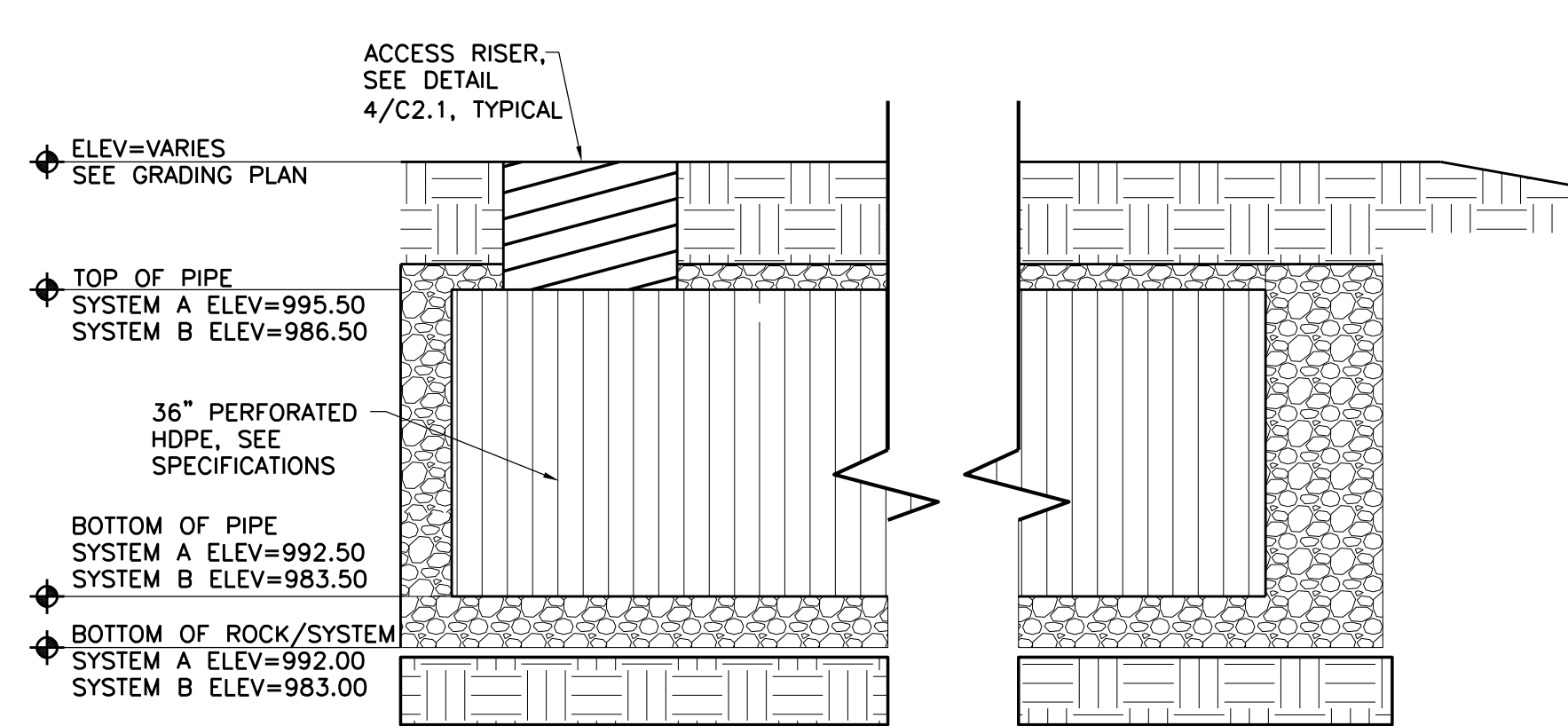
EROSION CONTROL
DETAILS

C1.1



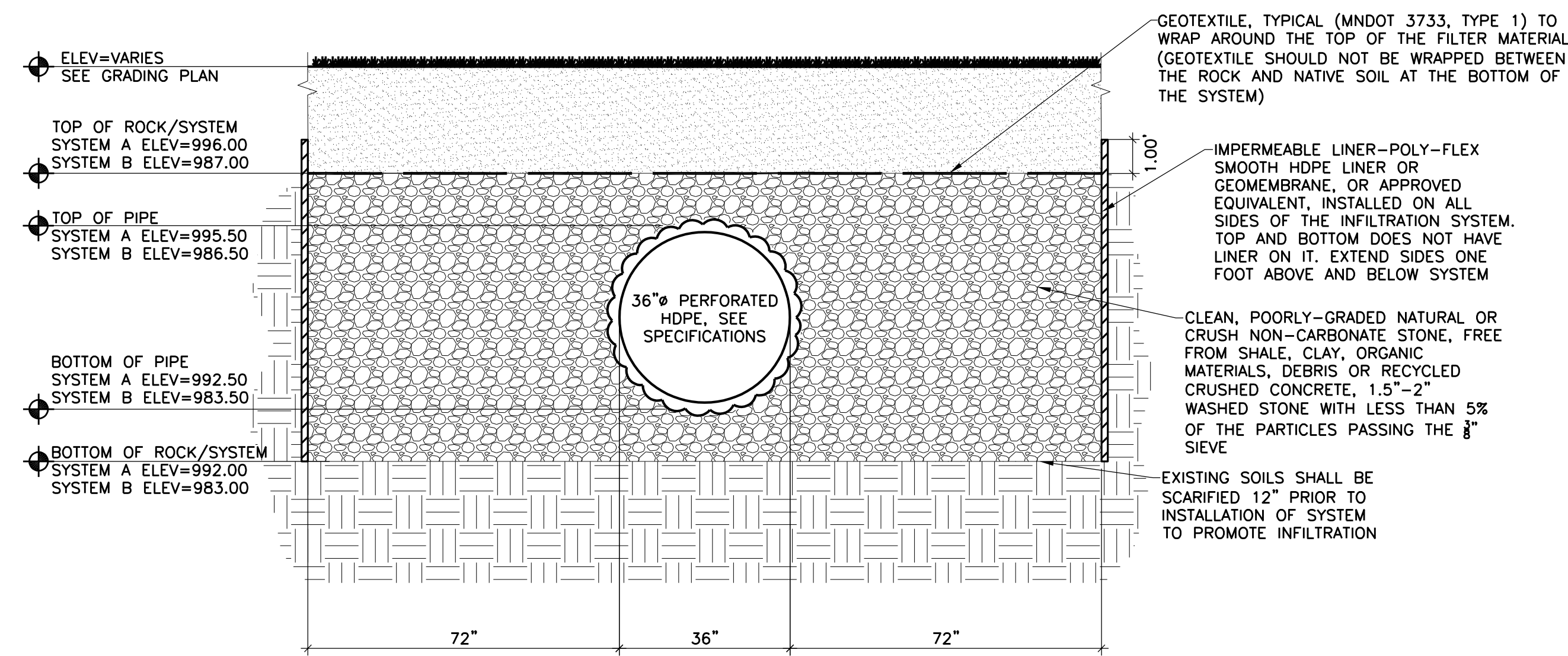
1 SOUTH INFILTRATION BASIN
C2.1

NO SCALE



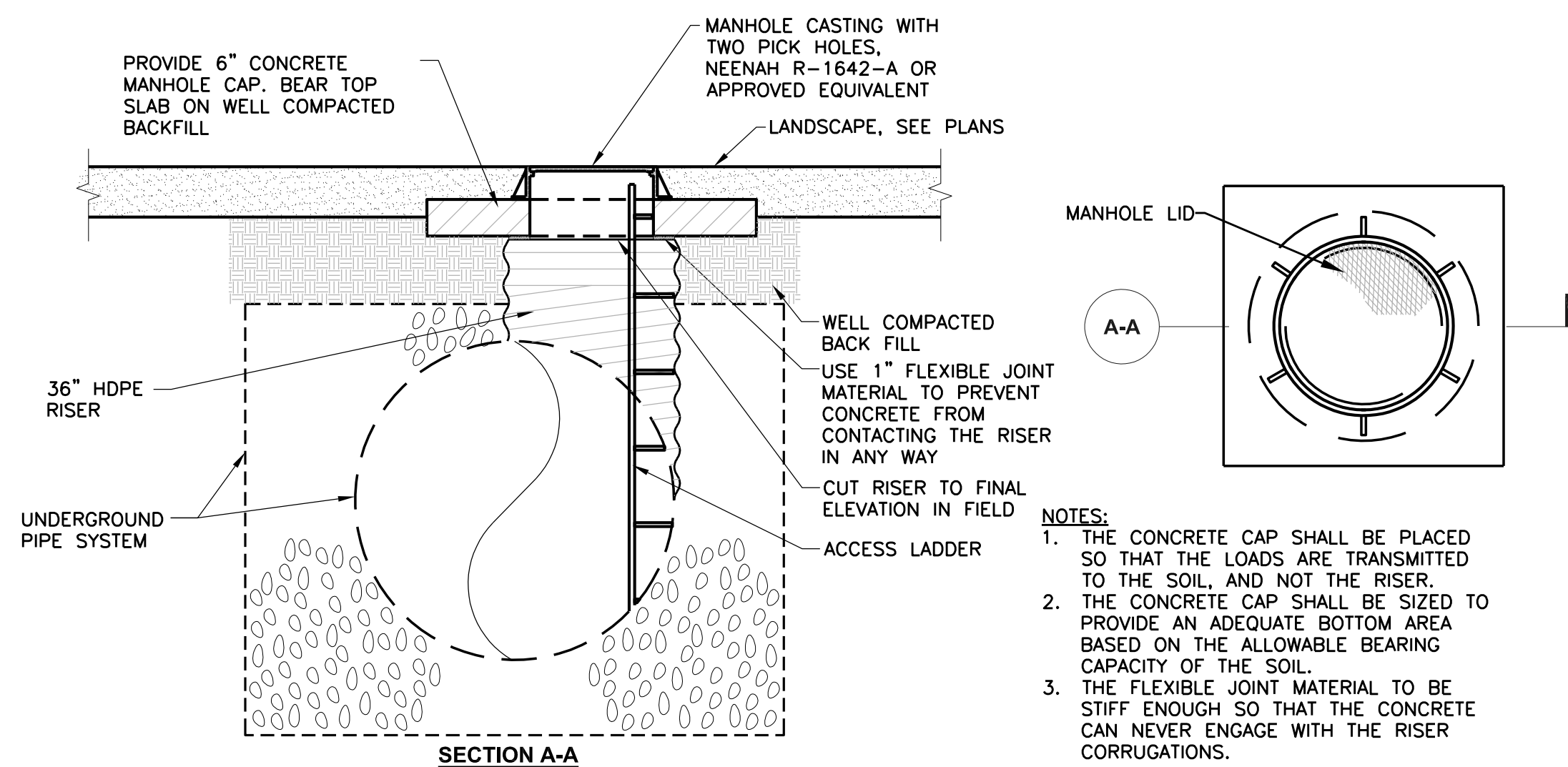
2 STORMWATER INFILTRATION SYSTEM SECTION
C2.1

NOTE: RISERS, INLET AND OUTLET PIPES ARE SHOWN IN PROFILE VIEW FOR REFERENCE
ONLY. SEE PLAN VIEW FOR ACTUAL LOCATIONS AND NUMBER OF RISERS AND PIPES.



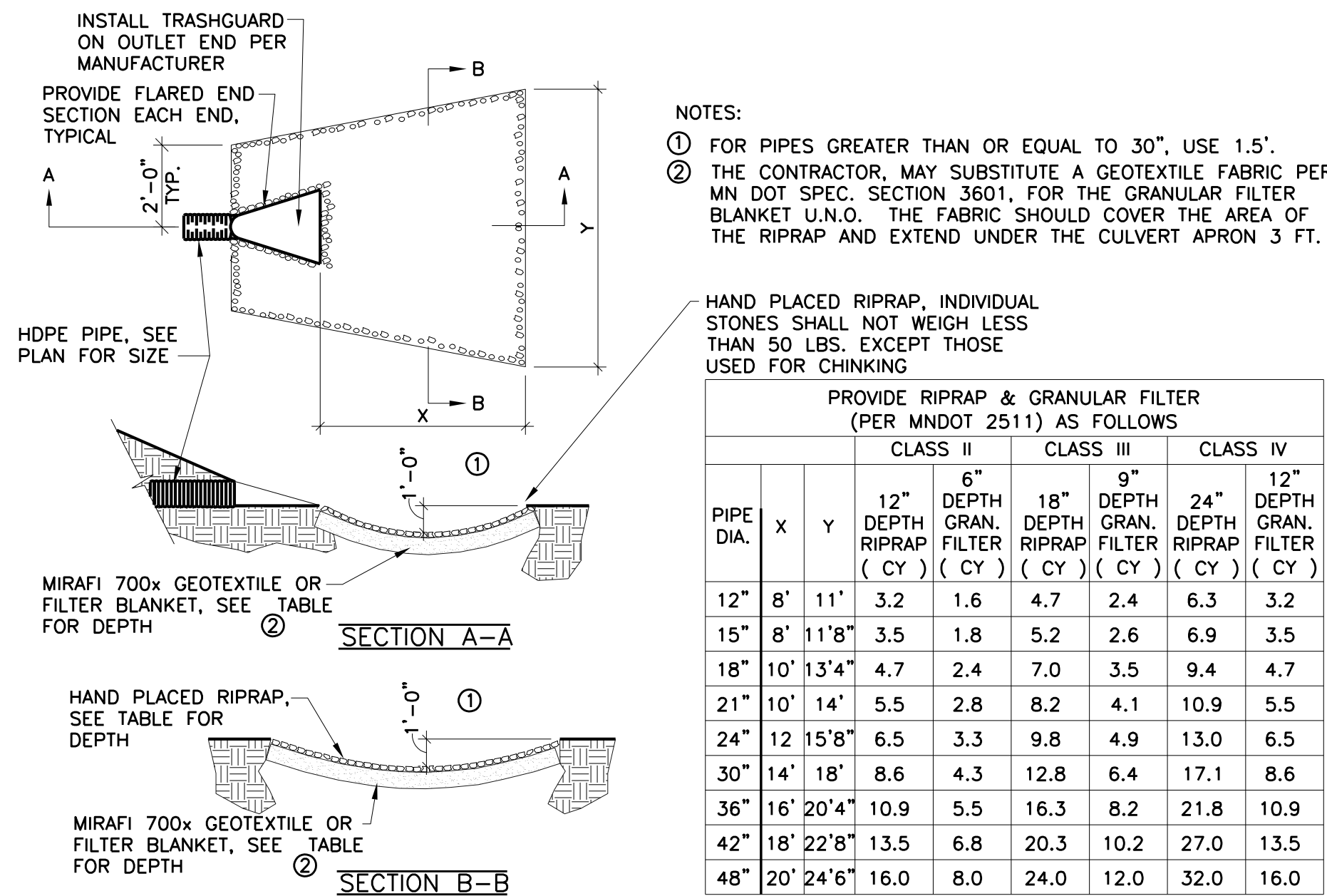
3 STORMWATER INFILTRATION SYSTEM CROSS SECTION
C2.1

NO SCALE



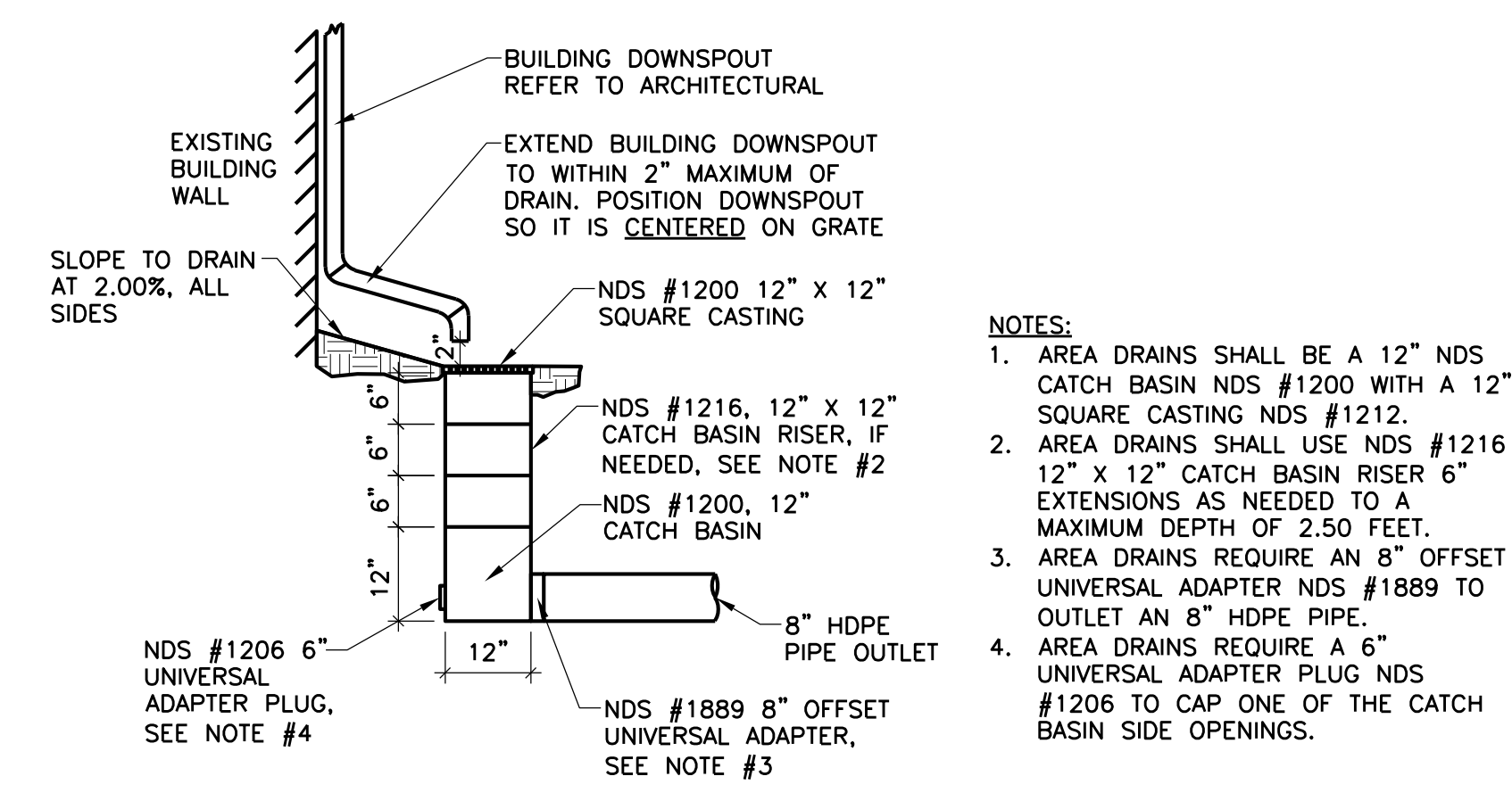
4 RISER DETAIL
C2.1

NO SCALE



5 RIPRAP AT HDPE OUTLET
C2.1

NO SCALE



6 AREA DRAIN AT DOWNSPOUT
C2.1

NO SCALE

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JOHANNSON RESIDENCE 1 SUNFISH LANE SUNFISH LAKE, MINNESOTA

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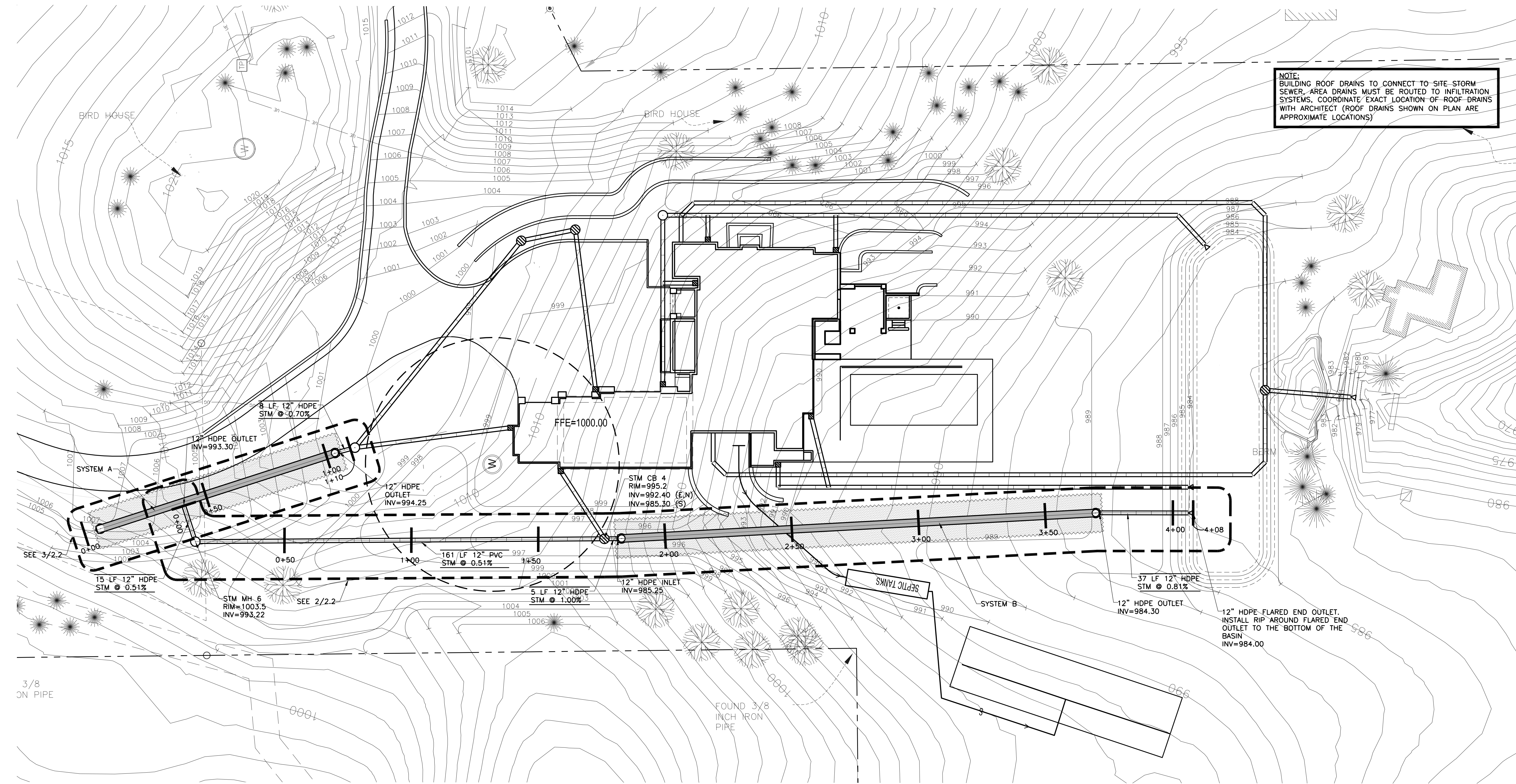
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CIVIL DETAILS

