

**INVER GROVE HEIGHTS
PLANNING COMMISSION AGENDA
TUESDAY, FEBRUARY 2, 2021 - 7:00 p.m.**

NOTICE TO RESIDENTS: The Planning Commission is taking proactive steps to prevent the spread of Covid 19 by meeting remote. People wishing to testify at the public hearing should call into the meeting using the following information:

Phone number: 651-450-2471

Individuals may submit written public comments in advance of the meeting by emailing comments to Kim Fox (kfox@ighmn.gov). Comments received prior to 4:00 p.m. on Monday, February 1, 2021, will be provided to the Planning Commission before the February 2, 2021 meeting.

1. CALL TO ORDER

2. APPROVAL OF THE PLANNING COMMISSION MINUTES FOR JANUARY 19, 2021

3. OTHER BUSINESS

3.01 CITY OF INVER GROVE HEIGHTS - CASE NO. 21-07X

Review of Capital Expenditure associated with Bryant Lane street rehabilitation and storm water system improvements for City Project No. 2021-09D for consistency with the comprehensive plan.

Planning Commission Action _____

3.02 CITY OF INVER GROVE HEIGHTS - CASE NO. 21-08X

Review of Capital Expenditure associated with the Comprehensive Sanitary Sewer Plan (CSSP) for CP 2015-20 Robert District for consistency with the comprehensive plan.

Planning Commission Action _____

4. APPLICANT REQUESTS AND PUBLIC HEARINGS

4.01 DAKOTA COUNTY (SMART CENTER) - CASE NO. 20-56V

Consider a variance from the front yard setback for a free-standing sign located at 9260 Courthouse Boulevard.

Planning Commission Action _____

4.02 WENCK ASSOCIATE, INC (FORTISTAR) - CASE NO. 21-03ZAC

Consider the following requests for the property located at 2495 117th St (west 100 acres):

- a) An Ordinance Amendment to the IRM, Integrated Resource Management Overlay District to allow for an energy recovery facility for the generation of renewable natural gas as a conditional use.

Planning Commission Action _____

- b) A conditional use permit to operate an energy recovery facility.

Planning Commission Action _____

5. ADJOURN

This document is available upon 3 business day request in alternate formats such as Braille, large print, audio recording, etc. Please contact Kim Fox at 651.450.2545 or kfox@ighmn.gov.

PLANNING COMMISSION MINUTES - CITY OF INVER GROVE HEIGHTS

Tuesday, January 19, 2021 - 7:00 p.m.

****REMOTE MEETING****

Chair Maggi called the Planning Commission meeting to order at 7:00 p.m.

Commissioners Present: Elizabeth Niemioja
Annette Maggi
Brett Kramer
Dennis Wippermann
Pat Simon
Scott Clancy
Kate Challeen
Joan Robertson

Commissioners Absent: Jonathan Weber (excused)

Others Present: Allan Hunting, City Planner
Heather Botten, Associate Planner

APPROVAL OF MINUTES

The minutes from the January 5, 2021 Planning Commission meeting were approved as submitted.

SKIGH DEVELOPMENT - CASE NO. 21-02PA

Chair Maggi advised that the applicant has withdrawn this request for a comprehensive plan amendment.

GARETT STAINBROOK (CHS) - CASE NO. 21-01V

Reading of Notice

Commissioner Simon read the public hearing notice to consider the request for a variance to allow a monument sign to exceed the 50 square foot maximum on a B-1 zoned property, and any other variances related thereto, for the property located at 5300 Babcock Trail. 4 notices were mailed.

Presentation of Request

Heather Botten, Associate Planner, explained the request as detailed in the report. She advised that the 30-plus acre subject property is in the southwest corner of Highway 52 and I-494 and is zoned B-1, Limited Business. The applicant is requesting two variances: one for a wall sign to be 54 square feet in size and the other to allow a 192 square foot monument sign whereas 50 square feet is the maximum allowed. The applicant has stated that the intent of the larger signs is to help the public identify the building's location while driving on the highway. This property is unique in that it is the only B-1 zoned property in the City that is located along two major highways and the B-1 district does not allow for larger signs on a property based on highway frontage or building size. The buildings on the east side of Highway 52 are allowed a freestanding sign up to 240 square feet and wall signs up to 100 square feet. Staff does not believe the proposed signs would affect the character of the locality and recommends approval

of the request with the one condition listed in the staff report. Staff did not hear from any of the surrounding property owners.

Commissioner Simon asked if this could set a precedent.

Ms. Botten replied that staff does not believe it would set a precedent because it is the only B-1 property in the City that has highway frontage along two sides of it.

Commissioner Simon asked for clarification regarding the properties in the business section of Arbor Pointe along Highway 52/55 and Concord Boulevard.

Ms. Botten replied those properties had different standards as they were zoned PUD, not B-1.

Opening of Public Hearing

Ms. Botten noted that the applicant was not present.

Chair Maggi closed the public hearing.

Planning Commission Discussion

Chair Maggi stated that she supported the practical difficulty of the property abutting major highways on two sides and the need for visibility.

Planning Commission Recommendation

Motion by Commissioner Niemioja, second by Commissioner Wippermann, to approve the request for a variance to allow a monument sign to exceed the 50 square foot maximum and to allow a wall sign to be 54 square feet in size in the B-1, Limited Business district, for the property located at 5300 Babcock Trail, with the practical difficulty as listed in the report as well as the need for the signs to be sizable because of the topography and existing vegetation.

Motion carried (8/0). This item goes to the City Council on January 25, 2021.

SANDRA PEREZ - CASE NO. 20-55C AND 20-54C

Chair Maggi suggested presenting the two requests for Perez at the same time but voting on them separately.

Ms. Botten advised that Ms. Perez was not currently logged into the zoom meeting and noted that the Planning Commission had the option of tabling the request if they had any questions that could not be answered.

Reading of Notice

Commissioner Simon read the public hearing notice to consider the request for a conditional use permit to operate a 24-hour childcare facility, for the property located at 2855 - 47th Street. 71 notices were mailed.

Commissioner Simon read the public hearing notice to consider the request for a conditional use permit to operate a 24-hour childcare facility, for the property located at 5300 South Robert Trail. 4 notices were mailed.

Presentation of Request

Heather Botten, Associate Planner, explained the request as detailed in the report. She advised that the applicant is asking for a conditional use permit to operate a 24-hour childcare facility at two different locations in the City. The first location is in the classrooms of Bethesda Church which is in the Institutional zoning district. A childcare facility is a conditional use in the Institutional district. The applicant currently operates a daycare at the site and is looking to expand the operating hours to allow for extended-overnight care. The second location is in Salem Square shopping center which is zoned B-3, General Business. A childcare facility is a conditional use in the B-3 district as well. A license from the State and occupancy permits from the City are required as well. These permits would include review by the chief building official and fire marshal. The applicant is anticipating the Bethesda Church center would close at 1:00 AM but would like the flexibility of being open 24 hours if there is a demand for longer hours. The center would be open Monday-Saturday as the Church uses the space on Sundays. No changes to the church facility are being proposed and they do not anticipate any traffic or parking issues. The new site at 5300 South Robert Trail would be operated seven days a week/24 hours a day. There is no loading space or drop off area at this location so parents would be required to park their cars in a parking space and come inside to drop off or pick up their children. Typically this would be a short visit and staff does not anticipate any traffic or parking problems for this site either. Staff recommends approval of both conditional use permit requests with the conditions listed in the staff report.

Commissioner Simon asked who regulates the number of children allowed per caretaker, noting that the applicant stated they were looking to increase the number of children they could provide for.

Ms. Botten replied that the State monitors that and provides the number of children they will allow. Whenever the State changes that they notify the City. The City then has 30 days to respond if they have any issues with the change of occupancy.

Commissioner Robertson asked If the applicant would own or lease the space in Salem Square shopping center.

Ms. Botten replied that she would be leasing the space.

Commissioner Robertson asked if the adjoining tenants or the owner/operator of Salem Square shopping center could put additional expectations on the applicant or have input into how she operates her business.

Ms. Botten replied that the owner/operator could best answer that question.

Chair Maggi asked Commissioner Robertson to clarify her question as it relates to the request.

Commissioner Robertson replied she was trying to understand if there were other things the City needed to know prior to approving this request.

Commissioner Kramer noted that a couple of the conditions of approval for the Bethesda Church location state that daycare operations may not commence until receiving proper approval; however, the daycare is currently operating. He asked if this would hold up any of the existing operations for the daycare center.

Ms. Botten replied it would not and advised that she would change those conditions to clarify that 'after care-operations' may not commence until receiving proper approval.

Commissioner Challeen asked if staff foresaw any issues regarding the lack of available outdoor space for the Salem Square location.

Ms. Botten replied that requiring an outdoor space was not called out to be a special condition for this type of CUP. Each parent that brings a child there would understand that they do not have outdoor space available.

Commissioner Challeen asked if it would be a licensing requirement.

Ms. Botten replied that if it were required it would be dealt with through the licensing agency. The applicant advised that, if necessary, they would either go for a walk or bus the children to a nearby park.

Opening of Public Hearing

Ms. Botten advised that the applicant, Sandra Perez, was not on this zoom meeting.

Roz Peterson, D & T Properties, advised that she was co-owner of Salem Square shopping center and the leasing agent for the property, and was available to answer any questions.

Commissioner Robertson asked if the owner/operator of Salem Square shopping center could impose restrictions on the proposed daycare center and has this been approved by the other tenants.

Ms. Peterson replied that this lease is somewhat complicated because the space is leased to Berean Church. Berean Church chose not to open and sublet the space to Ms. Perez. She stated the other tenants do not really have a say in how this business is operated, but she believes they are looking forward to having more activity. Because she was not directly involved with the negotiation between Berean Church and the applicant, she does not have the answers.

Chair Maggi asked if the applicant had joined the zoom meeting.

Matt Sletten, BWBR Architects, advised he was late to the meeting because of technical difficulties but could answer any questions related to the variance request for signage at CHS.

Chair Maggi advised that had already been discussed, was approved, and will go to the City Council on January 25, 2021.

Chair Maggi closed the public hearing.

Planning Commission Discussion

Commissioner Niemioja stated she supported both CUP requests and was not going to speculate on any potential licensing issues.

Planning Commission Recommendation

Motion by Commissioner Niemioja, second by Challeen, to approve the request for a conditional use permit to operate a 24-hour childcare facility, for the property located at 2855 - 47th Street, with the six conditions listed in the report.

Motion carried (8/0). This item goes to the Ctiy Council on January 25, 2021.

Motion by Commissioner Niemioja, second by Commissioner Robertson, to approve the request for a conditional use permit to operate a 24-hour childcare facility, for the property located at 5300 South Robert Trail. with the five conditions listed in the report.

Motion carried (8/0). This item goes to the Ctiy Council on January 25, 2021.

The meeting was unanimously adjourned at 7:33 p.m.

Respectfully submitted,

Kim Fox
Recording Secretary



PLANNING REPORT

CASE NO: 21-07X

MEETING DATE: February 2, 2021

APPLICANT: City of Inver Grove Heights

PROPERTY OWNER: N/A

REQUEST: Review of Capital Expenditure associated with Bryant Lane Area Improvements

LOCATION: N/A

COMPREHENSIVE PLAN: N/A

ZONING: N/A

REVIEWING DIVISIONS: Planning
Engineering

PREPARED BY: Allan Hunting
City Planner

BACKGROUND

The City Council reviewed a feasibility report at their January 25, 2021 meeting regarding City Project No. 2021-09D, street rehabilitation and storm water improvements for Bryant Lane.

Assistant City Engineer Steve Dodge has prepared a brief memo with a map illustrating the improvements.

Per State Statutes, the Planning Commission must review capital improvement projects for consistency with the Comprehensive Plan (Minnesota Statute 462.356 subd. 2).

EVALUATION OF THE REQUEST

Compliance with the Comprehensive Plan. Minnesota Statutes requires the Planning Commission to review capital improvement projects to verify they are in compliance with the City's Comprehensive Plan.

The capital improvement project would fall under Chapter 5 Transportation and Chapter 10 Surface Water Management of the comprehensive plan. The project would be consistent with the 2040 comp plan.

ALTERNATIVES

A. Approval. If the Planning Commission finds the request acceptable, the following actions should take place:

- An Approval recommendation that City Project No. 2021-09D Bryant Lane Area Improvements is consistent with the Comprehensive Plan.

B. Denial. If the Planning Commission does not find the proposed project consistent with the Comprehensive Plan, the above request should be recommended for denial. With a recommendation for denial, findings or the basis for the denial should be given.

RECOMMENDATION

The Engineering Department and Planning Staff both recommend the capital expenditure be found consistent with the Comprehensive Plan.

Attachment: Memo from Steve Dodge, Assistant City Engineer

MEMO

CITY OF INVER GROVE HEIGHTS

TO: Allan Hunting, City Planner

FROM: Steve W. Dodge, P.E., Assistant City Engineer

DATE: February 2, 2021 Planning Commission Meeting *SWD*

SUBJECT: Comprehensive Plan Review
Bryant Lane Area Improvements (aka Majestic Woodlands)
City Project No. 2021-09D

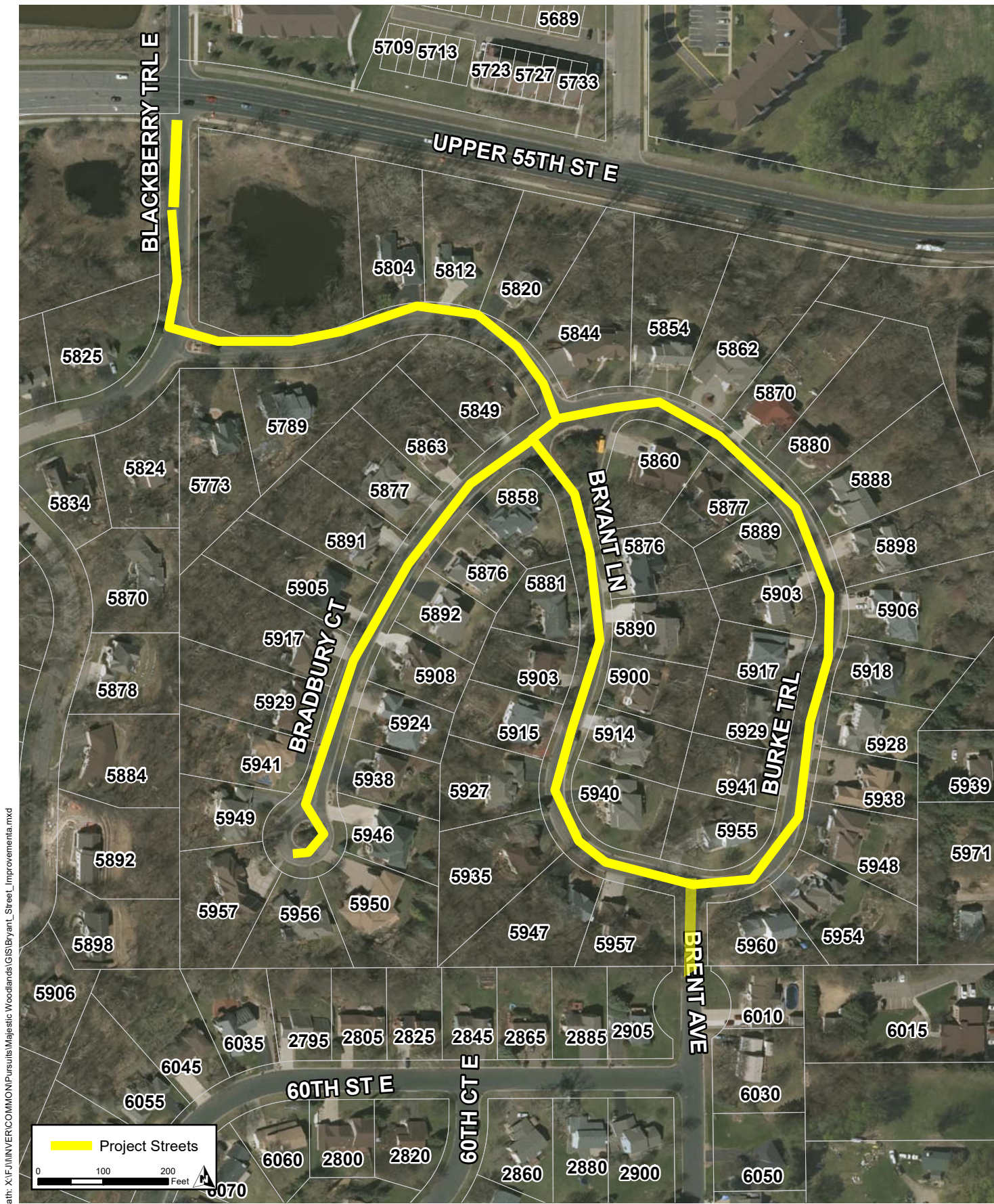
At the January 25, 2021 regular meeting, City Council received the feasibility report for City Project No. 2021-09D Bryant Lane Area Improvements (aka Majestic Woodlands) and scheduled the Public Improvement Hearing for February 22, 2021. The location map is attached. This project will include street rehabilitation, storm water system improvements and appurtenances.

The Planning Commission should review the project to ensure it is consistent with the City's Comprehensive Plan.

SWD/sd

Attachments: Project Map

cc: Scott D. Thureen, Public Works Director
Thomas J. Kaldunski, City Engineer
Bridget McCauley Nason, City Attorney
Greg Anderson, Project Manager, SEH



Print Date: 9/8/2020

Bryant Lane Area Improvements

Inver Grove Heights, Minnesota

FIGURE 1

City Project Number: 2021-09D



This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



PLANNING REPORT

CASE NO: 21-08X

MEETING DATE: February 2, 2021

APPLICANT: City of Inver Grove Heights

PROPERTY OWNER: N/A

REQUEST: Review of Capital Expenditure associated with Canvas at IGH NWA Trunk Utility Improvements

LOCATION: N/A

COMPREHENSIVE PLAN: N/A

ZONING: N/A

REVIEWING DIVISIONS: Planning
Engineering

PREPARED BY: Allan Hunting
City Planner

BACKGROUND

The City Council reviewed a feasibility report at their January 25, 2021 meeting regarding the implementation of the comprehensive sanitary sewer plan for the north portion of the NWA Robert District.

Assistant City Engineer Steve Dodge has prepared a brief memo with a map illustrating the improvements.

Per State Statutes, the Planning Commission must review capital improvement projects for consistency with the Comprehensive Plan (Minnesota Statute 462.356 subd. 2).

EVALUATION OF THE REQUEST

Compliance with the Comprehensive Plan. Minnesota Statutes requires the Planning Commission to review capital improvement projects to verify they are in compliance with the City's Comprehensive Plan.

The capital improvement project would fall under Chapter 7 Sanitary Sewer of the comprehensive plan. The project would be consistent with the 2040 comp plan.

ALTERNATIVES

A. Approval. If the Planning Commission finds the request acceptable, the following actions should take place:

- An Approval recommendation that the capital expenditures for implementation of Option 2B of the comprehensive sanitary sewer plan is consistent with the Comprehensive Plan.

B. Denial. If the Planning Commission does not find the proposed project consistent with the Comprehensive Plan, the above request should be recommended for denial. With a recommendation for denial, findings or the basis for the denial should be given.

RECOMMENDATION

The Engineering Department and Planning Staff both recommend the capital expenditure be found consistent with the Comprehensive Plan.

Attachment: Memo from Steve Dodge, Assistant City Engineer

MEMO

CITY OF INVER GROVE HEIGHTS

TO: Allan Hunting, City Planner

FROM: Steve W. Dodge, P.E., Assistant City Engineer *SWD*

DATE: February 2, 2021 Planning Commission Meeting

SUBJECT: Comprehensive Plan Review
Technical Memorandum Related to Canvas at IGH
NWA Trunk Utility Improvements - Robert District
City Project No. 2015-20

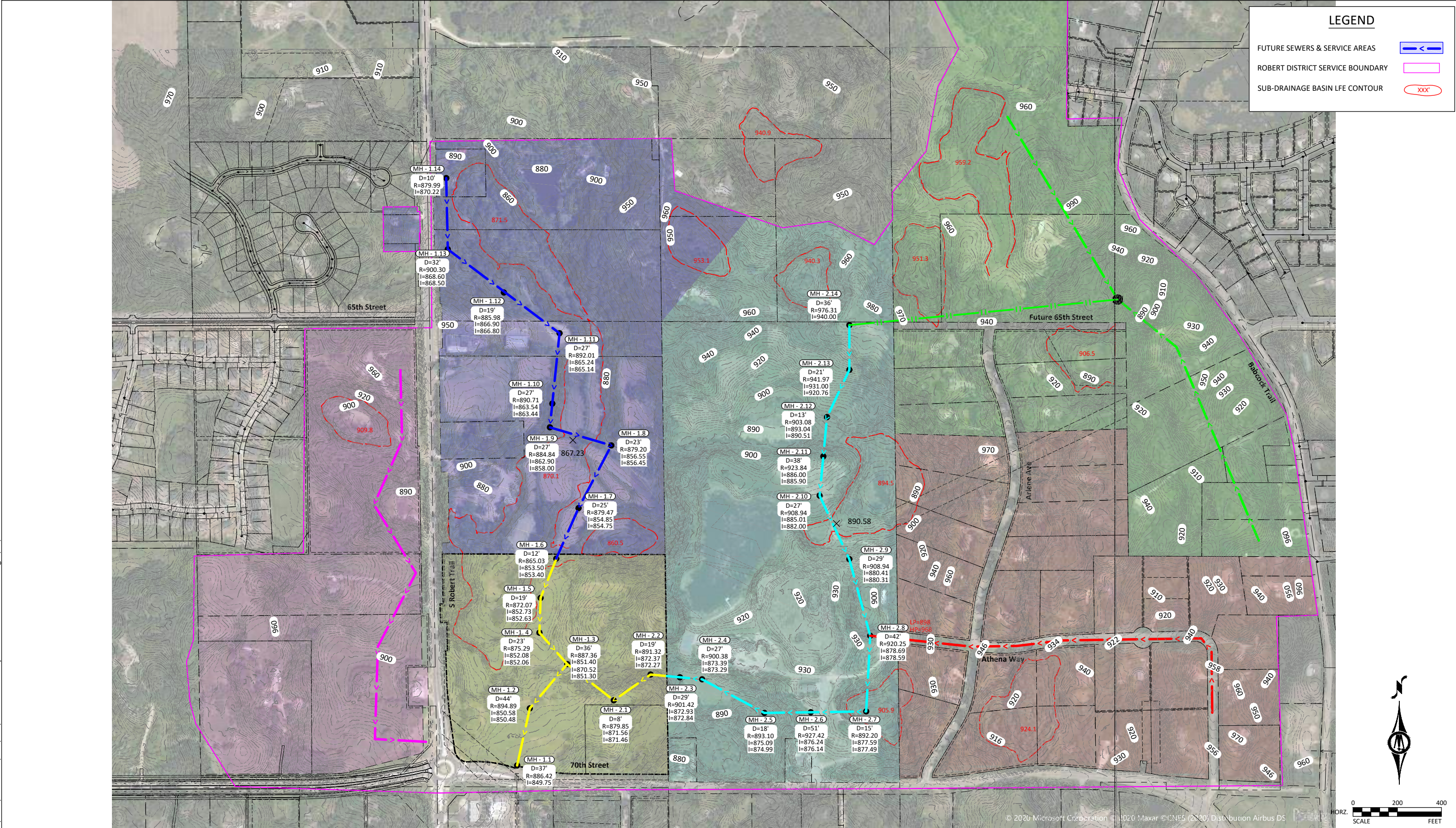
At the January 25, 2021 regular meeting, City Council received a technical memorandum implementing the comprehensive sanitary sewer plan (CSSP) Alternate 2B adopted by Council on November 13, 2017. Option 2B is conveying the north portion of the NWA Robert District to the B-Line trunk service district via a future lift station and forcemain, providing substantial NWA infrastructure costs savings as part of City Project No. 2015-20 - NWA Trunk Utility Improvements - Robert District. The updated sanitary sewer shed map for the Robert District is attached. By implementing the CSSP plan, we have been able to provide guidance to Canvas and future developments on shallower sewer depths at a substantial cost savings.

The Planning Commission should review the project to ensure it is consistent with the City's Comprehensive Plan.

SWD/sd

Attachments: Robert Sewer District Map

cc: Scott D. Thureen, Public Works Director
Thomas J. Kaldunski, City Engineer
Bridget McCauley Nason, City Attorney
Eric Seaburg, Project Manager, Bolton & Menk





PLANNING REPORT

CASE NO: 20-56V

APPLICANT: Dakota County

PROPERTY OWNER: Dakota County

REQUEST: Variance from front yard setback for free standing sign

HEARING DATE: February 2, 2021

LOCATION: Corner of Concord Blvd and Courthouse Boulevard Court

COMPREHENSIVE PLAN: P, Public/Institutional

ZONING: P, Institutional

REVIEWING DIVISIONS: Planning
Engineering

PREPARED BY: Allan Hunting
City Planner

BACKGROUND

The applicant is requesting a setback variance to allow a monument sign to be 50 feet from centerline of Courthouse Boulevard, or 38 feet from edge of pavement. The sign is for the Dakota County SMART building that is currently under construction. The segment of Courthouse in front of the site is right-of-way for the old alignment of Hwy 55. The right-of-way is 160 feet wide which far exceeds any typical non-highway right-of-way in the city. This segment of roadway is classified as a collector road which would have a typical right-of-way of 80 feet.

The proposed location would put the sign within the street right-of-way and off the actual property. Staff contacted the city attorney to determine if a variance could be applied for and if so what other unique conditions would be needed. The city attorney stated that yes, a variance can be processed and if approved, an encroachment agreement would be required to address a private improvement within a public right-of-way.

The requested distance from the roadway comes from discussions with the Engineering department on their future needs for any road and trail improvements. Engineering notes assuming a 38' state aid road with 6' boulevard and 10' trail, that would be 35' from centerline plus 2' clear zone for trail = 37'. Add 10' for setback and you get 47' from centerline. The proposed setback of 50 feet from road centerline would provide enough room for future improvements to the road.

EVALUATION OF THE REQUEST

The following land uses, zoning districts and comprehensive plan designations surround the subject property:

North: City fire station; zoned P; guided Institutional

East: Hwy 55/52

West: Large lot residential; zoned A; guided RDR

South: Concord Blvd, highway right-of-way

VARIANCE

City Code Title 10, Chapter 3. Variances, states that the City Council may grant variances when they are in harmony with the general purposes and intent of the zoning ordinance and consistent with the comprehensive plan and establishes that there are practical difficulties in complying with the official control. In order to grant the requested variances, City Code identifies criteria which are to be considered practical difficulties. The applicant's request is reviewed below against those criteria.

1. *The variance request is in harmony with the general purpose and intent of the city code and consistent with the comprehensive plan.*

The proposed sign location is still setback far enough from the street surface so there is no traffic hazard and the placement provides for future improvements to the road.

2. *The property owner proposes to use the property in a reasonable manner not permitted by the zoning ordinance.*

The required 10 foot setback from an 80 foot half right-of-way would make a sign virtually useless because it would be so far back from the road, drivers would not be able to see it. There is a significant amount of tree growth in the right-of-way compounding the visibility.

3. *The plight of the landowner is due to circumstances unique to the property not created by the landowner.*

The right-of-way for Courthouse along this stretch is 160 feet wide. Typical right-of-way width for a collector road would be 80 feet. This is the only location along Courthouse Blvd where 160 feet exist. This appears to be a unique circumstance to allow for a reduced setback for the monument sign. There are other physical constraints on the site that limit location such as the topography as site rises from the street and the wetlands near the driveway which limit placement.

4. *The variance will not alter the essential character of the locality.*

The sign location would not appear to alter the character of the neighborhood. The sign would not negatively impact the lots on the opposite side of the road and with the fire station to the north, the uses along the north or easterly side of the road are now

public/institutional in nature and a small monument sign would not create a negative impact.

5. *Economic considerations alone do not constitute an undue hardship.*
Economic considerations do not appear to be a basis or a sole basis for either of these requests.

ALTERNATIVES

The Planning Commission has the following actions available on the following requests:

- A. Approval.** If the Planning Commission finds the application to be acceptable, the following action should be taken:

- Approval of the **Variance** to allow a monument sign setback 50 feet from the centerline of Courthouse Boulevard subject to the following condition:
 1. The sign placement shall be consistent with the drawings provided in the project narrative dated January 12, 2021.
 2. Prior to issuance of any sign permits, an encroachment agreement shall be entered into between the city and county to allow the sign within the public right-of-way.

- B. Denial.** If the Planning Commission does not favor the proposed application, or portions thereof, the above request should be recommended for denial. With a recommendation for denial, findings or the basis for the denial should be given.

RECOMMENDATION

The sign location meets any criteria Engineering has for any future improvements for the road surface. Planning has provided some rationale for approval of the variance.

Attachments: Location Map
Applicant Narrative

Location Map

Case No. 20-56V





SIGNAGE VARIANCE

Dakota County SMART Center

January 12, 2021

Dakota County SMART Center
9260 Courthouse Blvd.
Inver Grove Heights, MN 55077

COLLABORATIVE **DesignGroup, Inc.**

125 Main Street SE
Suite 240
Minneapolis, Minnesota 55414

Table of Contents

Planning Application Form	1-4
Type of Variance Requested	5
Abutting Properties Information	6
Narrative	7-13
Applicable Zoning Code	
Variance Requested	
Basis of Variance Request	
Summary	14-15
Appendix	16
C303 SWPPP Proposed Conditions	
C400 Grading and Drainage Plan	
A010 Architectural Site Plan & Signage Details	

Planning Application Form

City of Inver Grove

Signage Variance

The following information is provided per the City of Inver Grove Variance Instructions. Attached to this document are the Planning Application Form with associated fee, the names, and address(s) of property owners near the site, a written narrative, the legal description of the property and reference drawings.

This document has been prepared by Collaborative Design Group for Dakota County, Owner of the property.

Abutting Properties Information

Residential

Mark and Stephanie Engen
9255 Courthouse Blvd
Inver Grove Heights, MN 55077

2.67 Acres

Property is across Courthouse Blvd. to the northwest.

Residential

Anthony and Mary Kadrlik
9361 Buckley Ct.
Inver Grove Heights, MN 55077

3.11 Acres

Property is across Courthouse Blvd. to southwest.

Commercial / Governmental

City of Inver Grove Heights
9200 Courthouse Blvd.
Inver Grove Heights, MN 55077

Property abuts on the northwest property line.

Narrative

Dakota County owns the property at 9260 Courthouse Blvd in the City of Inver Grove Heights. The County is constructing a training / office building on this property. The building, known as the Dakota County SMART Center, is currently under construction, with a completion date of July 2021.

The Owner seeks a variance to the signage requirements specified in the Zoning Code. In particular, the variance is to allow the monument sign to be located closer to Courthouse Blvd.

The following are descriptions of and response to City Code Section 10-3-4D which delineates and summarizes the items upon which the City Council may approve variances.

Applicable Zoning Code

Under Inver Grove Zoning, 10-15E-8: Sign in B, I and P Districts, this building being zoned P, the following is specified:

- I. In all B, I and P zoning districts, freestanding signs shall be placed at a minimum setback of ten feet (10') from any property line. Signs exceeding one hundred (100) square feet of individual sign surface (per side) shall be set back a minimum of twenty feet (20') from any property line.

Under this zoning requirement the monument sign would be located approximately 77'-8" from the Courthouse Blvd.

Variance Requested

The Owner is requesting a variance to the above noted code, 10-15E-8. Specifically, the requested variance would allow for a monument sign between Courthouse Blvd. and the property line. The specific location would be 40' from centerline of ROW plus 10' setback = +/- 38' from edge of bituminous off of Courthouse Blvd. to the leading face of the sign. See drawings attached for specific location. Additionally, the Owner would remove trees in the ROW so that the sign is visible from 38'-0" in both approach directions.

Basis of Variance Request

A practical difficulty exists, as distinguished from a mere inconvenience, because of the particular physical surrounds, shape or topographic conditions of the property.

Description of Condition:

This site, at 9260 Courthouse Blvd., has several physical features that create difficulties in placing a monument sign: two wetlands bordering the entry drive, topographic elevation change of eight feet, and highly wooded frontage area.

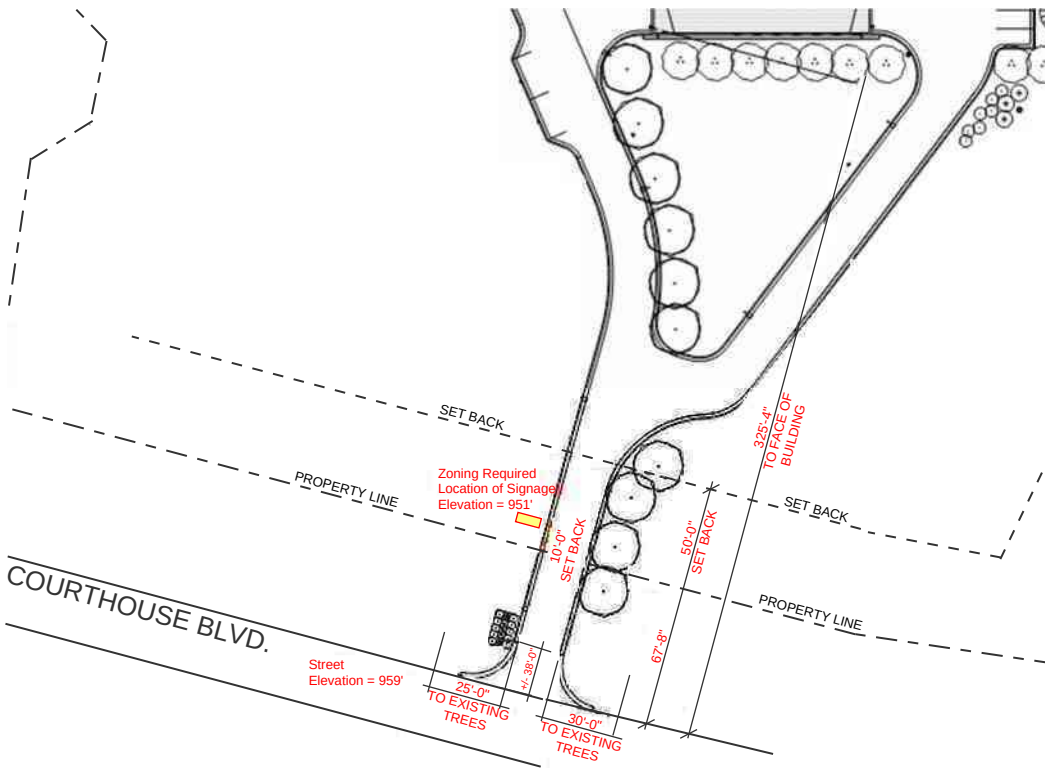


Image 1:

Enlarged Architectural Site Plan. General dimensions and information regarding the site. See attached drawings for overall site plan and civil drawings showing site conditions.

There are **two wetland areas**, one on each side of the entry drive. Building in these areas is not permitted. With the wetland building restrictions, there is only a narrow strip of land on each side of the entry drive where the monument signage can be placed. See Image 2.

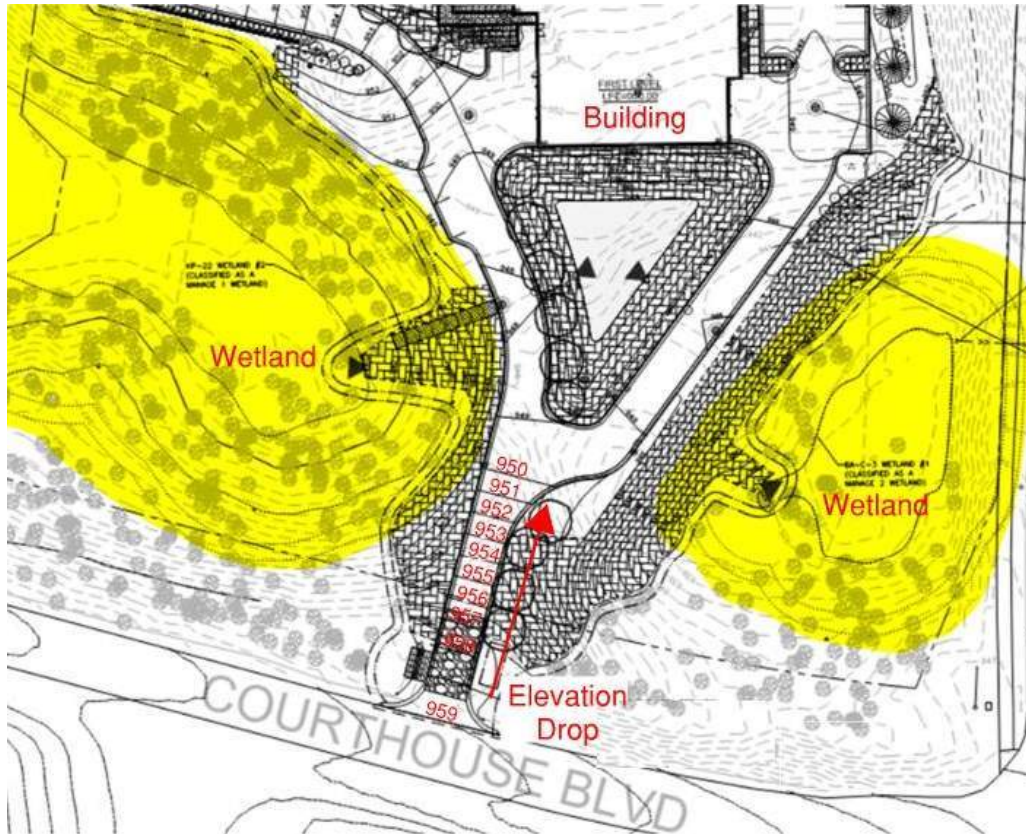


Image 2:

Location of the entrance drive was constrained by two wetlands. The drive needed to squeeze between the two wetland areas in order to place the building on the usable portion of the site.

The **topography of the site**, in relationship to Courthouse Blvd. varies greatly. Courthouse Blvd. has an elevation of 959', the lowest usable elevation on the site is 948' and the highest usable elevation is 965'. The entry drive undulates from Courthouse Blvd. to the building.

If the monument sign were placed in accordance with the zoning code, its elevation would be approximately 951'. At this elevation, the monument sign would be eight feet (8') below the 959' elevation at Courthouse Blvd. See Image 3.

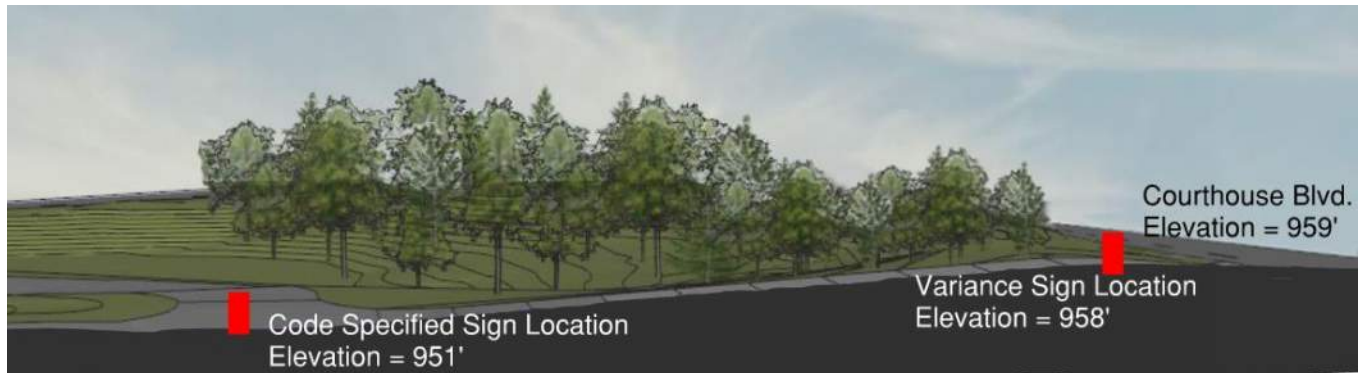


Image 3:

As the entry drive leads from Courthouse Blvd. to the building, the drive lane drops in elevation by eight feet (8') making it nearly impossible to see a sign that is located as specified by code.

This is a **highly wooded site**. The zoning code and SWPP dictate the number of trees that can be removed from the site. That along with the wetland restrictions has limited tree clearing to just along the entry drive. See Image 4.

The view down the entry drive to the monument sign, in its code specified location is limited by the trees that were required to remain. At the site entry on Courthouse there is approximately 20'-35' on each side of the entry drive that is free of trees. On approach to the site entry, the view of the monument sign in its code specified location is obscured until the driver is almost directly in front of the entry. See Images 5, 6 and 7.

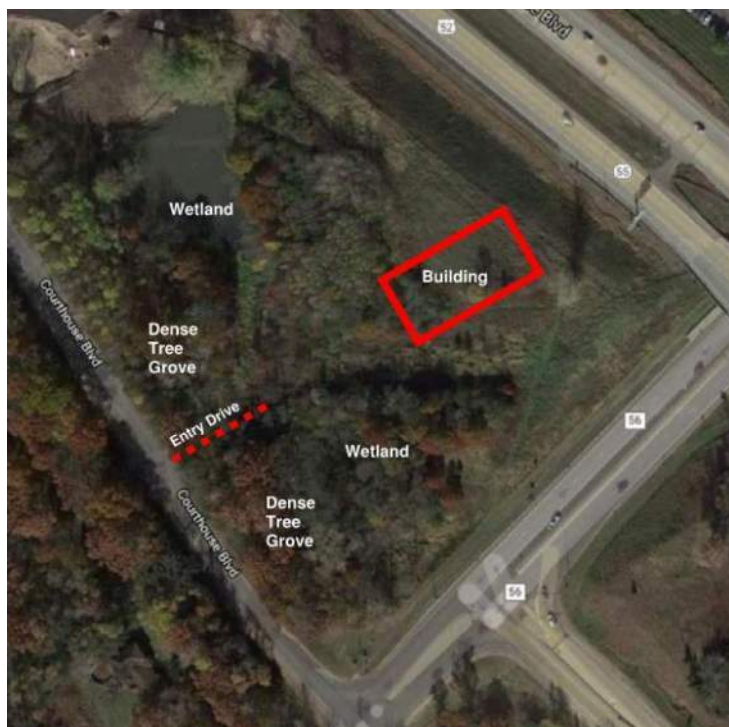


Image 4:

Aerial view of pre-construction site conditions. Dense tree groves line both sides of the entry drive. A minimal number of trees were able to be removed due to wetland and soil conservation regulations. The remaining trees block the view of the sign at the code specified location.



Image 5:

This image simulates the vehicular approach from the west approximately 60' from the entrance drive. Foliage and trees block the drive after the first 25'. A monument sign placed 38' inside the right-of-way would be visible.

See Viewing Triangle, Image 7.



Image 6:

This image simulates the vehicular approach from the east approximately 60' from entrance drive. Foliage and trees block view down the entrance drive toward the building. A monument sign placed 38' inside of the right-of-way would be seen, but signage placed per zoning specifications would not.

See Viewing Triangle, Image 7.

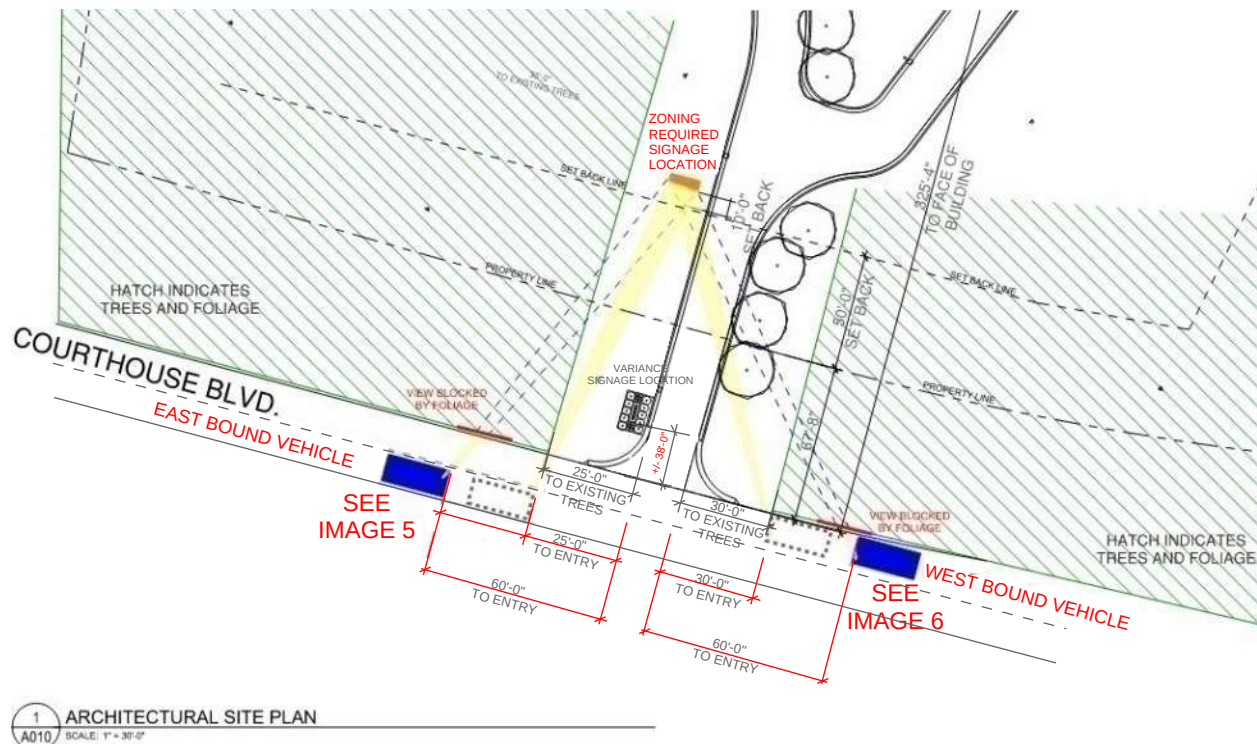


Image 7:

The driver response time is shortened when the sign is placed in the code specified location. From east or west on Courthouse Blvd. a car would need to be within 25' of the entrance to have the possibility to see the sign. Moving the sign to within 38' of Courthouse Blvd. more than doubles the driver's response time. See Images 5 and 6 for vehicle location as experienced on site.

Response to "Practical Difficulties"

The zoning specified location of the monument sign poses a safety hazard. The elevation of the sign, the location of the sign as dictated by the wetlands and the highly wooded areas to the east and west of the entry drive give drivers minimal warning to the approaching entry. This blind approach to the entry or exit from the site have the potential to cause vehicular accidents.

A typical collector road would have an 80' ROW. Courthouse Blvd., because it was originally a State Highway, has a 160' ROW. Courthouse Blvd. is no longer designated as a Highway, it is now a collector road.

Moving the monument sign to 38'-0" off Courthouse Blvd. gives entering and exiting vehicles another 30'-40' to prepare to turn or to react to actions of other motorists.

The plight of the landowner is due to the circumstances unique to the property not created by the landowner.

Placement of the building and entry onto the site was limited by zoning requirements and physical site conditions that were inherent to the site. This includes right-of-way, wetland zoning and building setbacks.

Response to "Plight of the Landowner"

The circumstances that have given rise to the request for this variance are due to the site conditions that are inherent to the site and not created by the siting of the building or other factors in the Landowner's control.

The variance will not alter the essential character of the neighborhood.

The monument sign is 5'-4" tall and 6'-6" long. The variance places it off of Courthouse Blvd. by 38'.

Response to "Altering the Character of the Neighborhood"

It is an understated masonry and concrete form which is dwarfed by the adjacent trees. There is additional landscaping at and near the monument sign that insure it is sympathetic to the landscape of the site and neighborhood. It will have little or no effect on the character of the neighborhood.

Economic considerations alone do not constitute practical difficulties.

The zoning specified location of the monument sign is closer to the building than the proposed location.

Response to "Economic Considerations"

By moving the monument sign away from the building and closer to Courthouse Blvd, the length of electrical conduit and cabling more than double. The preferred monument sign location will not save the Landowner money, it will more than double his cost for this work.

The variance does not affect the supply of light and air to the adjacent properties.

Response to "Affecting Light and Air"

The monument sign is 5'-4" tall and 6'-6" long. The nearest adjacent property is more than 250' away from the sign. It does not affect the light or air quality on site or of the adjacent property.

Summary:

A practical difficulty exists, as distinguished from a mere inconvenience, because of the particular physical surrounds, shape, or topographic conditions of the property.

Dakota County, Owner, is seeking a variance to the zoning code, in particular the requirements regarding signage. The Owner believes that 'practical difficulties exist.... because of the particular physical...conditions of the property' and that these conditions are out of the Owner's control.

The zoning specification for signage on this property is 10'-0" back from the property line. That location places the signage 77'-8" from Courthouse Blvd, the access road for the property.

Three physical features of this site either create a safety hazard and/or limit visibility of the monument sign in the zoning specified location. These problematic physical features of the site are:

- Two large wetlands which take up a third of the total area of the site
- Topographic elevation varies more than ten feet across the site
- The site is densely wooded

These three conditions and zoning/code requirements meant that the building and its associated entry drive were limited in their site placement. This in turn limited the location of signage.

Placement of the sign is pushed next to the entry drive by the no-build area associated with the wetlands. Thus leaving approximately 10'-0" on each side of the entry road in which the sign can be placed.

At the zoning specified area, sitting next to the entry drive as required by the wetland zoning, there is a significant drop in elevation from the access road to the sign. The sign at this location would be approximately 8'-0" below the elevation of the access road, a location drivers will not expect. This location is a safety hazard for drivers attempting to find the site. Drivers may become distracted looking for signage causing them to lose focus on the road or causing them to make split second decisions.

Adding to the difficulty in elevation of the sign, is the fact that the site is densely wooded. Zoning and SWPPP requirements meant that a limited number of trees could be removed from the site. The clearing of trees was focused on the entry drive and 20'-0" on each side of it. With this narrow band cleared, views toward the building and the zoning specified sign location are limited or non-existent. Approaching on Courthouse Blvd. from either the east or west the entry drive is visible from approximately 65', while the zoning specified signage location is only

visible when the driver is within approximately 20' of the drive. This is a safety hazard causing drivers to make last minute decisions and/or distracting them from focusing on driving.

The location of the monument sign between Courthouse Blvd and the property line will alleviate most if not all the safety hazards associated with the zoning specified sign location. Drivers will have an additional 40', approximately 65' total, to see the sign and react accordingly.

In accordance with the zoning code, this variance is not of the owner's making, but completely based on the physical features of the site. These conditions existed prior to the Owner's possession of this parcel.

Care is also taken to ensure that the signage does not alter the character of the neighborhood. The size and materials for this sign do not change with this variance. It is an understated, modest sign that is flanked by landscaping that is in keeping with the nature of the existing and new landscaping. The signs location at the entry drive will be readable, but in harmony with existing features. Additionally, with its diminutive stature, and integration into the landscape, the sign does alter the existing light or air of the area.

This change in sign location does allow the Owner to provide a clear entrance onto the site. However, this change does not provide the Owner with any financial gain. Electrical service for the sign comes from the building. At the zoning specified location the sign is closer to the building. By not running electrical connections out to within 38' of Courthouse Blvd. it would save the Owner a considerable amount. The Owner is willing to accept these additional cost in order to provide safer access to the site.

Courthouse Blvd. was constructed as a Highway, and as such had a ROW of 160'. This road is no longer designated as a Highway. Courthouse Blvd. is designated a collector road. As such, in compliance with the City ordinances, the ROW should be 80'. The collector road designation would allow for the sign to be 38' off of Courthouse Blvd.

For these reasons, the Dakota County is requesting a variance for the location of the monument sign to 38'-0" from Courthouse Blvd. This location is shown on the Permit set.



PLANNING REPORT

CASE NO: 21-03ZAC

APPLICANT: Wenck Associates

PROPERTY OWNER: BFI Waste Systems of North America, LLC

REQUEST: Zoning Code Amendment and CUP for renewable natural gas plant

HEARING DATE: February 2, 2021

LOCATION: 2495 117th St (west 100 acres)

COMPREHENSIVE PLAN: LI, Light Industrial

ZONING: I-1, IRM Overlay District

REVIEWING DIVISIONS: Planning
Engineering

PREPARED BY: Allan Hunting
City Planner

BACKGROUND

Wenck Associates has submitted an application on behalf of Fortistar Methane Group for a conditional use permit to construct a renewable natural gas processing plant on the west 100 acres next to the Pine Bend Landfill. A natural by-product of the decomposition of solid waste in the landfill is the formation of methane gas in the buried debris. This gas must be handled in some way, so it does not accumulate inside the landfill. Typical mitigation includes a system that collects the gas and then is burned off at specific locations on the landfill. In 1995, the city approved a CUP to allow the construction of a plant (12,000 square feet in size) in the northwest corner of the landfill site to take some of the methane gas process and convert the energy into electricity. That plan was in operation until sometime in 2019. Fortistar is now requesting to construct a new building that will convert the raw methane gas into renewable natural gas that can be used for an alternate energy source for such things as truck fleets. Fortistar would be leasing an approximate 5 acre area for the plant. Access would be from a driveway constructed to Rich Valley Boulevard. The converted gas would be transported via pipeline to an existing facility owned by NSP near Rich Valley Boulevard and Barnes Avenue. The gas will then be transported through the existing NSP pipeline system. There will be no truck transport of any gas from the new facility.

The City was concerned about further possible expansions to the Pine Bend Landfill on the current site and also on the west 100 acres. In 1991, the City adopted an overlay district specifically for landfills and waste related industries. The ordinance provided a specific list of

allowed uses in the overlay district, all by conditional use . In 1995, the ordinance was amended to allow for an energy recovery facility for the generation of electricity. Now that the electric plant no longer operations and a new form of energy recovery facility is being proposed, the IRM District will also need to be amended to allow for an energy recovery facility of the generation of renewable natural gas.

SPECIFIC REQUESTS

The application consists of the following:

1. An Ordinance Amendment to the IRM, Integrated Resource Management Overlay District to allow for an energy recovery facility for the generation of renewable natural gas as a conditional use.
2. A Conditional Use Permit to operate an energy recovery facility.

EVALUATION OF THE REQUEST

The following land uses, zoning districts and comprehensive plan designations surround the subject property:

North: Vacant; zoned A; guided RDR

East: Pine Bend Landfill

West: Bituminous Roadways; zoned A and S&G Overlay; guided RDR

South: Vacant part of west 100 acres; zoned I-1; guided LI

ORDINANCE AMENDMENT

In 1991, the City adopted the IRM, Integrated Resource Management Overlay District to regulate and limit uses in and around the existing landfill. The primary purpose was to prohibit any further landfill expansion on abutting properties and make the uses allowed by conditional use permit. In 1995, the City amendment the ordinance to allow for a methane to electric conversion energy recovery facility. The code is very specific to allow only methane generated by the landfill to be converted to electricity at the facility that is now been shuttered.

An ordinance amendment is proposed to allow for an energy recovery facility for the generation of renewable natural gas as a conditional use with the same performance standards used for the electric facility.

CONDITIONAL USE PERMIT FOR ENERGY RECOVERY FACILITY

Setbacks. The leased space is approximately 200 feet wide from N-S. The 12,000 square foot building location exceeds the required 40 foot setback from property lines. The closest point of the building to a property line (north) would be 72 feet. The building would be 274 feet from Rich Valley Boulevard.

Parking. The building would be occupied by a total of three employees, two during the day, one at night. The plan provides for four parking spaces. Staff is comfortable with the parking provided.

Access. The site will be accessed via a long driveway from Rich Valley Boulevard. The access point will be opposite the main driveway for Bituminous Roadways. As stated earlier, the site is only serviced by three employees. No truck traffic will be coming from this site.

Landscaping/Tree Protection. The vast majority of the property is open and flat and without trees. There is some existing vegetation around the wetland to the southeast of the construction site.

Landscaping is proposed along the north boundary of the site, around the storm water pond and around the building. The code requires a total of 72 trees or their equivalent be provided. The landscape plan identifies 46 trees and 180 shrubs to be planted. This satisfies the landscape requirement.

Building Materials. The proposed building will consist of textured wall panels with a stucco finish on all four sides of the building with masonry block on the bottom ¼ of the building. The proposed materials comply with exterior material standards.

Engineering. There will be stormwater infiltration basin located on the west side of the building to address stormwater needs. The site will have its own private septic system on the east side of the building. Water will be provided either by a private extension from the public system on the landfill property or an extension of the public system. Engineering has reviewed plans and finds the design acceptable. There will still be some technical detail elements to be worked out before any permits can be issued.

Lighting. A lighting and illumination plan has been submitted which identifies all lighting will be using down cast style fixtures on the light poles and building. The illumination pattern complies with the zoning code maximums.

General conditional use permit criteria review

This section reviews the plans against the CUP criteria in the Zoning Ordinance (Section 10-3A).

1. *The use is consistent with the goals, policies and plans of the City Comprehensive Plan, including future land uses, utilities, streets and parks.*

The comprehensive plan for this area is to provide for light industrial type uses, related or not related to the landfill, but no further expansion on the west 100 acres. The use is not a landfill but is ancillary to the impacts of the landfill. Allowing for methane to be converted to pipeline grade gas is an environmental benefit rather than just flaring off the excess methane.

2. *The use is consistent with the City Code, especially the Zoning Ordinance and the intent of the specific Zoning District in which the use is located.*

With the proposed amendment to the overlay district, the use would be consistent with the intent of the code to allow industrial types uses but no landfill expansion.

3. *The use would not be materially injurious to existing or planned properties or improvements in the vicinity.*

The use would be low intensity and would not generate noise, odors, high traffic volumes, etc. that would have an impact on existing or planned properties. Allowing this conversion of the methane gas is a better choice than flaring the methane.

4. *The use does not have an undue adverse impact on existing or planned City facilities and services, including streets, utilities, parks, police and fire, and the reasonable ability of the City to provide such services in an orderly, timely manner.*

The use will require connection to the municipal water system. The system has the capacity to provide service to the user.

5. *The use is generally compatible with existing and future uses of surrounding properties, including:*

- i. *Aesthetics/exterior appearance*

The proposed building materials comply with code requirements.

- ii. *Noise*

The proposed building would be a low noise generator.

- iii. *Fencing, landscaping and buffering*

The applicant is providing landscaping and preserving existing trees to buffer the site.

6. *The property is appropriate for the use considering: size and shape; topography, vegetation, and other natural and physical features; access, traffic volumes and flows; utilities; parking; setbacks; lot coverage and other zoning requirements; emergency access, fire lanes, hydrants, and other fire and building code requirements.*

The proposed use is located away from other properties and close to the landfill. The use would be a low traffic generator and general operating hours would not conflict with surrounding land uses.

7. *The use does not have an undue adverse impact on the public health, safety or welfare.*

This use does not appear to have any negative effects on the public health, safety or welfare.

8. *The use does not have an undue adverse impact on the environment, including, but not limited to, surface water, groundwater and air quality.*

This use would have a positive impact on the environment by recycling the methane gas generated from the landfill and converting to usable gas for energy for other uses.

ALTERNATIVES

The Planning Commission has the following actions available on the following requests:

- A. Approval.** If the Planning Commission finds the application to be acceptable, the following action should be taken:

- Approve an Ordinance Amendment to the IRM, Integrated Resource Management Overlay District to allow for an energy recovery facility for the generation of renewable natural gas as a conditional use.
- Approve a Conditional Use Permit to allow an energy recovery facility for the generation of renewable natural gas in the IRM overlay district subject to the following conditions:

1. The site shall be developed in substantial conformance with the plan set revision date of 12/21/20. Plans are on file with the Planning and Engineering Departments.

***The final list of approved plans and date of plans shall also be identified in the development contract.**

2. The City Code Enforcement Officer, or other designee, shall be granted right of access to the property at all reasonable times to ensure compliance with the conditions of this permit.
3. Any parking lot and building lighting on site shall be a down cast, "shoe-box" style and the bulb shall not be visible from property lines.
4. Any roof top and/or ground utility equipment shall be substantially screened on all sides from public view. Screening materials shall be compatible with the building's overall design.
5. All plans shall be subject to the review and approval of the City Fire Marshal.
6. An improvement agreement, stormwater agreements, and other agreements related thereto, shall be required to be executed between the City and the developer. The contract will address specific site improvements and parties responsible for improvements and will require financial surety for the landscaping and any other public improvements that may be necessary.

7. Final site, grading, storm water management, erosion control plans and utility plans shall be approved by the City Engineer, Barr Engineering and Stantec Engineering.
8. The developer shall meet the conditions outlined in the City Engineers review memo dated 1/11/21 and any subsequent correspondence.

B. Denial. If the Planning Commission does not favor the proposed application, or portions thereof, the above request should be recommended for denial. With a recommendation for denial, findings or the basis for the denial should be given.

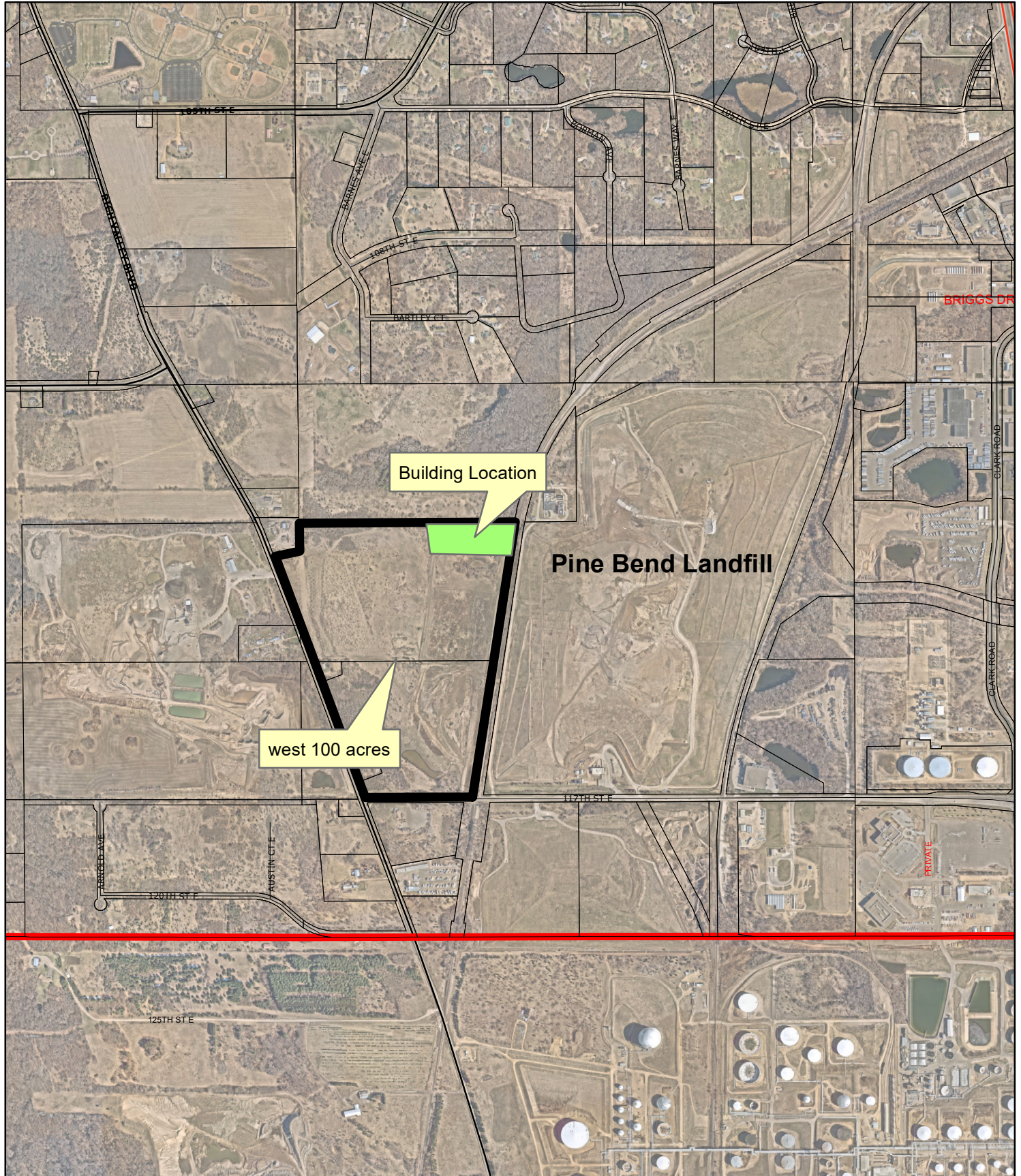
RECOMMENDATION

Staff recommends approval of both the ordinance amendment and conditional use permit.

Attachments: Location Map and west 100 acres
Applicant Narrative and construction plans
Overall Site Plan
Building Elevation Plans
Photometrics Plan

Location Map

Case No. 21-03ZAC



December 21st, 2020

City of Inver Grove Heights

Planning Department

8150 Barbara Avenue

Inver Grove Heights, MN 55077

Fortistar RNG Expansion – Project Narrative

Background

The Fortistar RNG Expansion project is located within the Republic Services Pine Bend Landfill in Inver Grove Heights, MN. The site is east of Dakota CSAH 71 (Rich Valley Blvd), west of the Union Pacific Railroad, North of 117th Street E and south of an Industrial open space owned by Flint Hills Resources Pine Bend LLC. The site is located on a 61-acre parcel (PID 20-02200-26-011). The proposed project consists of construction of a single story, 12,000 SF renewable natural gas (RNG) plant for the Fortistar Methane Group.

Zoning and Land Use

The current parcel is zoned as (I-1) Limited Industry. As part of the Conditional Use Application the project will also be applying for a Zoning Code Amendment to allow for the processing and production to occur on this site and to ultimately be distributed to Xcel Energy. The surrounding properties of this site are zoned as (A) Agricultural to the north and west, (I-1) Limited Industry to the south and (I-2) General Industry to the east. The Future Land Use Map consists of Industrial Open Space to the north and west, Light Industrial for the site and to the south and General Industrial to the east. This site is also located within the Integrated Resource Management (IRM) overlay District. The city also verified that platting is not required for a lease site.

Building/Processing Plant

SCS Energy (SCS) will provide a renewable natural gas (RNG) plant. The plant will be delivered on an engineer/procure/construct (EPC) basis. The project will install a new gas processing facility capable to process up to 3,200 SCFM of landfill gas (LFG) from the Republic Services Pine Bend Sanitary Landfill to produce pipeline quality Renewable Natural Gas (RNG). This plant will be utilizing the latest gas treatment technologies available in the market. The produced RNG will meet gas specifications mandated by the gas off-taker for injection into a nearby pipeline. The proposed building is 30' – 6" tall and is 60-feet wide by 200-feet long. The mechanical equipment room, air compressor room and the storage/shop room will include a wet sprinkler system. The mechanical equipment room will be designed for Class 1 Division 2. Electric heaters will be supplied in the mechanical equipment room to maintain a minimum temperature of 50° F with the mechanical equipment offline. The building exterior walls will be constructed to meet local building code requirements. The RNG plant is expected to produce 2,182 million British thermal units per day (mmBtu/day) at an ambient air temperature of 62° F. The RNG plant will satisfy the Northern States Power Company Minnesota (NSPCM) pipeline quality gas specifications.

Site

The proposed 5.5 acres site will be leased from Republic Services Pine Bend Land fill. The lot is 200 feet wide (north/south) and meets the city's Setback requirements for (I-1) Limited Industry District as listed in the table below.

	Building Setback		Pavement Setback	
	Required	Proposed	Required	Proposed
Front / (West)	40 Feet	274 Feet	10 Feet	220 Feet
Side Yard (North)	40 Feet	72 Feet	5 Feet	14 Feet
Side Yard (South)	40 Feet	68 Feet	5 Feet	5 Feet
Rear Yard (East)	40 Feet	725 Feet	5 Feet	683 Feet
Lot Width	100 Feet	200 Feet		
Lot Area	1 Acres	5.5 Acres		
Height (Max.)	60 Feet	30.5 Feet		
Building Coverage	30%	21%		

Access and Parking

Site access will be provided via a newly constructed 1,300 lineal foot access drive from Dakota CSAH 71 (Rich Valley Blvd) to the west of the site. The access drive will consist of a 20-foot-wide bituminous pavement section and a 2-foot-wide gravel shoulder on each side. The access drive will encircle the entire building to provide fire protection access to all four sides of the building and the accompanying mechanical equipment.

The proposed building will be occupied by a total of three employees, two of which will work during the day shift and one working the over night shift. The proposed parking area consists of 4 standard parking spaces, 1 accessible parking space and 1 access aisle. All of the parking spaces are 18 feet long by 9 feet wide. An expanded 24-foot-wide drive aisle will be constructed adjacent to the parking area to provide adequate vehicle maneuvering space. A turning Simulation Exhibit was produced to verify that a 40-foot-long pumper fire truck is capable of accessing the entire building perimeter.

Landscaping and Tree Preservation

The proposed landscaping is designed to provide site character and blend into the surrounding existing site vegetation. We plan to preserve all existing trees that fall outside of the grading limits and to provide additional trees for create screening for adjacent properties. The project has proposed a planting schedule which provides ample landscaping and screening for the site. The types (species) of new trees and minimum size specified meets the City ordinance. The number of trees that will be removed within the limits of disturbance is not anticipated to exceed the city's 60% threshold for I-1 Zoning Districts. A tree survey will be conducted prior to construction to confirm the quantity of significant trees that will be removed. The significant trees that are removed outside of the lease site area will be recorded and will need to be

accounted for if future Landfill development exceeds the 60% threshold for the entire property. At that time a tree preservation plan will be produced for the expanded development.

Grading and Drainage

Proposed site grades are generally between 1.0% and 5.0% within drive aisles and parking areas. The parking lot and drive aisles will be bounded with curb and gutter to collect stormwater runoff and direct it to the onsite stormwater infiltration basin. Overall grades within greenspace areas are typically kept at 4:1, though some areas may steepen to a maximum of 3:1. The parking area will be flush with exterior sidewalk and will provide accessible access to the building.

Stormwater Treatment

The site is currently vacant and forms overland runoff. The geotechnical report provided by the Northern Technologies, LLC suggested approximately 2 to 9 feet of undocumented fill overlying poorly graded sand on the site. This project will disturb total of 3.4 acres and result in a net increase of approximately 1.6 acres of new impervious area (including the access road). The proposed development includes grading much of the site to allow construction and adequate drainage.