C2.1

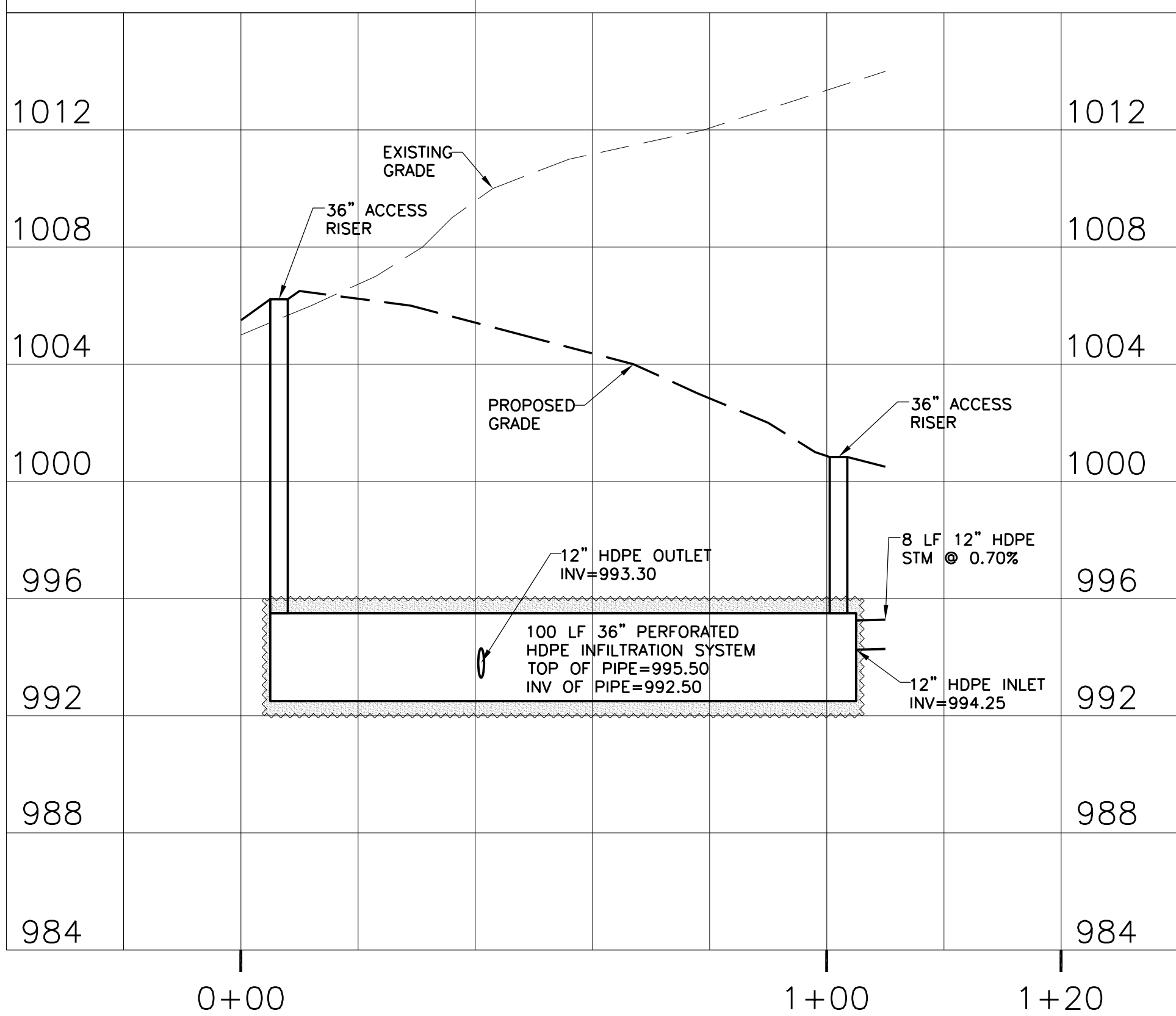


1
C2.2

STORMWATER PLAN AND PROFILE

1"=20'

SCALE
VERTICAL 1"=4'
HORIZONTAL 1"=20'

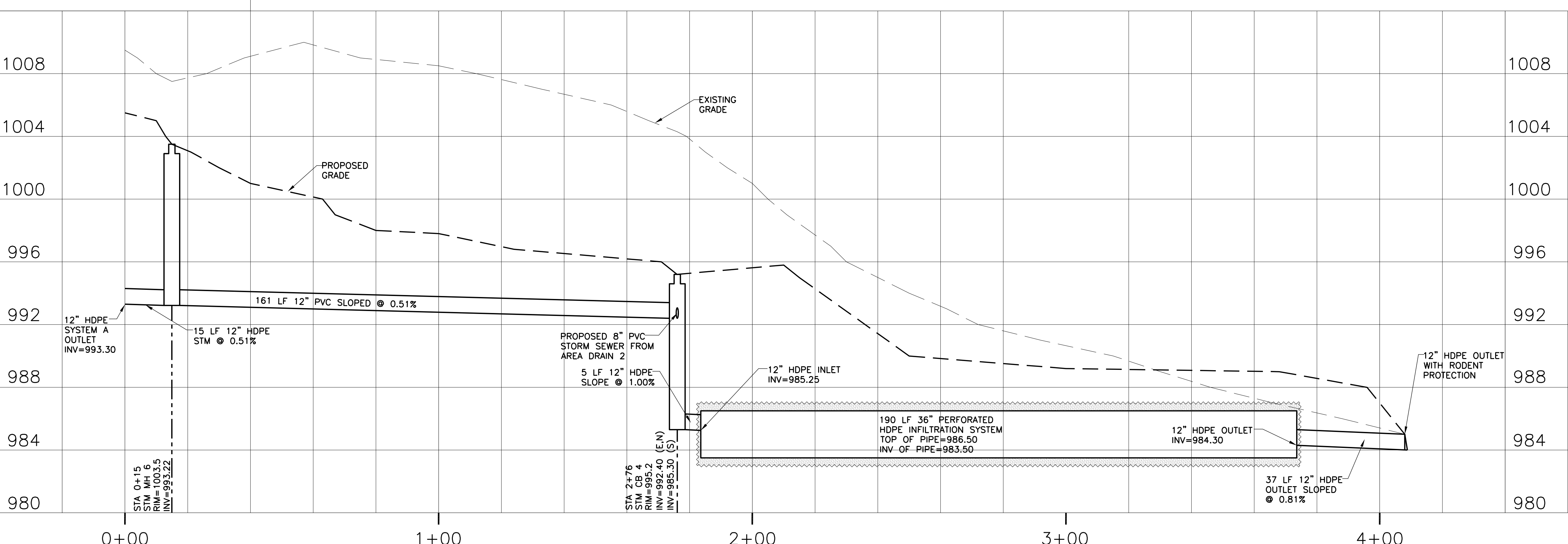


2
C2.2

STORM SEWER PROFILE — SYSTEM A

1"=20'

SCALE
VERTICAL 1"=4'
HORIZONTAL 1"=20'



3
C2.2

STORM SEWER PROFILE — SYSTEM B

1"=20'

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ASSOCIATES

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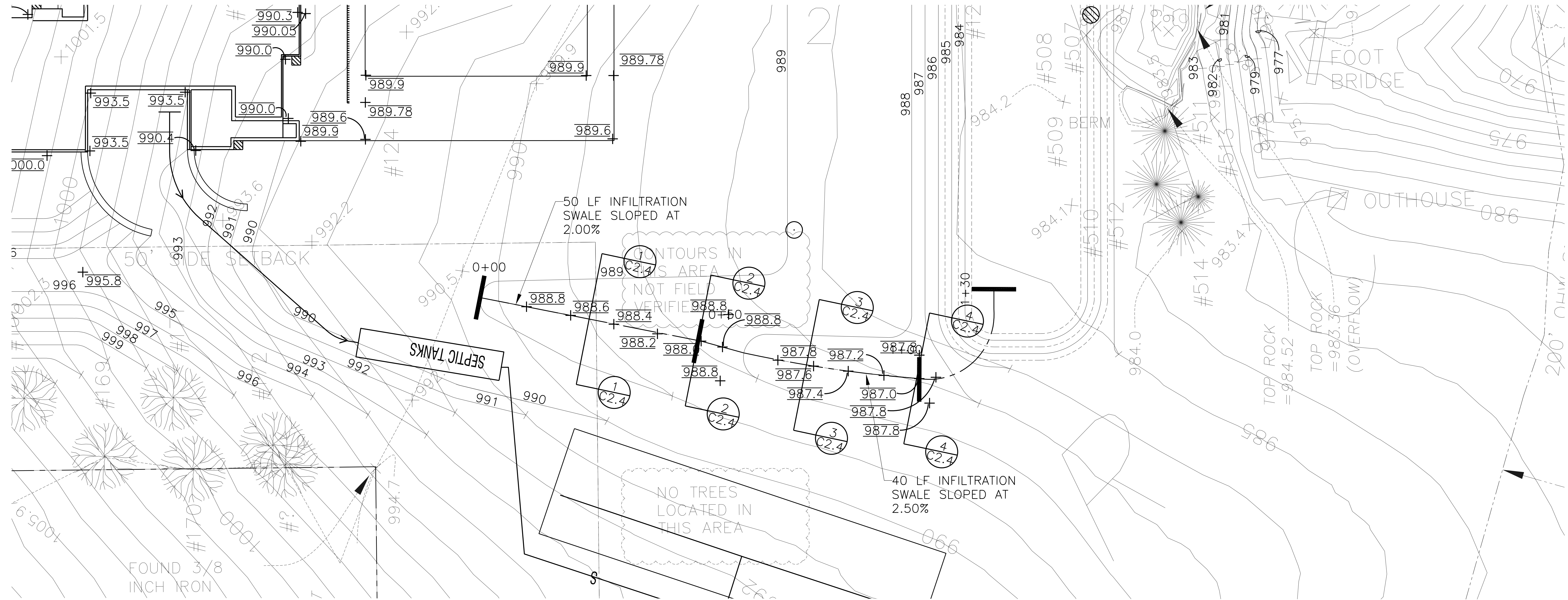
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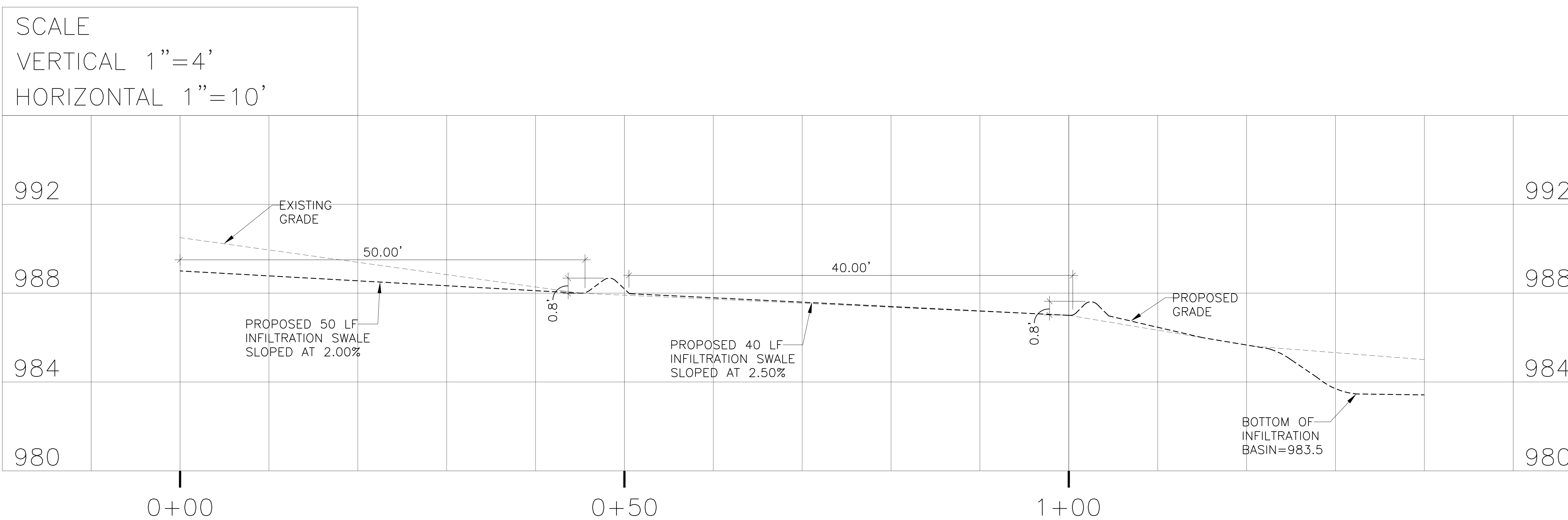
Drawing Title

STORMWATER PLAN
AND PROFILE

C2.2



1 INFILTRATION SWALE PLAN AND PROFILE
1"=10'



2 INFILTRATION SWALE PLAN AND PROFILE
1"=10'

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SUNFISH LAKE, MINNESOTA

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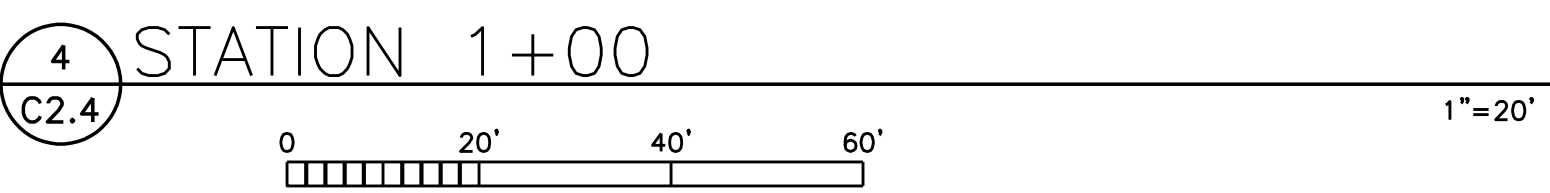
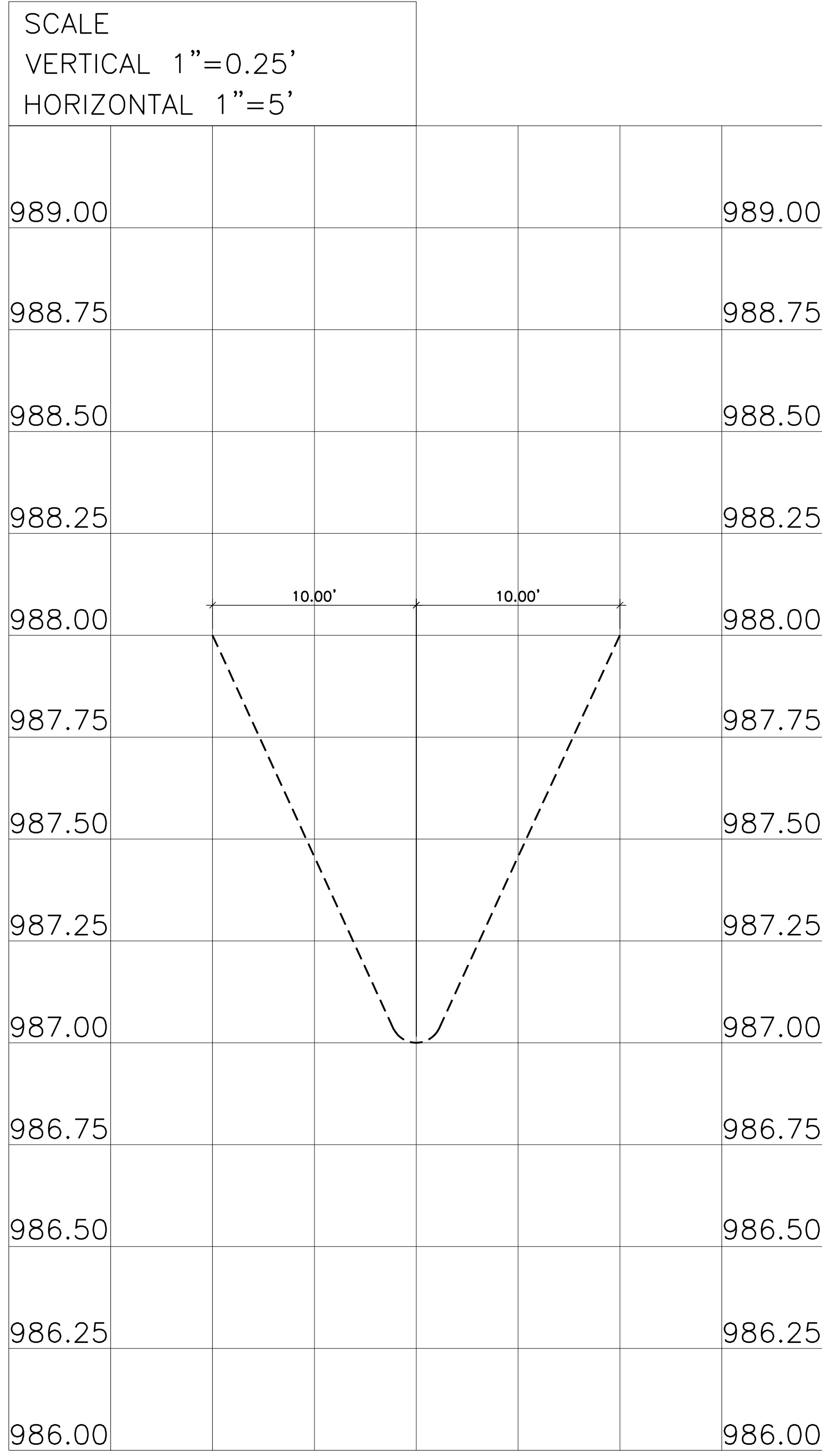
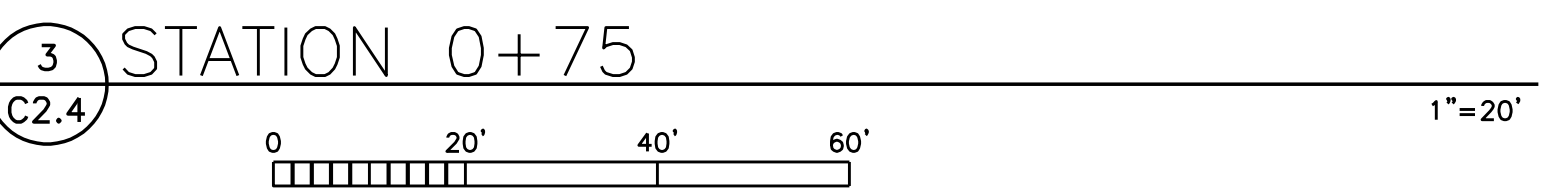
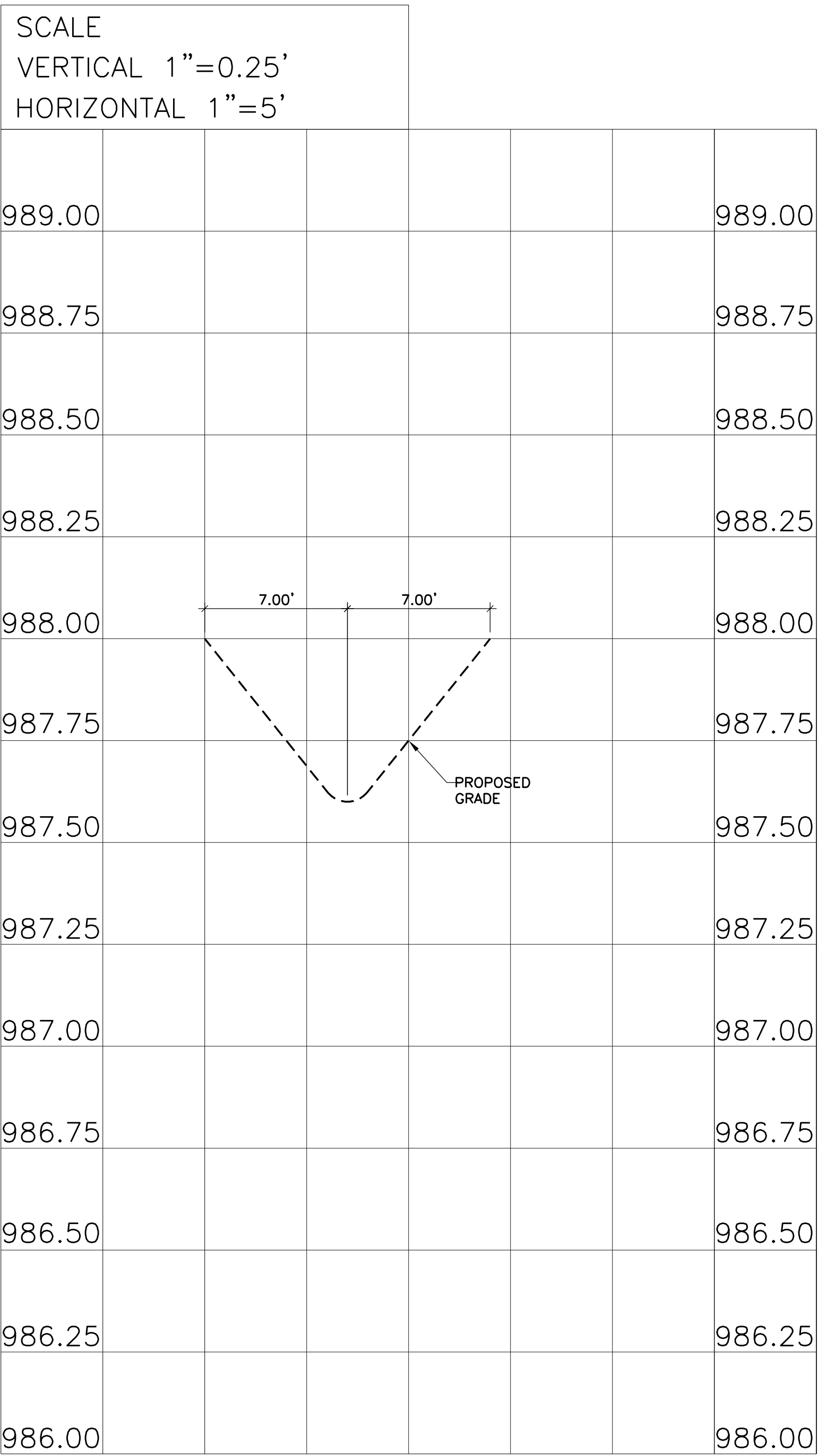
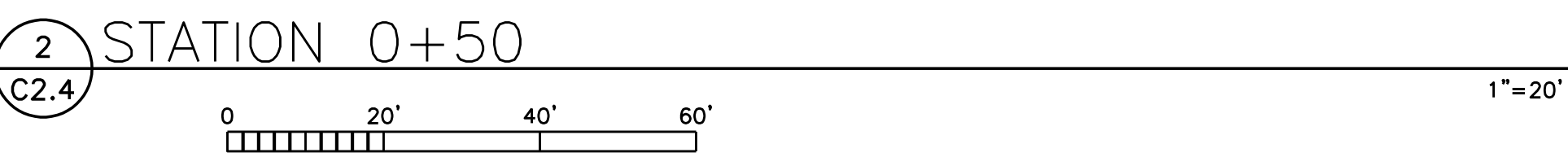
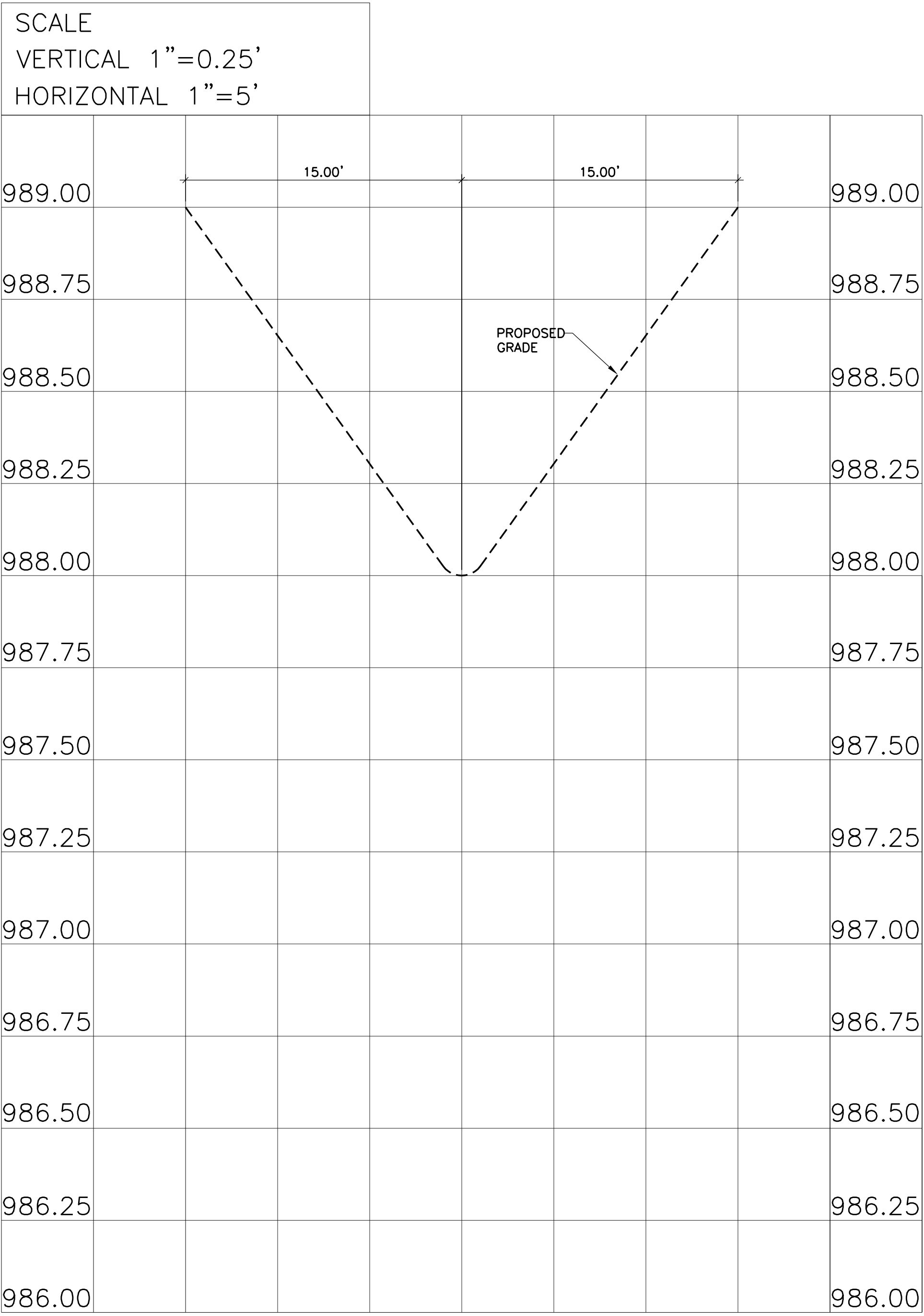
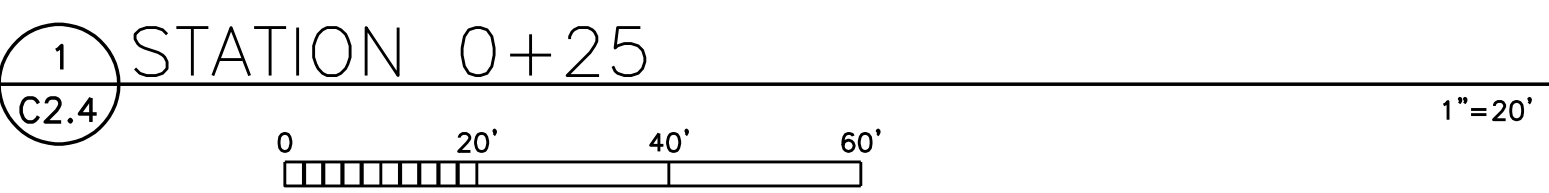
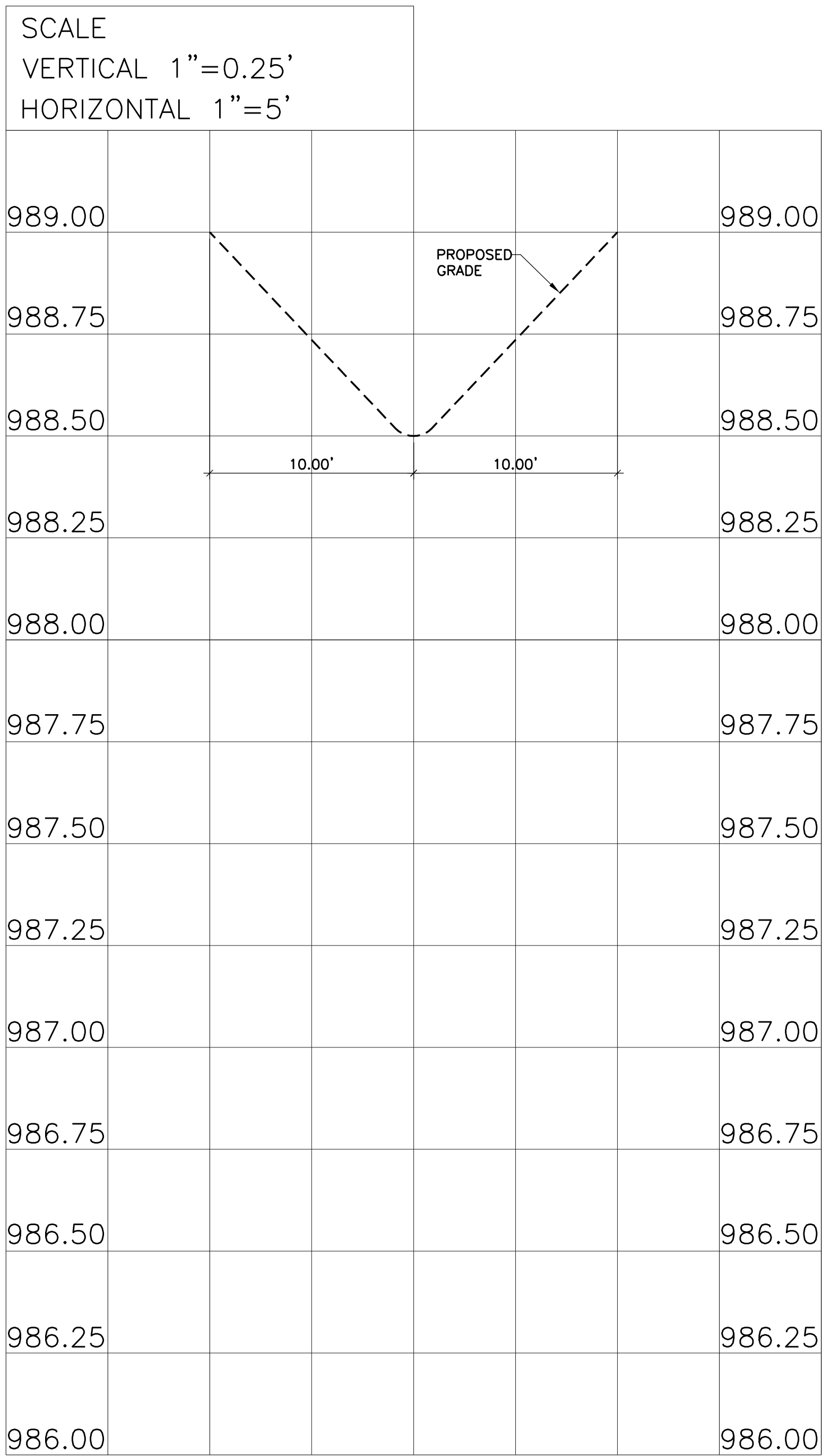
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Drawing Title
**INFILTRATION SWALE
PLAN AND PROFILE**

C2.3



PIERCE PINI & ASSOCIATES

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JOHANNSON RESIDENCE

1 SUNFISH LANE
SUNFISH LAKE, MINNESOTA

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For PIERCE PINI & ASSOCIATES, INC.

By RHONDA S. PIERCE
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Drawing Title

INFILTRATION SWALE
PLAN AND PROFILE

C2.4

PIERCE, PINI & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS

STORMWATER CALCULATIONS

FOR

JOHANNSON RESIDENCE

1 Sunfish Lane
Sunfish Lake, MN 55118

November 5, 2019
Revised June 22, 2020

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR
UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL
ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Rhonda S. Pierce

41333

11/05/2019

Name: RHONDA S. PIERCE

LICENSE NO.

DATE

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2. STORMWATER CALCULATIONS
 - a. DRAINAGE AREA SUMMARY
 - b. STORMWATER RATE SUMMARY
3. DRAINAGE MAPS
 - a. EXISTING CONDITIONS
 - b. PROPOSED CONDITIONS
4. HYDROCAD REPORTS
 - a. EXISTING CONDITIONS
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 - c. NORTH INFILTRATION PIPE STAGE STORAGE TABLE
 - d. NORTH INFILTRATION PIPE DRAWDOWN TABLE
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 - h. INFILTRATION BASIN DRAWDOWN TABLE
5. OPERATION AND MAINTENANCE PLAN

STORMWATER MANGEMENT NARRATIVE

Existing Conditions

The subject property is a 7.76-acre residential parcel on the north side of Sunfish Lake. The disturbed area is limited to 2.34 acres. The existing property currently has a house with a detached garage, driveway and deck. The existing property within the disturbance area has 0.24 acres of impervious surface. The site drains almost entirely south to the lake and there is currently no stormwater management features on the property.

Proposed Conditions

The project includes the removal of the existing house and driveway and the construction of a new house with an attached garage, swimming pool, terrace and new driveway. The proposed work will disturb approximately 2.34 acres and will result in 0.50 acres of total impervious area. This results in a net increase of 0.26 acres of impervious area.

Soil Analysis

The NRCS soil map has been pulled for the project site and is included in this report. The vast majority of the site is categorized as Kingsley sandy loam. This soil type corresponds to Hydrologic Soil Group 'C'. Since a formal geotechnical report has not been completed to date for the site, the design for the stormwater management system will utilize infiltration and filtration practices due to the uncertain nature of infiltration feasibility.

Stormwater Management

The local government unit for stormwater is the City of Sunfish Lake. The City stormwater management plan requires a water quality treatment volume of 1.0" from the new or disturbed net increase of impervious area of the disturbed area on site. An infiltration pipe system and infiltration basin are proposed to provide the stormwater needs for the project. The site will be graded into various catch basins to collect and route runoff into two infiltration system. A small portion will runoff to the north of the site without being treated. A summary of the infiltration requirements are below.

Treatment Amount	Net Increase Impervious Area (SF)	Required Volume (CF)
1.0"	11,342	945
Treatment System	Volume Provided (CF)	Total Excess Volume (CF)
North Pipe (2AP)	886	-59
South Pipe (2BP)	1670	1,611
Basin (1P)	2794	4,405

The proposed infiltration systems must also maintain or reduce the peak rate for the 2, 10, and 100-year storm events from the existing conditions. The systems must also maintain or reduce

the volume runoff for the 2, 10 and 100-year storm events from existing conditions. A summary of the existing conditions and proposed conditions for discharge rates and volume is below.

Rate Summary Table				
Storm Event	Existing North Rate (cfs)	Proposed North Rate (cfs)	Existing Sunfish Lake Rate (cfs)	Proposed Sunfish Lake Rate (cfs)
2-Year Event	1.41	0.32	1.50	0.07
10-Year Event	2.72	0.65	3.42	1.11
100-Year Event	6.06	1.47	8.75	6.66

Volume Summary Table				
Storm Event	Existing North Volume (ac-ft)	Proposed North Volume (ac-ft)	Existing Sunfish Lake Volume (ac-ft)	Proposed Sunfish Lake Volume (ac-ft)
2-Year Event	0.063	0.017	0.118	0.004
10-Year Event	0.123	0.035	0.254	0.144
100-Year Event	0.282	0.081	0.643	0.635

A hydraulic model has been established for the site. The hydrograph method uses NRCS TR-20 modeling. All modeling analysis uses the most current rainfall frequencies based on NOAA Atlas 14 rainfall data.

Infiltration BMPs are required to provide a drawdown time within 48 hours for surface features. The basins have a maximum depth of 0.8' between the bottom and the water quality overflow outlet. There is a 24" section of imported filter media sand with an infiltration rate of 0.8 inches per hour or greater between the bottom of the basin and the underlying soils.

Floodplain Mitigation

The construction of the new residence will not impact the existing floodplain and does not propose to fill anything within the FEMA floodplain.

Sediment and Erosion Control

Silt fence, catchbasin inserts and biologs will need to be placed along the perimeter of the disturbed construction area prior to construction to prevent silting of the adjacent lake. A rock construction entrance will need to be established and site street sweeping performed throughout the construction phase. Soils stockpiles shall be covered when not used for more than 48 hours or temporarily seeded to prevent windblown sediment from transporting off-site.

Permanent erosion control will consist of sod and paved sidewalks and roads. Slopes and swales will be stabilized with a heavy duty erosion control mat designed for the intended area. A Storm Water Pollution Prevention Plan has prepared and will be implemented for the project.