Stormwater treatment will be provided with an infiltration basin on the west end of the site. Most of the on-site impervious surface runoff will be directed to the infiltration basin for treatment. A small portion of the site and the paved access road will be discharged off-site. Discharges from the impervious surfaces will be pre-treated to remove sediments with a combination of a sump structures with flow attenuating baffle. The water quality volume provided by the infiltration basin is adequate to treat 1" runoff from impervious surfaces to comply with the MPCA NPDES permit requirements. The infiltration basin exceeds the total required water quality volume. About 24,794 square feet (36%) of the new impervious surface is not routed to the infiltration basin and this includes 22,878 sf of the paved access road. The paved access road will flow through a vegetated buffer along the shoulders. The outlet structure and basin are designed to provide a minimum of two feet of separation between the adjacent structure finished floor elevation (FFE) of 865.00-feet and 100-year high water level (HWL). The 100-year high water level for the basin is 857.8 ft and provides adequate protection for the adjacent structures. The basin is also designed to provide rate control for site discharges.

City of Inver Grove Heights requires that implementation of best management practices to reduce TSS and TP by 85% and 55%, respectively. SHSAM and P8 models were set up to determine the efficiency of the proposed infiltration basin and the overall site. The overall removal efficiency for the site resulted in 91% TSS removal and 65% TP removal.

Wetlands

The project area has an existing wetland to the southeast of the site, which was delineated in 2018. The 1.02 acre basin was classified as a type 1 and 2 (circular 39) wetland. The PEM1B (Cowardin) wetland is listed as a seasonally flooded basin and fresh (wet) meadow (Eggers and Reed). The delineation report will be included with the project submittal package for reference. The proposed site disturbance will not impact the existing wetland. Erosion control measure will be implemented to protect the wetland from construction activities.

Utilities

The proposed facility will connect to existing water lines east of the property. The 10" DIP fire protection line and 4" DIP domestic water services will be routed under the Union Pacific Railroad within a 24" steel casing pipe that will be jacked and bored. On the eastside of the railroad the domestic water service will connect the 12" city watermain and the fire protection line will be routed to the existing fire pump house adjacent to the existing plant building. Additionally, on the east side of the building a new fire hydrant will be installed to provide full building coverage and fire apparatus access.

The landfill gas will be routed from the existing landfill on the east side of the railroad to the new building via 24" HDPE service pipe. Along with the gas line two additional 3-inch HDPE condensate service lines will be installed within a 36" steel casing pipe, which will also be jacked and bored under the railroad. Southwest of the building on the west side of the access road there will be a thermal oxidizer. Additionally, in the northwest portion of the site there will be a Pipeline Company Metering and Monitoring station, where the final product gas and supplemental fuel will connect to the site.

The existing site is not served by municipal sanitary sewer so the project will install a subsurface sewage treatment system consisting of a underground septic tank, pump, and force main to the primary drainage field. Additionally, a secondary drainage field is also shown on the proposed plans and the area will be protected from disturbance until the system is being installed. The septic system will be designed and permitted via a licensed SSTS contractor.

Site lighting will be provided via wall fixtures on the proposed building per the luminaire plan. Lighting will be consistent with the lighting zoning code and minimize glare and impact to surrounding properties.

Dakota Electrical Association will be installing new overhead power lines and poles that service the site from the west. The new service will follow the west side fo the access road from Rich Valley Blvd to the proposed transformer location near the northeast for of the building.

Fortistar RNG Expansion Development Schedule

Winter, 2020 – Application to the City of Inver Grove Heights

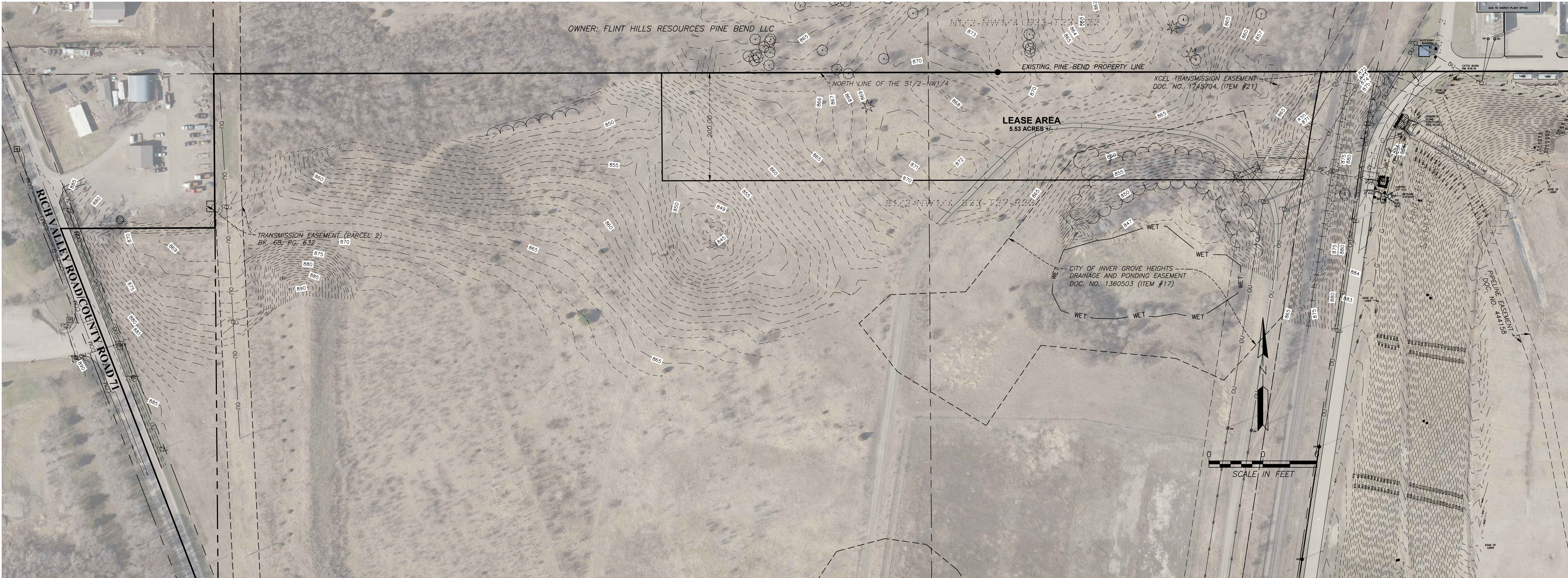
Winter/Spring, 2020/2021 – Building Permit Application

Spring, 2021 – Begin Construction

Fall, 2021 – Building Occupancy

Submittal Package Summary

0. Conditional Use Permit Application
1. Project Narrative
2. Topographic and Boundary Survey
3. Civil engineering and Landscape Architecture Plans
4. Building Elevation Plan, Floor Plan and Product Information
5. Fire Truck Turning Movement Exhibit
6. Site Photometrics Plans
7. Lighting Details and Specifications
8. Stormwater Management Plan (Memo, HydroCAD Report and Geotech Report)
9. Wetland Delineation Report
10. Pine Bend Vesting Deed Description
11. Pine Bend Warranty Deed
12. DCS Title - Abstractors Certificate – Radius Report



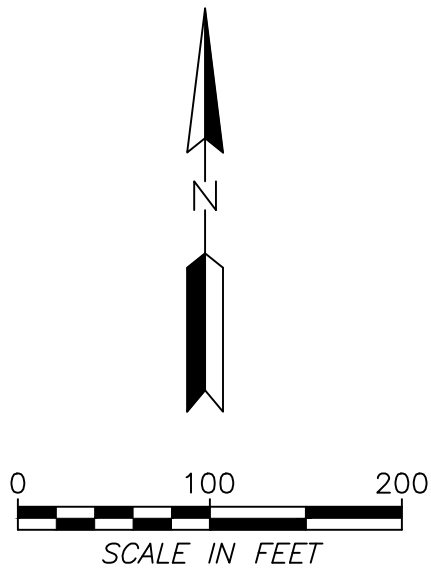
SURVEYORS NOTES:

1. Bearings are based on the local landfill system.
2. Property boundary and easement information shown hereon is based on a cursory title search and may not reflect all encumbrances or easements on the property.

SURVEYORS CERTIFICATION:

I hereby certify that this survey was completed by me or under my direct supervision and that I am a duly licensed land surveyor under the laws of the State of Minnesota.


Chris Ambourn
LS 43055
12/18/2020
Date



LEGEND

- | | | | |
|---------|-----------------------|----------|--------------------------------|
| ● | FOUND SURVEY MONUMENT | — I — | WATERMAIN |
| ⊕ | STORM SEWER MANHOLE | — G — | UNDERGROUND GAS LINE |
| ⊗ | STORM SEWER INLET | — COM — | UNDERGROUND COMMUNICATION LINE |
| ⊗ | STORM SEWER INLET | — F/O — | UNDERGROUND FIBER OPTIC LINE |
| △ | FLARED END SECTION | — UE — | UNDERGROUND ELECTRIC LINE |
| • | BOLLARD/POST | — OU — | OVERHEAD UTILITY LINE |
| • | UTILITY POLE | — WET — | APPROXIMATE WETLAND EDGE |
| ☀ | LIGHT POLE | — TREE — | TREE LINE |
| ☀ | DECIDUOUS TREE | | |
| ☀ | CONIFEROUS TREE | | |
| +++ | RAILROAD TRACK CL | | |
| — X — | FENCE LINE | | |
| — >> — | STORM SEWER | | |
| — >—> — | SANITARY SEWER | | |



Responsive partner. Exceptional outcomes.

Address
City, State, Zip

Ph:
Fax:

CLIENT NAME

SCS ENGINEERING

PROJECT TITLE

CERTIFICATE OF SURVEY

DWN BY CNA

CHK'D XXX

APP'D XXX

DWG DATE SEE ABOVE

SCALE SEE SCALE BAR

PROJECT NO. 7125-20-500

SHEET NO. 1 OF 1

PRELIMINARY SITE CONSTRUCTION PLANS

FOR

FORTISTAR RNG EXPANSION

INVER GROVE HEIGHTS, MINNESOTA

DECEMBER 2020

ENGINEER



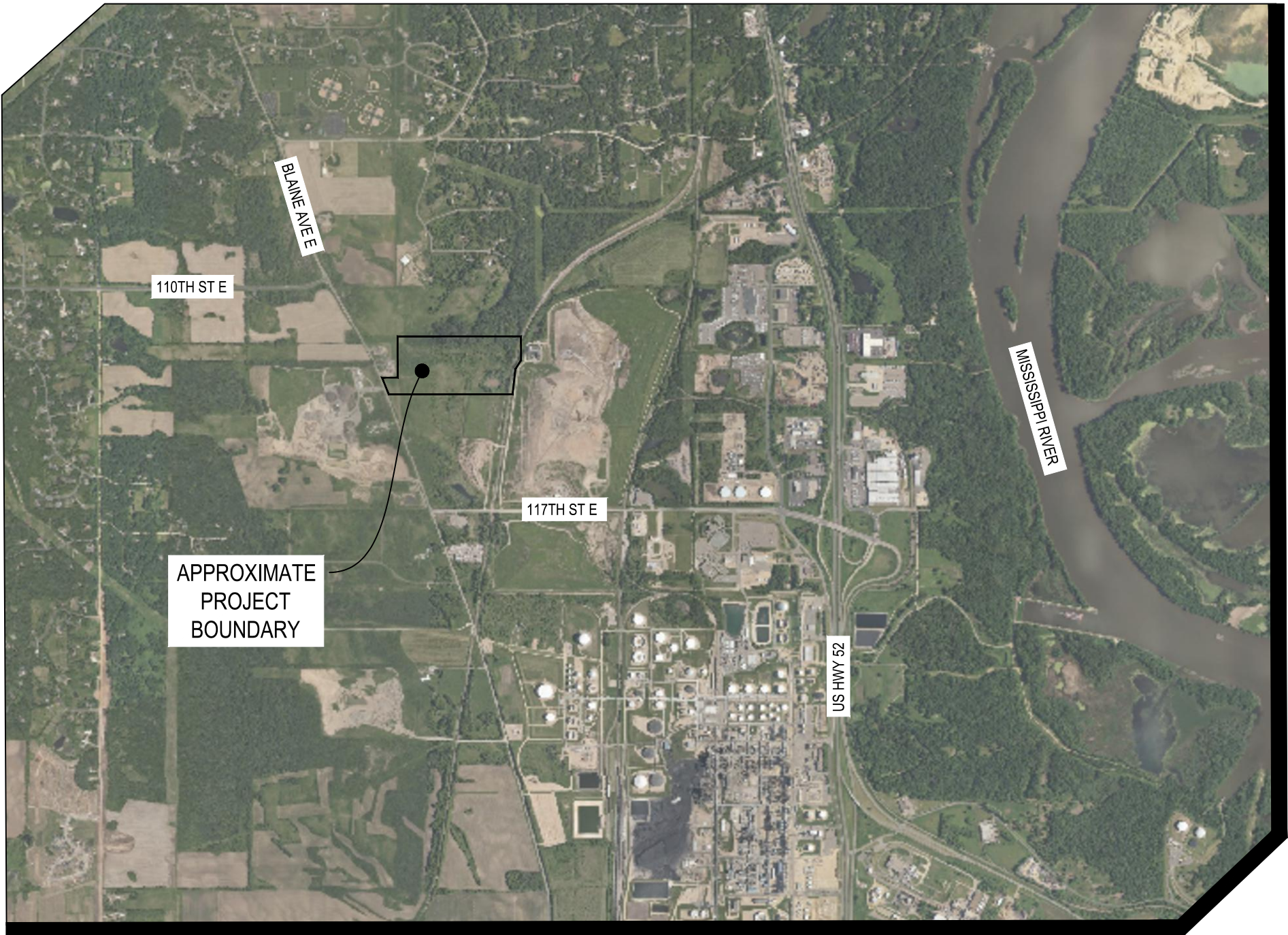
WENCK

WENCK ASSOCIATES, INC.
7500 OLSON MEMORIAL HIGHWAY
GOLDEN VALLEY, MINNESOTA 55427
(P) - 763-489-7400
CONTACT: PAT SVEUM P.E.

DEVELOPER

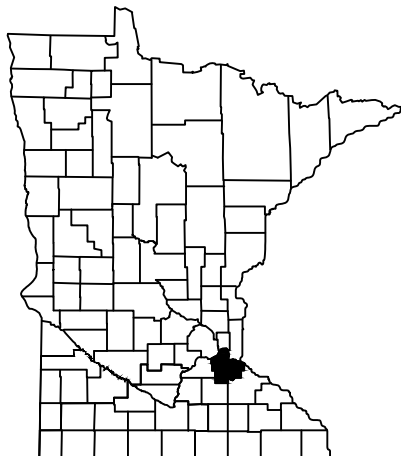


SCS ENGINEERING
3900 KILROY AIRPORT WAY, SUITE 100
LONG BEACH, CALIFORNIA 90806
(P) - 562-426-9544
CONTACT: JEFFERY PIERCE



VICINITY MAP

NOT TO SCALE



PROJECT LOCATION

CITY: INVER GROVE HEIGHTS
COUNTY: DAKOTA COUNTY

SHEET INDEX

Sheet Number	Sheet Title
C-001	COVER SHEET
C-003	EXISTING CONDITIONS
C-004	REMOVALS AND PRECONSTRUCTION EROSION CONTROL PLAN
C-101	OVERALL SITE PLAN
C-102	ENLARGED SITE PLAN
C-201	OVERALL POST-CONSTRUCTION STABILIZATION PLAN
C-202	ENLARGED POST-CONSTRUCTION STABILIZATION PLAN
C-203	SWPPP
C-301	ENLARGED GRADING PLAN
C-302	ENTRANCE ROAD PLAN & PROFILE (WEST)
C-303	ENTRANCE ROAD PLAN & PROFILE (EAST)
C-401	UTILITY PLAN AND PROFILE (WEST)
C-402	UTILITY PLAN AND PROFILE (EAST)
C-501	STORM SEWER PLAN
C-801	DETAILS
C-802	DETAILS
C-803	DETAILS
L-101	WEST LANDSCAPE PLAN
L-102	EAST LANDSCAPE PLAN
L-801	LANDSCAPE NOTES & DETAILS

THIS PLANSET CONTAINS 20 SHEETS



7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:



SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

ISSUE NO.:

1

DESCRIPTION:

CITY SUBMITTAL

DATE:

12/21/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY: MDH CHKD BY: PWS APPD BY: JTJ

ISSUE DATE: 12/21/2020

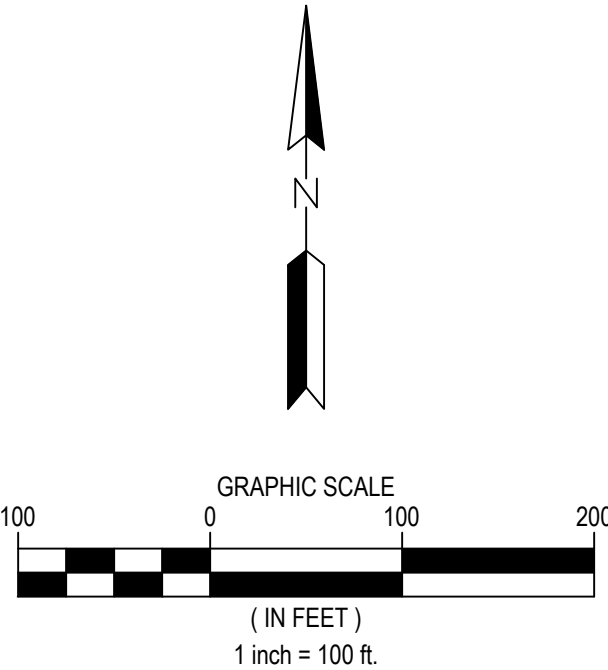
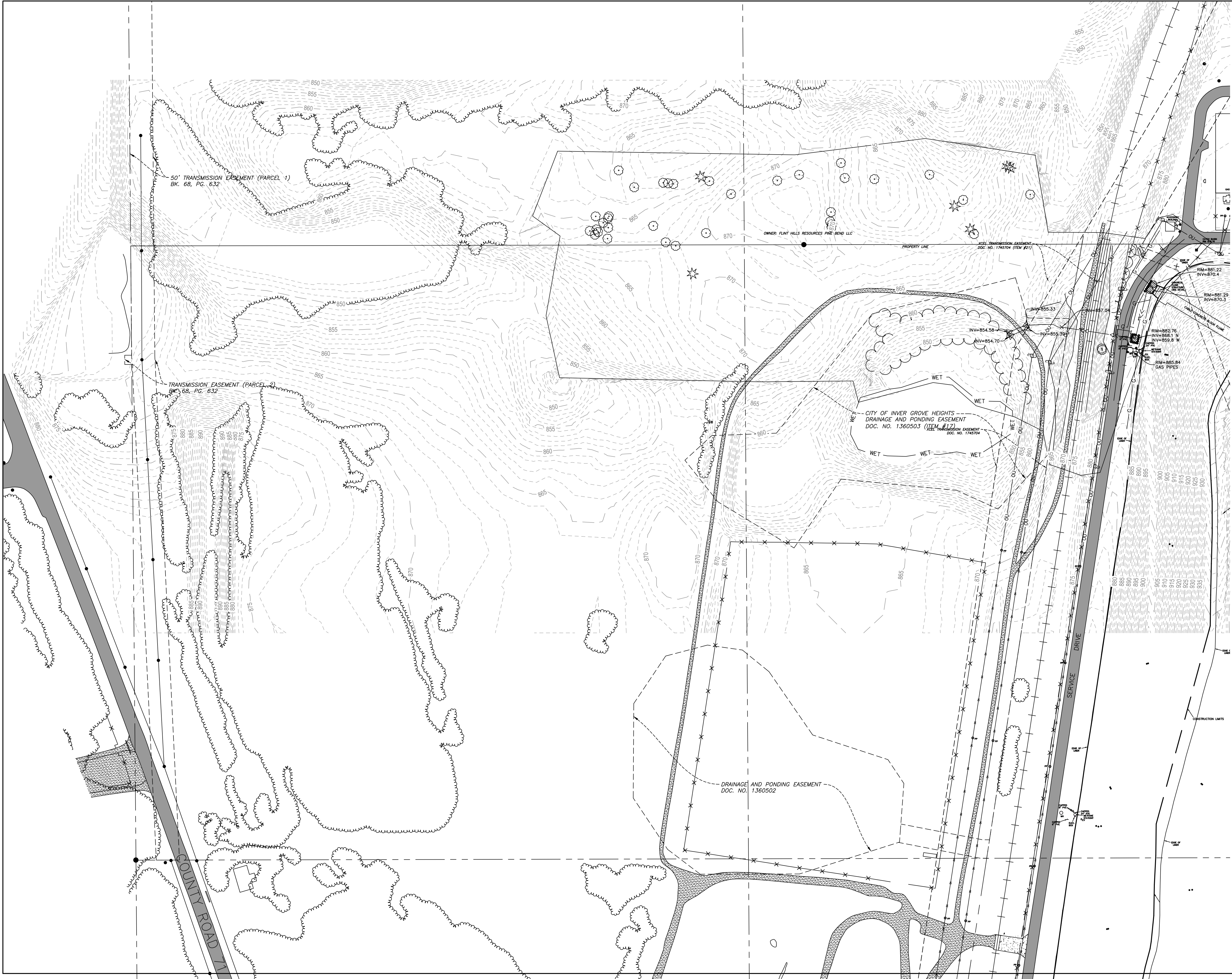
ISSUE NO.: 1

SHEET TITLE:

COVER SHEET

SHEET NO.:

C-001



LEGEND	
	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	EXISTING EASEMENT LINE
	EXISTING PROPERTY LINE
	EXISTING RAILROAD TRACK
	EXISTING FENCE LINE
	EXISTING STORM SEWER
	EXISTING UNDERGROUND GAS LINE
	EXISTING OVERHEAD UTILITY LINE
	EXISTING EDGE OF PAVEMENT
	EXISTING EDGE OF GRAVEL
	EXISTING TREE LINE
	EXISTING WETLAND BOUNDARY
	EXISTING ASPHALT SURFACE
	EXISTING GRAVEL SURFACE
	EXISTING CONCRETE SURFACE
	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	EXISTING SANITARY MANHOLE
	EXISTING STORM SEWER INLET
	EXISTING FLARED END SECTION

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.

INVER GROVE HEIGHTS

DAKOTA COUNTY, MINNESOTA, 55077

PROJECT NO.

7251-20-500

ISSUE NO.

1

DESCRIPTION

CITY SUBMITTAL

DATE

12/1/2020

CERTIFICATION

NOT FOR CONSTRUCTION

PROJECT NO.

7251-20-500

DWN BY

MDH

CHKD BY

PWS

APPD BY

JTW

ISSUE DATE

12/21/2020

ISSUE NO.

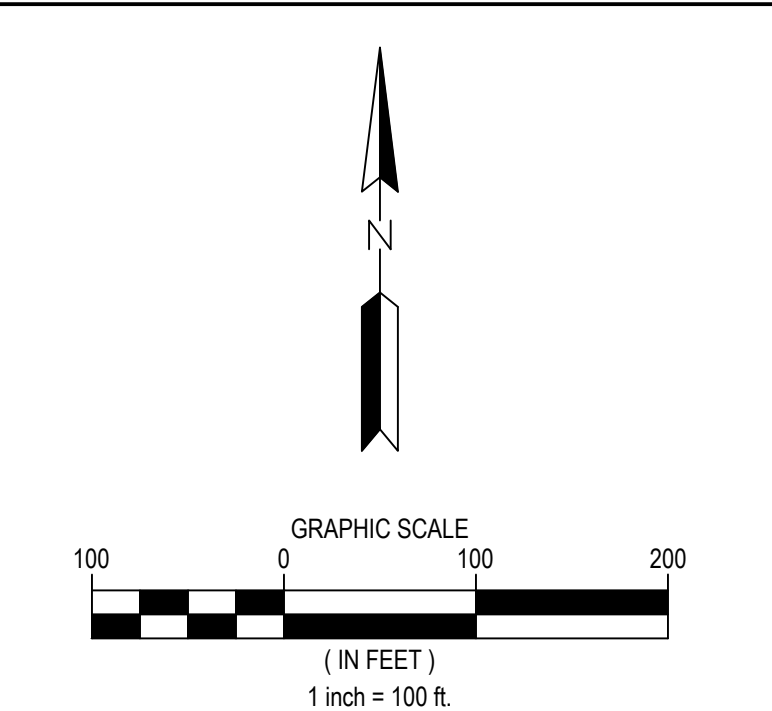
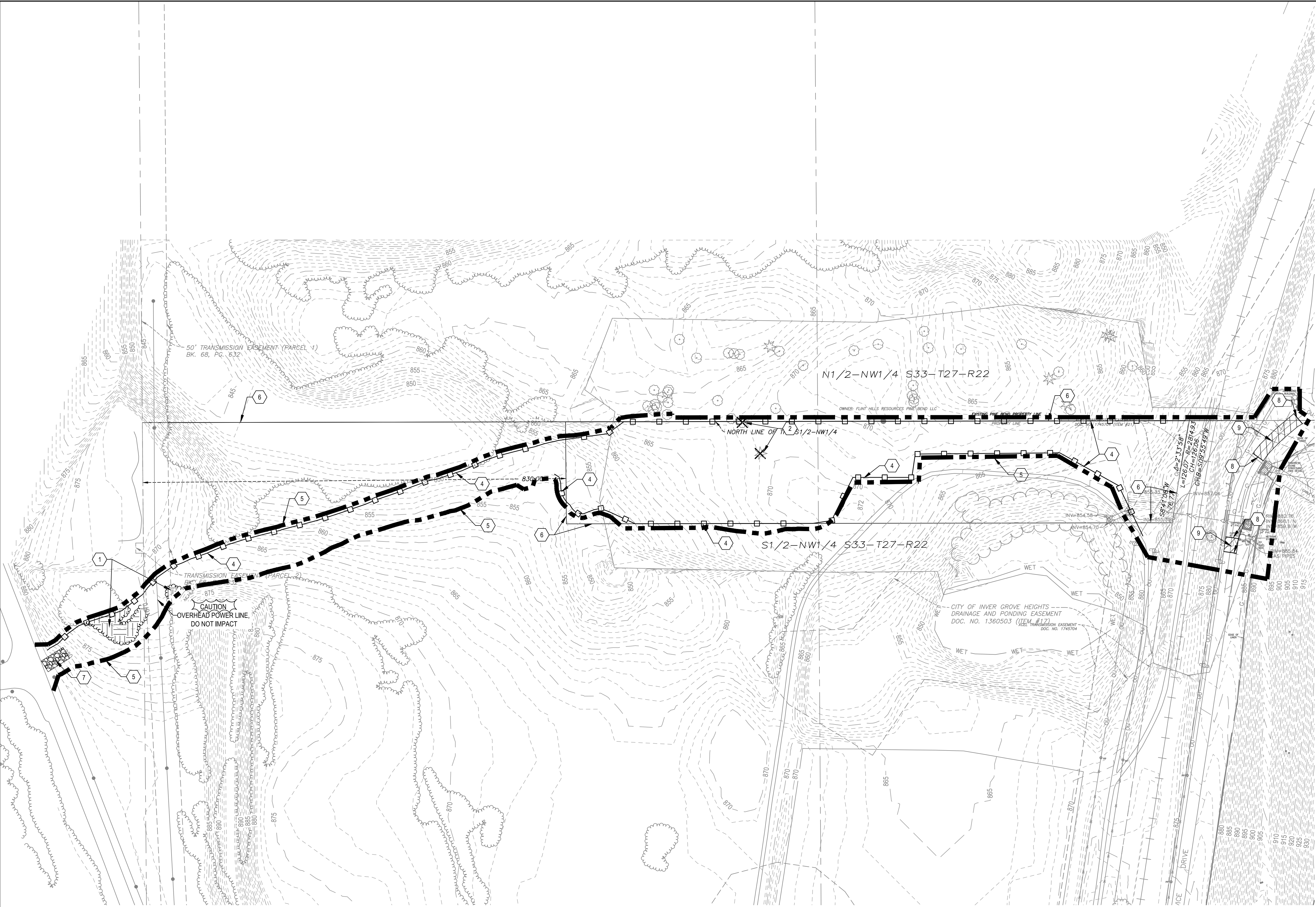
1

SHEET TITLE

EXISTING CONDITIONS

SHEET NO.

C-003



- LEGEND**
- PROPERTY BOUNDARY
 - LOT LINE
 - EASEMENT LINE
 - SETBACK LINE
 - RIGHT OF WAY LINE
 - SECTION LINE
 - QUARTER LINE
 - EXISTING EASEMENT LINE
 - EXISTING PROPERTY LINE
 - CLEAR AND GRUB AREA
 - ROCK CONSTRUCTION EXIT
 - REMOVE TREE
 - SILT FENCE
 - TREE PROTECTION
 - EXISTING MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - CONSTRUCTION LIMITS
 - SAWCUT PAVEMENT
 - REMOVE BITUMINOUS PAVEMENT

- NOTES**
- CONSTRUCTION SITE SHALL HAVE A STABILIZED ENTRANCE AT ALL TIMES THROUGHOUT THE DURATION OF THE PROJECT. CONTRACTOR IS ULTIMATELY RESPONSIBLE TO PROTECT DOWNSTREAM WATERS FROM CONSTRUCTION RUNOFF.
 - CONSTRUCTION LIMITS AND SILT FENCE ARE SHOWN OFFSET FOR CLARITY, WHERE APPLICABLE.
 - CLEAR AND GRUB AS NEEDED FOR CONSTRUCTION WITHIN THE LIMITS OF DISTURBANCE.

- KEYNOTES**
- CLEAR AND GRUB AREA
 - REMOVE TREE
 - INSTALL TREE PROTECTION
 - INSTALL SILT FENCE - SEE DETAIL
 - CONSTRUCTION LIMITS (TYP.)
 - PROPERTY BOUNDARY (TYP.)
 - INSTALL ROCK CONSTRUCTION ENTRANCE - SEE DETAIL
 - SAWCUT BITUMINOUS PAVEMENT TO FULL DEPTH
 - REMOVE BITUMINOUS PAVEMENT

WARNING:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

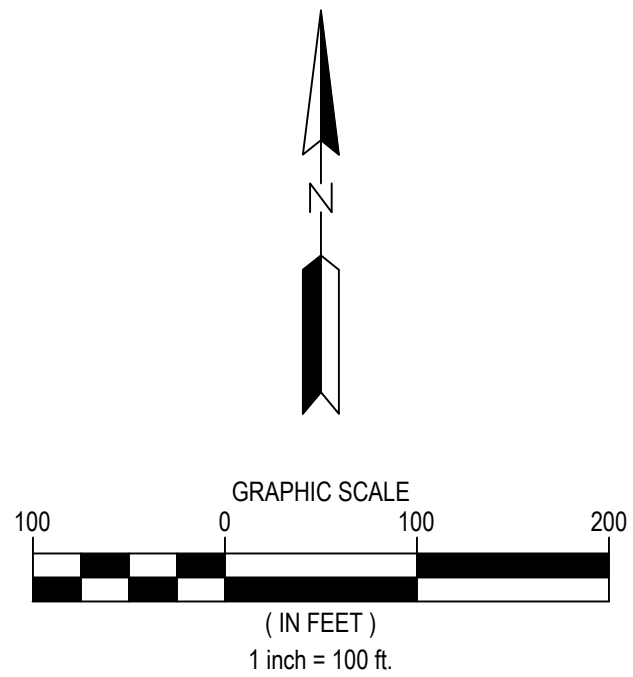
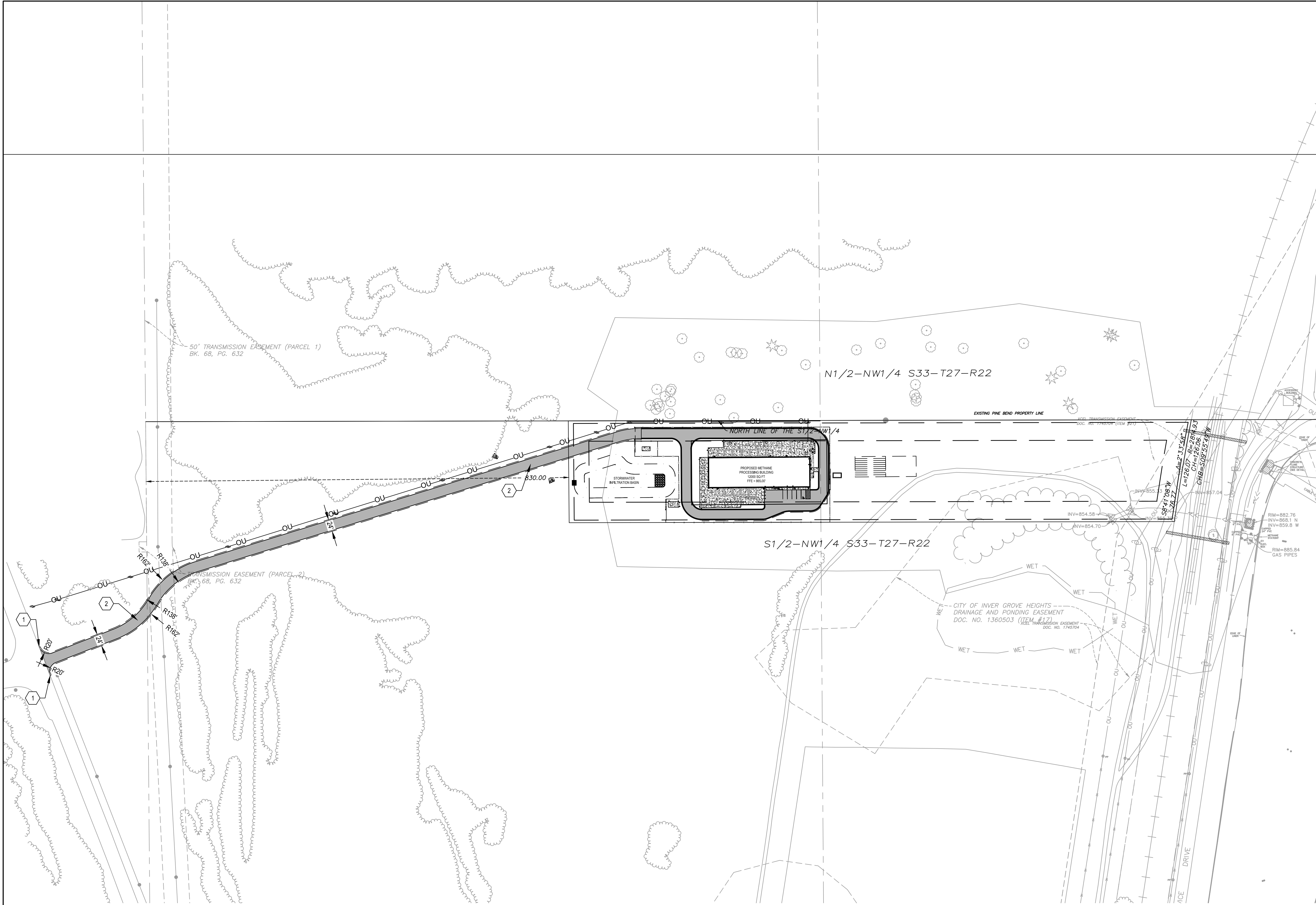
CLIENT:

www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION
11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:
ISSUE NO.: 1
DESCRIPTION: CITY SUBMITTAL
DATE: 12/21/2020
CERTIFICATION:
NOT FOR CONSTRUCTION
PROJECT NO.: 7251-20-500
DWN BY: MDH
CHKD BY: PWS
APPD BY: JTW
ISSUE DATE: 12/21/2020
ISSUE NO.: 1
SHEET TITLE:
REMOVALS AND
PRECONSTRUCTION
EROSION CONTROL PLAN
SHEET NO.:
C-004