Johannson Residence**PN: 19-037****Date: 6/22/20**

Existing Conditions						
Drainage Area	Pervious Area [SF]	CN Value	Impervious Area [SF]	CN Value	Total Area [SF]	CN Value
EX1	475	74	368	98	843	84
EX2	19607	74	7735	98	27342	81
EX3	71363	74	2558	98	73921	75
Total	91445	74	10661	98	102106	77

Existing Conditions Rates			
Drainage Area	2-Year Event (cfs)	10-Year Event (cfs)	100-Year Event (cfs)
EX1	0.05	0.09	0.19
EX2	1.36	2.64	5.87
EX3	1.50	3.42	8.75

North Runoff
Sunfish Lake Runoff

Proposed Conditions						
Drainage Area	Pervious Area [SF]	CN Value	Impervious Area [SF]	CN Value	Total Area [SF]	CN Value
P1	520	74	323	98	843	83
P2	6054	74	1534	98	7588	79
P3A	22801	74	9761	98	32562	81
P3B	6289	74	1019	98	7308	77
P4	5391	74	786	98	6177	77
P5	21652	74	8513	98	30165	81
P6	14712	74	67	98	14779	74
P7	2684	74	0	98	2684	74
Total	80103	74	22003	98	102106	79

Proposed Conditions Rates			
Drainage Area	2-Year Event (cfs)	10-Year Event (cfs)	100-Year Event (cfs)
P1	0.04	0.07	0.16
P2	0.28	0.58	1.32
P7	0.07	0.17	0.42
1P (P3-P6)	0.00	1.08	6.43

North Runoff
Sunfish Lake Runoff

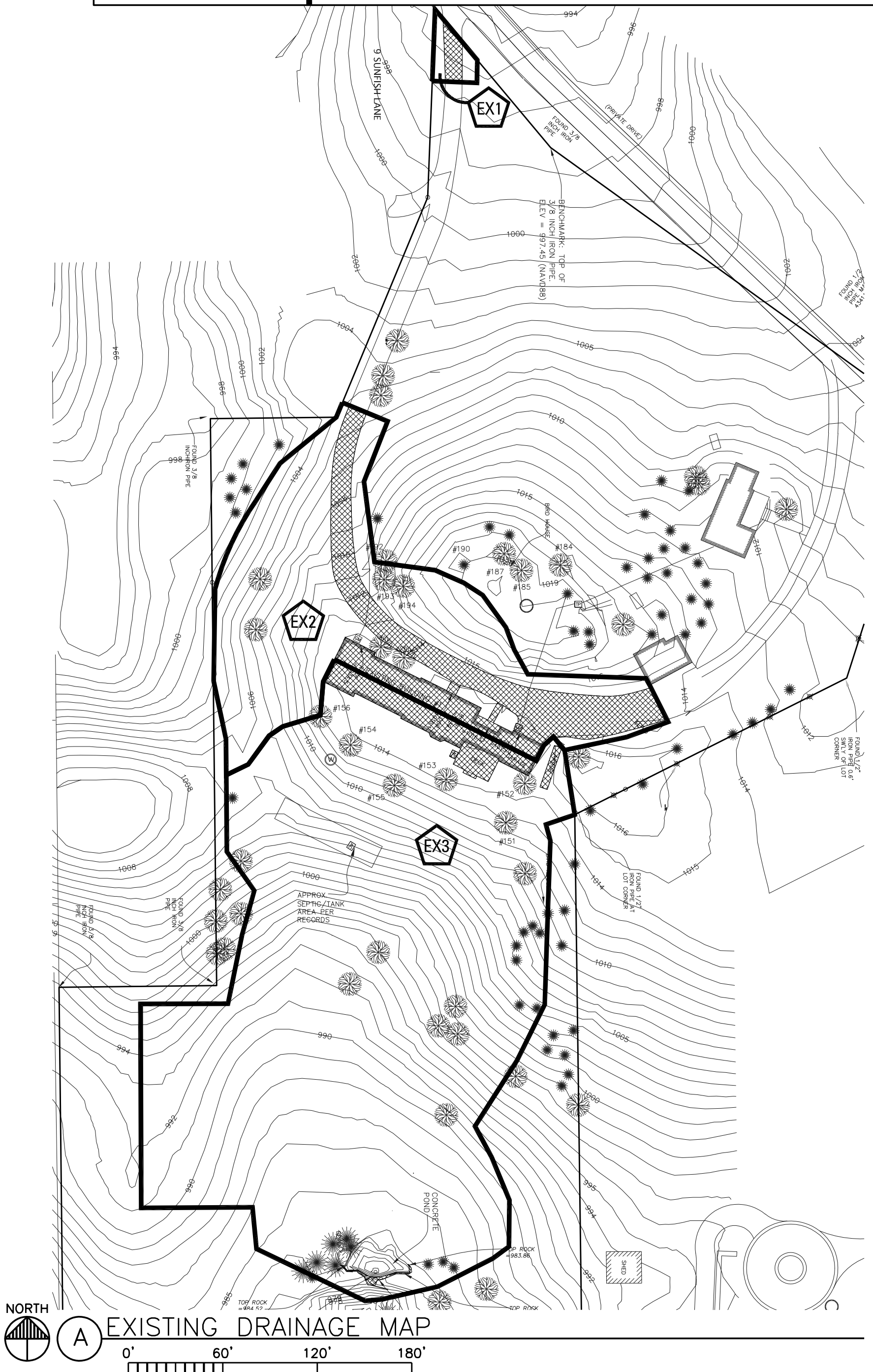
Rate Summary Table				
Storm Event	Ex. North Rate (cfs)	Pr. North Rate (cfs)	Ex. Sunfish Rate (cfs)	Pr. Sunfish Rate (cfs)
2-Year	1.41	0.32	1.50	0.07
10-Year	2.72	0.65	3.42	1.11
100-Year	6.06	1.47	8.75	6.66

Volume Summary Table				
Storm Event	Ex. North Volume (ac-ft)	Pr. North Volume (ac-ft)	Ex. Sunfish Lake Volume (ac-ft)	Pr. Sunfish Lake Volume (ac-ft)
2-Year	0.063	0.017	0.118	0.004
10-Year	0.123	0.035	0.254	0.144
100-Year	0.282	0.081	0.643	0.635

Treatment Amount	Net Increase Impervious Area (SF)	Required Volume (CF)
1.0"	11,342	945
Treatment System	Volume Provided (CF)	Total Excess Volume (CF)
North Pipe (2AP)	886	-59
South Pipe (2BP)	1670	1,611
Basin	2794	4,405

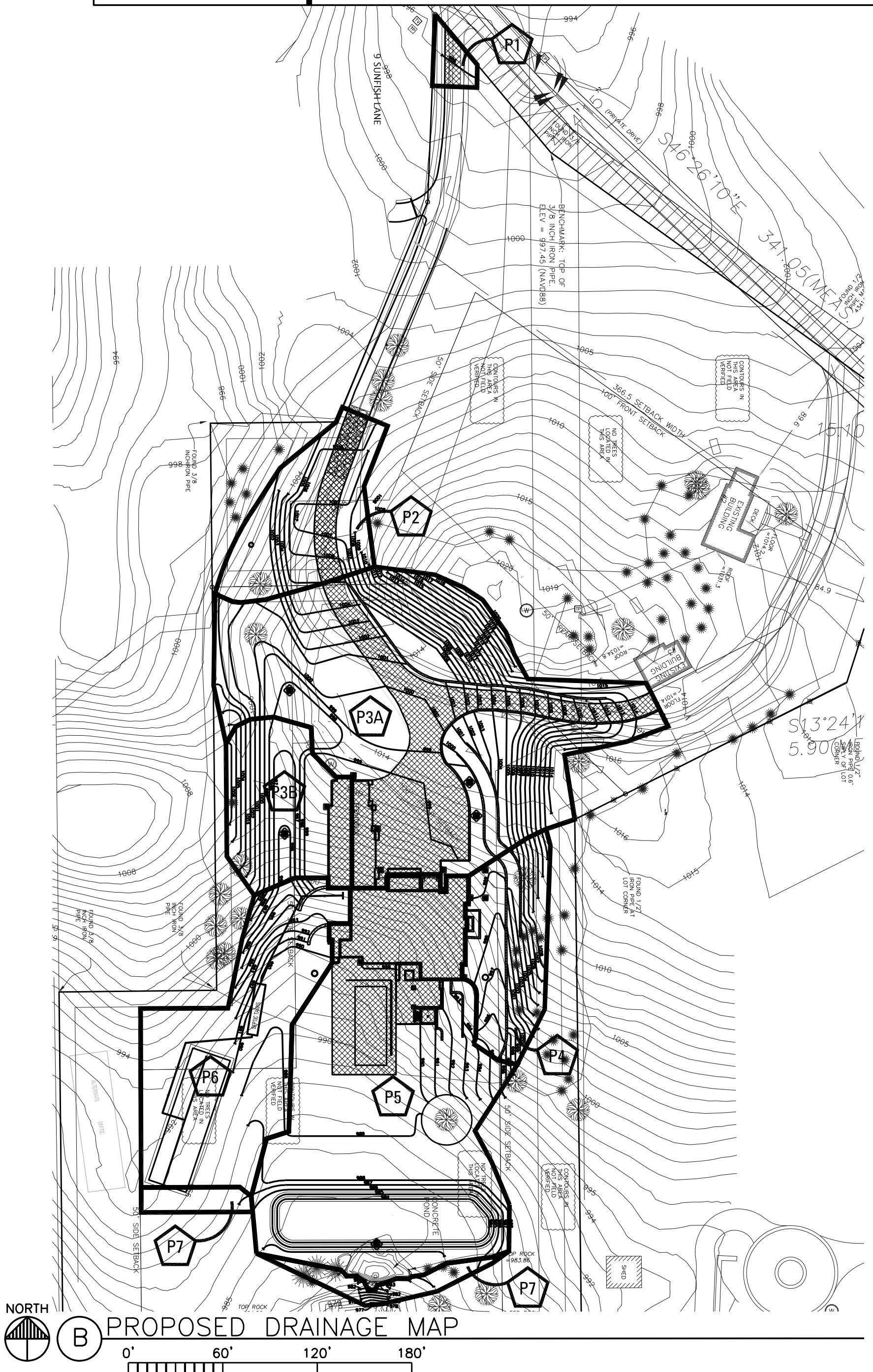
9298 CENTRAL AVENUE,
SUITE 312
BLAINE, MN 55434
TEL 763.537.1311
FAX 763.537.1354

PPA PROJECT: 19-037
DATE: 06.22.20
DRAWN BY: DPM

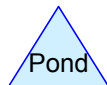
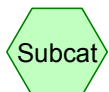
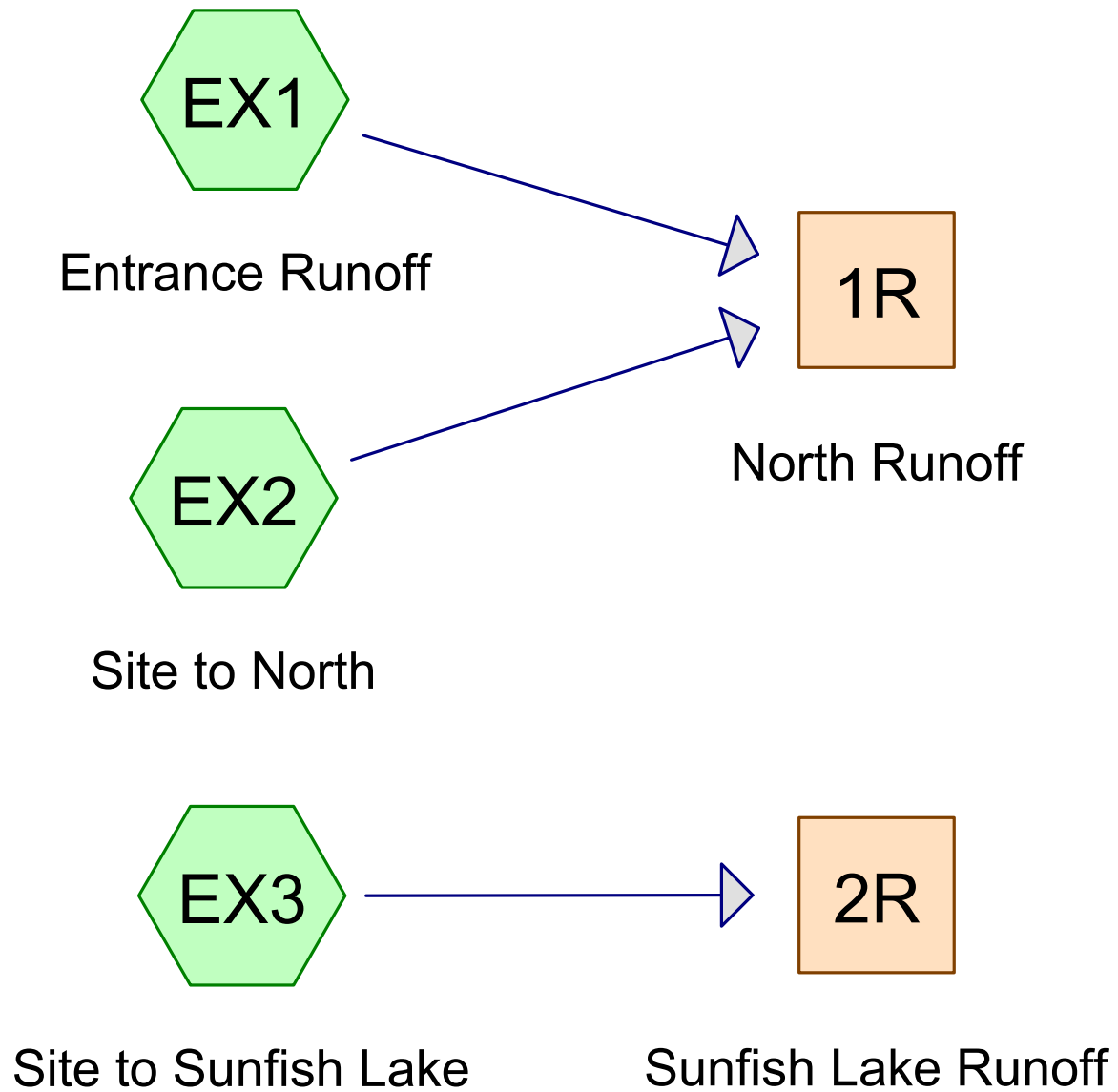


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PPA PROJECT: 19-037
DATE: 06.22.20
DRAWN BY: DPM



Existing Conditions



Routing Diagram for Existing Conditions

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.099	74	>75% Grass cover, Good, HSG C (EX1, EX2, EX3)
0.245	98	Paved parking, HSG C (EX1, EX2, EX3)
2.344	77	TOTAL AREA

Existing Conditions

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.344	HSG C	EX1, EX2, EX3
0.000	HSG D	
0.000	Other	
2.344		TOTAL AREA

Existing Conditions

MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEX1: Entrance Runoff

Runoff Area=843 sf 43.65% Impervious Runoff Depth=1.35"
Tc=6.0 min CN=84 Runoff=0.05 cfs 0.002 af

SubcatchmentEX2: Site to North

Runoff Area=27,342 sf 28.29% Impervious Runoff Depth=1.16"
Tc=6.0 min CN=81 Runoff=1.36 cfs 0.061 af

SubcatchmentEX3: Site to Sunfish Lake

Runoff Area=73,921 sf 3.46% Impervious Runoff Depth=0.83"
Flow Length=360' Slope=0.1000 '/' Tc=19.5 min CN=75 Runoff=1.50 cfs 0.118 af

Reach 1R: North Runoff

Inflow=1.41 cfs 0.063 af
Outflow=1.41 cfs 0.063 af

Reach 2R: Sunfish Lake Runoff

Inflow=1.50 cfs 0.118 af
Outflow=1.50 cfs 0.118 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.181 af Average Runoff Depth = 0.92"
89.56% Pervious = 2.099 ac 10.44% Impervious = 0.245 ac

Existing Conditions

MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Summary for Subcatchment EX1: Entrance Runoff

Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
475	74	>75% Grass cover, Good, HSG C
368	98	Paved parking, HSG C
843	84	Weighted Average
475		56.35% Pervious Area
368		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX2: Site to North

Runoff = 1.36 cfs @ 12.14 hrs, Volume= 0.061 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
19,607	74	>75% Grass cover, Good, HSG C
7,735	98	Paved parking, HSG C
27,342	81	Weighted Average
19,607		71.71% Pervious Area
7,735		28.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX3: Site to Sunfish Lake

Runoff = 1.50 cfs @ 12.31 hrs, Volume= 0.118 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
71,363	74	>75% Grass cover, Good, HSG C
2,558	98	Paved parking, HSG C
73,921	75	Weighted Average
71,363		96.54% Pervious Area
2,558		3.46% Impervious Area

Existing Conditions

MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	300	0.1000	0.26		Sheet Flow, Grass: Dense n= 0.240 P2= 2.80"
0.2	60	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
19.5	360	Total			

Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.647 ac, 28.75% Impervious, Inflow Depth = 1.17" for 2-Year Event event
Inflow = 1.41 cfs @ 12.14 hrs, Volume= 0.063 af
Outflow = 1.41 cfs @ 12.14 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.697 ac, 3.46% Impervious, Inflow Depth = 0.83" for 2-Year Event event
Inflow = 1.50 cfs @ 12.31 hrs, Volume= 0.118 af
Outflow = 1.50 cfs @ 12.31 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Existing Conditions

MSE 24-hr 3 10-Year Event Rainfall=4.17"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEX1: Entrance Runoff

Runoff Area=843 sf 43.65% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=84 Runoff=0.09 cfs 0.004 af

SubcatchmentEX2: Site to North

Runoff Area=27,342 sf 28.29% Impervious Runoff Depth=2.27"
Tc=6.0 min CN=81 Runoff=2.64 cfs 0.118 af

SubcatchmentEX3: Site to Sunfish Lake

Runoff Area=73,921 sf 3.46% Impervious Runoff Depth=1.80"
Flow Length=360' Slope=0.1000 '/' Tc=19.5 min CN=75 Runoff=3.42 cfs 0.254 af

Reach 1R: North Runoff

Inflow=2.72 cfs 0.123 af
Outflow=2.72 cfs 0.123 af

Reach 2R: Sunfish Lake Runoff

Inflow=3.42 cfs 0.254 af
Outflow=3.42 cfs 0.254 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.376 af Average Runoff Depth = 1.93"
89.56% Pervious = 2.099 ac 10.44% Impervious = 0.245 ac

Existing Conditions

MSE 24-hr 3 10-Year Event Rainfall=4.17"

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Summary for Subcatchment EX1: Entrance Runoff

Runoff = 0.09 cfs @ 12.13 hrs, Volume= 0.004 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.17"

Area (sf)	CN	Description
475	74	>75% Grass cover, Good, HSG C
368	98	Paved parking, HSG C
843	84	Weighted Average
475		56.35% Pervious Area
368		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX2: Site to North

Runoff = 2.64 cfs @ 12.13 hrs, Volume= 0.118 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.17"

Area (sf)	CN	Description
19,607	74	>75% Grass cover, Good, HSG C
7,735	98	Paved parking, HSG C
27,342	81	Weighted Average
19,607		71.71% Pervious Area
7,735		28.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX3: Site to Sunfish Lake

Runoff = 3.42 cfs @ 12.29 hrs, Volume= 0.254 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.17"

Area (sf)	CN	Description
71,363	74	>75% Grass cover, Good, HSG C
2,558	98	Paved parking, HSG C
73,921	75	Weighted Average
71,363		96.54% Pervious Area
2,558		3.46% Impervious Area

Existing Conditions

MSE 24-hr 3 10-Year Event Rainfall=4.17"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	300	0.1000	0.26		Sheet Flow, Grass: Dense n= 0.240 P2= 2.80"
0.2	60	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
19.5	360	Total			

Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.647 ac, 28.75% Impervious, Inflow Depth = 2.27" for 10-Year Event event
 Inflow = 2.72 cfs @ 12.13 hrs, Volume= 0.123 af
 Outflow = 2.72 cfs @ 12.13 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.697 ac, 3.46% Impervious, Inflow Depth = 1.80" for 10-Year Event event
 Inflow = 3.42 cfs @ 12.29 hrs, Volume= 0.254 af
 Outflow = 3.42 cfs @ 12.29 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Existing Conditions

MSE 24-hr 3 100-Year Event Rainfall=7.45"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentEX1: Entrance Runoff

Runoff Area=843 sf 43.65% Impervious Runoff Depth=5.57"
Tc=6.0 min CN=84 Runoff=0.19 cfs 0.009 af

SubcatchmentEX2: Site to North

Runoff Area=27,342 sf 28.29% Impervious Runoff Depth=5.23"
Tc=6.0 min CN=81 Runoff=5.87 cfs 0.273 af

SubcatchmentEX3: Site to Sunfish Lake

Runoff Area=73,921 sf 3.46% Impervious Runoff Depth=4.55"
Flow Length=360' Slope=0.1000 '/' Tc=19.5 min CN=75 Runoff=8.75 cfs 0.643 af

Reach 1R: North Runoff

Inflow=6.06 cfs 0.282 af
Outflow=6.06 cfs 0.282 af

Reach 2R: Sunfish Lake Runoff

Inflow=8.75 cfs 0.643 af
Outflow=8.75 cfs 0.643 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.925 af Average Runoff Depth = 4.74"
89.56% Pervious = 2.099 ac 10.44% Impervious = 0.245 ac

Existing Conditions

MSE 24-hr 3 100-Year Event Rainfall=7.45"

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Summary for Subcatchment EX1: Entrance Runoff

Runoff = 0.19 cfs @ 12.13 hrs, Volume= 0.009 af, Depth= 5.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.45"

Area (sf)	CN	Description
475	74	>75% Grass cover, Good, HSG C
368	98	Paved parking, HSG C
843	84	Weighted Average
475		56.35% Pervious Area
368		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX2: Site to North

Runoff = 5.87 cfs @ 12.13 hrs, Volume= 0.273 af, Depth= 5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.45"

Area (sf)	CN	Description
19,607	74	>75% Grass cover, Good, HSG C
7,735	98	Paved parking, HSG C
27,342	81	Weighted Average
19,607		71.71% Pervious Area
7,735		28.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment EX3: Site to Sunfish Lake

Runoff = 8.75 cfs @ 12.29 hrs, Volume= 0.643 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.45"

Area (sf)	CN	Description
71,363	74	>75% Grass cover, Good, HSG C
2,558	98	Paved parking, HSG C
73,921	75	Weighted Average
71,363		96.54% Pervious Area
2,558		3.46% Impervious Area

Existing Conditions

MSE 24-hr 3 100-Year Event Rainfall=7.45"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	300	0.1000	0.26		Sheet Flow, Grass: Dense n= 0.240 P2= 2.80"
0.2	60	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
19.5	360	Total			

Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.647 ac, 28.75% Impervious, Inflow Depth = 5.24" for 100-Year Event event
 Inflow = 6.06 cfs @ 12.13 hrs, Volume= 0.282 af
 Outflow = 6.06 cfs @ 12.13 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

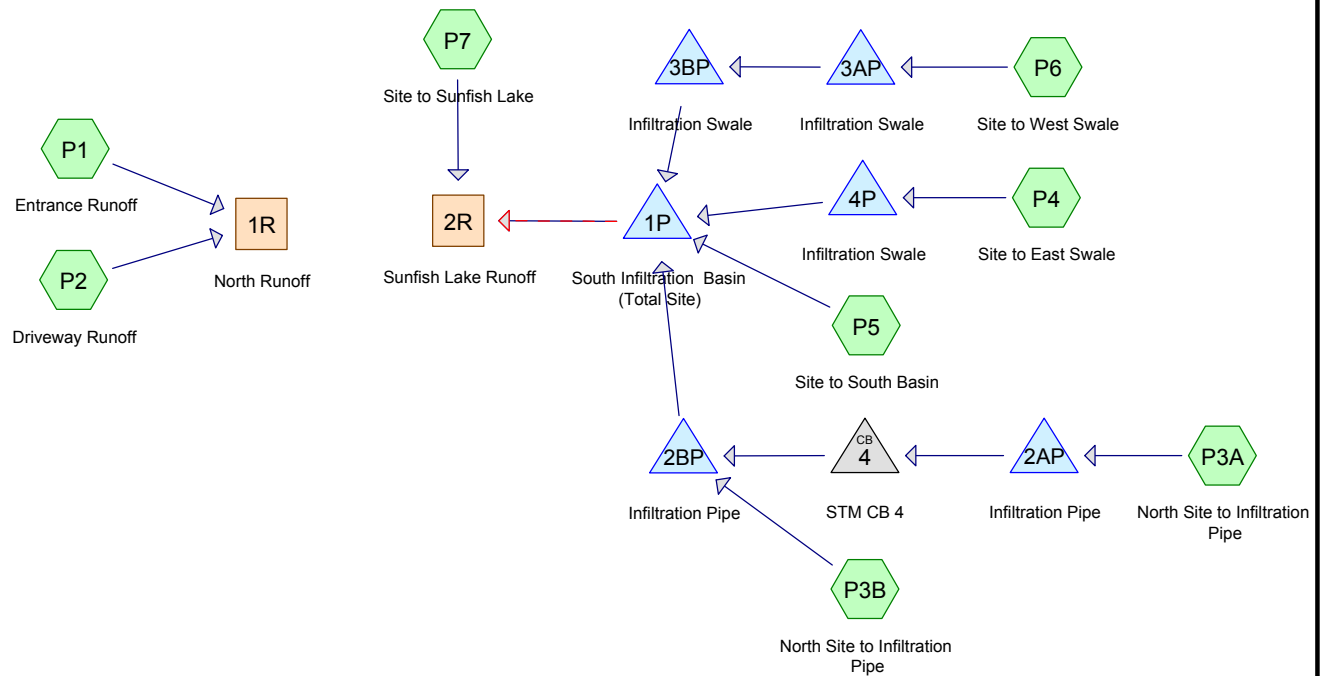
Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.697 ac, 3.46% Impervious, Inflow Depth = 4.55" for 100-Year Event event
 Inflow = 8.75 cfs @ 12.29 hrs, Volume= 0.643 af
 Outflow = 8.75 cfs @ 12.29 hrs, Volume= 0.643 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Proposed Conditions



Routing Diagram for Proposed Conditions

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.839	74	>75% Grass cover, Good, HSG C (P1, P2, P3A, P3B, P4, P5, P6, P7)
0.505	98	Paved parking, HSG C (P1, P2, P3A, P3B, P4, P5, P6)
2.344	79	TOTAL AREA

Proposed Conditions

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.344	HSG C	P1, P2, P3A, P3B, P4, P5, P6, P7
0.000	HSG D	
0.000	Other	
2.344		TOTAL AREA

Proposed Conditions

MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP1: Entrance Runoff Runoff Area=843 sf 38.32% Impervious Runoff Depth=1.29"
Tc=10.0 min CN=83 Runoff=0.04 cfs 0.002 af

SubcatchmentP2: Driveway Runoff Runoff Area=7,588 sf 20.22% Impervious Runoff Depth=1.04"
Tc=10.0 min CN=79 Runoff=0.28 cfs 0.015 af

SubcatchmentP3A: North Site to Runoff Area=32,562 sf 29.98% Impervious Runoff Depth=1.16"
Tc=10.0 min CN=81 Runoff=1.35 cfs 0.072 af

SubcatchmentP3B: North Site to Runoff Area=7,308 sf 13.94% Impervious Runoff Depth=0.93"
Tc=10.0 min CN=77 Runoff=0.24 cfs 0.013 af

SubcatchmentP4: Site to East Swale Runoff Area=6,177 sf 12.72% Impervious Runoff Depth=0.93"
Tc=10.0 min CN=77 Runoff=0.20 cfs 0.011 af

SubcatchmentP5: Site to South Basin Runoff Area=30,165 sf 28.22% Impervious Runoff Depth=1.16"
Tc=10.0 min CN=81 Runoff=1.25 cfs 0.067 af

SubcatchmentP6: Site to West Swale Runoff Area=14,779 sf 0.45% Impervious Runoff Depth=0.78"
Tc=10.0 min CN=74 Runoff=0.39 cfs 0.022 af

SubcatchmentP7: Site to Sunfish Lake Runoff Area=2,684 sf 0.00% Impervious Runoff Depth=0.78"
Tc=10.0 min CN=74 Runoff=0.07 cfs 0.004 af

Reach 1R: North Runoff Inflow=0.32 cfs 0.017 af
Outflow=0.32 cfs 0.017 af

Reach 2R: Sunfish Lake Runoff Inflow=0.07 cfs 0.004 af
Outflow=0.07 cfs 0.004 af

Pond 1P: South Infiltration Basin (Total Site) Peak Elev=984.21' Storage=2,464 cf Inflow=1.25 cfs 0.073 af
Discarded=0.02 cfs 0.073 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.073 af

Pond 2AP: Infiltration Pipe Peak Elev=993.72' Storage=1,217 cf Inflow=1.35 cfs 0.072 af
Discarded=0.01 cfs 0.028 af Primary=0.54 cfs 0.044 af Outflow=0.55 cfs 0.072 af

Pond 2BP: Infiltration Pipe Peak Elev=984.38' Storage=1,782 cf Inflow=0.65 cfs 0.057 af
Discarded=0.01 cfs 0.051 af Primary=0.02 cfs 0.006 af Outflow=0.03 cfs 0.057 af

Pond 3AP: Infiltration Swale Peak Elev=988.59' Storage=735 cf Inflow=0.39 cfs 0.022 af
Discarded=0.01 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.022 af

Pond 3BP: Infiltration Swale Peak Elev=987.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 4: STM CB 4 Peak Elev=985.73' Inflow=0.54 cfs 0.044 af
12.0" Round Culvert n=0.012 L=5.0' S=0.0100 ' /' Outflow=0.54 cfs 0.044 af

Proposed Conditions*MSE 24-hr 3 2-Year Event Rainfall=2.80"*

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Pond 4P: Infiltration Swale

Peak Elev=995.16' Storage=283 cf Inflow=0.20 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.207 af Average Runoff Depth = 1.06"
78.45% Pervious = 1.839 ac 21.55% Impervious = 0.505 ac

Proposed Conditions*MSE 24-hr 3 2-Year Event Rainfall=2.80"*

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Summary for Subcatchment P1: Entrance Runoff

Runoff = 0.04 cfs @ 12.18 hrs, Volume= 0.002 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
520	74	>75% Grass cover, Good, HSG C
323	98	Paved parking, HSG C
843	83	Weighted Average
520		61.68% Pervious Area
323		38.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P2: Driveway Runoff

Runoff = 0.28 cfs @ 12.18 hrs, Volume= 0.015 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
6,054	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG C
7,588	79	Weighted Average
6,054		79.78% Pervious Area
1,534		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3A: North Site to Infiltration Pipe

Runoff = 1.35 cfs @ 12.18 hrs, Volume= 0.072 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
22,801	74	>75% Grass cover, Good, HSG C
9,761	98	Paved parking, HSG C
32,562	81	Weighted Average
22,801		70.02% Pervious Area
9,761		29.98% Impervious Area

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MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3B: North Site to Infiltration Pipe

Runoff = 0.24 cfs @ 12.18 hrs, Volume= 0.013 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
6,289	74	>75% Grass cover, Good, HSG C
1,019	98	Paved parking, HSG C
7,308	77	Weighted Average
6,289		86.06% Pervious Area
1,019		13.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P4: Site to East Swale

Runoff = 0.20 cfs @ 12.18 hrs, Volume= 0.011 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
5,391	74	>75% Grass cover, Good, HSG C
786	98	Paved parking, HSG C
6,177	77	Weighted Average
5,391		87.28% Pervious Area
786		12.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P5: Site to South Basin

Runoff = 1.25 cfs @ 12.18 hrs, Volume= 0.067 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

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MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Area (sf)	CN	Description
21,652	74	>75% Grass cover, Good, HSG C
8,513	98	Paved parking, HSG C
30,165	81	Weighted Average
21,652		71.78% Pervious Area
8,513		28.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P6: Site to West Swale

Runoff = 0.39 cfs @ 12.19 hrs, Volume= 0.022 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
14,712	74	>75% Grass cover, Good, HSG C
67	98	Paved parking, HSG C
14,779	74	Weighted Average
14,712		99.55% Pervious Area
67		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P7: Site to Sunfish Lake

Runoff = 0.07 cfs @ 12.19 hrs, Volume= 0.004 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Event Rainfall=2.80"

Area (sf)	CN	Description
2,684	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
2,684	74	Weighted Average
2,684		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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MSE 24-hr 3 2-Year Event Rainfall=2.80"

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Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 22.03% Impervious, Inflow Depth = 1.07" for 2-Year Event event
 Inflow = 0.32 cfs @ 12.18 hrs, Volume= 0.017 af
 Outflow = 0.32 cfs @ 12.18 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.150 ac, 21.51% Impervious, Inflow Depth = 0.02" for 2-Year Event event
 Inflow = 0.07 cfs @ 12.19 hrs, Volume= 0.004 af
 Outflow = 0.07 cfs @ 12.19 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Pond 1P: South Infiltration Basin (Total Site)

Inflow Area = 2.089 ac, 22.14% Impervious, Inflow Depth = 0.42" for 2-Year Event event
 Inflow = 1.25 cfs @ 12.18 hrs, Volume= 0.073 af
 Outflow = 0.02 cfs @ 20.64 hrs, Volume= 0.073 af, Atten= 99%, Lag= 507.4 min
 Discarded = 0.02 cfs @ 20.64 hrs, Volume= 0.073 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 984.21' @ 20.64 hrs Surf.Area= 3,781 sf Storage= 2,464 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 1,410.7 min (2,248.7 - 838.0)

Volume	Invert	Avail.Storage	Storage Description
#1	983.50'	8,118 cf	Infiltration Basin (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
983.50	3,130	0	0
984.00	3,580	1,678	1,678
984.50	4,050	1,908	3,585
985.00	4,530	2,145	5,730
985.50	5,020	2,388	8,118
Device	Routing	Invert	Outlet Devices
#1	Discarded	983.50'	0.200 in/hr Exfiltration over Surface area
#2	Primary	978.10'	12.0" Round Culvert L= 25.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.10' / 978.00' S= 0.0040 '/' Cc= 0.900

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#3	Device 2	984.30'	n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf 16.0" Horiz. Overflow CB Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	985.20'	20.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 20.64 hrs HW=984.21' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=983.50' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 0.00 cfs of 8.37 cfs potential flow)

↑ **3=Overflow CB Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=983.50' TW=0.00' (Dynamic Tailwater)

↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2AP: Infiltration Pipe

Inflow Area =	0.748 ac, 29.98% Impervious, Inflow Depth = 1.16" for 2-Year Event event
Inflow =	1.35 cfs @ 12.18 hrs, Volume= 0.072 af
Outflow =	0.55 cfs @ 12.38 hrs, Volume= 0.072 af, Atten= 59%, Lag= 11.8 min
Discarded =	0.01 cfs @ 11.56 hrs, Volume= 0.028 af
Primary =	0.54 cfs @ 12.38 hrs, Volume= 0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 993.72' @ 12.38 hrs Surf.Area= 1,530 sf Storage= 1,217 cf

Plug-Flow detention time= 523.5 min calculated for 0.072 af (100% of inflow)

Center-of-Mass det. time= 523.7 min (1,344.3 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	992.00'	2,165 cf	15.00"W x 102.00'L x 4.00'H Field A 6,120 cf Overall - 707 cf Embedded = 5,413 cf x 40.0% Voids
#2A	992.50'	707 cf	CMP Round 36 x 5 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L
		2,872 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	992.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	993.30'	12.0" Round Culvert L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 993.30' / 992.90' S= 0.0047 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

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Discarded OutFlow Max=0.01 cfs @ 11.56 hrs HW=992.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.54 cfs @ 12.38 hrs HW=993.72' TW=985.73' (Dynamic Tailwater)

↑**2=Culvert** (Barrel Controls 0.54 cfs @ 2.53 fps)

Summary for Pond 2BP: Infiltration Pipe

Inflow Area = 0.915 ac, 27.04% Impervious, Inflow Depth = 0.75" for 2-Year Event event
Inflow = 0.65 cfs @ 12.36 hrs, Volume= 0.057 af
Outflow = 0.03 cfs @ 15.67 hrs, Volume= 0.057 af, Atten= 95%, Lag= 198.6 min
Discarded = 0.01 cfs @ 12.11 hrs, Volume= 0.051 af
Primary = 0.02 cfs @ 15.67 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 984.38' @ 15.74 hrs Surf.Area= 2,880 sf Storage= 1,782 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 1,145.3 min (1,989.8 - 844.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	983.00'	4,071 cf	15.00'W x 192.00'L x 4.00'H Field A 11,520 cf Overall - 1,343 cf Embedded = 10,177 cf x 40.0% Voids
#2A	983.50'	1,343 cf	CMP Round 36 x 9 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= +10.00' x 7.07 sf x 1 rows
		5,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	983.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	984.30'	12.0" Round Culvert L= 37.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 984.30' / 984.00' S= 0.0081 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 12.11 hrs HW=983.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.02 cfs @ 15.67 hrs HW=984.38' TW=984.15' (Dynamic Tailwater)

↑**2=Culvert** (Outlet Controls 0.02 cfs @ 1.03 fps)

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Summary for Pond 3AP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 0.78" for 2-Year Event event
Inflow = 0.39 cfs @ 12.19 hrs, Volume= 0.022 af
Outflow = 0.01 cfs @ 11.96 hrs, Volume= 0.022 af, Atten= 99%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.96 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 988.59' @ 20.33 hrs Surf.Area= 1,250 sf Storage= 735 cf

Plug-Flow detention time= 1,253.1 min calculated for 0.022 af (100% of inflow)
Center-of-Mass det. time= 1,253.2 min (2,091.9 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	988.00'	1,250 cf	25.00'W x 50.00'L x 1.00'H Prismaoid

Device	Routing	Invert	Outlet Devices
#1	Discarded	988.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	988.80'	15.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 11.96 hrs HW=988.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=988.00' TW=987.00' (Dynamic Tailwater)

↑**2=Sharp-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond 3BP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 0.00" for 2-Year Event event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 987.00' @ 0.00 hrs Surf.Area= 1,000 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	987.00'	1,000 cf	25.00'W x 40.00'L x 1.00'H Prismaoid

Device	Routing	Invert	Outlet Devices
#1	Discarded	987.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	987.80'	12.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=987.00' (Free Discharge)

↑**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=987.00' TW=983.50' (Dynamic Tailwater)

↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4: STM CB 4

[57] Hint: Peaked at 985.73' (Flood elevation advised)

Inflow Area = 0.748 ac, 29.98% Impervious, Inflow Depth = 0.71" for 2-Year Event event
Inflow = 0.54 cfs @ 12.38 hrs, Volume= 0.044 af
Outflow = 0.54 cfs @ 12.38 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.38 hrs, Volume= 0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 985.73' @ 12.38 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	985.30'	12.0" Round Culvert L= 5.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.30' / 985.25' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.38 hrs HW=985.73' TW=983.36' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 0.54 cfs @ 2.45 fps)

Summary for Pond 4P: Infiltration Swale

Inflow Area = 0.142 ac, 12.72% Impervious, Inflow Depth = 0.93" for 2-Year Event event
Inflow = 0.20 cfs @ 12.18 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.16 hrs, Volume= 0.011 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.16 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 995.16' @ 15.07 hrs Surf.Area= 1,725 sf Storage= 283 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 368.2 min (1,198.9 - 830.8)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	6,900 cf	15.00'W x 115.00'L x 4.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	995.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	995.40'	10.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=995.04' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=995.00' TW=983.50' (Dynamic Tailwater)

↑2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

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MSE 24-hr 3 10-Year Event Rainfall=4.20"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP1: Entrance Runoff Runoff Area=843 sf 38.32% Impervious Runoff Depth=2.46"
Tc=10.0 min CN=83 Runoff=0.07 cfs 0.004 af

SubcatchmentP2: Driveway Runoff Runoff Area=7,588 sf 20.22% Impervious Runoff Depth=2.13"
Tc=10.0 min CN=79 Runoff=0.58 cfs 0.031 af

SubcatchmentP3A: North Site to Runoff Area=32,562 sf 29.98% Impervious Runoff Depth=2.29"
Tc=10.0 min CN=81 Runoff=2.66 cfs 0.143 af

SubcatchmentP3B: North Site to Runoff Area=7,308 sf 13.94% Impervious Runoff Depth=1.97"
Tc=10.0 min CN=77 Runoff=0.51 cfs 0.028 af