LEGEND	
	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	EXISTING EASEMENT LINE
	EXISTING PROPERTY LINE
	CONCRETE PAVEMENT
	BITUMINOUS PAVEMENT
	FENCE
	RETAINING WALL [BY OTHERS]
	CURB AND GUTTER
	PROPOSED PARKING COUNT

- NOTES**
- SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.
- KEYNOTES**
- MATCH EXISTING
 - BITUMINOUS PAVEMENT - SEE DETAIL

WARNING:
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
 TWIN CITY AREA: 651-454-0002
 TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
 SUITE 300
 GOLDEN VALLEY, MN 55427
 PHONE: 763-262-6800
 FAX: 952-831-1268
 WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

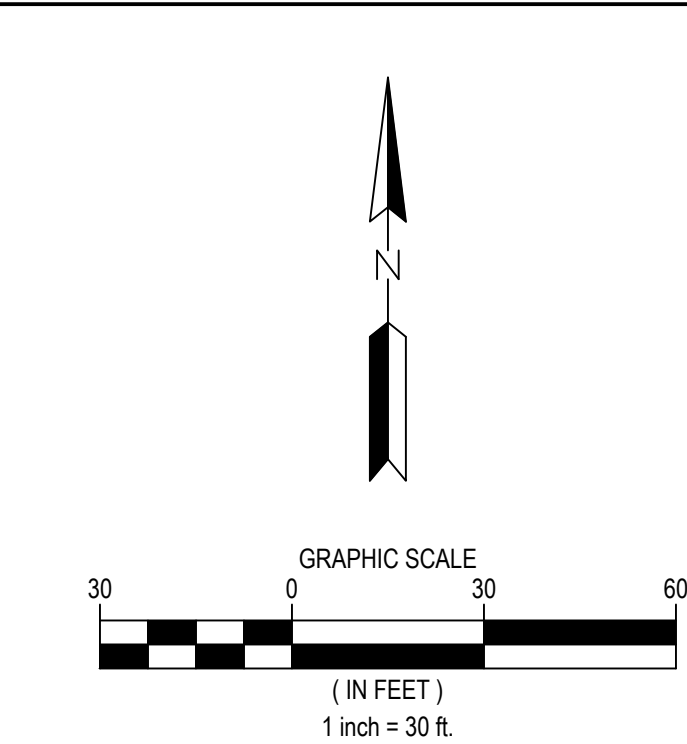
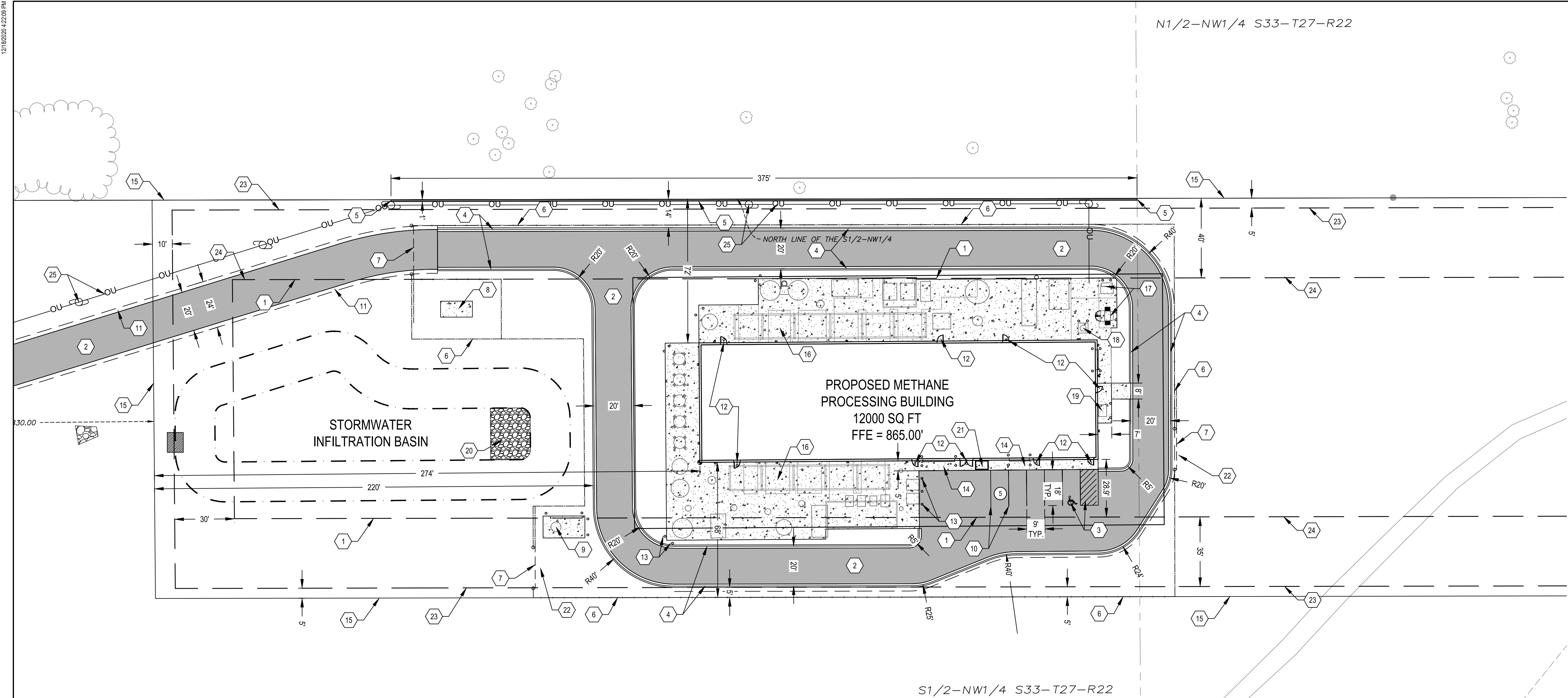
FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
 INVER GROVE HEIGHTS
 DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:	FORTISTAR RNG EXPANSION				
ISSUE NO.:	1				
DESCRIPTION:	CITY SUBMITTAL				
DATE:	12/21/2020				
CERTIFICATION:	NOT FOR CONSTRUCTION				
PROJECT NO.:	7251-20-500				
DWN BY:	MDH	CHKD BY:	PWS	APPD BY:	JTW
ISSUE DATE:	12/21/2020				
ISSUE NO.:	1				
SHEET TITLE:	OVERALL SITE PLAN				
SHEET NO.:	C-101				

12/18/2020 12:28 PM

N:\17261_SCS_Engineers\20500_Fortistar RNG Expansion\DESIGN\CADD\PLANS\SHEETS\01 SITE PLAN.dwg 12/18/2020 MICHAEL D. HUMMERICH



LEGEND	
	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	EXISTING EASEMENT LINE
	EXISTING PROPERTY LINE
	CONCRETE PAVEMENT
	BITUMINOUS PAVEMENT
	RIP RAP
	FENCE
	PROPOSED OVERHEAD ELECTRIC LINE
	RETAINING WALL (BY OTHERS)
	CURB AND GUTTER
	PROPOSED PARKING COUNT

NOTES

- SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.

KEYNOTES

- BUILDING SETBACK LINE
- BITUMINOUS PAVEMENT - SEE DETAIL
- ADA AISLE AND ACCESSIBLE PARKING - SEE DETAIL
- B612 CONCRETE CURB AND GUTTER (TYP.) - SEE DETAIL
- RETAINING WALL, 375 LF - (DESIGN BY OTHERS)
- 8' CHAIN LINK SECURITY FENCE (TYP.)
- SECURITY GATE
- CONCRETE EQUIPMENT PAD
- THERMAL OXIDIZER - (BY OTHERS)
- PAVEMENT STRIPE (TYP.)
- 2' WIDE GRAVEL SHOULDER - SEE DETAIL
- BUILDING ENTRANCE AND STOOP - SEE ARCHITECTURAL/ STRUCTURAL PLANS
- BOLLARD (TYP.) - SEE DETAIL
- 5' WIDE CONCRETE SIDEWALK
- PROPERTY BOUNDARY (TYP.)
- MECHANICAL EQUIPMENT AND TANKS (TYP.) - (BY OTHERS)
- ELECTRICAL TRANSFORMERS - (BY OTHERS)
- LANDFILL BIOGAS INLET SUMP - (BY OTHERS)
- HVAC CONDENSER - (BY OTHERS)
- RIP-RAP - SEE DETAIL
- TRASH RECEPTACLE
- FUTURE ROAD CONNECTION - (BY OTHERS)
- PARKING SETBACK LINE (TYP.)
- BUILDING SETBACK LINE (TYP.)
- PROPOSED OVERHEAD POWER LINE AND POWER POLES (TYP.) - COORDINATE LOCATION, DESIGN, AND INSTALLATION WITH DAKOTA ELECTRIC ASSOCIATION

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG

GOPHER STATE ONE CALL

TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

M:\17251_SGS_Engineer\202500-Fortstar-RING Expansion\6_DESIGN1_CADD PLANS\NETS\C-C-10 SITE PLAN.dwg, 12/10/2020 MICHAEL D. MINNERICH

SITE ANALYSIS TABLE			
ADDRESS		INVER GROVE HEIGHT S	
EXISTING ZONING		LIGHT INDUSTRIAL (LI)	
PROPOSED ZONING		LIGHT INDUSTRIAL (LI)	
PROPOSED USE		METHANE PROCESSING PLANT	
LOT AREA SUMMARY			
LOT NUMBER	TOTAL AREA (AC.)	IMPERVIOUS AREA (AC.)	PERVIOUS AREA (AC.)
EXISTING PARCEL SUMMARY	5.54	0	5.54
PROPOSED PARCEL SUMMARY	5.54	1.15	4.39
PROPOSED ACCESS DRIVE	1.63	0.62	0.96
BUILDING SUMMARY			
LOT NUMBER	BUILDING FOOTPRINT (SF)	GROSS FLOOR AREA (SF)	# OF STORIES
PROPOSED USE (use)	12,000	12,000	1
PARKING SUMMARY			
TOTAL PARKING	REQUIRED	PROPOSED	
PROPOSED USE (use)	4	5	
ACCESSIBLE PARKING	REQUIRED	PROPOSED	
PROPOSED USE (use)	1	1	
GREENSPACE SUMMARY			
	CODE REQUIREMENT	PROPOSED	
IMPERVIOUS AREA (INCL. BLDG.)	N/A	21%	
PERVIOUS AREA	N/A	79%	
BUILDING AREA	30%	5%	
SETBACK SUMMARY			
BUILDING SETBACKS	REQUIRED	PROPOSED	
FRONT (WEST)	40	274'	
SIDE (NORTH)	40	72'	
SIDE (SOUTH)	40	68"	
REAR (EAST)	40	725'	
PARKING SETBACKS			
FRONT (WEST)	10	220'	
SIDE (NORTH)	5	14'	
SIDE (SOUTH)	5	5'	
REAR (EAST)	5	683'	

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

1

DESCRIPTION:

CITY SUBMITTAL

DATE:

12/21/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY: MDH

CHKD BY: PWS

APPD BY: JTW

ISSUE DATE: 12/21/2020

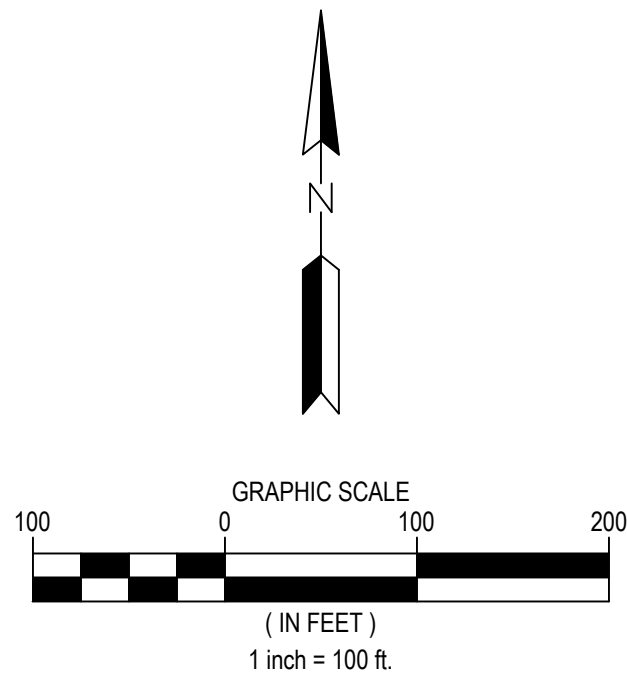
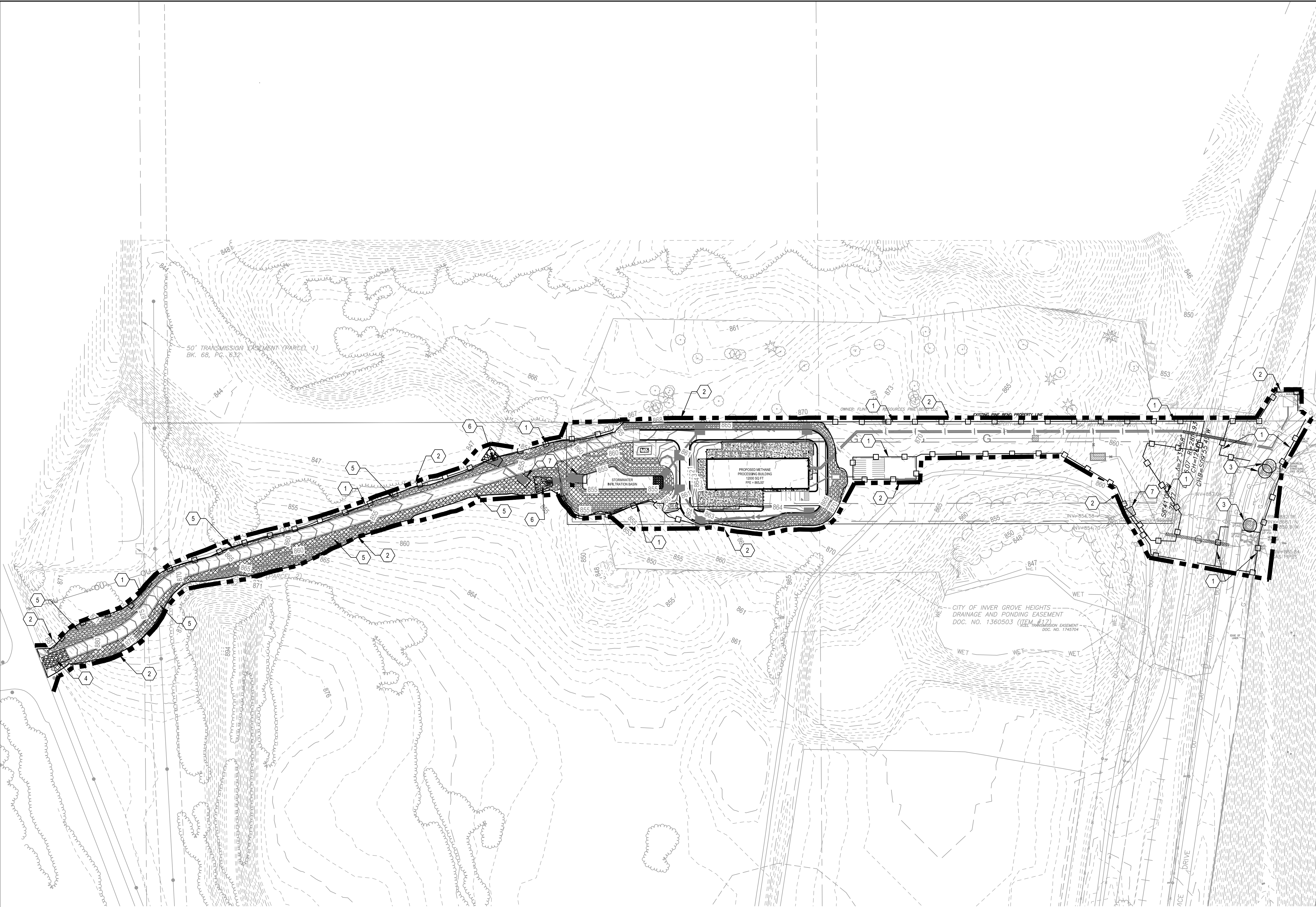
ISSUE NO.: 1

SHEET TITLE:

ENALRGED SITE PLAN

SHEET NO.:

C-102



LEGEND

- PROPERTY BOUNDARY
- LOT LINE
- EASEMENT LINE
- SETBACK LINE
- RIGHT OF WAY LINE
- SECTION LINE
- QUARTER LINE
- EXISTING EASEMENT LINE
- EXISTING PROPERTY LINE
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- ROCK CONSTRUCTION EXIT
- EROSION CONTROL BLANKET
- SILT FENCE
- CONSTRUCTION LIMITS
- STORM SEWER
- SANITARY SEWER
- WATERMAIN
- GAS LINE
- STORM MANHOLE
- STORM CATCH BASIN
- FLARED END SECTION
- RIPRAP
- INLET PROTECTION
- CULVERT PROTECTION
- TREE PROTECTION

NOTES

- SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.

KEYNOTES

- INSTALL SILT FENCE - SEE DETAIL
- CONSTRUCTION LIMITS (TYP.)
- INSTALL CULVERT PROTECTION - SEE DETAIL
- INSTALL ROCK CONSTRUCTION ENTRANCE - SEE DETAIL
- INSTALL EROSION CONTROL BLANKET - SEE DETAIL
- INSTALL RIP RAP - SEE DETAIL

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG

GOPHER STATE ONE CALL

TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

WENCK

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

SCS
ENGINEERS
www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

ISSUE NO.:

1

DESCRIPTION:

CITY SUBMITTAL

DATE:

12/21/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.:

7251-20-500

DWN BY: MDH

CHKD BY: PWS

APPD BY: JTJ

ISSUE DATE: 12/21/2020

ISSUE NO.:

1

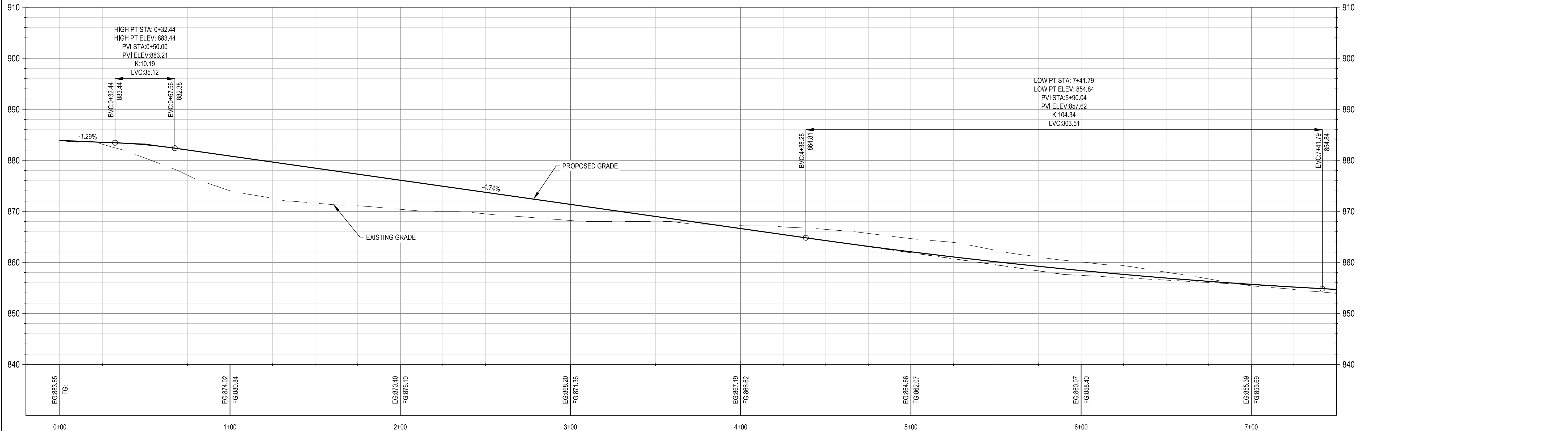
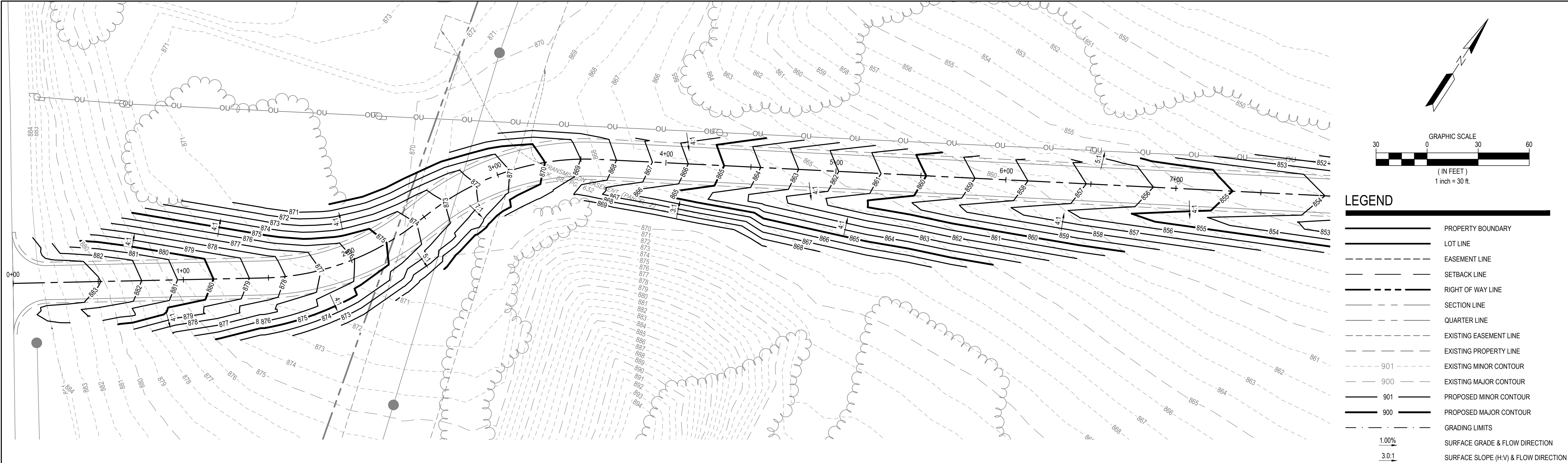
SHEET TITLE:
OVERALL
POST-CONSTRUCTION
STABILIZATION PLAN

SHEET NO.:

C-201

12/18/2020 12:29 PM

M:\17261_SCS_Engineers\2020_Fortistar RNG Expansion\5. DESIGN\1. CAD\3 PLANS\17261-Fortistar RNG Expansion\5. DESIGN\1. CAD\3 PLANS\17261-Fortistar RNG Expansion.dwg 12/18/2020 MICHAEL D. HMMERICH



7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

ISSUE NO.	DESCRIPTION	DATE
1	CITY SUBMITTAL	12/21/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.:

7251-20-500

DWN BY:

MDH

CHKD BY:

PWS

APPD BY:

JTW

ISSUE DATE:

12/21/2020

ISSUE NO.:

1

SHEET TITLE:

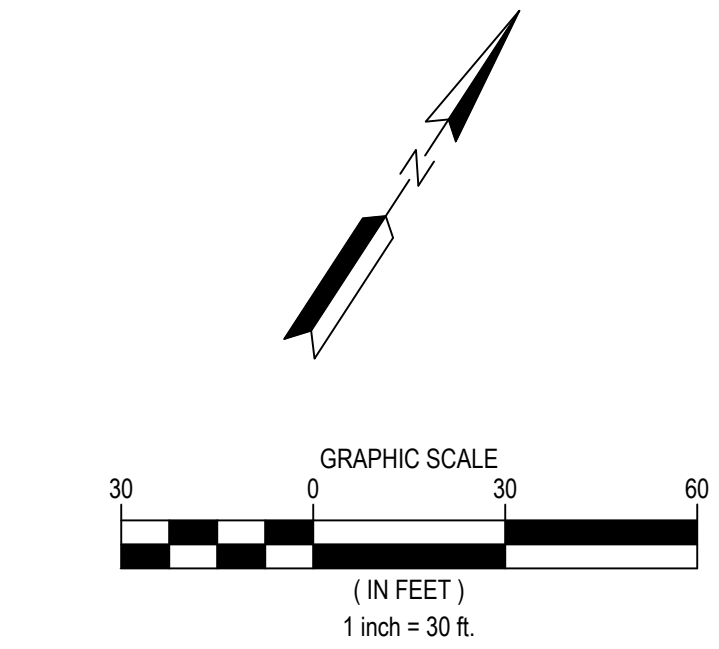
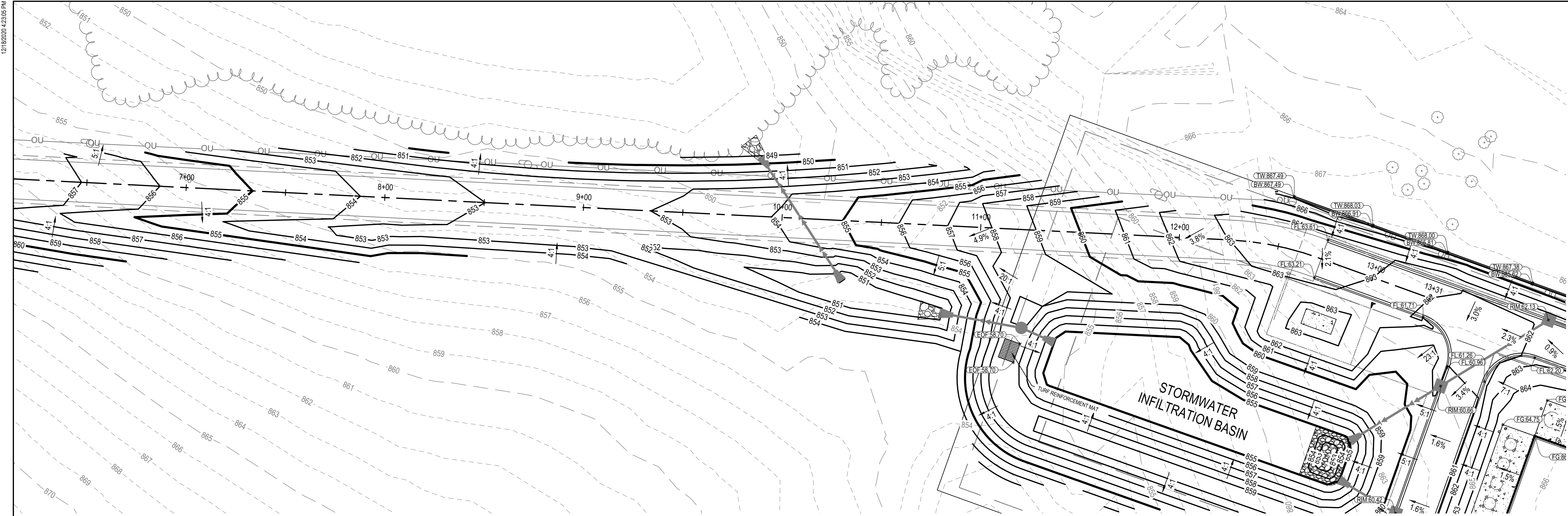
ENTRANCE ROAD
PLAN & PROFILE
(WEST)

SHEET NO.:

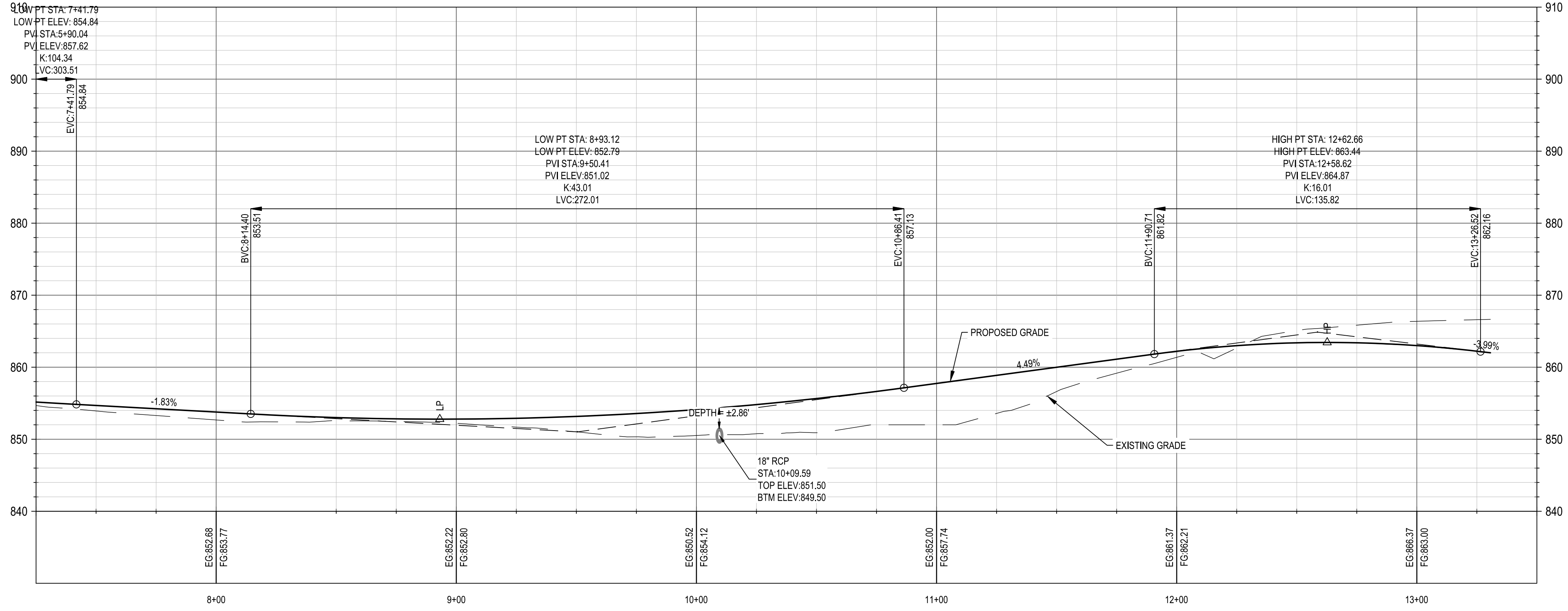
C-302

12/16/2020 12:33 PM

M:\1261_SCS_Engineers\2020_Fortistar RNG Expansion\DESIGN\CADD\PLANS\SHETS\C-301 GRADING PLAN.dwg 12/16/2020 MICHAEL D. HMMERICH



- LEGEND**
- PROPERTY BOUNDARY
 - LOT LINE
 - EASEMENT LINE
 - SETBACK LINE
 - RIGHT OF WAY LINE
 - SECTION LINE
 - QUARTER LINE
 - EXISTING EASEMENT LINE
 - EXISTING PROPERTY LINE
 - EXISTING MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - PROPOSED MAJOR CONTOUR
 - GRADING LIMITS
 - SURFACE GRADE & FLOW DIRECTION
 - SURFACE SLOPE (H:V) & FLOW DIRECTION





7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:



www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

ISSUE NO.: 1

DESCRIPTION: CITY SUBMITTAL

DATE: 12/21/2020

CERTIFICATION:

PROJECT NO.: 7251-20-500

DWN BY: MDH

CHKD BY: PWS

APPD BY: JTJW

ISSUE DATE: 12/21/2020

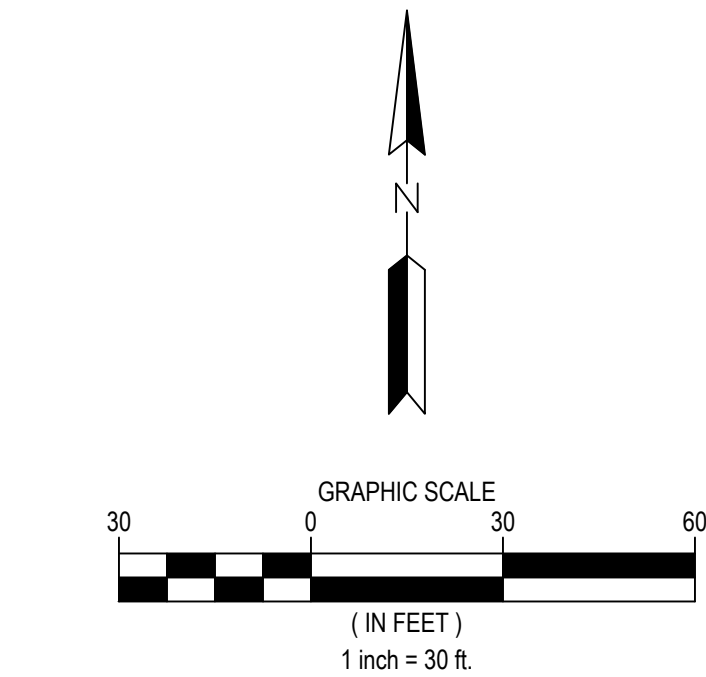
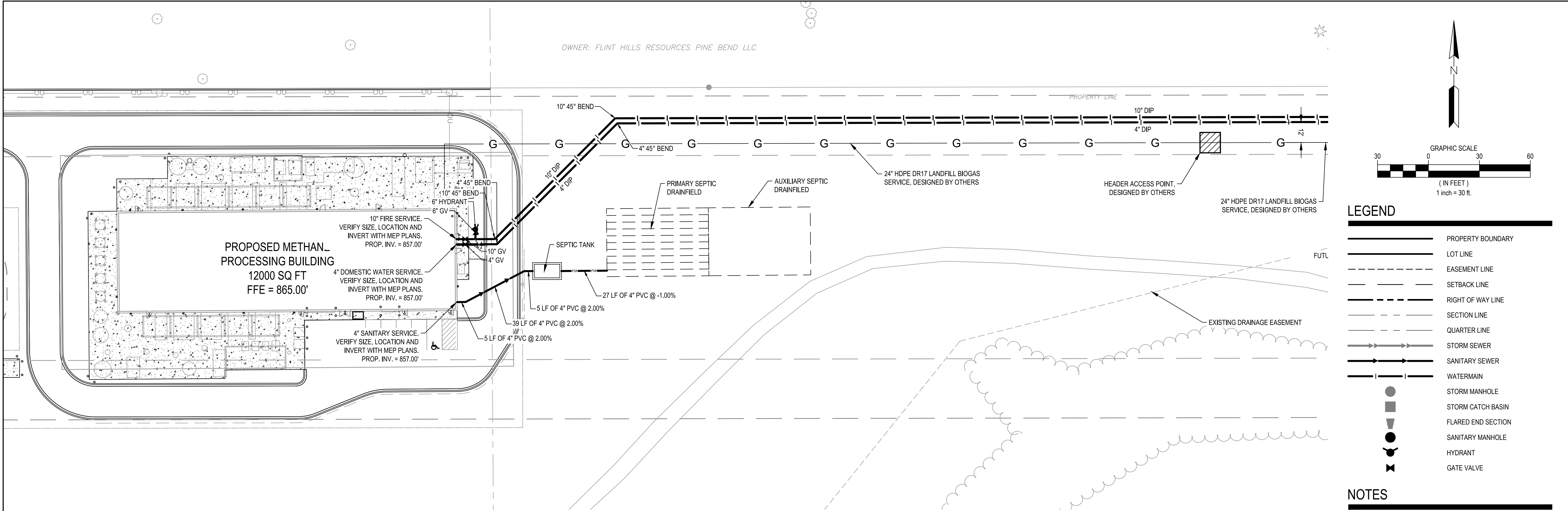
ISSUE NO.: 1

SHEET TITLE: ENTRANCE ROAD PLAN & PROFILE (EAST)

SHEET NO.: C-303

12/18/2020 12:13 PM

N:\17261_SCS_Engineers\2020 Fortistar RNG Expansion\DESIGN\ CAD\ PLANS\ SHEETS\ C-401 UTILITY PLAN.dwg 12/18/2020 MICHAEL D. HIMMERICH



LEGEND

	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	STORM SEWER
	SANITARY SEWER
	WATERMAIN
	STORM MANHOLE
	STORM CATCH BASIN
	FLARED END SECTION
	SANITARY MANHOLE
	HYDRANT
	GATE VALVE

NOTES

1. SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG

GOPHER STATE ONE CALL

TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

DATE:	DESCRIPTION:	ISSUE NO.:
12/21/2020	CITY SUBMITTAL	1

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY:	CHKD BY:	APPD BY:
MDH	PWS	JTW

ISSUE DATE: 12/21/2020

ISSUE NO.: 1

SHEET TITLE:

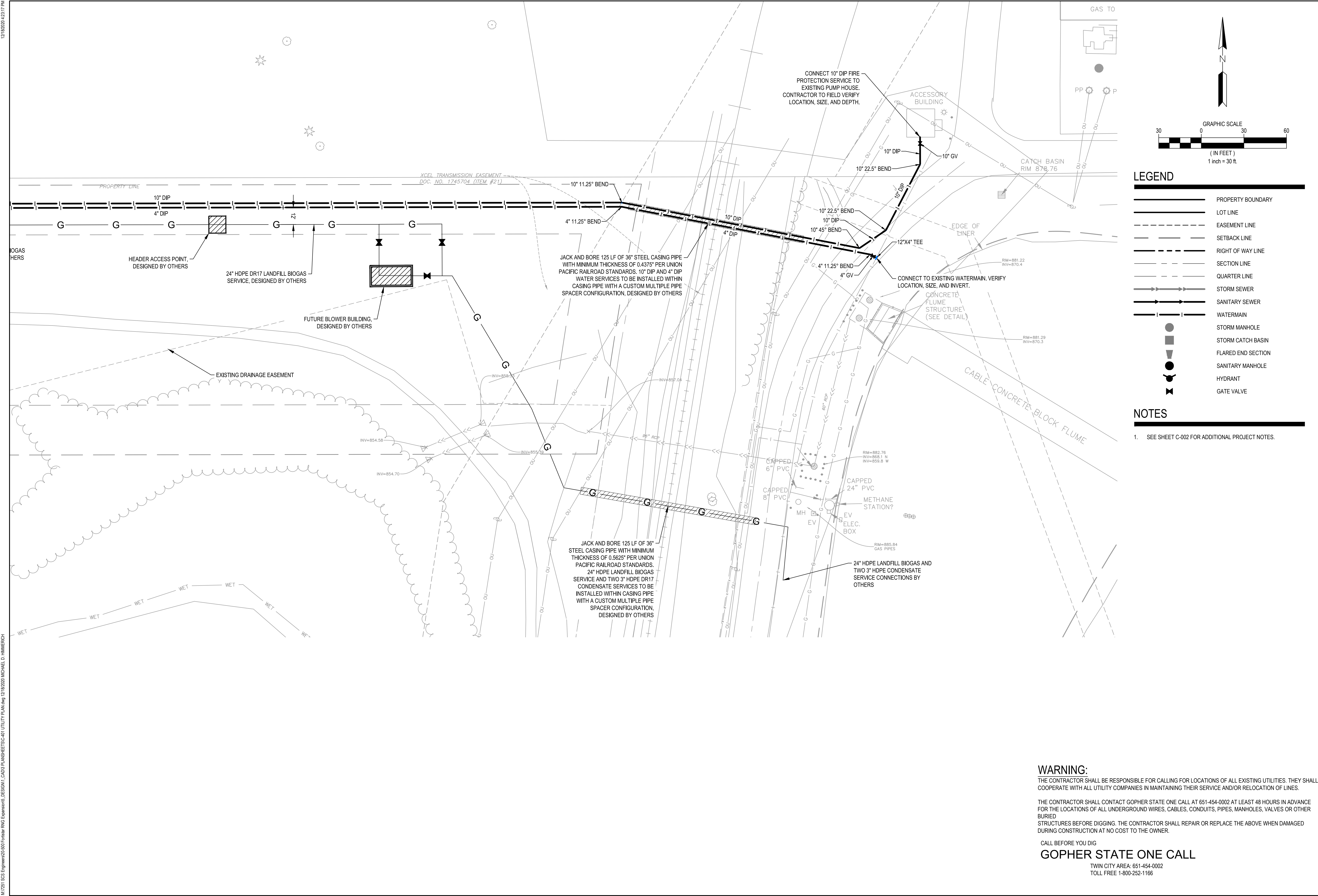
UTILITY PLAN AND PROFILE (WEST)

SHEET NO.:

C-401

12/18/2020 12:31:17 PM

N:\1251 SCS Engineers\201500 Fortistar RNG Expansion\DESIGN\ CAD\ PLANS\SHEETS\401 UTILITY PLAN.dwg 12/18/2020 MICHAEL D. HIMMERICH



WARNING:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE	ISSUE NO.	DESCRIPTION	DATE	CERTIFICATION
FORTISTAR RNG EXPANSION	1	CITY SUBMITTAL	12/21/2020	NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY: MDH	CHKD BY: PWS	APPD BY: JTW
-------------	--------------	--------------

ISSUE DATE: 12/21/2020

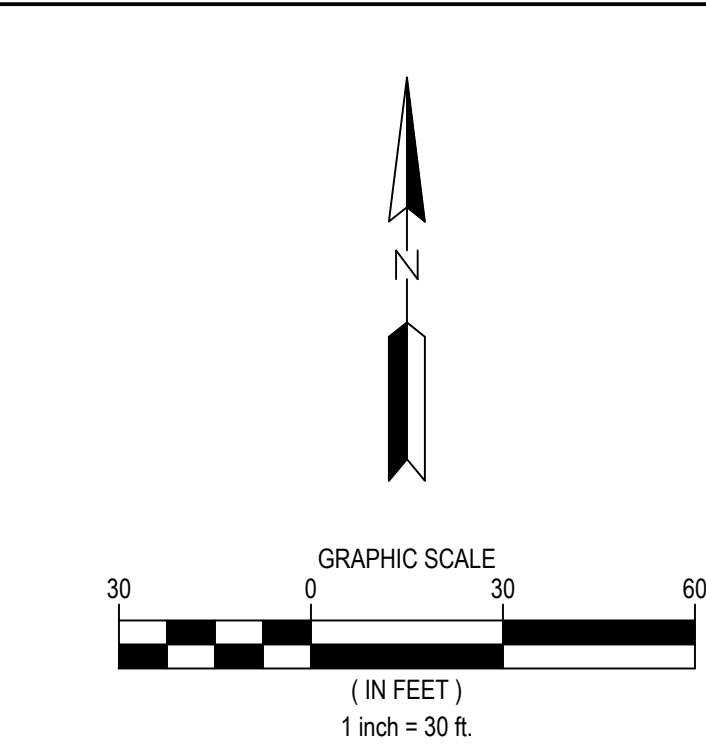
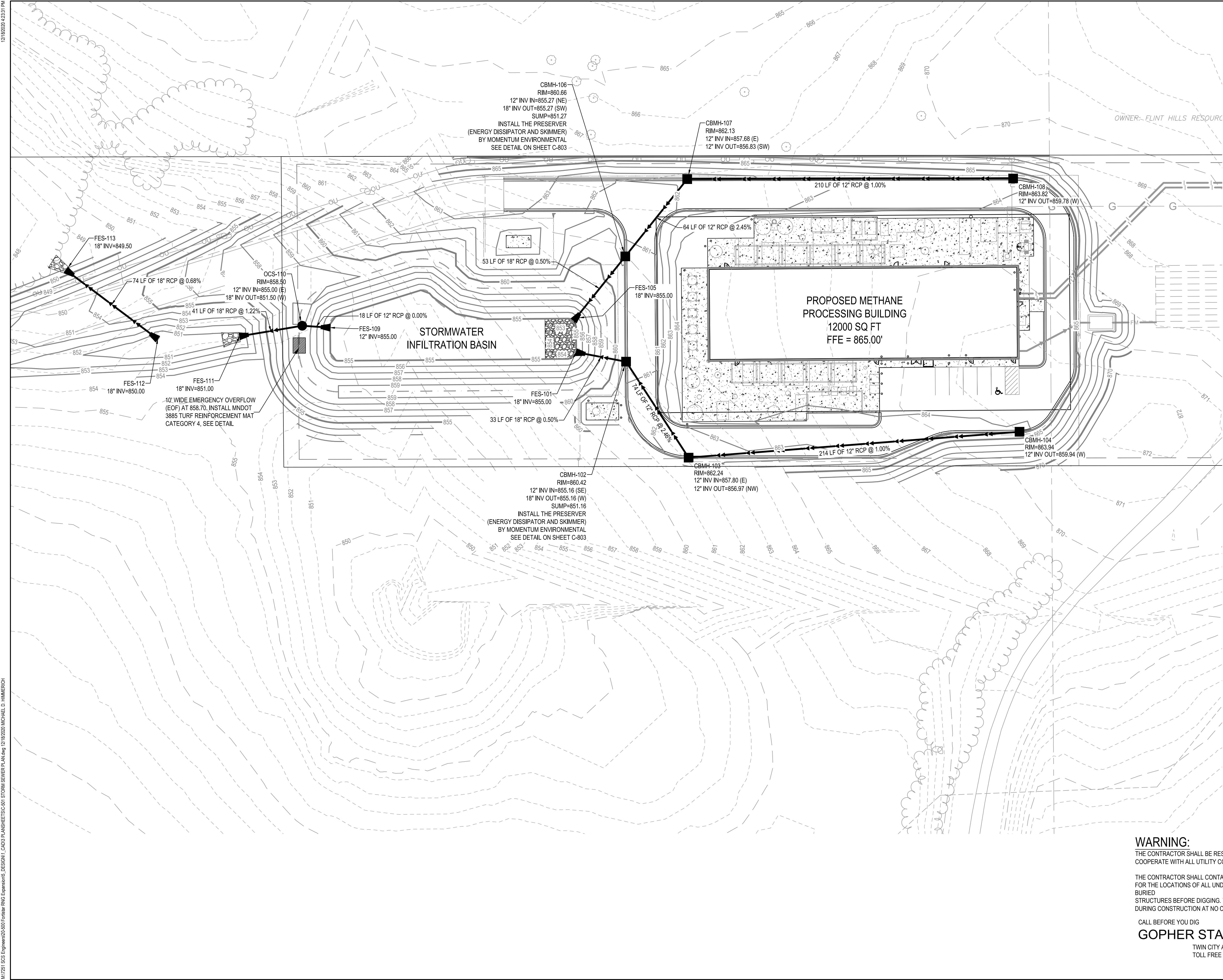
ISSUE NO.: 1

SHEET TITLE:
UTILITY PLAN AND PROFILE (EAST)

SHEET NO.:
C-402

12/18/2020 12:31 PM

M:\17261_SCS_Engineers\2020_Fortistar RNG Expansion\DESIGN\ CAD\3 PLANS\HETS\C-501 STORM SEWER PLAN.dwg 12/18/2020 MICHAEL D. HIMMERICH



LEGEND	
	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	EXISTING EASEMENT LINE
	EXISTING PROPERTY LINE
	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	STORM SEWER
	SANITARY SEWER
	SANITARY FORCEMAIN
	WATERMAIN
	STORM MANHOLE
	STORM CATCH BASIN
	FLARED END SECTION
	SANITARY MANHOLE
	GATE VALVE

NOTES

1. SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.

WARNING:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

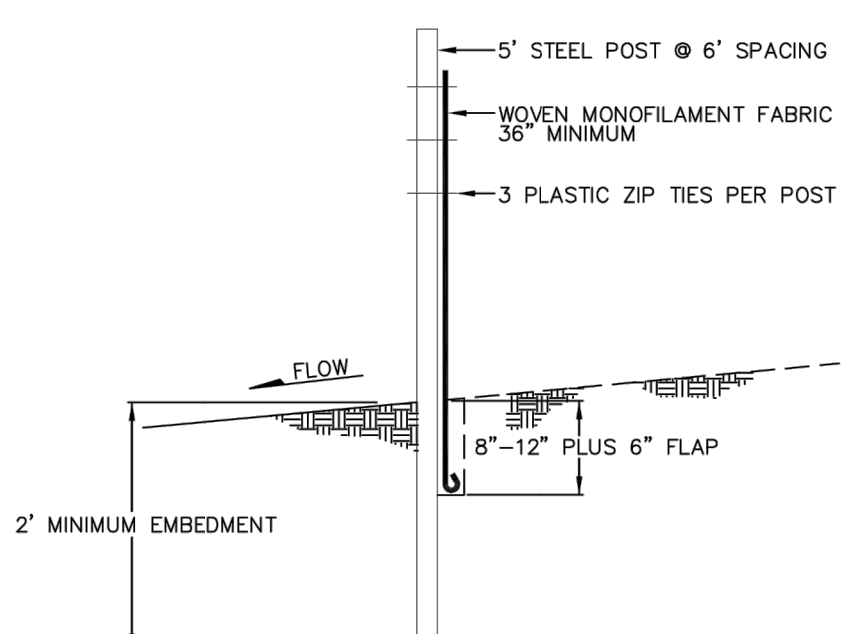
www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

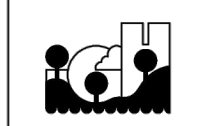
PROJECT TITLE	FORTISTAR RNG EXPANSION
ISSUE NO.	1
DESCRIPTION	CITY SUBMITTAL
DATE	12/1/2020
CERTIFICATION:	
NOT FOR CONSTRUCTION	
PROJECT NO.:	7251-20-500
DWN BY:	MDH
CHKD BY:	PWS
APPD BY:	JTW
ISSUE DATE:	12/21/2020
ISSUE NO.:	1
SHEET TITLE:	STORM SEWER PLAN
SHEET NO.:	C-501



MACHINE SLICED SILT FENCE

NOTES:

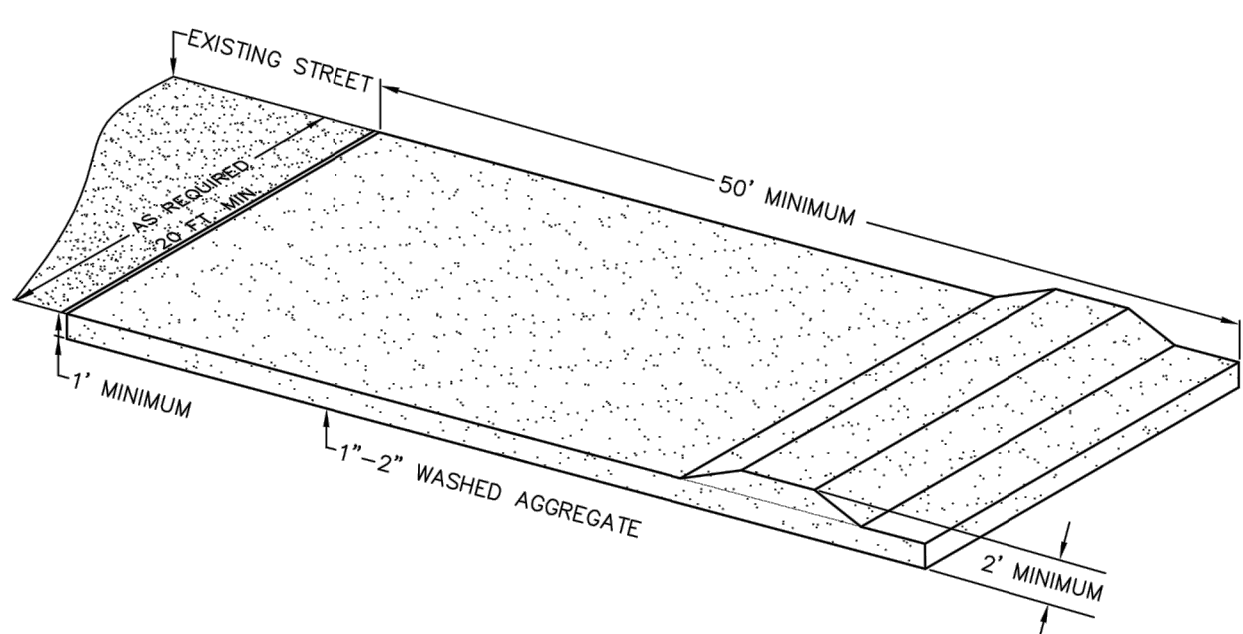
- WOOD POSTS MAY BE USED IN NON-CRITICAL AREAS. WOOD POST SPACING AT 4' MAXIMUM. STEEL POSTS ARE REQUIRED WHEN HEAVY DUTY SILT FENCE IS SPECIFIED.
- SILT FENCE MUST BE CLEANED OR REPLACED WHEN SILT DEPTH IS 1/3 HEIGHT OF FABRIC.



SILT FENCE
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

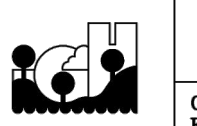
4/11

PLATE NO.
EC-02



NOTES:

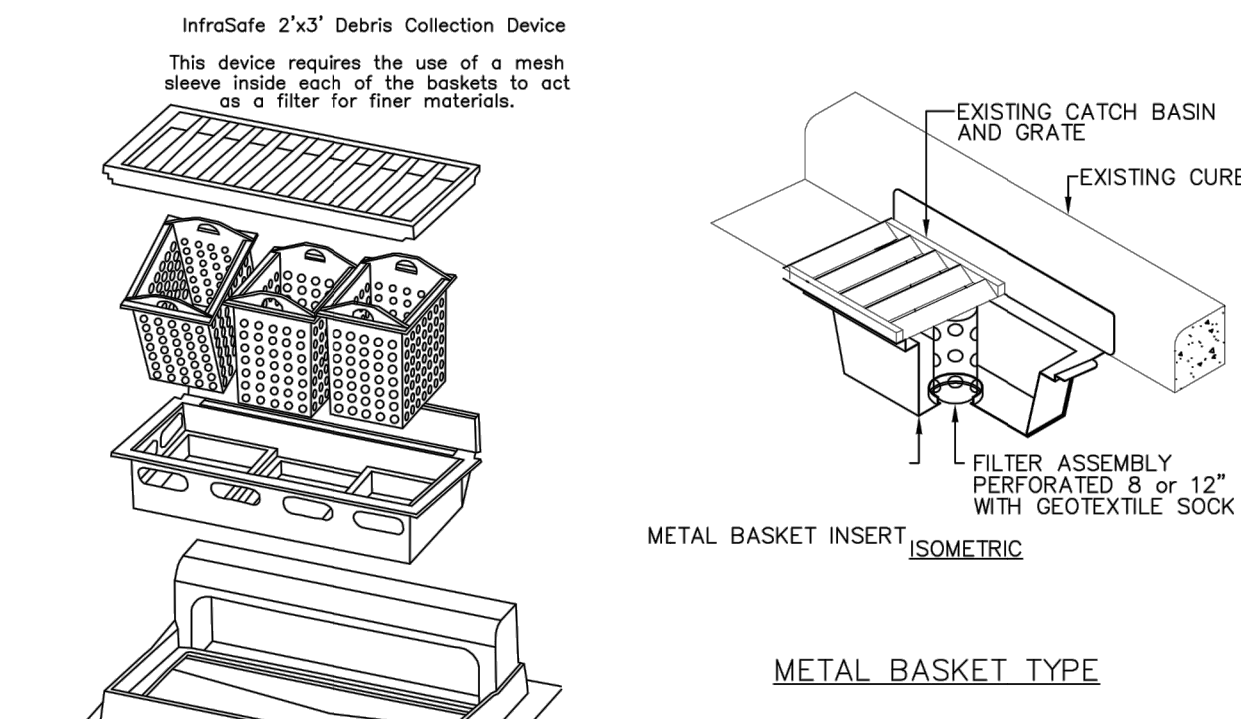
- ROCK CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITY.
- FOR RESIDENTIAL CONSTRUCTION, CLASS 5 MAY BE INSTALLED AS A ROCK CONSTRUCTION ENTRANCE
- AGGREGATE SHALL BE CLEANED, MAINTAINED, OR REPLENISHED AS NECESSARY.
- SILT TRACKED ONTO THE STREET SHALL BE SWEEPED THE SAME DAY BY A WATER BASED SWEEPER.
- LENGTH MAY BE MODIFIED AND 1' HIGH RIDGE MAY BE ELIMINATED FOR RESIDENTIAL CONSTRUCTION.



ROCK CONSTRUCTION ENTRANCE
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

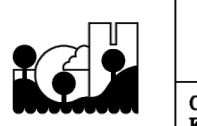
4/11

PLATE NO.
EC-03



NOTES:

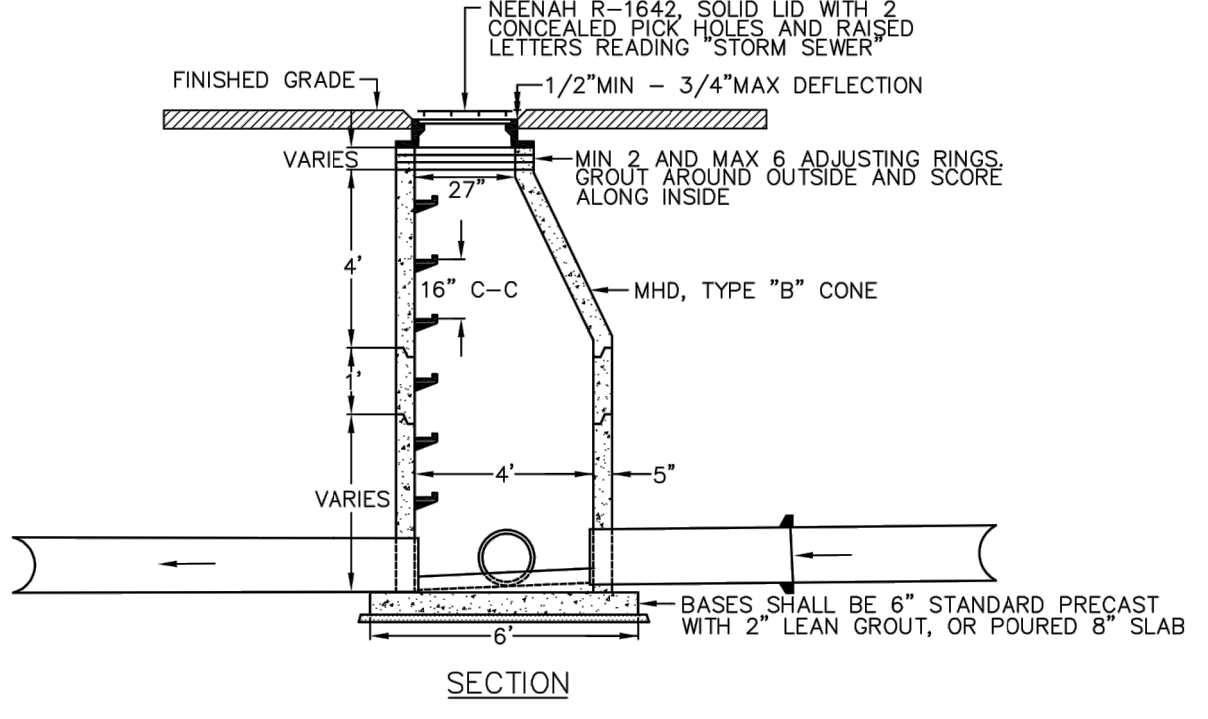
- EACH STORM WATER INLET REQUIRES AN APPROVED INLET PROTECTION DEVICE FROM THE TIME THE CASTING AND RINGS ARE PLACED UNTIL THE SURROUNDING AREAS ARE ESTABLISHED, OR UNTIL DIRECTED BY THE CITY ENGINEER.
- THESE DEVICES SHALL BE REMOVED WHEN THERE IS FROST IN THE GROUND AND REINSTALLED WHEN THE GROUND THAWS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE PLACEMENT, MAINTENANCE, AND REMOVAL OF ALL INLET PROTECTION DEVICES.
- SEALING THE SORM SEWER INLET WITH FABRIC IS NOT AN APPROVED METHOD OF INLET PROTECTION.



STORM SEWER INLET PROTECTION
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

4/11

PLATE NO.
EC-04



SECTION

NOTES:

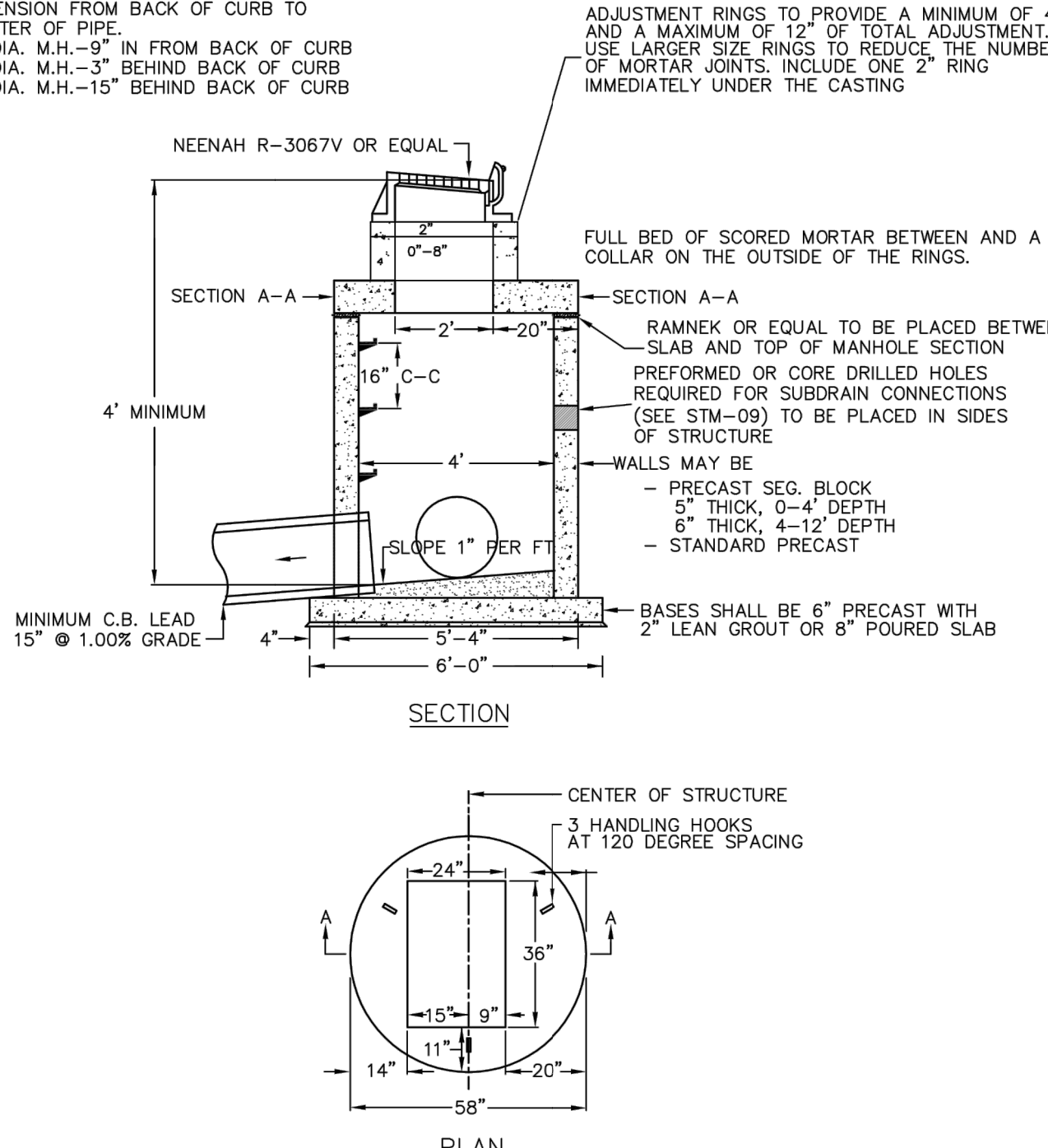
- ALL MANHOLES MUST BE A MINIMUM OF 4' IN DEPTH.
- MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET VERTICAL PORTION OF CONE IS FACING DOWNSTREAM.
- PROVIDE POURED CONCRETE INVERTS AND DOGHOUSES.
- GROUT ALL LIFT HOLES.
- MARKING POSTS SHALL BE INSTALLED AT ALL MANHOLES LOCATED OUTSIDE OF STREET SECTION. SEE PLATE NO. MISC-01.
- MINIMUM 48" DIAMETER WHEN PIPE IS 36" OR SMALLER
MINIMUM 72" DIAMETER WHEN PIPE IS LARGER THAN 36"



STORM STANDARD MANHOLE
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

8/13

PLATE NO.
STM-01

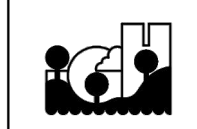


SECTION

PLAN

NOTES:

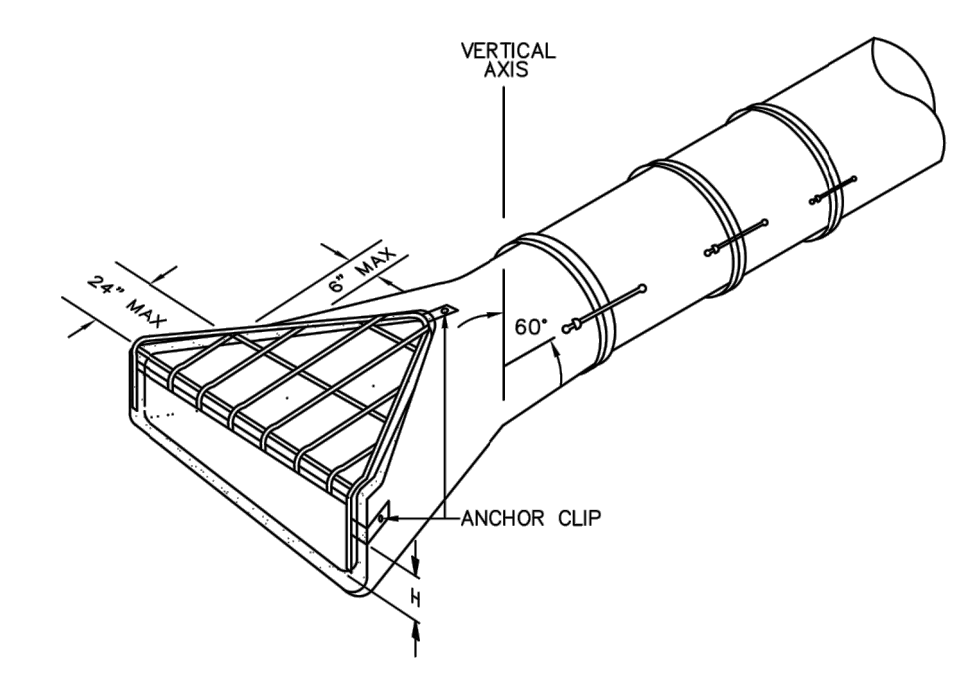
- ALL CATCH BASIN/MANHOLES MUST BE A MINIMUM OF 4' IN DEPTH.
- PROVIDE POURED CONCRETE INVERTS AND DOGHOUSES.
- GROUT ALL LIFT HOLES.
- DRAINTILE SHALL BE INSTALLED AT ALL CATCH BASINS. SEE PLATE NO. STM-09.
- STEPS SHALL BE PLACED IN EITHER FRONT CORNER DEPENDING ON PIPE CONFIGURATION.



CATCH BASIN/MANHOLE WITH RECTANGULAR LID
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

1/17

PLATE NO.
STM-02



TIE BOLT & FASTENER ASSEMBLY

NOTES:

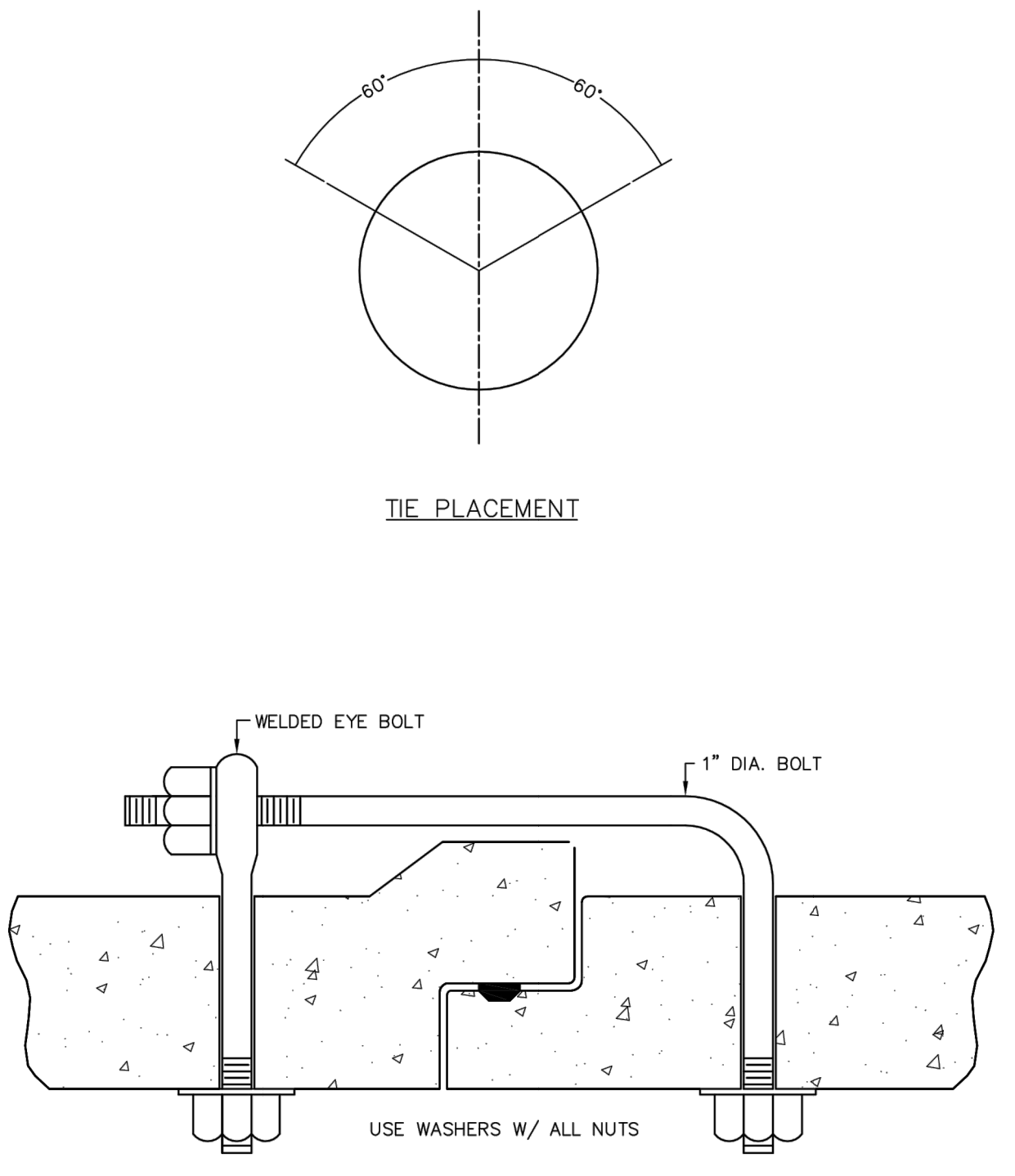
- USE TWO TIE BOLT FASTENERS PER JOINT INSTALLED AT 60' FROM TOP OF PIPE.
- LAST THREE JOINTS SHALL BE TIED.
- TYING AND TRASH GUARD SHALL BE INCLUDED IN UNIT PRICE BID FOR END SECTION.
- BARS AND PLATES ARE HOT-ROLLED STEEL.
- BARS, PLATES, PIPE, AND BOLTS ARE GALVANIZED.
- VERTICAL OPENING SHALL BE A MAXIMUM OF 6" AND A MINIMUM OF 4" HIGH
- FOR RIP RAP PLACEMENT SEE DETAIL STM-12
- TRASH GUARDS ON 15"-18" FLARED END SECTIONS SHALL BE PLACED ON POND OUTLETS ONLY. DO NOT PLACE ON POND INLETS OR CULVERTS.