SubcatchmentP4: Site to East Swale Runoff Area=6,177 sf 12.72% Impervious Runoff Depth=1.97"
Tc=10.0 min CN=77 Runoff=0.43 cfs 0.023 af

SubcatchmentP5: Site to South Basin Runoff Area=30,165 sf 28.22% Impervious Runoff Depth=2.29"
Tc=10.0 min CN=81 Runoff=2.47 cfs 0.132 af

SubcatchmentP6: Site to West Swale Runoff Area=14,779 sf 0.45% Impervious Runoff Depth=1.74"
Tc=10.0 min CN=74 Runoff=0.92 cfs 0.049 af

SubcatchmentP7: Site to Sunfish Lake Runoff Area=2,684 sf 0.00% Impervious Runoff Depth=1.74"
Tc=10.0 min CN=74 Runoff=0.17 cfs 0.009 af

Reach 1R: North Runoff Inflow=0.65 cfs 0.035 af
Outflow=0.65 cfs 0.035 af

Reach 2R: Sunfish Lake Runoff Inflow=1.11 cfs 0.144 af
Outflow=1.11 cfs 0.144 af

Pond 1P: South Infiltration Basin (Total Site) Peak Elev=984.48' Storage=3,523 cf Inflow=2.47 cfs 0.220 af
Discarded=0.02 cfs 0.085 af Primary=1.09 cfs 0.135 af Secondary=0.00 cfs 0.000 af Outflow=1.11 cfs 0.220 af

Pond 2AP: Infiltration Pipe Peak Elev=994.26' Storage=1,642 cf Inflow=2.66 cfs 0.143 af
Discarded=0.01 cfs 0.029 af Primary=2.13 cfs 0.113 af Outflow=2.14 cfs 0.143 af

Pond 2BP: Infiltration Pipe Peak Elev=984.83' Storage=2,453 cf Inflow=2.57 cfs 0.141 af
Discarded=0.01 cfs 0.054 af Primary=0.86 cfs 0.087 af Outflow=0.87 cfs 0.141 af

Pond 3AP: Infiltration Swale Peak Elev=988.83' Storage=1,037 cf Inflow=0.92 cfs 0.049 af
Discarded=0.01 cfs 0.029 af Primary=0.25 cfs 0.020 af Outflow=0.25 cfs 0.049 af

Pond 3BP: Infiltration Swale Peak Elev=987.73' Storage=725 cf Inflow=0.25 cfs 0.020 af
Discarded=0.00 cfs 0.020 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.020 af

Pond 4: STM CB 4 Peak Elev=986.28' Inflow=2.13 cfs 0.113 af
12.0" Round Culvert n=0.012 L=5.0' S=0.0100 ' /' Outflow=2.13 cfs 0.113 af

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Pond 4P: Infiltration Swale

Peak Elev=995.40' Storage=696 cf Inflow=0.43 cfs 0.023 af
Discarded=0.01 cfs 0.023 af Primary=0.01 cfs 0.001 af Outflow=0.02 cfs 0.023 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.419 af Average Runoff Depth = 2.14"
78.45% Pervious = 1.839 ac 21.55% Impervious = 0.505 ac

Proposed Conditions

MSE 24-hr 3 10-Year Event Rainfall=4.20"

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Summary for Subcatchment P1: Entrance Runoff

Runoff = 0.07 cfs @ 12.18 hrs, Volume= 0.004 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
520	74	>75% Grass cover, Good, HSG C
323	98	Paved parking, HSG C
843	83	Weighted Average
520		61.68% Pervious Area
323		38.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P2: Driveway Runoff

Runoff = 0.58 cfs @ 12.18 hrs, Volume= 0.031 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
6,054	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG C
7,588	79	Weighted Average
6,054		79.78% Pervious Area
1,534		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3A: North Site to Infiltration Pipe

Runoff = 2.66 cfs @ 12.18 hrs, Volume= 0.143 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
22,801	74	>75% Grass cover, Good, HSG C
9,761	98	Paved parking, HSG C
32,562	81	Weighted Average
22,801		70.02% Pervious Area
9,761		29.98% Impervious Area

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MSE 24-hr 3 10-Year Event Rainfall=4.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3B: North Site to Infiltration Pipe

Runoff = 0.51 cfs @ 12.18 hrs, Volume= 0.028 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
6,289	74	>75% Grass cover, Good, HSG C
1,019	98	Paved parking, HSG C
7,308	77	Weighted Average
6,289		86.06% Pervious Area
1,019		13.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P4: Site to East Swale

Runoff = 0.43 cfs @ 12.18 hrs, Volume= 0.023 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
5,391	74	>75% Grass cover, Good, HSG C
786	98	Paved parking, HSG C
6,177	77	Weighted Average
5,391		87.28% Pervious Area
786		12.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P5: Site to South Basin

Runoff = 2.47 cfs @ 12.18 hrs, Volume= 0.132 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

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Area (sf)	CN	Description
21,652	74	>75% Grass cover, Good, HSG C
8,513	98	Paved parking, HSG C
30,165	81	Weighted Average
21,652		71.78% Pervious Area
8,513		28.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P6: Site to West Swale

Runoff = 0.92 cfs @ 12.18 hrs, Volume= 0.049 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
14,712	74	>75% Grass cover, Good, HSG C
67	98	Paved parking, HSG C
14,779	74	Weighted Average
14,712		99.55% Pervious Area
67		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P7: Site to Sunfish Lake

Runoff = 0.17 cfs @ 12.18 hrs, Volume= 0.009 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Event Rainfall=4.20"

Area (sf)	CN	Description
2,684	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
2,684	74	Weighted Average
2,684		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 22.03% Impervious, Inflow Depth = 2.16" for 10-Year Event event
 Inflow = 0.65 cfs @ 12.18 hrs, Volume= 0.035 af
 Outflow = 0.65 cfs @ 12.18 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.150 ac, 21.51% Impervious, Inflow Depth = 0.80" for 10-Year Event event
 Inflow = 1.11 cfs @ 12.65 hrs, Volume= 0.144 af
 Outflow = 1.11 cfs @ 12.65 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Pond 1P: South Infiltration Basin (Total Site)

Inflow Area = 2.089 ac, 22.14% Impervious, Inflow Depth = 1.26" for 10-Year Event event
 Inflow = 2.47 cfs @ 12.18 hrs, Volume= 0.220 af
 Outflow = 1.11 cfs @ 12.66 hrs, Volume= 0.220 af, Atten= 55%, Lag= 28.8 min
 Discarded = 0.02 cfs @ 12.66 hrs, Volume= 0.085 af
 Primary = 1.09 cfs @ 12.66 hrs, Volume= 0.135 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 984.48' @ 12.66 hrs Surf.Area= 4,036 sf Storage= 3,523 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 627.2 min (1,453.4 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	983.50'	8,118 cf	Infiltration Basin (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
983.50	3,130	0	0
984.00	3,580	1,678	1,678
984.50	4,050	1,908	3,585
985.00	4,530	2,145	5,730
985.50	5,020	2,388	8,118

Device	Routing	Invert	Outlet Devices
#1	Discarded	983.50'	0.200 in/hr Exfiltration over Surface area
#2	Primary	978.10'	12.0" Round Culvert L= 25.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.10' / 978.00' S= 0.0040 '/' Cc= 0.900

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#3 Device 2 984.30' n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
16.0" Horiz. Overflow CB Grate C= 0.600
Limited to weir flow at low heads
#4 Secondary 985.20' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.66 hrs HW=984.48' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.09 cfs @ 12.66 hrs HW=984.48' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 1.09 cfs of 9.17 cfs potential flow)

↑ **3=Overflow CB Grate** (Weir Controls 1.09 cfs @ 1.41 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=983.50' TW=0.00' (Dynamic Tailwater)

↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2AP: Infiltration Pipe

Inflow Area = 0.748 ac, 29.98% Impervious, Inflow Depth = 2.29" for 10-Year Event event
Inflow = 2.66 cfs @ 12.18 hrs, Volume= 0.143 af
Outflow = 2.14 cfs @ 12.24 hrs, Volume= 0.143 af, Atten= 20%, Lag= 3.8 min
Discarded = 0.01 cfs @ 10.80 hrs, Volume= 0.029 af
Primary = 2.13 cfs @ 12.24 hrs, Volume= 0.113 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 994.26' @ 12.24 hrs Surf.Area= 1,530 sf Storage= 1,642 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 277.2 min (1,083.8 - 806.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	992.00'	2,165 cf	15.00"W x 102.00'L x 4.00'H Field A 6,120 cf Overall - 707 cf Embedded = 5,413 cf x 40.0% Voids
#2A	992.50'	707 cf	CMP Round 36 x 5 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L
		2,872 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	992.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	993.30'	12.0" Round Culvert L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 993.30' / 992.90' S= 0.0047 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

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Discarded OutFlow Max=0.01 cfs @ 10.80 hrs HW=992.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.13 cfs @ 12.24 hrs HW=994.26' TW=986.28' (Dynamic Tailwater)

↑**2=Culvert** (Barrel Controls 2.13 cfs @ 3.53 fps)

Summary for Pond 2BP: Infiltration Pipe

Inflow Area = 0.915 ac, 27.04% Impervious, Inflow Depth = 1.85" for 10-Year Event event
Inflow = 2.57 cfs @ 12.23 hrs, Volume= 0.141 af
Outflow = 0.87 cfs @ 12.53 hrs, Volume= 0.141 af, Atten= 66%, Lag= 17.8 min
Discarded = 0.01 cfs @ 11.93 hrs, Volume= 0.054 af
Primary = 0.86 cfs @ 12.53 hrs, Volume= 0.087 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 984.83' @ 12.55 hrs Surf.Area= 2,880 sf Storage= 2,453 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 525.1 min (1,346.5 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	983.00'	4,071 cf	15.00'W x 192.00'L x 4.00'H Field A 11,520 cf Overall - 1,343 cf Embedded = 10,177 cf x 40.0% Voids
#2A	983.50'	1,343 cf	CMP Round 36 x 9 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= +10.00' x 7.07 sf x 1 rows
		5,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	983.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	984.30'	12.0" Round Culvert L= 37.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 984.30' / 984.00' S= 0.0081 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 11.93 hrs HW=983.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.86 cfs @ 12.53 hrs HW=984.83' TW=984.46' (Dynamic Tailwater)

↑**2=Culvert** (Outlet Controls 0.86 cfs @ 2.96 fps)

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Summary for Pond 3AP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 1.74" for 10-Year Event event
Inflow = 0.92 cfs @ 12.18 hrs, Volume= 0.049 af
Outflow = 0.25 cfs @ 12.49 hrs, Volume= 0.049 af, Atten= 72%, Lag= 18.4 min
Discarded = 0.01 cfs @ 11.53 hrs, Volume= 0.029 af
Primary = 0.25 cfs @ 12.49 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 988.83' @ 12.49 hrs Surf.Area= 1,250 sf Storage= 1,037 cf

Plug-Flow detention time= 997.5 min calculated for 0.049 af (100% of inflow)
Center-of-Mass det. time= 997.7 min (1,818.3 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	988.00'	1,250 cf	25.00'W x 50.00'L x 1.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	988.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	988.80'	15.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 11.53 hrs HW=988.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.25 cfs @ 12.49 hrs HW=988.83' TW=987.05' (Dynamic Tailwater)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.25 cfs @ 0.56 fps)

Summary for Pond 3BP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 0.72" for 10-Year Event event
Inflow = 0.25 cfs @ 12.49 hrs, Volume= 0.020 af
Outflow = 0.00 cfs @ 12.44 hrs, Volume= 0.020 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.44 hrs, Volume= 0.020 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 987.73' @ 20.61 hrs Surf.Area= 1,000 sf Storage= 725 cf

Plug-Flow detention time= 1,468.4 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 1,468.5 min (2,330.6 - 862.1)

Volume	Invert	Avail.Storage	Storage Description
#1	987.00'	1,000 cf	25.00'W x 40.00'L x 1.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	987.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	987.80'	12.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.00 cfs @ 12.44 hrs HW=987.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=987.00' TW=983.50' (Dynamic Tailwater)

↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4: STM CB 4

[57] Hint: Peaked at 986.28' (Flood elevation advised)

Inflow Area = 0.748 ac, 29.98% Impervious, Inflow Depth = 1.82" for 10-Year Event event
Inflow = 2.13 cfs @ 12.24 hrs, Volume= 0.113 af
Outflow = 2.13 cfs @ 12.24 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min
Primary = 2.13 cfs @ 12.24 hrs, Volume= 0.113 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 986.28' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	985.30'	12.0" Round Culvert L= 5.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.30' / 985.25' S= 0.0100 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=2.13 cfs @ 12.24 hrs HW=986.28' TW=983.96' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 2.13 cfs @ 3.44 fps)

Summary for Pond 4P: Infiltration Swale

Inflow Area = 0.142 ac, 12.72% Impervious, Inflow Depth = 1.97" for 10-Year Event event
Inflow = 0.43 cfs @ 12.18 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 14.79 hrs, Volume= 0.023 af, Atten= 96%, Lag= 156.7 min
Discarded = 0.01 cfs @ 12.00 hrs, Volume= 0.023 af
Primary = 0.01 cfs @ 14.79 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 995.40' @ 14.79 hrs Surf.Area= 1,725 sf Storage= 696 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 841.0 min (1,655.6 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	6,900 cf	15.00'W x 115.00'L x 4.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	995.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	995.40'	10.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.01 cfs @ 12.00 hrs HW=995.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 14.79 hrs HW=995.40' TW=984.36' (Dynamic Tailwater)

↑**2=Sharp-Crested Rectangular Weir**(Weir Controls 0.01 cfs @ 0.20 fps)

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP1: Entrance Runoff Runoff Area=843 sf 38.32% Impervious Runoff Depth=5.41"
Tc=10.0 min CN=83 Runoff=0.16 cfs 0.009 af

SubcatchmentP2: Driveway Runoff Runoff Area=7,588 sf 20.22% Impervious Runoff Depth=4.95"
Tc=10.0 min CN=79 Runoff=1.32 cfs 0.072 af

SubcatchmentP3A: North Site to Runoff Area=32,562 sf 29.98% Impervious Runoff Depth=5.18"
Tc=10.0 min CN=81 Runoff=5.87 cfs 0.323 af

SubcatchmentP3B: North Site to Runoff Area=7,308 sf 13.94% Impervious Runoff Depth=4.73"
Tc=10.0 min CN=77 Runoff=1.22 cfs 0.066 af

SubcatchmentP4: Site to East Swale Runoff Area=6,177 sf 12.72% Impervious Runoff Depth=4.73"
Tc=10.0 min CN=77 Runoff=1.03 cfs 0.056 af

SubcatchmentP5: Site to South Basin Runoff Area=30,165 sf 28.22% Impervious Runoff Depth=5.18"
Tc=10.0 min CN=81 Runoff=5.44 cfs 0.299 af

SubcatchmentP6: Site to West Swale Runoff Area=14,779 sf 0.45% Impervious Runoff Depth=4.39"
Tc=10.0 min CN=74 Runoff=2.31 cfs 0.124 af

SubcatchmentP7: Site to Sunfish Lake Runoff Area=2,684 sf 0.00% Impervious Runoff Depth=4.39"
Tc=10.0 min CN=74 Runoff=0.42 cfs 0.023 af

Reach 1R: North Runoff Inflow=1.47 cfs 0.081 af
Outflow=1.47 cfs 0.081 af

Reach 2R: Sunfish Lake Runoff Inflow=6.66 cfs 0.635 af
Outflow=6.66 cfs 0.635 af

Pond 1P: South Infiltration Basin (Total Peak Elev=985.21' Storage=6,718 cf Inflow=10.15 cfs 0.702 af
Discarded=0.02 cfs 0.089 af Primary=6.42 cfs 0.612 af Secondary=0.10 cfs 0.001 af Outflow=6.55 cfs 0.702 af

Pond 2AP: Infiltration Pipe Peak Elev=995.72' Storage=2,699 cf Inflow=5.87 cfs 0.323 af
Discarded=0.01 cfs 0.031 af Primary=4.36 cfs 0.292 af Outflow=4.37 cfs 0.323 af

Pond 2BP: Infiltration Pipe Peak Elev=986.11' Storage=4,328 cf Inflow=5.35 cfs 0.358 af
Discarded=0.01 cfs 0.057 af Primary=3.58 cfs 0.301 af Outflow=3.60 cfs 0.358 af

Pond 3AP: Infiltration Swale Peak Elev=988.93' Storage=1,158 cf Inflow=2.31 cfs 0.124 af
Discarded=0.01 cfs 0.030 af Primary=2.28 cfs 0.094 af Outflow=2.28 cfs 0.124 af

Pond 3BP: Infiltration Swale Peak Elev=987.93' Storage=930 cf Inflow=2.28 cfs 0.094 af
Discarded=0.00 cfs 0.023 af Primary=1.89 cfs 0.071 af Outflow=1.89 cfs 0.094 af

Pond 4: STM CB 4 Peak Elev=987.14' Inflow=4.36 cfs 0.292 af
12.0" Round Culvert n=0.012 L=5.0' S=0.0100 ' Outflow=4.36 cfs 0.292 af

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Pond 4P: Infiltration Swale

Peak Elev=995.48' Storage=834 cf Inflow=1.03 cfs 0.056 af
Discarded=0.01 cfs 0.025 af Primary=0.80 cfs 0.031 af Outflow=0.81 cfs 0.056 af

Total Runoff Area = 2.344 ac Runoff Volume = 0.971 af Average Runoff Depth = 4.97"
78.45% Pervious = 1.839 ac 21.55% Impervious = 0.505 ac

Proposed Conditions

MSE 24-hr 3 100-Year Event Rainfall=7.40"

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Summary for Subcatchment P1: Entrance Runoff

Runoff = 0.16 cfs @ 12.17 hrs, Volume= 0.009 af, Depth= 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
520	74	>75% Grass cover, Good, HSG C
323	98	Paved parking, HSG C
843	83	Weighted Average
520		61.68% Pervious Area
323		38.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P2: Driveway Runoff

Runoff = 1.32 cfs @ 12.17 hrs, Volume= 0.072 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
6,054	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG C
7,588	79	Weighted Average
6,054		79.78% Pervious Area
1,534		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3A: North Site to Infiltration Pipe

Runoff = 5.87 cfs @ 12.17 hrs, Volume= 0.323 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
22,801	74	>75% Grass cover, Good, HSG C
9,761	98	Paved parking, HSG C
32,562	81	Weighted Average
22,801		70.02% Pervious Area
9,761		29.98% Impervious Area

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MSE 24-hr 3 100-Year Event Rainfall=7.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P3B: North Site to Infiltration Pipe

Runoff = 1.22 cfs @ 12.17 hrs, Volume= 0.066 af, Depth= 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
6,289	74	>75% Grass cover, Good, HSG C
1,019	98	Paved parking, HSG C
7,308	77	Weighted Average
6,289		86.06% Pervious Area
1,019		13.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P4: Site to East Swale

Runoff = 1.03 cfs @ 12.17 hrs, Volume= 0.056 af, Depth= 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
5,391	74	>75% Grass cover, Good, HSG C
786	98	Paved parking, HSG C
6,177	77	Weighted Average
5,391		87.28% Pervious Area
786		12.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P5: Site to South Basin

Runoff = 5.44 cfs @ 12.17 hrs, Volume= 0.299 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

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MSE 24-hr 3 100-Year Event Rainfall=7.40"

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Area (sf)	CN	Description
21,652	74	>75% Grass cover, Good, HSG C
8,513	98	Paved parking, HSG C
30,165	81	Weighted Average
21,652		71.78% Pervious Area
8,513		28.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P6: Site to West Swale

Runoff = 2.31 cfs @ 12.18 hrs, Volume= 0.124 af, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
14,712	74	>75% Grass cover, Good, HSG C
67	98	Paved parking, HSG C
14,779	74	Weighted Average
14,712		99.55% Pervious Area
67		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment P7: Site to Sunfish Lake

Runoff = 0.42 cfs @ 12.18 hrs, Volume= 0.023 af, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Event Rainfall=7.40"