STANDARD FLARED END SECTION AND TRASH GUARD
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

4/17

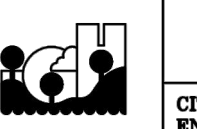
PLATE NO.
STM-10



PIPE TIE DETAIL

NOTES:

- USE TWO TIE BOLT FASTENERS PER JOINT INSTALLED AT 60' FROM TOP OF PIPE.
- LAST THREE JOINTS SHALL BE TIED.
- TYING AND TRASH GUARD SHALL BE INCLUDED IN UNIT PRICE BID FOR END SECTION.
- BARS AND PLATES ARE HOT-ROLLED STEEL.
- BARS, PLATES, PIPE, AND BOLTS ARE GALVANIZED.
- VERTICAL OPENING SHALL BE A MAXIMUM OF 6" AND A MINIMUM OF 4" HIGH
- FOR RIP RAP PLACEMENT SEE DETAIL STM-12
- TRASH GUARDS ON 15"-18" FLARED END SECTIONS SHALL BE PLACED ON POND OUTLETS ONLY. DO NOT PLACE ON POND INLETS OR CULVERTS.



PIPE TIE DETAIL
CITY OF INVER GROVE HEIGHTS
ENGINEERING DEPARTMENT

3/11

PLATE NO.
STM-11



7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

SCS ENGINEERS
www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

ISSUE NO.: 1

DESCRIPTION: CITY SUBMITTAL

DATE: 12/1/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

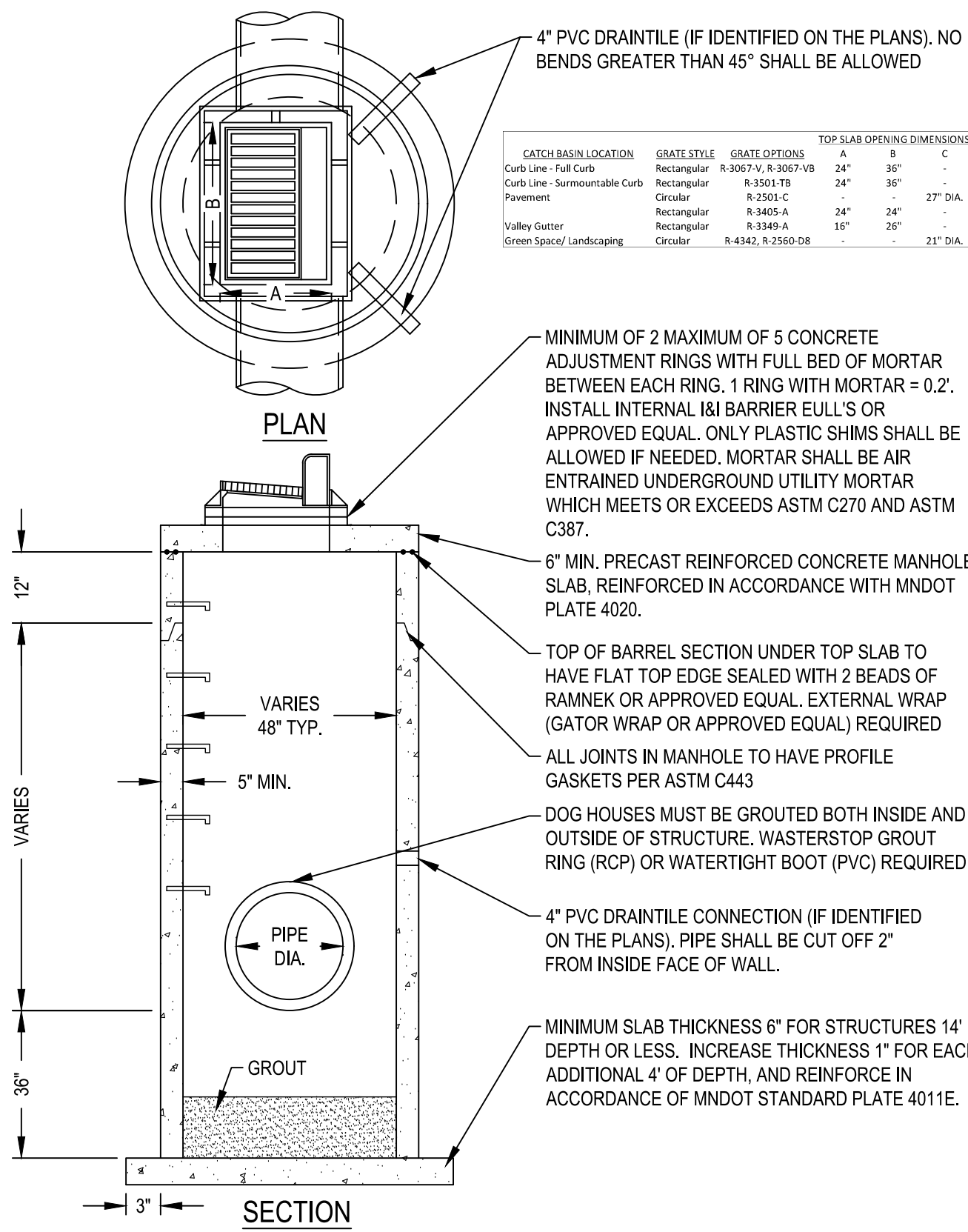
DWN BY: MDH CHKD BY: PWS APPD BY: JTJ

ISSUE DATE: 12/21/2020

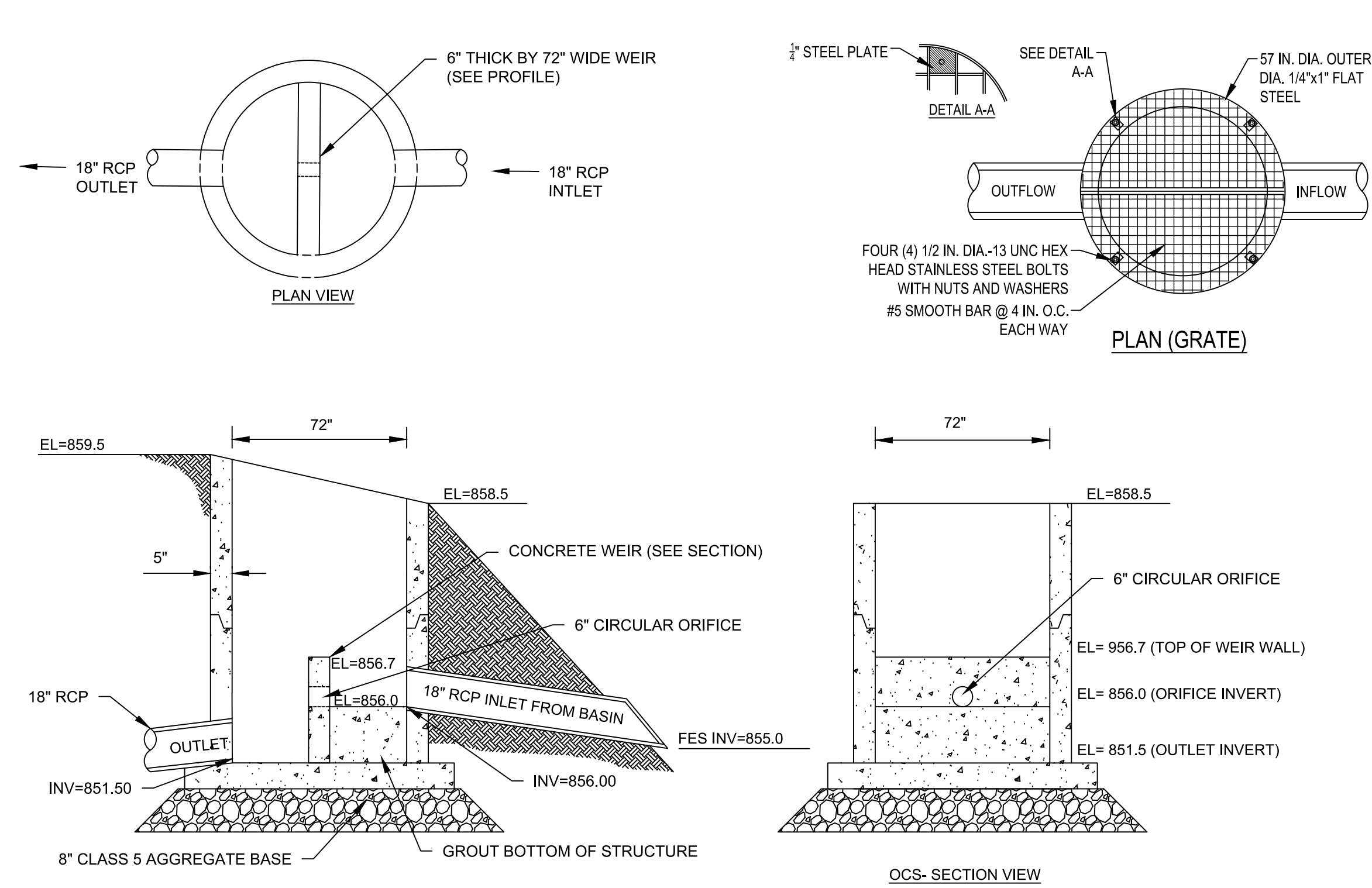
ISSUE NO.: 1

SHEET TITLE: DETAILS

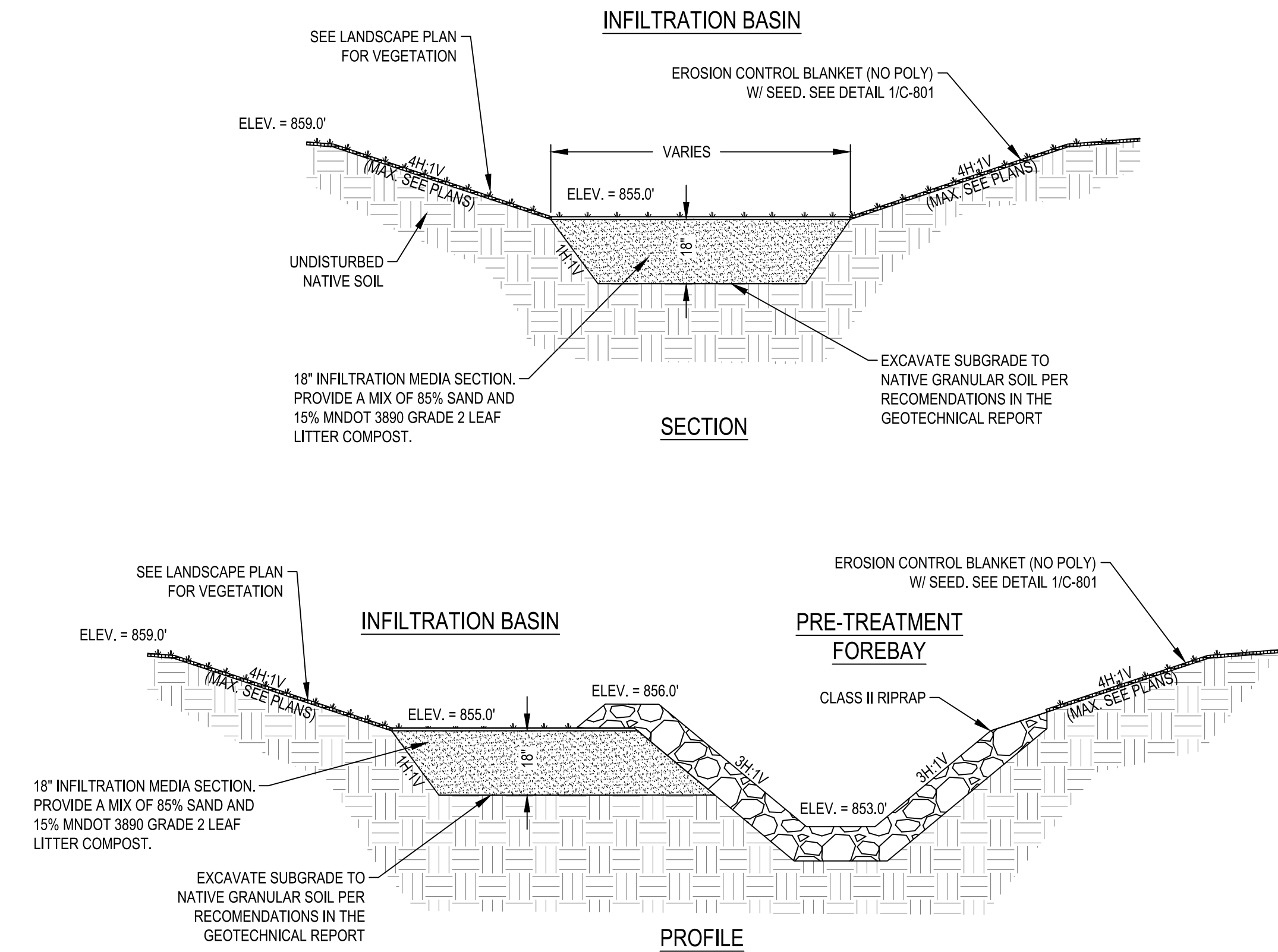
SHEET NO.: C-801



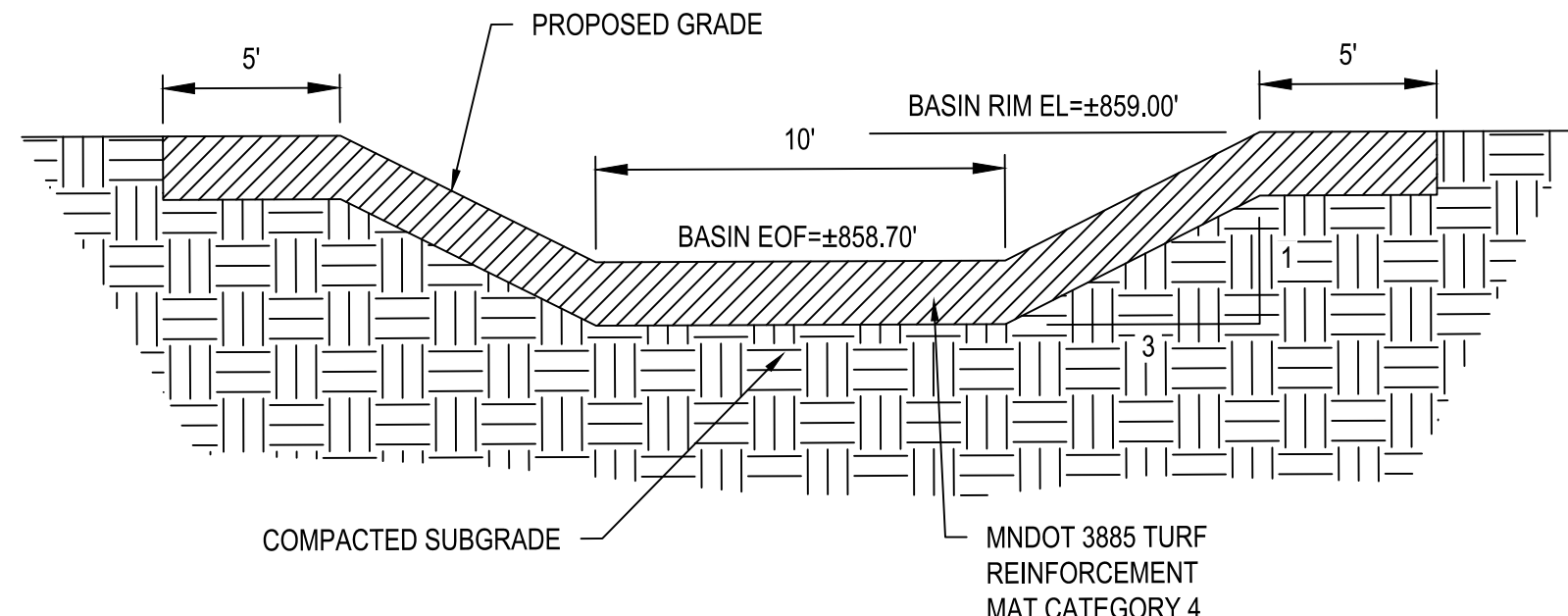
1 CATCH BASIN MANHOLE WITH SUMP
C-803 NOT TO SCALE



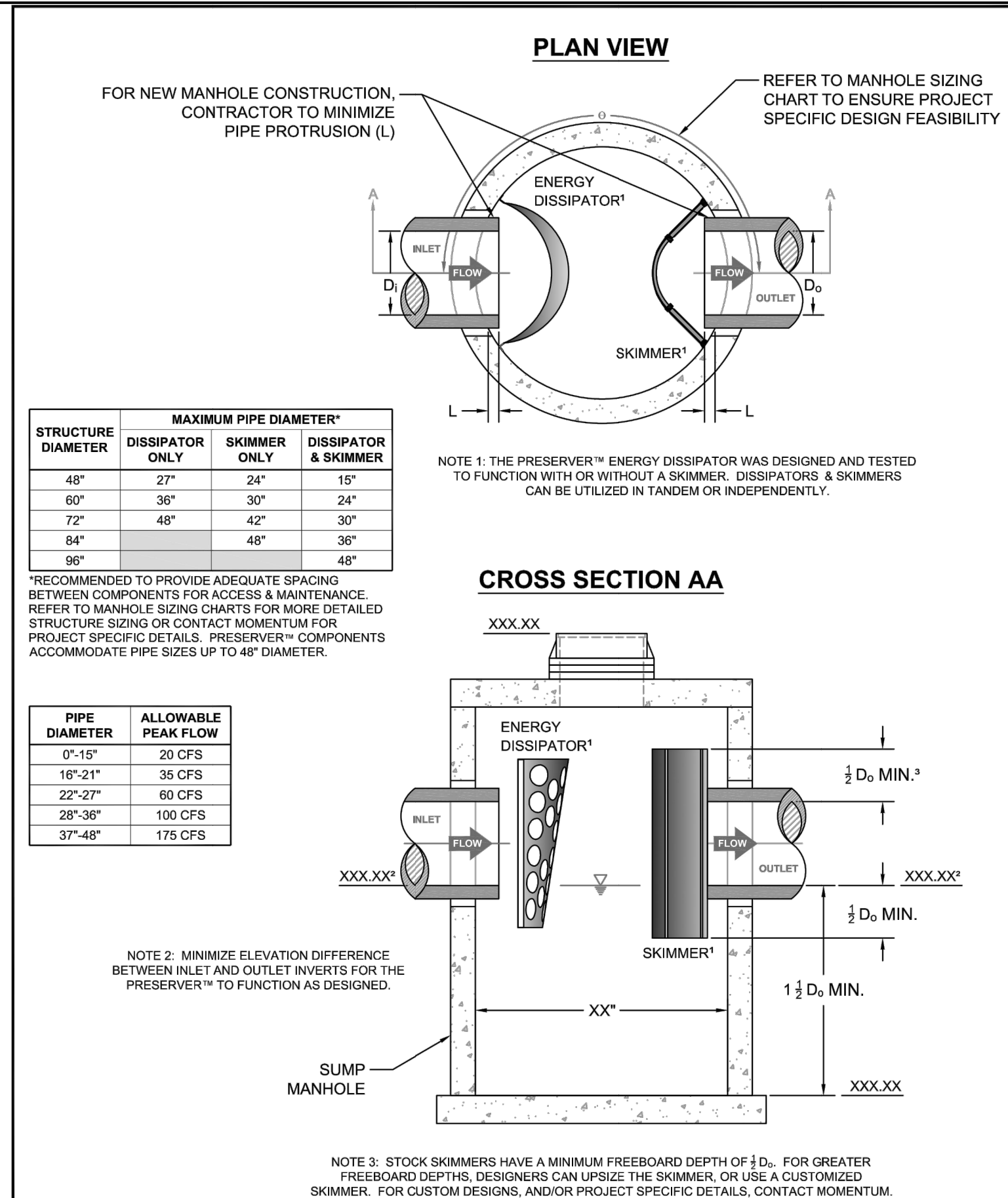
2 OUTLET CONTROL STRUCTURE (OCS)
C-803 NOT TO SCALE



3 INFILTRATION BASIN DETAILS
C-803 NOT TO SCALE



4 EMERGENCY OVERFLOW SPILLWAY
C-803 NOT TO SCALE



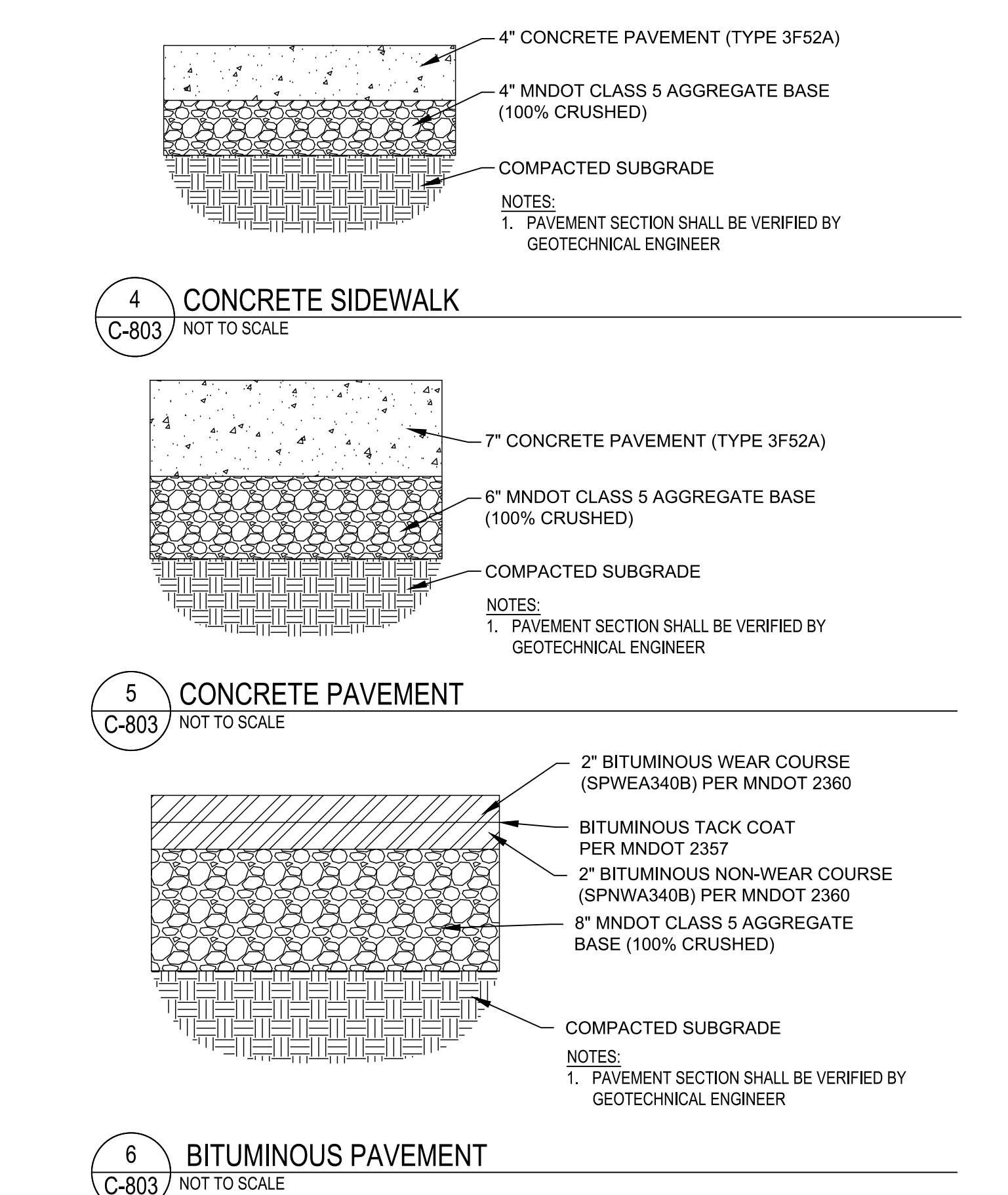
Not to Scale

THE PRESERVER™ STANDARD DETAIL

ENERGY DISSIPATOR AND/OR SKIMMER

USA

CONCEPTUAL PLAN DISCLAIMER: THIS GENERIC DETAIL DOES NOT ENCOMPASS THE SIZING, FIT, AND APPLICABILITY OF THE PRESERVER FOR THIS SPECIFIC PROJECT. IT IS THE ULTIMATE RESPONSIBILITY OF THE DESIGN ENGINEER TO ASSURE THAT THE STORMWATER SYSTEM DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. MOMENTUM ENVIRONMENTAL, LLC DOES NOT APPROVE TRANS, SIZING, OR SYSTEM DESIGNS. THE DESIGN ENGINEER IS RESPONSIBLE FOR ALL DESIGN DECISIONS.



6 BITUMINOUS PAVEMENT
C-803 NOT TO SCALE

WENCK

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

SCS ENGINEERS

www.scsengineers.com

SCS ENGINEERS

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

PROJECT TITLE:

ISSUE NO.: 1

DESCRIPTION: CITY SUBMITAL

DATE: 12/21/2020

CERTIFICATION:

PROJECT NO.: 7251-20-500

DWN BY: MDH

CHKD BY: PWS

APPD BY: JTJW

ISSUE DATE: 12/21/2020

ISSUE NO.: 1

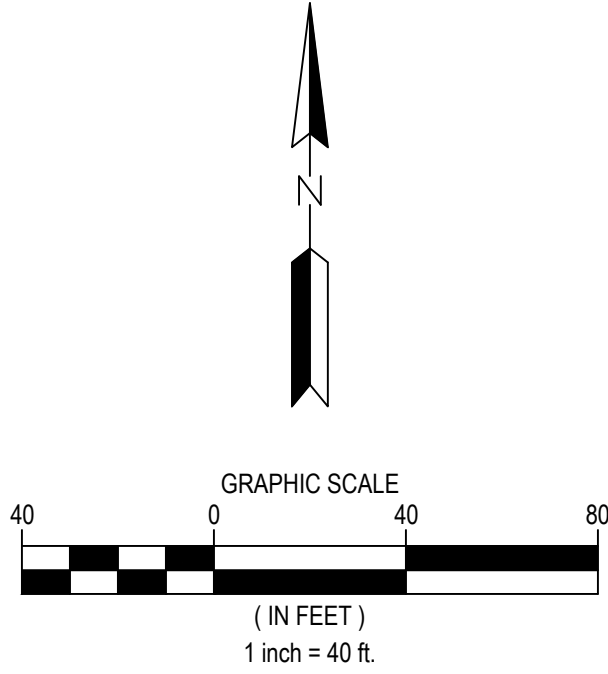
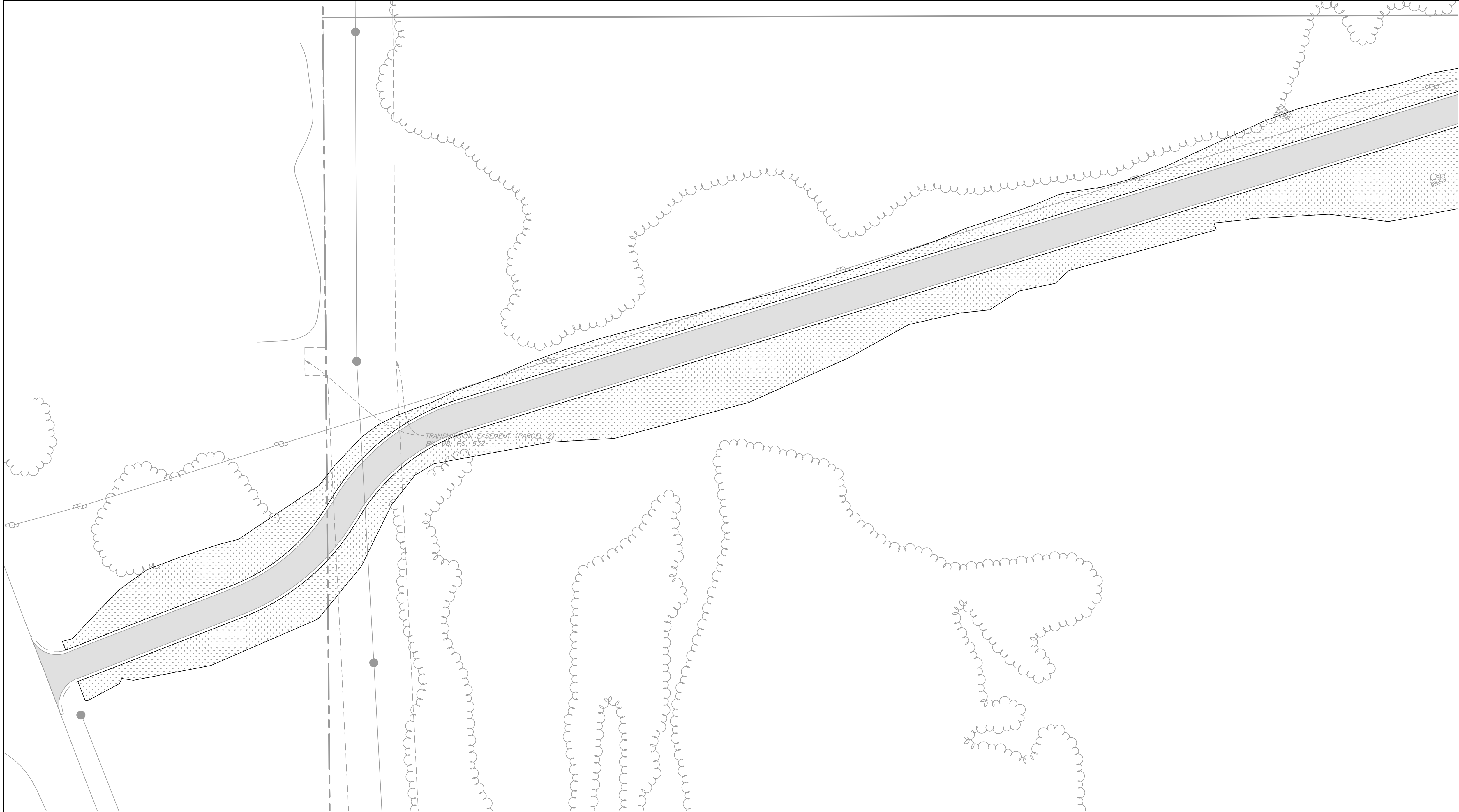
SHEET TITLE:

DETAILS

SHEET NO.: C-803

12/21/2020 10:48:42 AM

N:\17251 SCS Engineers\20190 Fortistar RNG Expansion\5. DESIGN\ CAD\3 PLANS\HETS\1-101 LANDSCAPE PLAN.dwg 12/21/2020 PAT W. SYDEM



LEGEND

- PROPERTY BOUNDARY
- LOT LINE
- EASEMENT LINE
- SETBACK LINE
- RIGHT OF WAY LINE
- SECTION LINE
- QUARTER LINE
- EXISTING EASEMENT LINE
- EXISTING PROPERTY LINE
- MINNESOTA STATE SEED MIX 25-131 LOW MAINTENANCE TURF

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG

GOPHER STATE ONE CALL

TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

DATE:	DESCRIPTION:	ISSUE NO.:
12/21/2020	CITY SUBMITTAL	1

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY: MDH

CHKD BY: PWS

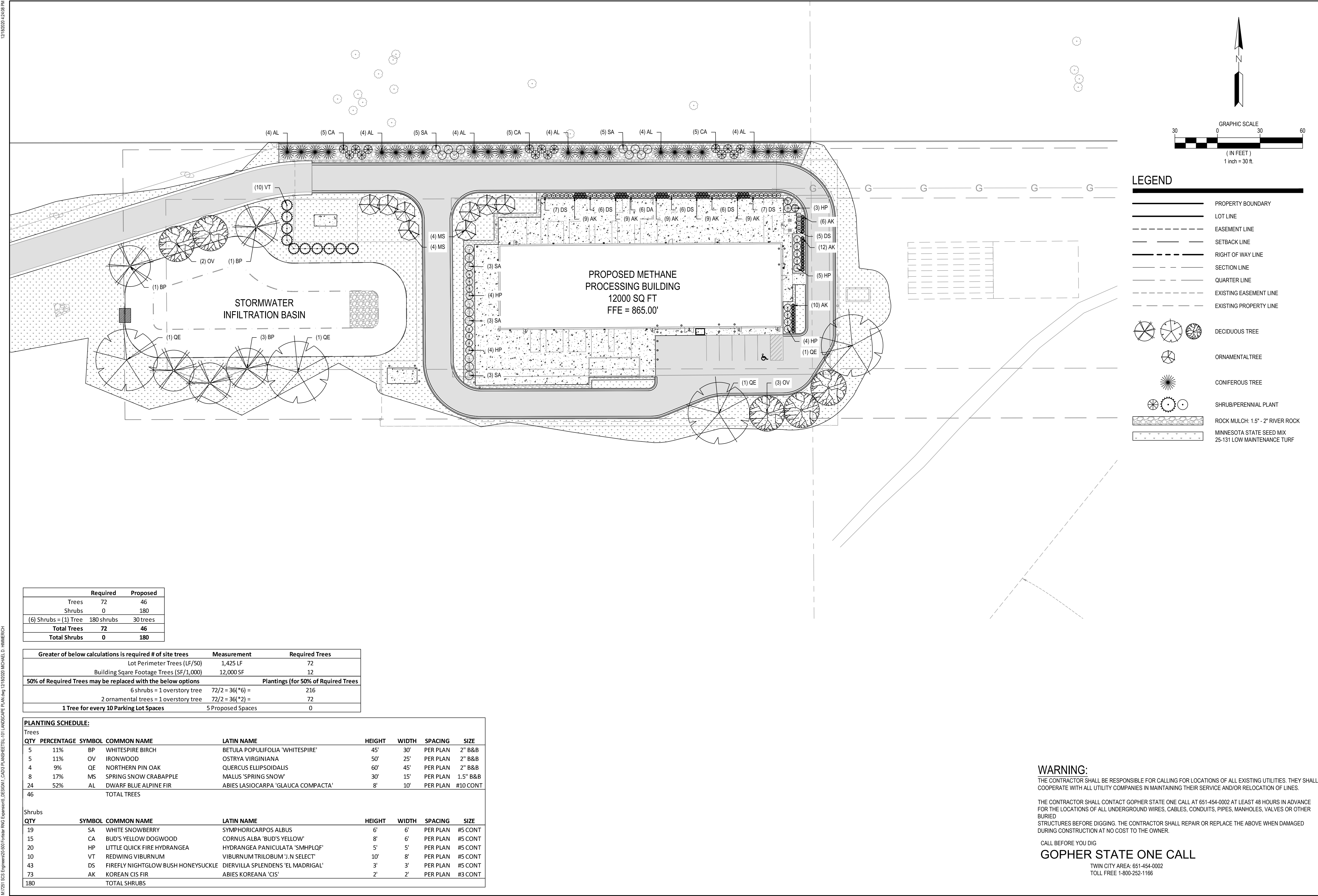
APPD BY: JTW

ISSUE DATE: 12/21/2020

ISSUE NO.: 1

SHEET TITLE:
WEST LANDSCAPE PLAN

SHEET NO.:
L-101



WARNING:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:**FORTISTAR RNG EXPANSION**
11300 RICH VALLEY BLVD.
INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA, 55077