Area (sf)	CN	Description
2,684	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
2,684	74	Weighted Average
2,684		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Summary for Reach 1R: North Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 22.03% Impervious, Inflow Depth = 5.00" for 100-Year Event event
 Inflow = 1.47 cfs @ 12.17 hrs, Volume= 0.081 af
 Outflow = 1.47 cfs @ 12.17 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Reach 2R: Sunfish Lake Runoff

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.150 ac, 21.51% Impervious, Inflow Depth = 3.54" for 100-Year Event event
 Inflow = 6.66 cfs @ 12.41 hrs, Volume= 0.635 af
 Outflow = 6.66 cfs @ 12.41 hrs, Volume= 0.635 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Summary for Pond 1P: South Infiltration Basin (Total Site)

Inflow Area = 2.089 ac, 22.14% Impervious, Inflow Depth = 4.03" for 100-Year Event event
 Inflow = 10.15 cfs @ 12.23 hrs, Volume= 0.702 af
 Outflow = 6.55 cfs @ 12.41 hrs, Volume= 0.702 af, Atten= 35%, Lag= 10.7 min
 Discarded = 0.02 cfs @ 12.41 hrs, Volume= 0.089 af
 Primary = 6.42 cfs @ 12.41 hrs, Volume= 0.612 af
 Secondary = 0.10 cfs @ 12.41 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 985.21' @ 12.41 hrs Surf.Area= 4,739 sf Storage= 6,718 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 210.8 min (1,018.1 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1	983.50'	8,118 cf	Infiltration Basin (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
983.50	3,130	0	0
984.00	3,580	1,678	1,678
984.50	4,050	1,908	3,585
985.00	4,530	2,145	5,730
985.50	5,020	2,388	8,118

Device	Routing	Invert	Outlet Devices
#1	Discarded	983.50'	0.200 in/hr Exfiltration over Surface area
#2	Primary	978.10'	12.0" Round Culvert L= 25.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.10' / 978.00' S= 0.0040 '/' Cc= 0.900

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#3 Device 2 984.30' n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
16.0" Horiz. Overflow CB Grate C= 0.600
Limited to weir flow at low heads
#4 Secondary 985.20' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.41 hrs HW=985.21' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=6.42 cfs @ 12.41 hrs HW=985.21' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 6.42 cfs of 9.72 cfs potential flow)

↑ **3=Overflow CB Grate** (Orifice Controls 6.42 cfs @ 4.60 fps)

Secondary OutFlow Max=0.10 cfs @ 12.41 hrs HW=985.21' TW=0.00' (Dynamic Tailwater)

↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.38 fps)

Summary for Pond 2AP: Infiltration Pipe

Inflow Area = 0.748 ac, 29.98% Impervious, Inflow Depth = 5.18" for 100-Year Event event
Inflow = 5.87 cfs @ 12.17 hrs, Volume= 0.323 af
Outflow = 4.37 cfs @ 12.25 hrs, Volume= 0.323 af, Atten= 26%, Lag= 4.5 min
Discarded = 0.01 cfs @ 8.82 hrs, Volume= 0.031 af
Primary = 4.36 cfs @ 12.25 hrs, Volume= 0.292 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 995.72' @ 12.25 hrs Surf.Area= 1,530 sf Storage= 2,699 cf

Plug-Flow detention time= 132.7 min calculated for 0.323 af (100% of inflow)

Center-of-Mass det. time= 132.9 min (923.2 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	992.00'	2,165 cf	15.00'W x 102.00'L x 4.00'H Field A 6,120 cf Overall - 707 cf Embedded = 5,413 cf x 40.0% Voids
#2A	992.50'	707 cf	CMP Round 36 x 5 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L
		2,872 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	992.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	993.30'	12.0" Round Culvert L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 993.30' / 992.90' S= 0.0047 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

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Discarded OutFlow Max=0.01 cfs @ 8.82 hrs HW=992.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=4.36 cfs @ 12.25 hrs HW=995.72' TW=987.13' (Dynamic Tailwater)

↑**2=Culvert** (Barrel Controls 4.36 cfs @ 5.55 fps)

Summary for Pond 2BP: Infiltration Pipe

Inflow Area = 0.915 ac, 27.04% Impervious, Inflow Depth = 4.69" for 100-Year Event event
Inflow = 5.35 cfs @ 12.22 hrs, Volume= 0.358 af
Outflow = 3.60 cfs @ 12.40 hrs, Volume= 0.358 af, Atten= 33%, Lag= 10.6 min
Discarded = 0.01 cfs @ 11.27 hrs, Volume= 0.057 af
Primary = 3.58 cfs @ 12.40 hrs, Volume= 0.301 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 986.11' @ 12.40 hrs Surf.Area= 2,880 sf Storage= 4,328 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 224.8 min (1,028.8 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	983.00'	4,071 cf	15.00'W x 192.00'L x 4.00'H Field A 11,520 cf Overall - 1,343 cf Embedded = 10,177 cf x 40.0% Voids
#2A	983.50'	1,343 cf	CMP Round 36 x 9 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= +10.00' x 7.07 sf x 1 rows
		5,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	983.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	984.30'	12.0" Round Culvert L= 37.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 984.30' / 984.00' S= 0.0081 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 11.27 hrs HW=983.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.58 cfs @ 12.40 hrs HW=986.11' TW=985.21' (Dynamic Tailwater)

↑**2=Culvert** (Inlet Controls 3.58 cfs @ 4.56 fps)

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Summary for Pond 3AP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 4.39" for 100-Year Event event
 Inflow = 2.31 cfs @ 12.18 hrs, Volume= 0.124 af
 Outflow = 2.28 cfs @ 12.19 hrs, Volume= 0.124 af, Atten= 1%, Lag= 0.8 min
 Discarded = 0.01 cfs @ 10.20 hrs, Volume= 0.030 af
 Primary = 2.28 cfs @ 12.19 hrs, Volume= 0.094 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 988.93' @ 12.19 hrs Surf.Area= 1,250 sf Storage= 1,158 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 406.6 min (1,208.3 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	988.00'	1,250 cf	25.00'W x 50.00'L x 1.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	988.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	988.80'	15.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 10.20 hrs HW=988.01' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.27 cfs @ 12.19 hrs HW=988.93' TW=987.68' (Dynamic Tailwater)
 ↳2=Sharp-Crested Rectangular Weir (Weir Controls 2.27 cfs @ 1.20 fps)

Summary for Pond 3BP: Infiltration Swale

Inflow Area = 0.339 ac, 0.45% Impervious, Inflow Depth = 3.33" for 100-Year Event event
 Inflow = 2.28 cfs @ 12.19 hrs, Volume= 0.094 af
 Outflow = 1.89 cfs @ 12.25 hrs, Volume= 0.094 af, Atten= 17%, Lag= 3.6 min
 Discarded = 0.00 cfs @ 12.08 hrs, Volume= 0.023 af
 Primary = 1.89 cfs @ 12.25 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 987.93' @ 12.25 hrs Surf.Area= 1,000 sf Storage= 930 cf

Plug-Flow detention time= 418.9 min calculated for 0.094 af (100% of inflow)
 Center-of-Mass det. time= 419.1 min (1,232.4 - 813.2)

Volume	Invert	Avail.Storage	Storage Description
#1	987.00'	1,000 cf	25.00'W x 40.00'L x 1.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	987.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	987.80'	12.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.00 cfs @ 12.08 hrs HW=987.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.88 cfs @ 12.25 hrs HW=987.93' TW=984.99' (Dynamic Tailwater)

↑**2=Sharp-Crested Rectangular Weir**(Weir Controls 1.88 cfs @ 1.21 fps)

Summary for Pond 4: STM CB 4

[57] Hint: Peaked at 987.14' (Flood elevation advised)

Inflow Area = 0.748 ac, 29.98% Impervious, Inflow Depth = 4.68" for 100-Year Event event
Inflow = 4.36 cfs @ 12.25 hrs, Volume= 0.292 af
Outflow = 4.36 cfs @ 12.25 hrs, Volume= 0.292 af, Atten= 0%, Lag= 0.0 min
Primary = 4.36 cfs @ 12.25 hrs, Volume= 0.292 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 987.14' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	985.30'	12.0" Round Culvert L= 5.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.30' / 985.25' S= 0.0100 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=4.36 cfs @ 12.25 hrs HW=987.13' TW=985.70' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 4.36 cfs @ 5.55 fps)

Summary for Pond 4P: Infiltration Swale

Inflow Area = 0.142 ac, 12.72% Impervious, Inflow Depth = 4.73" for 100-Year Event event
Inflow = 1.03 cfs @ 12.17 hrs, Volume= 0.056 af
Outflow = 0.81 cfs @ 12.24 hrs, Volume= 0.056 af, Atten= 22%, Lag= 4.1 min
Discarded = 0.01 cfs @ 11.40 hrs, Volume= 0.025 af
Primary = 0.80 cfs @ 12.24 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 995.48' @ 12.24 hrs Surf.Area= 1,725 sf Storage= 834 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 399.4 min (1,196.4 - 797.0)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	6,900 cf	15.00'W x 115.00'L x 4.00'H Prismatic

Device	Routing	Invert	Outlet Devices
#1	Discarded	995.00'	0.200 in/hr Exfiltration over Surface area
#2	Primary	995.40'	10.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.5' Crest Height

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Discarded OutFlow Max=0.01 cfs @ 11.40 hrs HW=995.04' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.80 cfs @ 12.24 hrs HW=995.48' TW=984.97' (Dynamic Tailwater)

↑2=Sharp-Crested Rectangular Weir (Weir Controls 0.80 cfs @ 0.96 fps)

Proposed Conditions*MSE 24-hr 3 100-Year Event Rainfall=7.40"*

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Stage-Area-Storage for Pond 2AP: Infiltration Pipe

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
992.00	1,530	0	994.60	1,530	1,908
992.05	1,530	31	994.65	1,530	1,947
992.10	1,530	61	994.70	1,530	1,986
992.15	1,530	92	994.75	1,530	2,024
992.20	1,530	122	994.80	1,530	2,063
992.25	1,530	153	994.85	1,530	2,101
992.30	1,530	184	994.90	1,530	2,139
992.35	1,530	214	994.95	1,530	2,176
992.40	1,530	245	995.00	1,530	2,214
992.45	1,530	275	995.05	1,530	2,251
992.50	1,530	306	995.10	1,530	2,288
992.55	1,530	338	995.15	1,530	2,324
992.60	1,530	372	995.20	1,530	2,360
992.65	1,530	406	995.25	1,530	2,396
992.70	1,530	441	995.30	1,530	2,432
992.75	1,530	476	995.35	1,530	2,466
992.80	1,530	512	995.40	1,530	2,501
992.85	1,530	548	995.45	1,530	2,534
992.90	1,530	584	995.50	1,530	2,566
992.95	1,530	621	995.55	1,530	2,597
993.00	1,530	658	995.60	1,530	2,627
993.05	1,530	696	995.65	1,530	2,658
993.10	1,530	734	995.70	1,530	2,689
993.15	1,530	771	995.75	1,530	2,719
993.20	1,530	810	995.80	1,530	2,750
993.25	1,530	848	995.85	1,530	2,780
993.30	1,530	886	995.90	1,530	2,811
993.35	1,530	925	995.95	1,530	2,842
993.40	1,530	964	996.00	1,530	2,872
993.45	1,530	1,003			
993.50	1,530	1,042			
993.55	1,530	1,081			
993.60	1,530	1,120			
993.65	1,530	1,159			
993.70	1,530	1,199			
993.75	1,530	1,238			
993.80	1,530	1,278			
993.85	1,530	1,317			
993.90	1,530	1,357			
993.95	1,530	1,396			
994.00	1,530	1,436			
994.05	1,530	1,476			
994.10	1,530	1,515			
994.15	1,530	1,555			
994.20	1,530	1,594			
994.25	1,530	1,634			
994.30	1,530	1,673			
994.35	1,530	1,713			
994.40	1,530	1,752			
994.45	1,530	1,791			
994.50	1,530	1,830			
994.55	1,530	1,869			

Proposed Conditions*MSE 24-hr 3 100-Year Event Rainfall=7.40"*

Prepared by {enter your company name here}

Printed 6/22/2020

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Hydrograph for Pond 2AP: Infiltration Pipe

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	992.00	0.00	0.00	0.00
2.00	0.00	0	992.00	0.00	0.00	0.00
4.00	0.00	0	992.00	0.00	0.00	0.00
6.00	0.00	0	992.00	0.00	0.00	0.00
8.00	0.01	2	992.00	0.01	0.01	0.00
10.00	0.06	177	992.29	0.01	0.01	0.00
12.00	2.22	1,505	994.09	1.60	0.01	1.59
14.00	0.19	1,082	993.55	0.20	0.01	0.20
16.00	0.10	1,020	993.47	0.10	0.01	0.09
18.00	0.08	1,004	993.45	0.08	0.01	0.07
20.00	0.06	987	993.43	0.06	0.01	0.05
22.00	0.04	966	993.40	0.04	0.01	0.03
24.00	0.02	938	993.37	0.02	0.01	0.01
26.00	0.00	875	993.29	0.01	0.01	0.00
28.00	0.00	824	993.22	0.01	0.01	0.00
30.00	0.00	773	993.15	0.01	0.01	0.00
32.00	0.00	722	993.08	0.01	0.01	0.00
34.00	0.00	671	993.02	0.01	0.01	0.00
36.00	0.00	620	992.95	0.01	0.01	0.00
38.00	0.00	569	992.88	0.01	0.01	0.00
40.00	0.00	518	992.81	0.01	0.01	0.00
42.00	0.00	467	992.74	0.01	0.01	0.00
44.00	0.00	416	992.66	0.01	0.01	0.00
46.00	0.00	365	992.59	0.01	0.01	0.00
48.00	0.00	314	992.51	0.01	0.01	0.00
50.00	0.00	263	992.43	0.01	0.01	0.00
52.00	0.00	212	992.35	0.01	0.01	0.00
54.00	0.00	161	992.26	0.01	0.01	0.00
56.00	0.00	110	992.18	0.01	0.01	0.00
58.00	0.00	59	992.10	0.01	0.01	0.00
60.00	0.00	8	992.01	0.01	0.01	0.00
62.00	0.00	0	992.00	0.00	0.00	0.00
64.00	0.00	0	992.00	0.00	0.00	0.00
66.00	0.00	0	992.00	0.00	0.00	0.00
68.00	0.00	0	992.00	0.00	0.00	0.00
70.00	0.00	0	992.00	0.00	0.00	0.00
72.00	0.00	0	992.00	0.00	0.00	0.00
74.00	0.00	0	992.00	0.00	0.00	0.00
76.00	0.00	0	992.00	0.00	0.00	0.00
78.00	0.00	0	992.00	0.00	0.00	0.00
80.00	0.00	0	992.00	0.00	0.00	0.00
82.00	0.00	0	992.00	0.00	0.00	0.00
84.00	0.00	0	992.00	0.00	0.00	0.00
86.00	0.00	0	992.00	0.00	0.00	0.00
88.00	0.00	0	992.00	0.00	0.00	0.00
90.00	0.00	0	992.00	0.00	0.00	0.00
92.00	0.00	0	992.00	0.00	0.00	0.00
94.00	0.00	0	992.00	0.00	0.00	0.00
96.00	0.00	0	992.00	0.00	0.00	0.00

Proposed Conditions

Prepared by {enter your company name here}

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MSE 24-hr 3 100-Year Event Rainfall=7.40"

Printed 6/22/2020

Stage-Area-Storage for Pond 2BP: Infiltration Pipe

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
983.00	2,880	0	985.60	2,880	3,598
983.05	2,880	58	985.65	2,880	3,671
983.10	2,880	115	985.70	2,880	3,744
983.15	2,880	173	985.75	2,880	3,816
983.20	2,880	230	985.80	2,880	3,889
983.25	2,880	288	985.85	2,880	3,960
983.30	2,880	346	985.90	2,880	4,032
983.35	2,880	403	985.95	2,880	4,103
983.40	2,880	461	986.00	2,880	4,174
983.45	2,880	518	986.05	2,880	4,244
983.50	2,880	576	986.10	2,880	4,313
983.55	2,880	637	986.15	2,880	4,382
983.60	2,880	699	986.20	2,880	4,450
983.65	2,880	764	986.25	2,880	4,518
983.70	2,880	829	986.30	2,880	4,584
983.75	2,880	896	986.35	2,880	4,650
983.80	2,880	964	986.40	2,880	4,714
983.85	2,880	1,032	986.45	2,880	4,777
983.90	2,880	1,101	986.50	2,880	4,838
983.95	2,880	1,170	986.55	2,880	4,895
984.00	2,880	1,240	986.60	2,880	4,953
984.05	2,880	1,311	986.65	2,880	5,011
984.10	2,880	1,382	986.70	2,880	5,068
984.15	2,880	1,453	986.75	2,880	5,126
984.20	2,880	1,525	986.80	2,880	5,183
984.25	2,880	1,598	986.85	2,880	5,241
984.30	2,880	1,670	986.90	2,880	5,299
984.35	2,880	1,743	986.95	2,880	5,356
984.40	2,880	1,816	987.00	2,880	5,414
984.45	2,880	1,890			
984.50	2,880	1,963			
984.55	2,880	2,037			
984.60	2,880	2,111			
984.65	2,880	2,185			
984.70	2,880	2,259			
984.75	2,880	2,334			
984.80	2,880	2,408			
984.85	2,880	2,483			
984.90	2,880	2,558			
984.95	2,880	2,632			
985.00	2,880	2,707			
985.05	2,880	2,782			
985.10	2,880	2,856			
985.15	2,880	2,931			
985.20	2,880	3,006			
985.25	2,880	3,080			
985.30	2,880	3,154			
985.35	2,880	3,229			
985.40	2,880	3,303			
985.45	2,880	3,377			
985.50	2,880	3,451			
985.55	2,880	3,524			

Proposed Conditions*MSE 24-hr 3 100-Year Event Rainfall=7.40"*

Prepared by {enter your company name here}

Printed 6/22/2020

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Hydrograph for Pond 2BP: Infiltration Pipe

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	983.00	0.00	0.00	0.00
2.00	0.00	0	983.00	0.00	0.00	0.00
4.00	0.00	0	983.00	0.00	0.00	0.00
6.00	0.00	0	983.00	0.00	0.00	0.00
8.00	0.00	0	983.00	0.00	0.00	0.00
10.00	0.01	0	983.00	0.01	0.01	0.00
12.00	2.04	1,508	984.19	0.01	0.01	0.00
14.00	0.24	2,153	984.63	0.30	0.01	0.29
16.00	0.11	1,984	984.51	0.13	0.01	0.11
18.00	0.09	1,939	984.48	0.09	0.01	0.08
20.00	0.06	1,901	984.46	0.07	0.01	0.06
22.00	0.04	1,854	984.43	0.05	0.01	0.03
24.00	0.02	1,793	984.38	0.03	0.01	0.01
26.00	0.00	1,688	984.31	0.01	0.01	0.00
28.00	0.00	1,591	984.25	0.01	0.01	0.00
30.00	0.00	1,495	984.18	0.01	0.01	0.00
32.00	0.00	1,399	984.11	0.01	0.01	0.00
34.00	0.00	1,303	984.04	0.01	0.01	0.00
36.00	0.00	1,207	983.98	0.01	0.01	0.00
38.00	0.00	1,111	983.91	0.01	0.01	0.00
40.00	0.00	1,015	983.84	0.01	0.01	0.00
42.00	0.00	919	983.77	0.01	0.01	0.00
44.00	0.00	823	983.70	0.01	0.01	0.00
46.00	0.00	727	983.62	0.01	0.01	0.00
48.00	0.00	631	983.55	0.01	0.01	0.00
50.00	0.00	535	983.46	0.01	0.01	0.00
52.00	0.00	439	983.38	0.01	0.01	0.00
54.00	0.00	343	983.30	0.01	0.01	0.00
56.00	0.00	247	983.21	0.01	0.01	0.00
58.00	0.00	151	983.13	0.01	0.01	0.00
60.00	0.00	55	983.05	0.01	0.01	0.00
62.00	0.00	0	983.00	0.00	0.00	0.00
64.00	0.00	0	983.00	0.00	0.00	0.00
66.00	0.00	0	983.00	0.00	0.00	0.00
68.00	0.00	0	983.00	0.00	0.00	0.00
70.00	0.00	0	983.00	0.00	0.00	0.00
72.00	0.00	0	983.00	0.00	0.00	0.00
74.00	0.00	0	983.00	0.00	0.00	0.00
76.00	0.00	0	983.00	0.00	0.00	0.00
78.00	0.00	0	983.00	0.00	0.00	0.00
80.00	0.00	0	983.00	0.00	0.00	0.00
82.00	0.00	0	983.00	0.00	0.00	0.00
84.00	0.00	0	983.00	0.00	0.00	0.00
86.00	0.00	0	983.00	0.00	0.00	0.00
88.00	0.00	0	983.00	0.00	0.00	0.00
90.00	0.00	0	983.00	0.00	0.00	0.00
92.00	0.00	0	983.00	0.00	0.00	0.00
94.00	0.00	0	983.00	0.00	0.00	0.00
96.00	0.00	0	983.00	0.00	0.00	0.00