ISSUE NO.:	DESCRIPTION:	DATE:
1	CITY SUBMITTAL	12/1/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

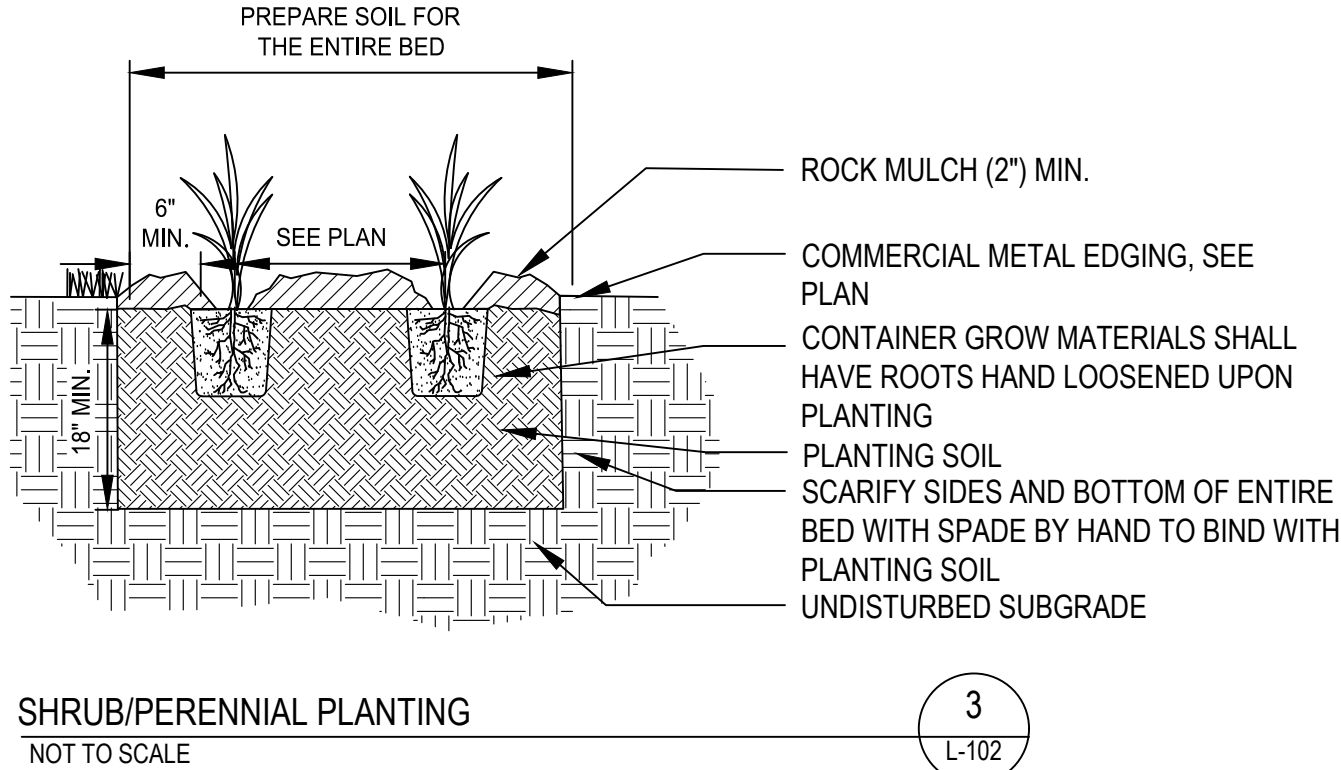
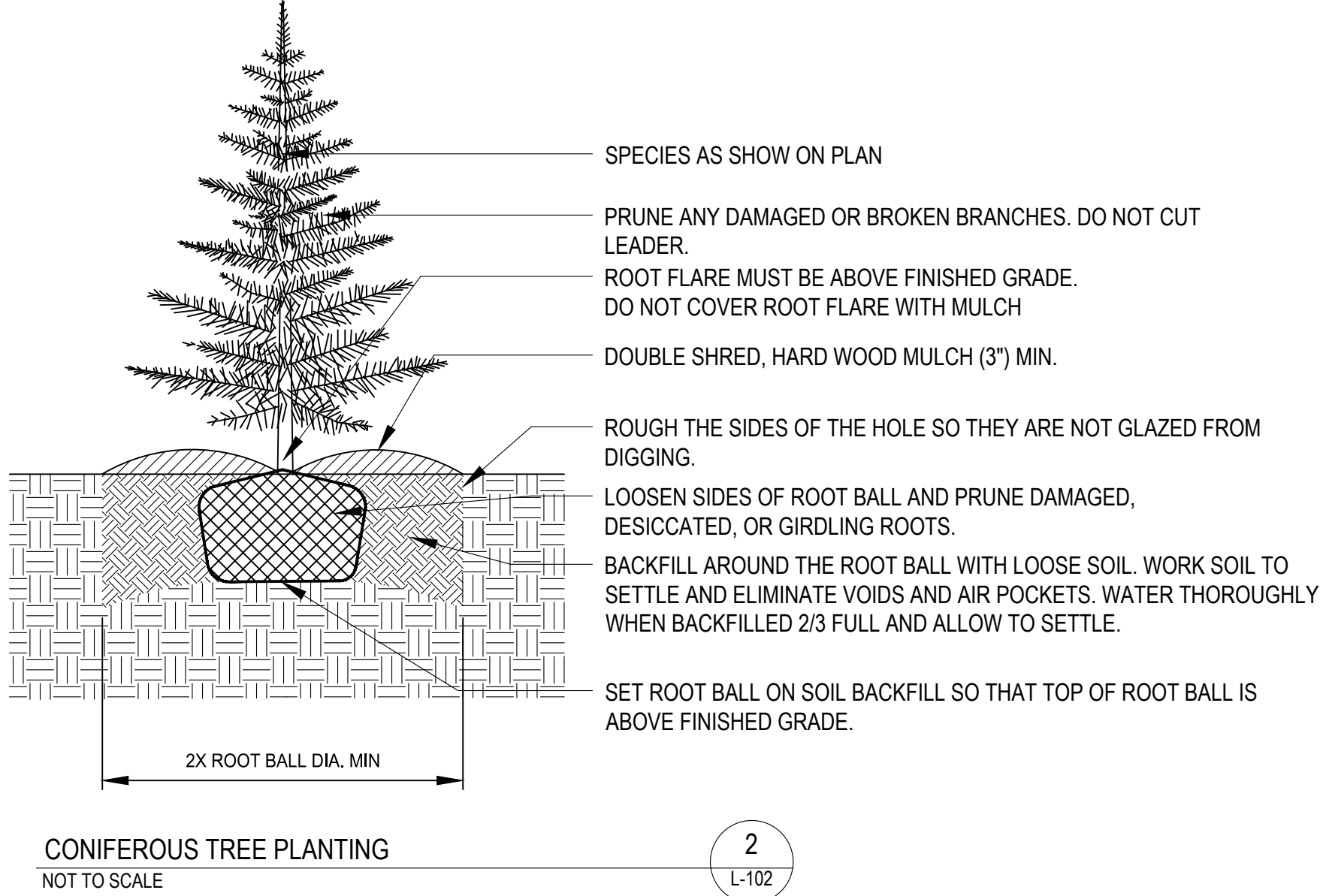
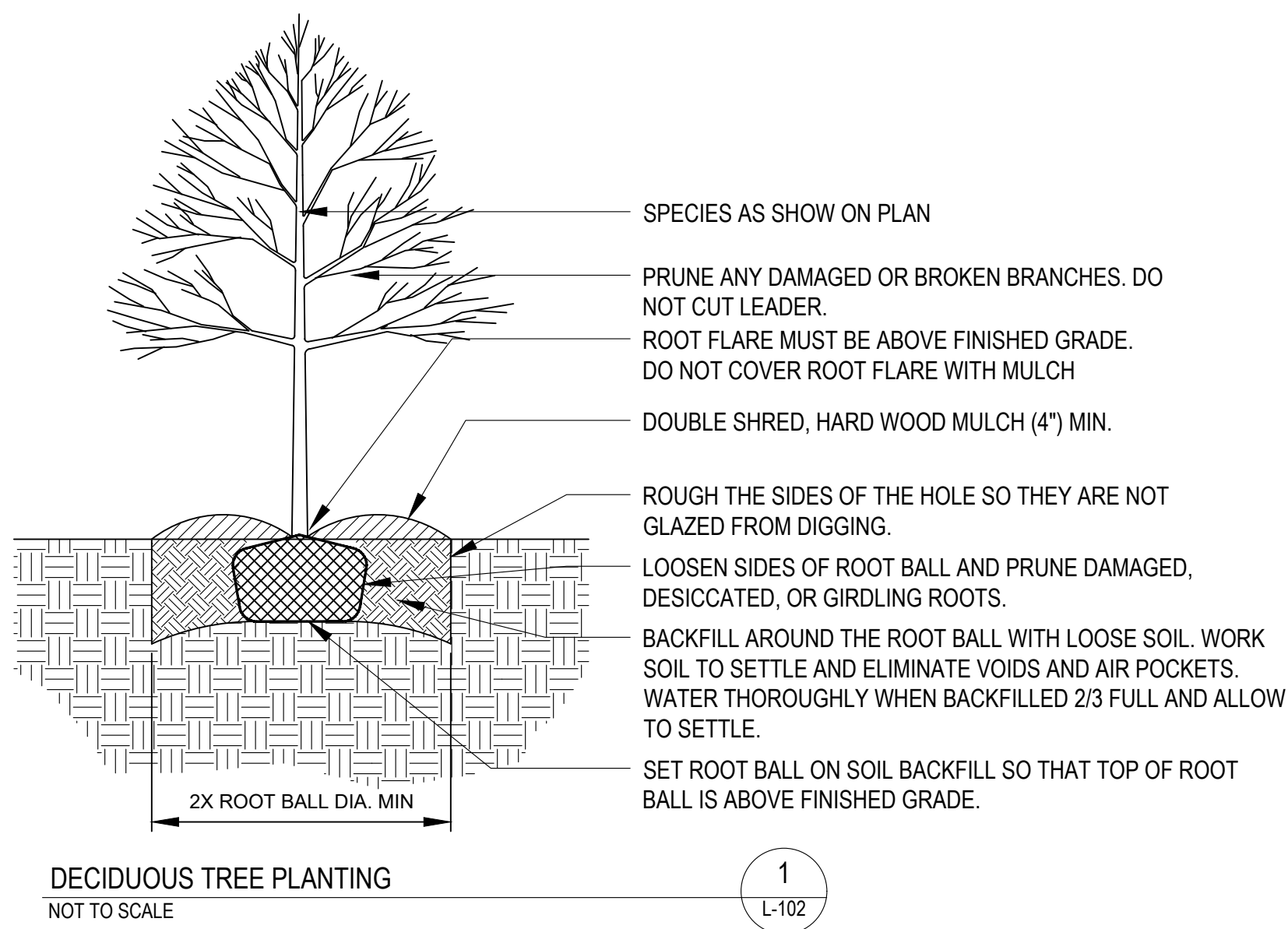
DWN BY:	CHKD BY:	APPD BY:
MDH	PWS	JTW

ISSUE DATE: 12/21/2020

ISSUE NO.: 1

SHEET TITLE:
EAST LANDSCAPE PLAN

SHEET NO.:
L-102



LANDSCAPE NOTES

1. TREES AND SHRUBS SHALL BE PROVIDED IN THE QUANTITY, SIZE, GENUS, SPECIES, AND VARIETY AS CHOSEN BY THE OWNER/OWNER AS LISTED ON THE LANDSCAPE PLAN L 101.
2. TREES AND SHRUBS SHALL BE HEALTHY, VIGOROUS STOCK, GROWN IN RECOGNIZED NURSERY IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICE AND FREE OF DISEASE, INSECTS, EGGS, LARVAE, AND DEFECTS.
3. OWNER RETAINS THE RIGHT TO INSPECT TREES AND SHRUBS FOR SIZE AND CONDITION OF BALLS AND ROOT SYSTEMS, INSECTS, INJURIES, AND LATENT DEFECTS, AND TO REJECT UNSATISFACTORY OR DEFECTIVE MATERIAL AT ANY TIME DURING PROGRESS OF WORK.
4. NURSERY STOCK SHALL BE DELIVERED DIRECTLY FROM NURSERY. HEEL IN IMMEDIATELY UPON DELIVERY IF NOT TO BE PLANTED WITHIN FOUR HOURS, COVERING WITH MOIST SOIL OR MULCH TO PROTECT FROM DRYING. STORE PLANTS IN SHADE AND PROTECT FROM WEATHER.
5. PROTECTION FROM EXTREMES IN EXPOSURE AND ROUGH HANDLING SHALL BE PROVIDED FOR ALL PLANT MATERIALS DURING TRANSPORT AND STORAGE.
6. THE CONTRACTOR SHALL NOTIFY THE OWNER 48 HOURS PRIOR TO PLANTING SO THAT A MUTUALLY AGREEABLE TIME MAY BE ARRANGED FOR INSPECTION.
7. LAY OUT INDIVIDUAL TREE AND SHRUB LOCATIONS WITH STAKES CENTERED AT PROPOSED PLANTING LOCATIONS FOR APPROVAL BY OWNER.
8. DO NOT START PLANTING WORK UNTIL LAYOUT IS APPROVED BY THE OWNER.

TURF RESTORATION NOTES

1. EDGE RESTRAINT BETWEEN PLANTING BEDS AND TURF SHALL BE BLACK COMMERCIAL GRADE LANDSCAPE EDGING BY COL-MET OR APPROVED EQUAL, 6"x12 GAUGE STEEL.
2. THE ESTABLISHMENT PERIOD FOR SOD SHALL BEGIN IMMEDIATELY AFTER INSTALLATION, WITH THE APPROVAL OF THE OWNER, AND CONTINUE UNTIL THE DATE THAT THE OWNER PERFORMS A FINAL INSPECTION.
3. THE ESTABLISHMENT PERIOD FOR SODDED AREAS IS 1 YEAR.
4. SOD SHALL CONFORM TO MNDOT SPEC. 3878.2.A MINERAL SOD; SOD SPECIES COMPOSITION SHALL BE MINNESOTA STATE SEED MIX 25-151 - HIGH MAINTENANCE TURF.
5. FERTILIZER SHALL CONFORM TO MNDOT SPEC. 3881, TYPE 2 PHOSPHOROUS-FREE.
6. FERTILIZER SHALL HAVE A FORMULA (N-P-K) AS DETERMINED BY THE RESULTS OF A SOIL TEST. CONTRACTOR TO CONDUCT SOIL TEST AND PROVIDE RESULTS ALONG WITH RECOMMENDED FERTILIZER FORMULA TO OWNER FOR REVIEW AND APPROVAL PRIOR TO APPLICATION.
7. TOPSOIL SHALL BE SALVAGED AND IMPORTED AS NEEDED AND CONFORM TO MNDOT SPEC. 3877.2B LOAM TOPSOIL BORROW. TOPSOIL SHALL BE SCREENED, PULVERIZED, AND CONTAIN LESS THAN 30% CLAY.
8. 6" OF TOPSOIL SHALL BE PLACED IN ALL SEEDING AREAS.
9. INSTALLATION OF SOD SHALL OCCUR WITHIN ONE (1) WEEK OF COMPLETING THE GRADING.
10. PLACE ALL SOD STRIPS WITH LONG EDGES PARALLEL TO THE CONTOURS. STAGGER ALL JOINTS ALTERNATELY WITHOUT SPACE BETWEEN. SECURE THE SOD TO SLOPES WITH BIODEGRADABLE ANCHOR SYSTEMS.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR WATER DURING THE PLANTING ESTABLISHMENT PERIOD.

INSPECTION AND ACCEPTANCE

1. LANDSCAPE WORK WILL BE INSPECTED FOR ACCEPTANCE IN PARTS AGREEABLE TO THE OWNER, PROVIDED WORK OFFERED FOR INSPECTION IS COMPLETE, INCLUDING MAINTENANCE, FOR THE PORTION IN QUESTION.
2. AT THE CONCLUSION OF THE ESTABLISHMENT PERIOD, WHICH WILL BE ONE YEAR FOLLOWING INITIAL INSTALLATION A FINAL INSPECTION OF PLANTING WILL BE MADE TO DETERMINE THE CONDITIONS OF AREAS SPECIFIED FOR LANDSCAPING.
3. WHEN INSPECTED LANDSCAPE WORK DOES NOT COMPLY WITH REQUIREMENTS, REPLACE REJECTED WORK AND CONTINUE SPECIFIED MAINTENANCE UNTIL RE-INSPECTED BY OWNER AND FOUND TO BE ACCEPTABLE. REMOVE REJECTED PLANTS AND MATERIALS FROM SITE.

PLANTING NOTES

1. UPON APPROVAL OF STAKING LOCATIONS CONTRACTOR SHALL EXCAVATE PLANTING HOLES CENTERED AT STAKED LOCATIONS.
2. DIG HOLES AS DETAILED AND TO A DIAMETER A MINIMUM OF TWO TIMES THE DIAMETER OF THE ROOT BALL OR CONTAINER.
3. REMOVE STICKS, RUBBISH, FOREIGN MATERIALS AND UNDESIRABLE PLANTS AND THEIR ROOTS. REMOVE STONES MEASURING OVER 1-1/2 INCHES IN ANY DIMENSIONS.
4. SET BALLED AND BURLAPPED (B&B) STOCK ON LAYER OF COMPACTED PLANTING SOIL MIXTURE, PLUMB AND IN CENTER OF PIT OR TRENCH WITH TOP OF ALL AT SAME ELEVATION AS ADJACENT FINISHED LANDSCAPE GRADES.
5. ROOT FLARE OF THE TREE MUST BE ABOVE FINISHED GRADE.
6. CUT ALL CORDS AND TWIN AND REMOVE WIRE BASKET AND BURLAP FROM TOP AND SIDES OF BALLS; RETAIN BURLAP ON BOTTOMS.
7. WHEN SET, PLACE ADDITIONAL PLANTING SOIL BACKFILL AROUND BASE AND SIDES OF BALL, AND WORK EACH LAYER TO SETTLE BACKFILL AND ELIMINATE VOIDS AND AIR POCKETS.
8. WHEN EXCAVATION IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF BACKFILL.
9. REPEAT WATERING UNTIL NO MORE IS ABSORBED. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL.
10. FOR CONTAINER GROWN STOCK, SAME AS FOR BALLED AND BURLAPPED STOCK, EXCEPT CUT CONTAINERS ON SIDES INTO QUARTERS WITH SHEAR. REMOVE CONTAINER BEFORE SETTING PLANT SO AS NOT TO DAMAGE ROOT BALLS.
11. WATER EACH PLANT WITHIN 2 HOURS OF PLANTING.
12. ALL PLANTINGS TO BE MULCHED UNLESS OTHERWISE NOTED ON THE PLAN.
13. PLACE 4-INCH THICKNESS OF MULCH AROUND TREES AND SHRUBS WITHIN A PERIOD OF 48 HOURS AFTER THE SECOND WATERING.
14. DO NOT PLACE MULCH IN DIRECT CONTACT WITH TRUNKS OR STEMS.

MAINTENANCE NOTES

1. WHEN INSPECTED LANDSCAPE WORK DOES NOT COMPLY WITH REQUIREMENTS, REPLACE REJECTED WORK AND CONTINUE SPECIFIED MAINTENANCE UNTIL RE-INSPECTED BY OWNER AND FOUND TO BE ACCEPTABLE. REMOVE REJECTED PLANTS AND MATERIALS FROM SITE.
2. BEGIN MAINTENANCE IMMEDIATELY AFTER PLANTING.
3. MAINTAIN TREES AND BUSHES INCLUDING WATERING FOR ONE YEAR AFTER ACCEPTANCE BY OWNER. IT IS CONTRACTORS RESPONSIBILITY FOR COORDINATE WATERING.
4. TRIM, PRUNE, REMOVE CLIPPINGS AND DEAD OR BROKEN BRANCHES, AND TREAT PRUNED AREAS AND OTHER WOUNDS.
5. IT IS THE CONTRACTOR'S OPTION WHETHER OR NOT TO STAKE TREES. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TREES IN AN UPRIGHT POSITION THROUGHOUT THE ONE-YEAR GUARANTEE PERIOD.

GUARANTEE AND REPLACEMENTS

1. PLANT MATERIAL SHALL BE GUARANTEED FOR ONE FULL YEAR AFTER OWNER ACCEPTANCE AND SHALL BE ALIVE AND IN SATISFACTORY CONDITION AT THE END OF THE GUARANTEE PERIOD. SUCH GUARANTEE EXCLUDES VANDALISM.
2. AT THE END OF THE ONE-YEAR GUARANTEE PERIOD, INSPECTION WILL BE MADE BY THE OWNER UPON WRITTEN NOTICE BY THE CONTRACTOR AT LEAST FIVE DAYS BEFORE THE ANTICIPATED DATE. ANY PLANT MATERIAL REQUIRED UNDER THE CONTRACT THAT IS DEAD OR NOT IN SATISFACTORY CONDITION, AS DETERMINED BY THE OWNER, SHALL BE REMOVED FROM THE SITE, AND SHALL BE REPLACED AS SOON AS CONDITIONS PERMIT DURING THE NORMAL PLANTING SEASONS.
3. THE OPINION OF THE OWNER SHALL GOVERN IN ANY AND ALL DISPUTES BY THE CONTRACTOR REGARDING THE CONDITION AND DISPOSITION OF UNSATISFACTORY MAINTENANCE PROCEDURES OR REJECTED PLANTS.
4. ALL REPLACEMENTS SHALL BE PLANT MATERIAL OF THE SAME KIND AND SIZE AS SPECIFIED IN THE PLANT LIST. REPLACEMENT COSTS SHALL BE BORNE BY THE CONTRACTOR.
5. REPLACEMENT PLANTINGS REQUIRED AT THE END OF THE GUARANTEE PERIOD ARE NOT TO BE GUARANTEED. THE PLANT MATERIAL IS SUBJECT TO INSPECTION AND REJECTION BY THE OWNER BEFORE AND AFTER PLANTING.

ISSUE NO.	DESCRIPTION	DATE
1	CITY SUBMITTAL	12/21/2020

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

A

B

C

D

E

F

G

H

1

J

**PINE BEND RNG LLC
PINE BEND RENEWABLE NATURAL GAS PLANT
PRODUCTION FACILITY
117TH STREET EAST
INVER GROVE HEIGHTS, MN 55077**

CENTRAL

GENERAL DRAWINGS

G-000	GENERAL COVER SHEET	B	12-21-20
G-100	GENERAL ARRANGEMENT	B	12-21-20
G-410	WALL SECTION	B	12-21-20

CONFIDENTIAL INFORMATION

PROPRIETARY AND CONFIDENTIAL PROPERTY OF STEARNS, CONRAD, AND
SCHMIDT CONSULTING ENGINEERS, INC., (d.b.a. SCS ENERGY) NOT TO BE
USED, COPIED, DISTRIBUTED, OR RETRANSMITTED IN ANY FORM WITHOUT
THE EXPRESS WRITTEN PERMISSION OF SCS ENERGY.
© SCS ENERGY, 2020



3900 KILROY AIRPORT WAY
LONG BEACH, CA 90806
(562) 426-9544

NAME: _____
EXPIRATION DATE: _____
PROFESSIONAL ENGINEER

PROJ. NO.	06219020.01
DSN. BY:	DL

DWN. BY:	DL
CHK. BY:	RN

ACAD FILE:	
APP. BY:	JP

	CLIENT
--	--------

**PINE BEND RNG LLC
ONE NORTH LEXINGTON AVENUE
WHITE PLAINS, NY 10601**

SHEET TITLE

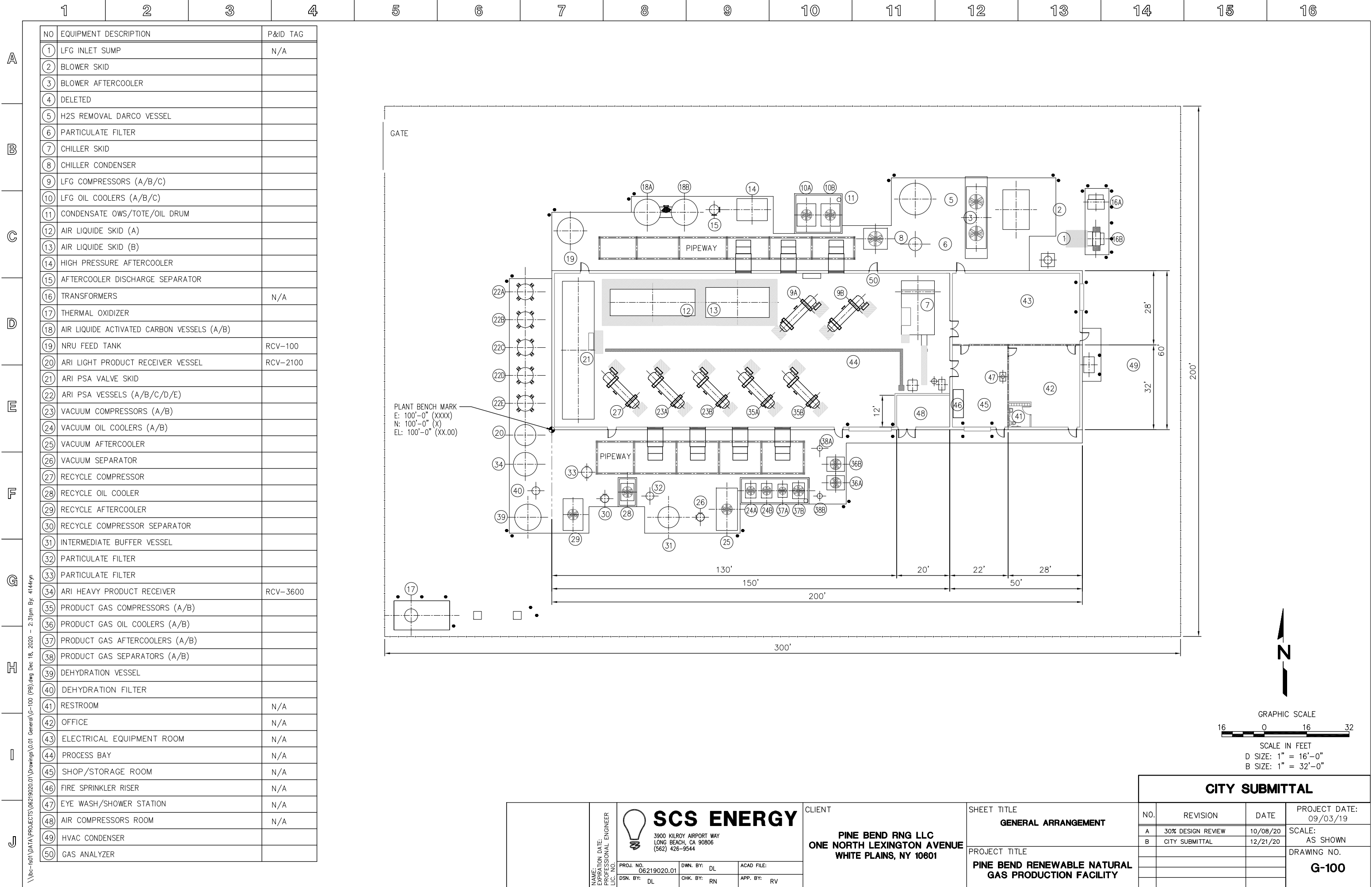
GENERAL COVER SHEET

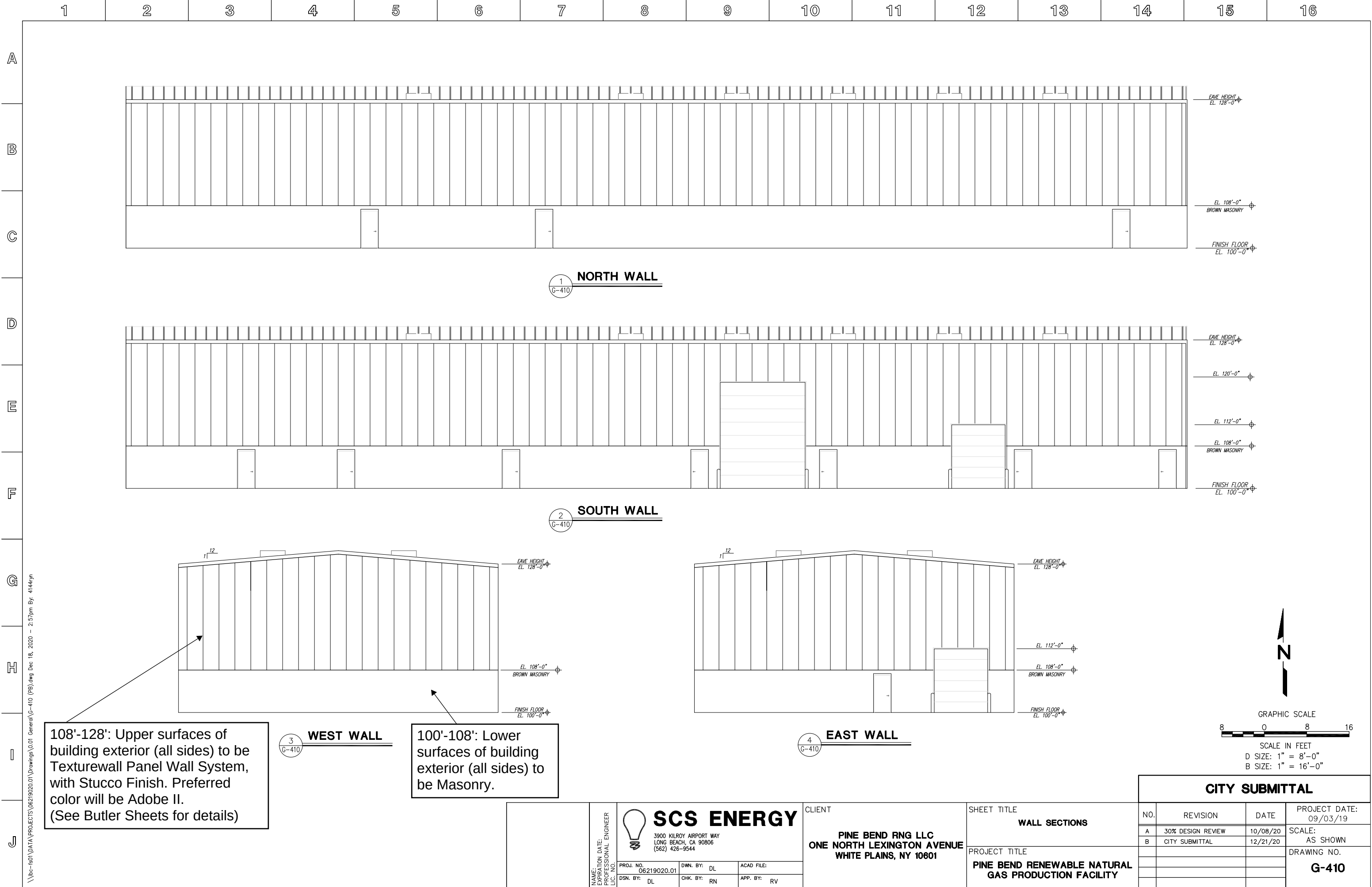
E	PROJECT TITLE

**PINE BEND RENEWABLE NATURAL
GAS PRODUCTION FACILITY**

CITY SUBMITTAL

NO.	REVISION	DATE	PROJECT DATE: 09/03/19
A	30% DESIGN REVIEW	10/08/20	SCALE:
B	CITY SUBMITTAL	12/21/20	AS SHOWN
			DRAWING NO.
			G-000





1
G-410
NORTH WALL

2
G-410
SOUTH WALL

3
G-410
WEST WALL

4
G-410
EAST WALL

108'-128': Upper surfaces of building exterior (all sides) to be Texturewall Panel Wall System, with Stucco Finish. Preferred color will be Adobe II. (See Butler Sheets for details)

100'-108': Lower surfaces of building exterior (all sides) to be Masonry.

CITY SUBMITTAL				
NO.	REVISION	DATE	PROJECT DATE: 09/03/19	
A	30% DESIGN REVIEW	10/08/20	SCALE: AS SHOWN	
B	CITY SUBMITTAL	12/21/20	DRAWING NO. G-410	

**SCS ENERGY**
3900 KILROY AIRPORT WAY
LONG BEACH, CA 90806
(562) 428-9544

NAME: _____
EXPIRATION DATE: _____
PROFESSIONAL ENGINEER
LIC. NO. _____

PROJ. NO. 06219020.01	DWN. BY: DL	ACAD FILE:
DSN. BY: DL	CHK. BY: RN	APP. BY: RV

CLIENT
PINE BEND RNG LLC
ONE NORTH LEXINGTON AVENUE
WHITE PLAINS, NY 10801

SHEET TITLE
WALL SECTIONS

PROJECT TITLE
PINE BEND RENEWABLE NATURAL GAS PRODUCTION FACILITY

INFORMATION ONLY



TEXTUREWALL™ PANEL WALL SYSTEM

Add a classic stucco appearance with lasting durability and enhanced efficiency.

The classic beauty of stucco. The enhanced performance of a Butler® building system. You can add this attractive combination of benefits with the TextureWall™ panel wall system. The textured look of this system makes it particularly ideal in instances where local building ordinances require a masonry or stucco exterior.

Choose the TextureWall system to add the beauty of stucco in applications such as retail centers, churches, recreational and community facilities, and more.

CREATE CLASSIC BEAUTY

The exterior face of the TextureWall system features the Texture-Cote™ finish system—a hard aggregate-fiber-reinforced polymer finish that creates its characteristic stucco appearance. The metal interior face is finished in an attractive, virtually flat finish with a polyester white color that is USDA approved. This can act as a finished interior wall or can be used for the application of other wall materials.

CUSTOMIZE THE LOOK

The rich textured surface of the Texture-Cote finish system is available in four attractive color options. Each is designed to complement other building materials, including Butler wall and roof systems. And with its 42-inch panel width, the TextureWall system creates a stunning monolithic stucco appearance.



Aspen White II



Adobe II

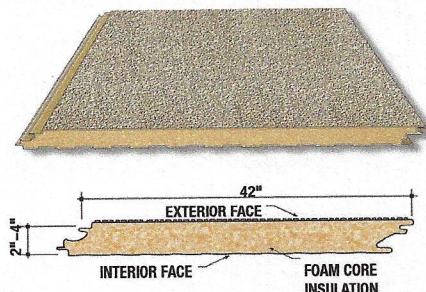


White II



Gray II

Note: Colors shown may vary from actual samples due to variations in the printing process. Colors and color availability subject to change without notice.



ASSURE LASTING DURABILITY

The TextureWall system's durable surface resists the effects of impact, abrasion, and harsh weather. And unlike field-applied finishes that are vulnerable to damp or cold weather during installation, TextureWall panels can be erected in virtually any weather condition.