Proposed Conditions

Prepared by {enter your company name here}

MSE 24-hr 3 100-Year Event Rainfall=7.40"

Printed 6/22/2020

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Stage-Area-Storage for Pond 1P: South Infiltration Basin (Total Site)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
983.50	3,130	0	984.54	4,088	3,748
983.52	3,148	63	984.56	4,108	3,830
983.54	3,166	126	984.58	4,127	3,912
983.56	3,184	189	984.60	4,146	3,995
983.58	3,202	253	984.62	4,165	4,078
983.60	3,220	318	984.64	4,184	4,161
983.62	3,238	382	984.66	4,204	4,245
983.64	3,256	447	984.68	4,223	4,330
983.66	3,274	512	984.70	4,242	4,414
983.68	3,292	578	984.72	4,261	4,499
983.70	3,310	644	984.74	4,280	4,585
983.72	3,328	710	984.76	4,300	4,670
983.74	3,346	777	984.78	4,319	4,757
983.76	3,364	844	984.80	4,338	4,843
983.78	3,382	912	984.82	4,357	4,930
983.80	3,400	979	984.84	4,376	5,017
983.82	3,418	1,048	984.86	4,396	5,105
983.84	3,436	1,116	984.88	4,415	5,193
983.86	3,454	1,185	984.90	4,434	5,282
983.88	3,472	1,254	984.92	4,453	5,371
983.90	3,490	1,324	984.94	4,472	5,460
983.92	3,508	1,394	984.96	4,492	5,550
983.94	3,526	1,464	984.98	4,511	5,640
983.96	3,544	1,535	985.00	4,530	5,730
983.98	3,562	1,606	985.02	4,550	5,821
984.00	3,580	1,678	985.04	4,569	5,912
984.02	3,599	1,749	985.06	4,589	6,004
984.04	3,618	1,821	985.08	4,608	6,096
984.06	3,636	1,894	985.10	4,628	6,188
984.08	3,655	1,967	985.12	4,648	6,281
984.10	3,674	2,040	985.14	4,667	6,374
984.12	3,693	2,114	985.16	4,687	6,467
984.14	3,712	2,188	985.18	4,706	6,561
984.16	3,730	2,262	985.20	4,726	6,656
984.18	3,749	2,337	985.22	4,746	6,750
984.20	3,768	2,412	985.24	4,765	6,845
984.22	3,787	2,488	985.26	4,785	6,941
984.24	3,806	2,564	985.28	4,804	7,037
984.26	3,824	2,640	985.30	4,824	7,133
984.28	3,843	2,717	985.32	4,844	7,230
984.30	3,862	2,794	985.34	4,863	7,327
984.32	3,881	2,871	985.36	4,883	7,424
984.34	3,900	2,949	985.38	4,902	7,522
984.36	3,918	3,027	985.40	4,922	7,620
984.38	3,937	3,106	985.42	4,942	7,719
984.40	3,956	3,185	985.44	4,961	7,818
984.42	3,975	3,264	985.46	4,981	7,917
984.44	3,994	3,344	985.48	5,000	8,017
984.46	4,012	3,424	985.50	5,020	8,118
984.48	4,031	3,504			
984.50	4,050	3,585			
984.52	4,069	3,666			

Proposed Conditions*MSE 24-hr 3 100-Year Event Rainfall=7.40"*

Prepared by {enter your company name here}

Printed 6/22/2020

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Hydrograph for Pond 1P: South Infiltration Basin (Total Site)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	983.50	0.00	0.00	0.00	0.00
2.00	0.00	0	983.50	0.00	0.00	0.00	0.00
4.00	0.00	0	983.50	0.00	0.00	0.00	0.00
6.00	0.00	0	983.50	0.00	0.00	0.00	0.00
8.00	0.01	0	983.50	0.01	0.01	0.00	0.00
10.00	0.06	109	983.53	0.01	0.01	0.00	0.00
12.00	2.05	2,329	984.18	0.02	0.02	0.00	0.00
14.00	0.56	3,298	984.43	0.65	0.02	0.63	0.00
16.00	0.24	3,058	984.37	0.26	0.02	0.24	0.00
18.00	0.18	3,000	984.35	0.19	0.02	0.17	0.00
20.00	0.12	2,953	984.34	0.13	0.02	0.11	0.00
22.00	0.07	2,899	984.33	0.08	0.02	0.06	0.00
24.00	0.03	2,839	984.31	0.04	0.02	0.02	0.00
26.00	0.00	2,727	984.28	0.02	0.02	0.00	0.00
28.00	0.00	2,600	984.25	0.02	0.02	0.00	0.00
30.00	0.00	2,473	984.22	0.02	0.02	0.00	0.00
32.00	0.00	2,348	984.18	0.02	0.02	0.00	0.00
34.00	0.00	2,223	984.15	0.02	0.02	0.00	0.00
36.00	0.00	2,099	984.12	0.02	0.02	0.00	0.00
38.00	0.00	1,977	984.08	0.02	0.02	0.00	0.00
40.00	0.00	1,856	984.05	0.02	0.02	0.00	0.00
42.00	0.00	1,735	984.02	0.02	0.02	0.00	0.00
44.00	0.00	1,616	983.98	0.02	0.02	0.00	0.00
46.00	0.00	1,498	983.95	0.02	0.02	0.00	0.00
48.00	0.00	1,380	983.92	0.02	0.02	0.00	0.00
50.00	0.00	1,264	983.88	0.02	0.02	0.00	0.00
52.00	0.00	1,149	983.85	0.02	0.02	0.00	0.00
54.00	0.00	1,034	983.82	0.02	0.02	0.00	0.00
56.00	0.00	921	983.78	0.02	0.02	0.00	0.00
58.00	0.00	809	983.75	0.02	0.02	0.00	0.00
60.00	0.00	697	983.72	0.02	0.02	0.00	0.00
62.00	0.00	587	983.68	0.02	0.02	0.00	0.00
64.00	0.00	478	983.65	0.02	0.02	0.00	0.00
66.00	0.00	369	983.62	0.01	0.01	0.00	0.00
68.00	0.00	262	983.58	0.01	0.01	0.00	0.00
70.00	0.00	156	983.55	0.01	0.01	0.00	0.00
72.00	0.00	51	983.52	0.01	0.01	0.00	0.00
74.00	0.00	0	983.50	0.00	0.00	0.00	0.00
76.00	0.00	0	983.50	0.00	0.00	0.00	0.00
78.00	0.00	0	983.50	0.00	0.00	0.00	0.00
80.00	0.00	0	983.50	0.00	0.00	0.00	0.00
82.00	0.00	0	983.50	0.00	0.00	0.00	0.00
84.00	0.00	0	983.50	0.00	0.00	0.00	0.00
86.00	0.00	0	983.50	0.00	0.00	0.00	0.00
88.00	0.00	0	983.50	0.00	0.00	0.00	0.00
90.00	0.00	0	983.50	0.00	0.00	0.00	0.00
92.00	0.00	0	983.50	0.00	0.00	0.00	0.00
94.00	0.00	0	983.50	0.00	0.00	0.00	0.00
96.00	0.00	0	983.50	0.00	0.00	0.00	0.00

PIERCE PINI & ASSOCIATES, INC.

STORMWATER OPERATION AND MAINTENANCE PLAN

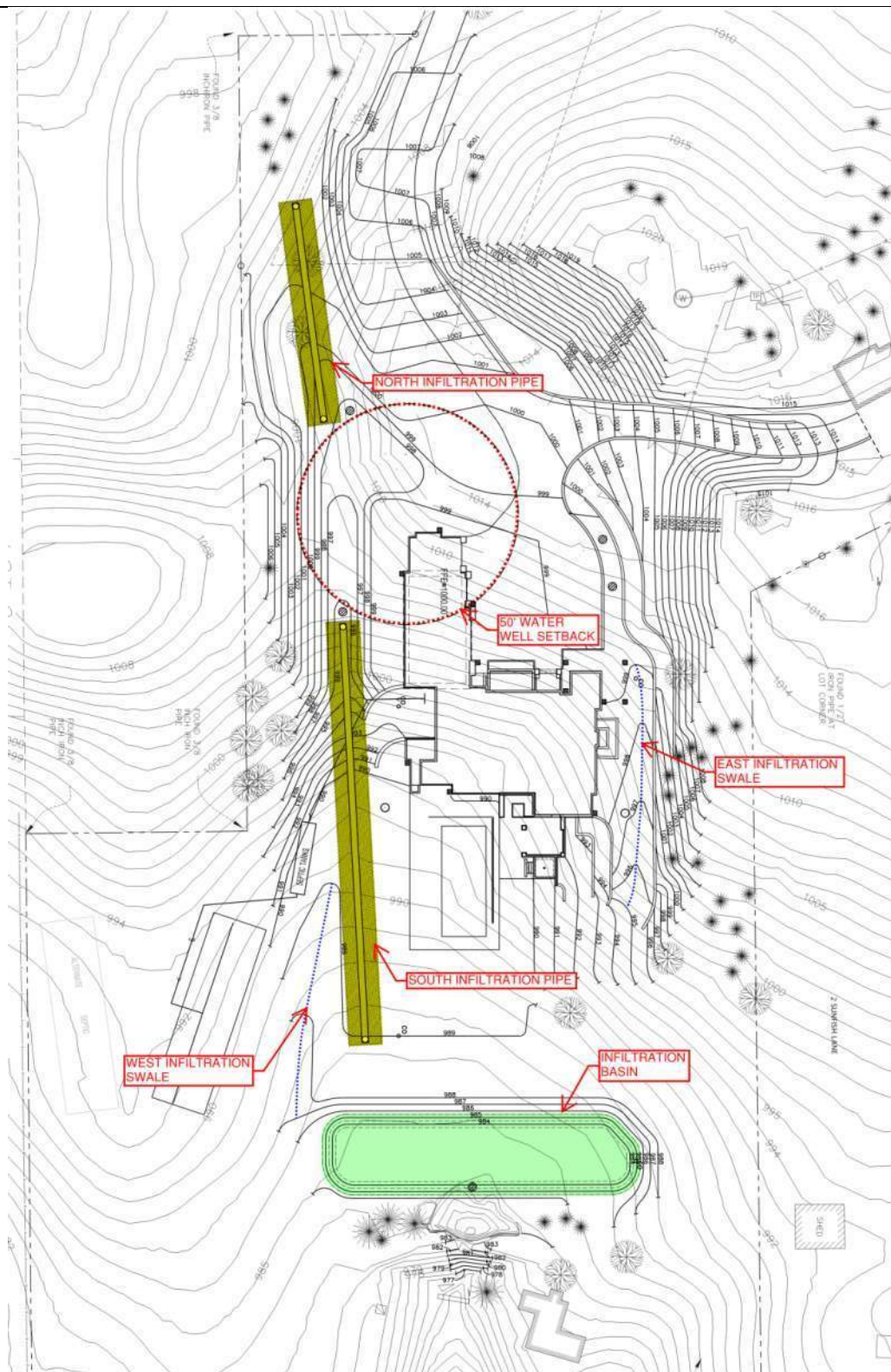
JOHANNSON RESIDENCE

1 Sunfish Lane
Sunfish Lake, MN

June 22, 2020

**PIERCE PINI +
ASSOCIATES, INC.**
Consulting Civil Engineers

9298 Central Avenue NE, Suite 312
Blaine, MN 55434-3425
Office: 763-537-1311
Contact: Rhonda Pierce, Civil Engineer
Email: rhonda@piercepini.com



OVERVIEW – INFILTRATION BASIN

A infiltration basin is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas, the opportunity to filtrate through a blended sand and compost medium that is collected by perforated drain tile at the bottom of the system. The purpose of a infiltration basin is to improve water quality in nearby bodies of water and to ensure that rainwater becomes available for plants as groundwater rather than being sent through stormwater drains and discharging to the nearest river or lake.

Below the surface of the basin, soils are engineered and appropriate plants or turf selected for the feature. The basin acts as a small bioretention cell in which stormwater is cleaned and reduced in volume once it enters the area. Nitrogen and phosphorus levels and overall sediment loads in the stormwater are reduced by the action of the plants and growing media on the water.

OVERVIEW – INFILTRATION PIPE

A infiltration basin is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas, the opportunity to filtrate through a blended sand and compost medium that is collected by perforated drain tile at the bottom of the system. The purpose of a infiltration basin is to improve water quality in nearby bodies of water and to ensure that rainwater becomes available for plants as groundwater rather than being sent through stormwater drains and discharging to the nearest river or lake.

Below the surface of the basin, soils are engineered and appropriate plants or turf selected for the feature. The basin acts as a small bioretention cell in which stormwater is cleaned and reduced in volume once it enters the area. Nitrogen and phosphorus levels and overall sediment loads in the stormwater are reduced by the action of the plants and growing media on the water.

OVERVIEW – MAINTENANCE OF INFILTRATION SYSTEM

Regular inspection and maintenance aids in the effective operation of the infiltration basin system. It is the responsibility of the property owner to maintain all stormwater BMP's in accordance with the minimum design standards and other guidance provided in this manual.

Inspection Schedule:

One inspection form shall be completed for the proposed system on a regular basis as specified on the attached checklist.

Erosion Control:

The soil and mulch on the property shall be inspected for eroded areas. Eroded areas shall be filled with soil or mulch and vegetated. In the event that erosion persists in a particular area, compacted aggregate shall be used to further stabilize the slope and to mitigate future erosion.

Sediment Accumulation & Clogging:

Sediment accumulation within the basin may reduce the filtration capacity and impair proper performance of the facility. The facility shall be inspected for accumulation of sediment as part of the inspection. Excessive sediment accumulation shall be removed as noted in the attached form.

Standing Water:

The recurring presence of standing water more than 48 hours after a rain event indicates that the soil media within the basin has been overcompacted or has accumulated sediment that is impeding filtration. This could also indicate that the perforated drain tile is clogged and needs to be cleaned out. If this condition occurs, the vegetation within the basin should be removed and the confining layer of soil removed and replaced with new, free-draining soil. The new soil media should be tested for proper filtration and then the vegetation replaced.

INSPECTION AND MAINTENANCE FORM

BMP/Location: Infiltration Pipe		
Date:	Inspector:	
Inspection Activity	Comments	Recommended Actions
<i>Monthly (& following large storm events)</i>		
Trash and Debris		*Remove trash and debris as soon as possible *Remove sediment in pipes when depth exceeds 6" or when infiltration is compromised
Catch Basins and Roof Drains		*Record depth of sediment at each inspection to gauge sediment accumulation rate *A vacuum truck shall be utilized to remove sediment within infiltration systems when infiltration is compromised
BMP: UG 36" CMP		
Dewatering		*If standing water is located, notify the city of the system's failure to drain within 72 hours of a storm event for further direction
<i>Annually</i>		
Structural Components		*Notify maintenance staff of any observed structural or screen damage, loose or missing bolts, inlet or outlet blockages, etc.
Surfaces above structure		*Sinkholes shall be filled and monitored for further depression. Continued depressions likely indicate a device failure and internal inspection is warranted.
Vegetation		*Remove and replace dead or diseased plants *Remove invasive weeds and make sure bare areas are covered
Additional Comments:		
Maintenance Required?	YES / NO	Maintenance Date:
Maintenance Comments:		

PIERCE PINI & ASSOCIATES, INC.

BMP/Location: Infiltration Basin		
Date:	Inspector:	
Inspection Activity	Comments	Recommended Actions
<i>Monthly (& following large storm events)</i>		
Trash and Debris		*Remove trash from garden area and clear inflow points
Ponding		*Clear inflow points of built-up sediment, check for erosion
<i>Annually</i>		
Mulch		*Check mulch surface for sediment build-up. Remove and replace mulch material as required
Underdrain System		*If clogged, try back-washing/vacuuming under the drain from the outlet
Infiltration Basin Soil Mix		*Make sure soil level is below overflow grate and has a hard surface level.
Vegetation		*Remove and replace dead or diseased plants *Remove invasive weeds and make sure bare areas are covered
Additional Comments:		
Maintenance Required?	YES / NO	Maintenance Date:
Maintenance Comments:		

From: [REDACTED]
Sent: Tuesday, August 18, 2020 6:31 PM
To: Ryan Krzos
Subject: Interim Use Permit for Sunfish Lake

Greetings,

I want to be added to the list of Sunfish Lake Residents "Not" in favor of any water being pumped out of Sunfish Lake. I assume there is no need for me to go into the many reasons pumping is a bad idea...low water levels in the lake, noise... Alternative plantings with Minnesota natives that don't need to be watered are a better solution than traditional lawns that require polluting fertilizers and herbicides and the most precious resource water.

Thank you,
Susan Barker
2180 Charlton Rd

From: [REDACTED]
Sent: Wednesday, August 19, 2020 3:54 PM
To: Ryan Krzos
Cc: James Stowell
Subject: New application for lake pump

Hello Ryan,

My husband and I own lake shore property on Sunfish Lake and have been informed about a lake pumping application for the new home being constructed at 1 Sunfish Lane. When I was Mayor of Sunfish Lake (2003-2011; 2013-2017) I recall that two applications were made and approved after much discussion and concern. These allowances were rare and guarded. As new lake shore homes are being built after tear downs of older "simpler" properties, this request to use the lake for watering purposes seems to be more prevalent. I have concerns about the effect of the VOLUME of pumping by home owners which may become the norm. The questions you identified in your Sunfish Lake Quarterly article are very apt: can pumping occur when the lake is low? Will erosion control protections need to be installed? Noise level and whether or not the pumping apparatus needs to be removed from the shoreline when not in use.....

These issues need to be thoughtfully and responsibly dealt with. I am not able to join you tonight for the Planning Commission meeting, but I look forward to hearing about the results. Other lakeshore neighbors have shared similar concerns with me. We all cherish the natural beauty and ambience of our lovely community. The new neighbors, too, obviously have been attracted to these qualities and want to enjoy living here for many years. Let's proceed thoughtfully and cautiously with this lake pumping allowance.

Thank you for your time and expertise.

Sincerely,

Molly Park 15 Sunnyside Lane.

Sent from my iPad

From: Dan Schadegg <[REDACTED]>
Sent: Wednesday, August 19, 2020 9:36 AM
To: [REDACTED] S [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] S [REDACTED]
[REDACTED] [REDACTED] Ryan Krzos; Jeff
[REDACTED] [REDACTED]
Cc: Rose Schadegg
Subject: Sunfish Lake irrigation pumping

To all

We will not be able to attend the meeting tonight but want to let you know that my wife and I are opposed to the lake water for irrigation purposes for many reasons as follows:

1. Our lake is way too small to accommodate multiple residences to use this for irrigation
2. The idea was that it would be banned when we have a dry period. Who enforces this? Doesn't work to have neighbors do this. This is when they would want to irrigate the most.
3. Once a lake system is installed, they would not have another way to irrigate with the exception of running hoses around and these large yards and types of homes wouldn't make sense to do this. Do we make them install a back-up connection from their house system so they won't be as determined to run the lake side system during a drought period?
4. The noise from the pumps for the neighbors
5. The look of the pumps from the lake side
6. The potential of over watering (because it is free and easy) and the runoff back into our lake

These are just a few of the many concerns we would have in regards to this situation.

We don't want Sunfish Lake to turn into another White Bear Lake!

Thanks for your time and attention to this matter
Any question, please give me a call.

Daniel M. Schadegg
President / CEO



www.schadegg-mech.com