BUILT-IN ENERGY EFFICIENCY

The TextureWall system's factory-installed foam core insulation and thermal break joint design

deliver excellent energy efficiency, with an R-value from 15 to 32 depending on panel thickness. The factory-applied joint sealant provides a complete wall system weather barrier. Panels are offered in 2- to 4-inch thicknesses.

FAST INSTALLATION

Installation of the Texture-Cote system can be performed from the exterior of the building, which saves time and money.

COMPARE OUR WARRANTY

While many field-applied systems offer a prorated 5-year warranty on the coating material only, Butler stands behind the Texture-Cote finish system with a full 10-year warranty on material and application.

TEXTUREWALL™ PANEL WALL SYSTEM

PANEL-TO-STRUCTURE ATTACHMENT

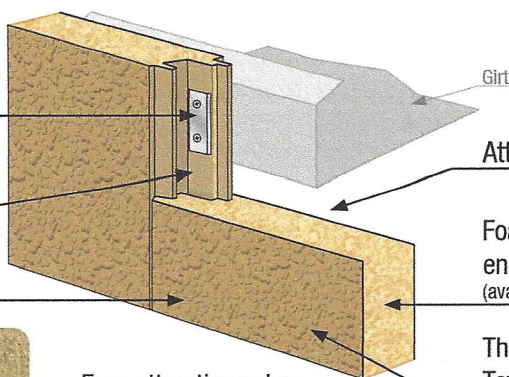
Concealed clip provides easy exterior installation and clean look

Thermal break joint to enhance energy efficiency

The classic textured look of stucco, with a 10-year finish warranty



Four attractive colors



Attractive interior surface

Foam core insulation to enhance energy efficiency (available in 2"-4" thicknesses)

The added durability of the Texture-Cote™ finish system



KEY BENEFITS

- ✓ The classic textured look of stucco satisfies many local building codes requiring masonry or stucco exteriors
- ✓ 10-year finish warranty
- ✓ Can be erected in virtually all weather conditions
- ✓ Foam core insulation and thermal break joint enhance energy efficiency
- ✓ Attractive interior metal panel provides finished look without the need for additional materials
- ✓ The added durability of the Texture-Cote™ finish system
- ✓ Four attractive colors
- ✓ Wide 42" panels create a monolithic appearance



BUTLER OFFERS YOU MORE

Butler Builders provide complete construction services with single-source responsibility

- Reputable professionals with extensive knowledge of local building codes

Maximize your building's performance with a complete Butler® system solution

- Innovative structural, wall, and roof systems
- Precision engineered for seamless integration



Butler Manufacturing
Kansas City, MO
816-968-3000

Butler Buildings Canada
Burlington, ON, Canada
905-332-7786

www.butlermfg.com



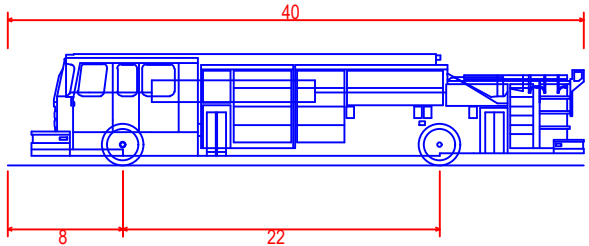
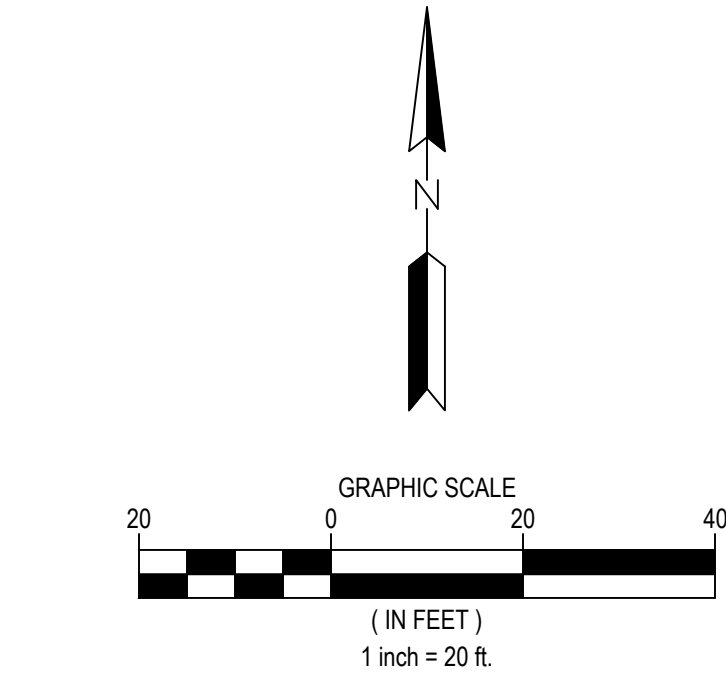
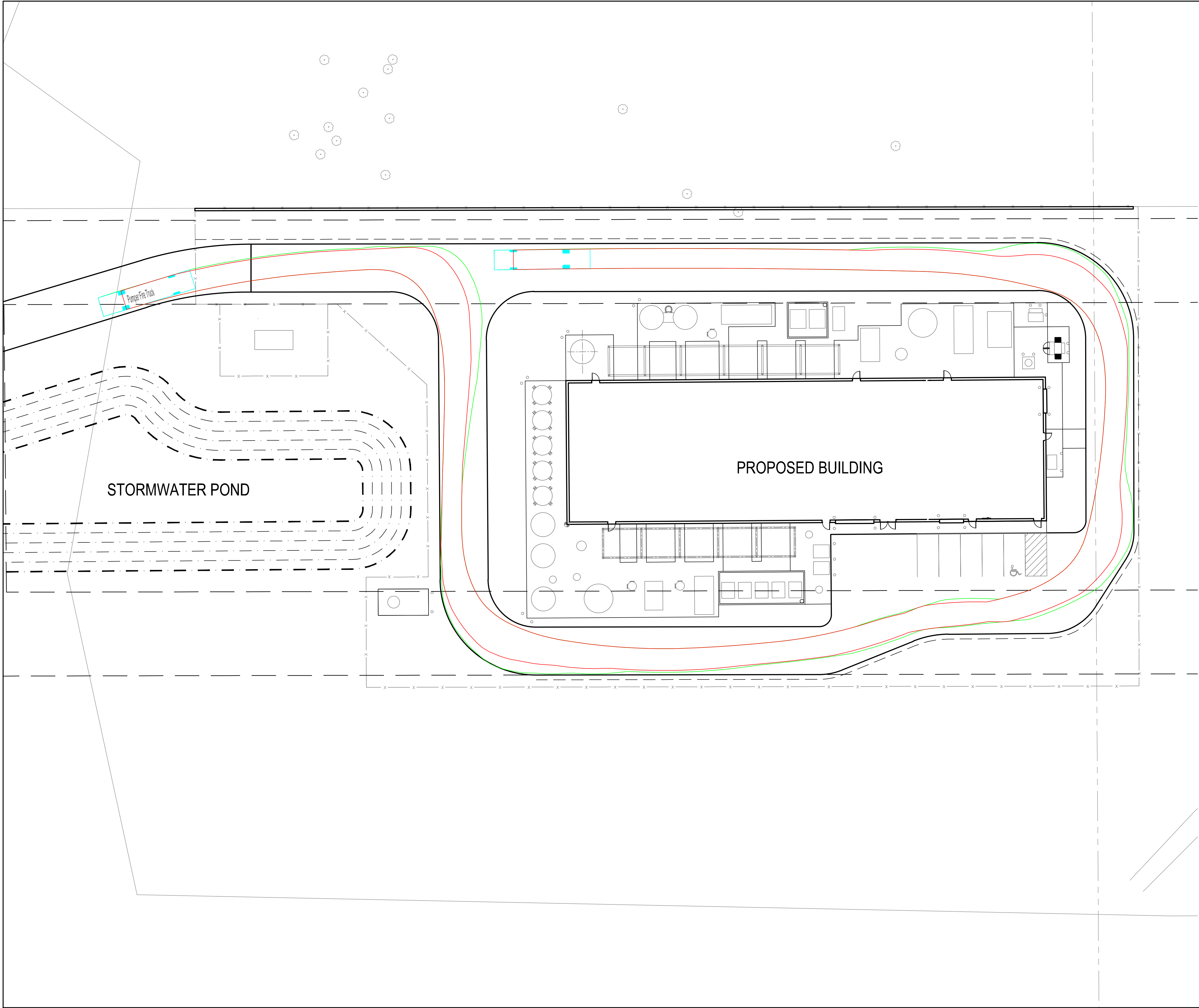
Butler® building products are constantly being improved; therefore, the information contained herein is subject to change without notice. Before finalizing project details, contact your nearest Butler Builder® or Butler Manufacturing™ for the latest information. Galvalume is a registered trademark of BIEC International, Inc. USGBC logo is a registered trademark owned by the U.S. Green Building Council and is used by permission. IAS is a subsidiary company of the International Code Council. The ENERGY STAR name and the ENERGY STAR symbol are registered trademarks of the United States Environmental Protection Agency.

© 2017 BlueScope Buildings North America, Inc. All rights reserved. Butler Manufacturing™ is a division of BlueScope Buildings North America, Inc. Find your independent Butler Builder® at www.butlerbuilder.com.

Form No. 5218 03/17

11/17/2020 3:37:17 PM

N:\7251 SS2 Engineers\20-500 Fortistar RNG Expansion\6. DESIGN\ CAD\ EXHIBITS\2020-11-17 EX-6 FIRE TURNING MOVEMENTS 7251-20-500.DWG 11/17/2020 MICHAEL HIMMERICH



Pumper Fire Truck
Overall Length
Overall Width
Overall Body Height
Min Body Ground Clearance
Track Width
Lock-to-lock time
Max Wheel Angle

40.000ft
8.167ft
7.745ft
0.656ft
8.167ft
8.00s
45.00°

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-252-6800
FAX: 952-831-1268
WWW.WENCK.COM

SUB CONSULTANT:

CLIENT:

FORTISTAR
METHANE GROUP

PROJECT TITLE:

FORTISTAR RNG EXPANSION

INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA 55077

ISSUE NO.:	DESCRIPTION:	DATE:

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.:

7251-20-500

DWN BY:	CHKD BY:	APPD BY:
BJC	PWS	###

ISSUE DATE: 11/13/2020

ISSUE NO.: 1

SHEET TITLE:

FIRE TURNING MOVEMENT

SHEET NO.:

EX-6

Luminaire Schedule							
Symbol	Qty	Label	Arrangement	LLF	Description	Arr. Watts	Lum. Lumens
	6	E	SINGLE	0.900	PEMCO TV2C32X10U41K-P14 PHOTOCELL MOUNT AT 10FT	20.16	2299
	10	WP	SINGLE	0.594	SPECGRADE DELA-100-40K-60-V01GR-WM905-NDIM VIA REMOTE PHOTOCELL MOUNT AT 20FT (LLF ADJUST FOR 100W)	100	14268
	4	WP1	SINGLE	0.900	RAYON T631LED-58-UNV12-T4-BZ-PC2 MOUNT AT 10FT	58.12	6122

Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	
SITE GROUND	Illuminance	Fc	1.38	30.7	0.0	N.A.	N.A.	



TYPE E



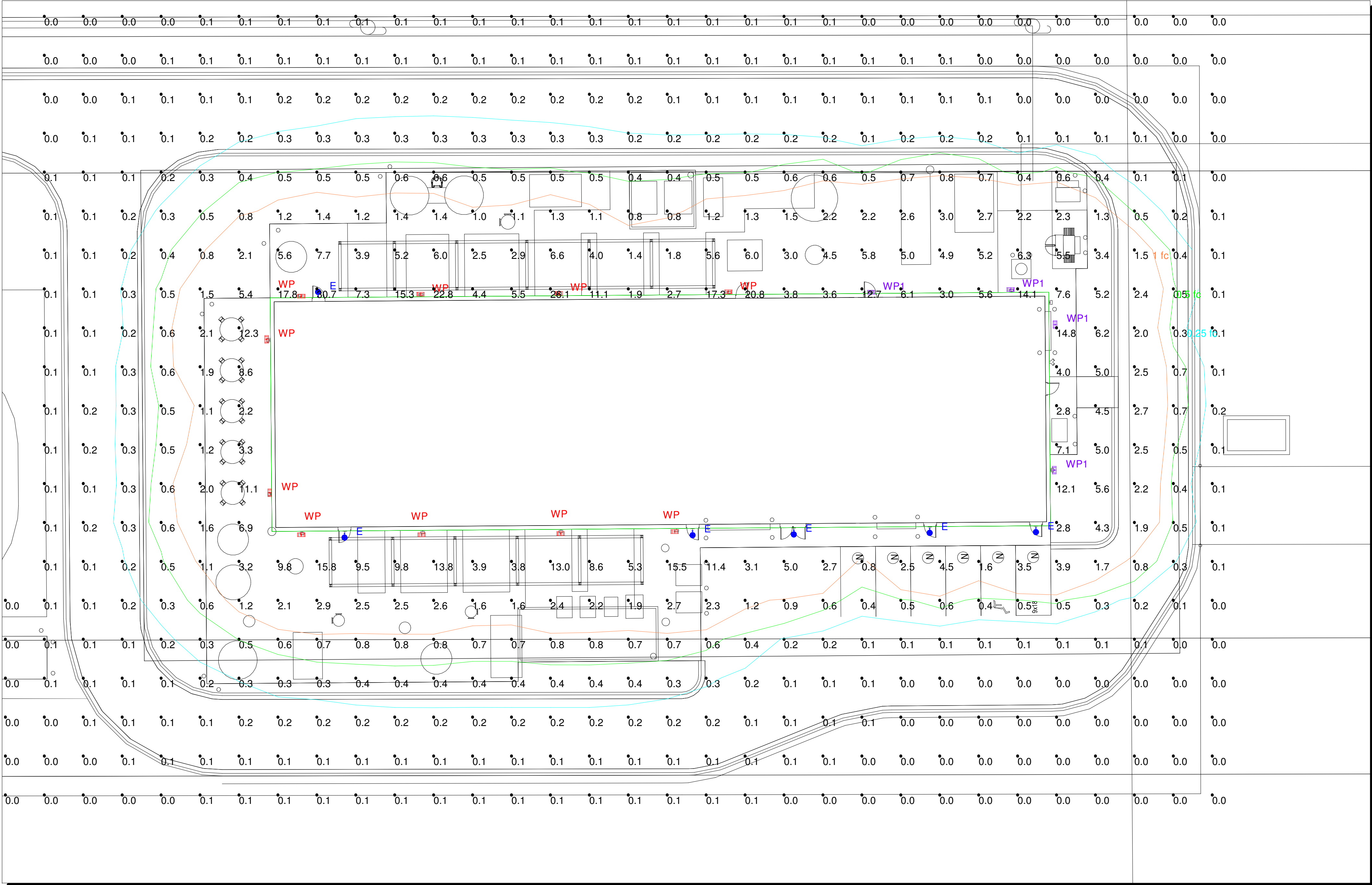
TYPE WP



TYPE WP1

GENERAL NOTES:

- A. PULSE PRODUCTS DOES NOT ASSUME RESPONSIBILITY FOR THE INTERPRETATION OF THIS CALCULATION OR COMPLAINT TO THE LOCAL, STATE, OR FEDERAL LIGHTNG CODES OR ORDINANCES.
- B. LIGHTING LAYOUT IS NOT INTENDED FOR CONSTRUCTION DOCUMENTS BUT ONLY TO ILLUSTRATE THE PERFORMANCE OF THE PRODUCT.
- C. ALL READINGS/CALCULATIONS SHOWN ARE SHOWN ON OBJECTS/SURFACES.



Plan View
Scale: 1 inch= 16 Ft.



#	Date	Comments

Revisions			

Drawn By: SANDY	RNG EXPANSION
Checked By: JILL	
Date:12/18/2020	
Scale: AS NOTED	INVER GROVE HEIGHTS, MN



Date: Dec 17, 2020

Pulse Products
6130 Blue Circle Drive
Minnetonka MN 55343
Phone: (952) 217-0400
Fax: (952) 930-1632

Job Name
RNG EXPANSION
PULSE20-77378
INVER GROVE HEIGHTS MN

Bid Date
Dec 17, 2020

Submittal Date
Dec 17, 2020

Specifier:
Wenck
7500 OLSON MEMORIAL HWY
GOLDEN VALLEY MN 55427



Transmittal

Pulse Products
6130 Blue Circle Drive
Minnetonka MN 55343
Phone: (952) 217-0400
From: Jill Bjornberg

Project **RNG EXPANSION**
Quote# PULSE20-77378
Location INVER GROVE HEIGHTS MN
To WENCK
 7500 OLSON MEMORIAL HWY
 SUITE 300
 GOLDEN VALLEY MN 55427
 Contact:

ATTACHED WE ARE SENDING YOU 1 COPY OF THE FOLLOWING ITEM:

- | | | |
|-----------------------------------|--|--------|
| ☐ Drawings | ☐ Specifications | Other: |
| ☐ Prints | ☐ Information | |
| ☐ Plans | ☒ Submittals | |

THESE ARE TRANSMITTED FOR:

- | | | |
|--|---|---------------------------------|
| ☐ Prior Approval | ☐ Resubmittal for Approval | ☐ Record |
| ☐ Approval | ☐ Corrections | Bids due on: |
| ☐ Approval as Submitted | ☒ Your Use | Other: |
| ☐ Approval as Noted | ☐ Review and Comment | |

Type	MFG	Part
E	PEMCO LIGHTING PRODUCTS	WDG2C3-2X10-U-41K-Z-P14
WP	SpecGrade LED	DELA-100-40-60-V01-GR-WM90S-NDIM
		CONNECT TO REMOTE PHOTOCELL
WP1	RAYON LIGHTING GROUP	T631LED-58-UNV12-T4-BZ-PC2

**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

WDG2C3-2X10-U-41K-Z-P14

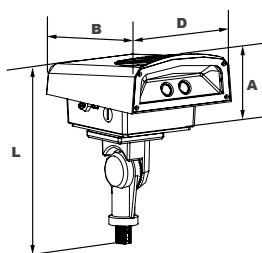
Notes:

Type:**E**

PULSE20-77378

**SMALL WEDGE****WALL & FLOOD MOUNT LIGHTING****L70**
25°C**76,000 Hours****12V****AVAILABLE**Shown with Battery
Backup OptionShown with "KN" Knuckle
Installed.**Dimensions**

Width (D)	6 1/8" (168mm)
Length (B)	7 1/4" (200mm)
Height (A)	4 1/2" (114mm)
Height with Mount (L)	10 1/8" (270mm)



Pemco's Small Wedge luminaire is available in two wattages designed to replace HID lighting systems up to 175w MH or HPS. Typical applications include general area, parking, flood, security, and accent lighting for retail centers, industrial parks, schools and universities, public transit and airports, office buildings and medical facilities. Mounting heights of 8 to 15 feet can be used based on light level and uniformity requirements.

Specifications and Features:**Housing:**

Die-Cast Gasketed Aluminum Housing, Includes Cast-In Box Template and Built in Level. White Reflector. Nickel-Plated Stainless Steel Hardware.

Listing & Ratings:

CSA: Listed for Wet Locations, ANSI/UL 1598, 8750; IP66 Sealed LED Compartment.

Finish:

Textured Architectural Bronze Powdercoat Finish Over a Chromate Conversion Coating. Custom Colors Available Upon Request.

Lens:

Tempered Clear Flat Glass Lens.

Mounting Options:

Mount Directly Over Recessed Electrical Box or use 1/2" Surface Mount Conduit. Adjustable Knuckle with 1/2" NPS Threads, Sold Separately, Field Installed.

COB LED:

QSSI Cool Copper COB

Wattage:

20w COB: 20w, System: 21w; (100w HID Equivalent) **Note: 12V Model is 20w only.**
40w COB 40w, System: 43w; (175w HID Equivalent)

Driver:

Electronic Driver, 120-277V, 50/60Hz; 347-480V, 50/60Hz or 347V, 50/60Hz; Less Than 20% THD and PF>0.90. Standard Internal Surge Protection is 2kV for 20w, 6kV for 40w. 0-10V Dimming Standard for a Dimming Range of 100% to 10%; Dimming Source Current is 150 Microamps.

12V: Electronic Driver, 12-17VAC Input, 50/60Hz, Non-Dimmable (20w Model Only)

Controls:

Fixtures Ordered with Factory-Installed Photocell or Motion Sensor Controls are Internally Wired for Switching and/or 1-10V Dimming Within the Housing. Remote Direct Wired Interface of 1-10V Dimming is Not Implied and May Not Be Available, Please Consult Factory. Fixtures are Tested with LEPC Controls and May Not Function Properly With Controls Supplied By Others. Fixtures are NOT Designed for Use with Line Voltage Dimmers.

Battery Backup:

Battery Backup Option Includes Accessory Housing (Ships Separately). Empty Accessory Housing is Available For Use When a Uniform Building Aesthetic is Desired.

Warranty:

5-Year Warranty for -40°C to +50°C Environment.

See Page 4 for Projected Lumen Maintenance Table.

Order Information Example:**WDG2C32X20U41KZKNP**

WDG2C3			41K			
Model	Wattage	Driver	CCT	Color	Mounting	Options
WDG2C3 =Small LED Traverse Wall Accent and Flood Light	2X10=20w 2X20=40w	U=120-277V V=12V* H=347-480V C=347V* *20w Model Only. *2x20w only	41K=4100k	Z=Bronze C=Custom (Consult Factory)	KN=Knuckle* *Optional, field installed. Order only for flood model.	SF=Single Fuse* DF=Double Fuse* SP=Surge Protection* P14=Pencil Photocell, 120-277VAC* BU4=Battery Backup, 90 Minutes* *Not Available on 12V Model. *120-277V Models Only.



Submitted by Pulse Products	Job Name: RNG EXPANSION Specifier: Wenck (GOLDEN VALLEY)	Catalog Number: WDG2C3-2X10-U-41K-Z-P14	Type: E
	Notes:	PULSE20-77378	



SMALL WEDGE



WALL & FLOOD MOUNT LIGHTING

Accessories & Replacement Parts:

Mounting Accessories (Order Separately, Field Installed)

FLPTFZ	Die-cast Post Top Fitter for 2½" to 3½" Poles, Bronze Powdercoat Finish, Three (3) ½" Coin Plugs.
FLSTK	Heavy Duty Ground Stake, Built-in Wiring Compartment with ½" NPS Threaded Fitting, Black Plastic. For Line-Voltage Applications.
NA04	Plastic Ground Stake with ½" NPT Threads, 11" H x 3" Diameter. For Low-Voltage Applications.



FLPTFZ FLSTK NA04

Accessories (Order Separately, Field Installed)

P18110	110-130V, 120VAC Pencil Photocell
P18112	208-277V, 240VAC Pencil Photocell
NT150BK	150w, 120V Black Powdercoat Steel Landscape Transformer, 12V, with Timer and Photocell
NT300SS	300w, 120V Stainless Steel Landscape Transformer, 12V, with Timer and Photocell
NT300SSM	300w, 120V Stainless Steel Landscape Transformer, Multi-Tap 12/14/17V, with Timer and Photocell
ACCHSG4*	Empty Die Cast Accessory Housing, Powdercoat Finish
*Not Available on 12V Model.	
*Specify Color: Z=Bronze, B=Black, C=Custom (Consult Factory)	



P18110, P18112 NT150BK NT300SS, NT300SSM ACCHSG4

Replacement Parts (Order Separately, Field Installed)

FLSTZ	Die-Cast Adjustable Knuckle with ½" NPS Threads, Bronze Powdercoat Finish.
P18114	120-277V, 50/60Hz Pencil Photocell
For Replacement Battery Backup, see the LEPA LED Battery Backup Specification Sheet.	
*Not Available on 12V Model.	



FLSTZ* P18114
*Shown Mounted

EPA (Effective Projected Area)

Configuration	EPA (Sq. Ft.)	Weight (Lbs.)
 1	.31	5 Lbs

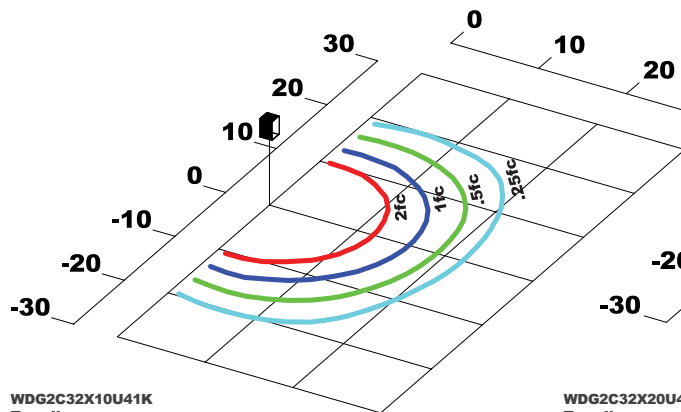
**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

WDG2C3-2X10-U-41K-Z-P14

Notes:

Type:**E**

PULSE20-77378

**SMALL WEDGE****WALL & FLOOD MOUNT LIGHTING****Photometric Data****WDG2C32X10U41K**Type II
Grid in MH
MH=10 Feet**WDG2C32X20U41K**Type II
Grid in MH
MH=10 Feet**Photometric Performance**

LED Board Watts	Drive Current (mA)	Input Watts	Optics	4100 CCT 80 CRI				
				Lumens	LPW	B	U	G
COB LED 21w	525	21	Type II	2,300	110	1	1	0
COB LED 43w		43	Type II	4,025	94	2	1	1

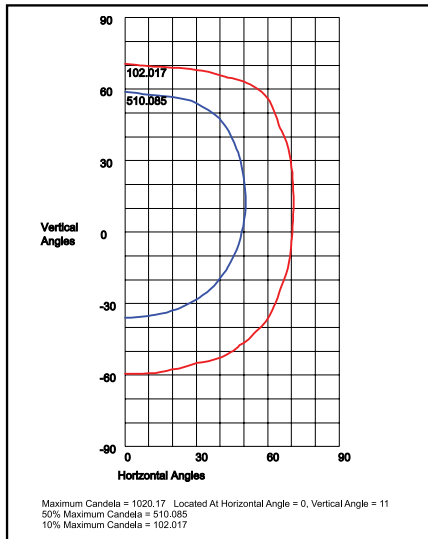
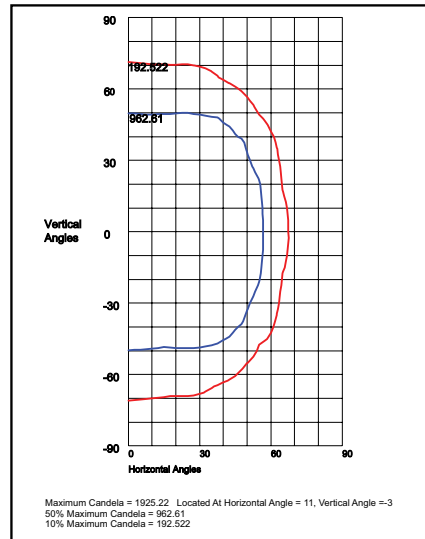
**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

WDG2C3-2X10-U-41K-Z-P14

Notes:

Type:**E**

PULSE20-77378

**SMALL WEDGE****WALL & FLOOD MOUNT LIGHTING****Photometric Data**WDG2C32X10U41K
110°H x 100°V Beam, NEMA 7H x 6VWDG2C32X20U41K
100°H x 90°V Beam, NEMA 7H x 6V**Photometric Performance**

LED Board Watts	Drive Current (mA)	Input Watts	Beam	4100 CCT 80 CRI	
				Lumens	LPW
COB LED 21w	525	21	110°H x 100°V, NEMA 7H x 6V	2,304	110
COB LED 43w		43	100°H x 90°V, NEMA 7H x 6V	4,034	94

Projected Lumen Maintenance

Data shown for 4100 CCT TM-21-11			Compare to MH			
	Input Watts	Initial	25,000 Hrs	50,000 Hrs	100,000 Hrs	Calculated LED Life
L70 Lumen Maintenance @ 25°C / 77°F	All wattages up to and including 43w	1.00	0.90	0.80	0.61	76,000
L70 Lumen Maintenance @ 50°C / 122°F		1.00	0.86	0.72	0.44	54,000
L80 Lumen Maintenance @ 40°C / 104°F		1.00	0.88	0.76	0.52	42,000

NOTES:

- Projected per IESNA TM-21-11. Data references the extrapolated performance projections for the 525mA base model in a 25°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.
- Compare to MH box indicates suggested Light Loss Factor (LLF) to be used when comparing to Metal Halide (MH) systems.

**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**DELA-100-40-60-V01-GR-WM90S-NDIM
CONNECT TO REMOTE PHOTOCELL

Notes:

Type:**WP**

PULSE20-77378

SPECGRADE
LED
PRECISE, HIGH-OUTPUT LIGHTING**DELTA-A****HAZARDOUS LOCATION LED****20W, 40W, 60W, 80W, 100W, 150W, 200W**
HAZARDOUS LOCATION LED

- Class I - Div 2: Groups A, B, C, D
- Class II - Div 1: Group E, F, G
- Class II - Div 2: Group F, G
- Class III
- UL 1598A Marine Listed
- UL 844
- IP66 & IK10 Rated

PROJECT

CATALOG #

TYPE

Rev: 06/06/2019

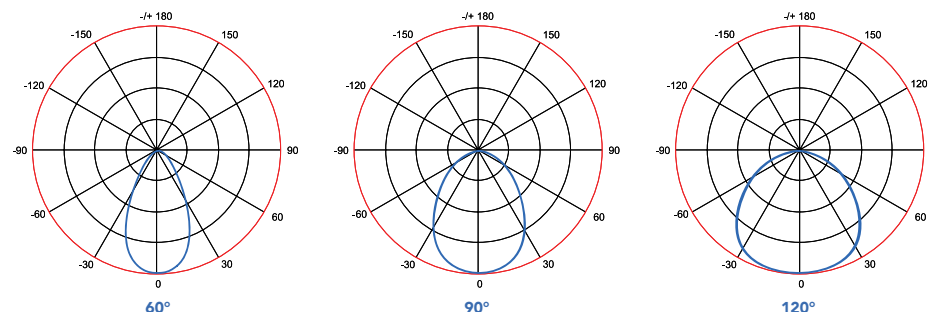
**POWER**Available from 20W up to
200W Configurations**PRECISION**Custom-Engineered Optics Offer
Precisely Directed Light**ENGINEERING**A383 Die Cast Aluminum Housing and
Tempered Glass Lens**ORDERING INFORMATION**

EXAMPLE PART #: DELA - 100 - 40K - 40 - V01 - GR - PM - NDIM

DELA					GR		
SERIES	WATTS	CCT	OPTICS	INPUT PWR	FINISH	MOUNTING	DIMMING
DELA	20	35K	60	V01 110/277V	GR	TM Trunnion Mount (Wall, Ceiling & Floor)	NDIM No Dimming
	40	40K	90	V04 347/480V		PM Pendant Mount	VDIM 0-10V Dimmable
	60	50K	120			JBT Junction Box w/Pendant	
	80	57K				WM25 25° Wall Mount & Junction Box: 3/4" NPT	
	100					WM90 90° Wall Mount & Junction Box: 3/4" NPT	
	150					WM90S 90° Wall Mount	
	200					PL25 25° Pole Mount: 1-1/2" NPT	
						PL90 90° Pole Mount: 1-1/2" NPT	

NOTES

- 20W & 40W Only Available in V01 110/277V
- 35K Available; Please Consult Factory for Lead Times

**CONNECT TO
REMOTE PHOTOCELL****OPTICS**

Due to continuous improvement and innovation, product appearance and specifications may change without notice. Actual performance may differ as a result of end-user environment and application.

TOLL-FREE: 888-410-5337 | FAX: 614-868-5344 | © 2018 SpecGradeLED

www.SpecGradeLED.com

**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**DELA-100-40-60-V01-GR-WM90S-NDIM
CONNECT TO REMOTE PHOTOCELL

Notes:

Type:**WP**

PULSE20-77378

DELTA-A

HAZARDOUS LOCATION LED

SPECGrade
LED
PRECISE, HIGH-OUTPUT LIGHTING

SPECIFICATIONS

Expected Life | Over 85,000 hrs.
Rating | IP66 & IK10
Color Rendering Index (CRI) | 70
Operating Temp | -40°C – +65°C
Relative Humidity | 10-90% RH
Power Factor | >.95
Input Line Voltage | 90-305 / 200-525 VAC
Input Line Frequency | 50/60 Hz
LED Chips | Philips
Driver | Meanwell
Surge Protection | 10KV
DC Output Ripple & Noise | <200mVP-P
T-Rating | T3

LISTINGS

UL 1598A Marine Listed**UL 844 Listed**

- Class I, Division 2, Groups A,B,C,D
- Class II, Division 1, Groups E,F,G
- Class II, Division 2, Groups F,G
- Class III

MATERIALS

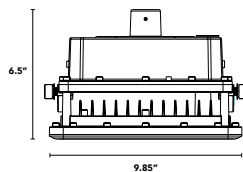
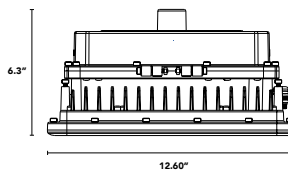
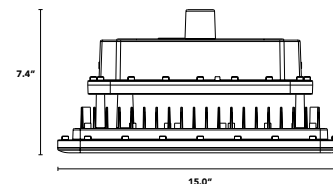
Housing | A383 Die Cast Aluminum
Gasketing | Fluorosilicone Rubber
Hardware | Stainless Steel 304
Finish | Polyester Powdercoat
Lens | Tempered Glass

LUMEN CHART

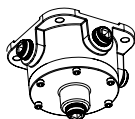
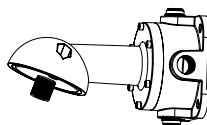
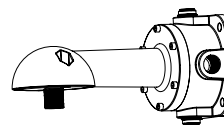
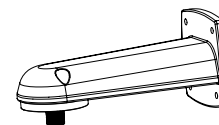
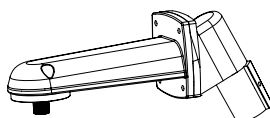
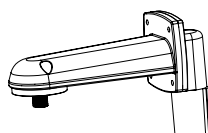
	3500K	4000K	5000K	5700K
20W	2,400 lm	2,560 lm	2,700 lm	2,800 lm
40W	4,800 lm	5,120 lm	5,400 lm	5,600 lm
60W	7,200 lm	7,680 lm	8,100 lm	8,400 lm
80W	9,600 lm	10,240 lm	10,800 lm	11,200 lm
100W	12,000 lm	12,800 lm	13,500 lm	14,000 lm
150W	18,000 lm	19,200 lm	20,250 lm	21,000 lm
200W	24,000 lm	25,600 lm	27,000 lm	28,000 lm

Typical delivered lumen data is approximate. Actual lumens will vary due to installation environment and beam pattern. Please see IES files.

PRODUCT DRAWINGS

20W - 40W - 60W**80W - 100W****150W - 200W**

ADDITIONAL MOUNTING OPTIONS

JBT: Junction Box w/ Pendant**WM25: 25° Wall Mount & Junction Box****WM90: 90° Wall Mount & Junction Box****WM90S: 90° Wall Mount****PL25: 25° Pole Mount****PL90: 90° Pole Mount**

Due to continuous improvement and innovation, product appearance and specifications may change without notice. Actual performance may differ as a result of end-user environment and application.

TOLL-FREE: 888-410-5337 | FAX: 614-868-5344 | © 2018 SpecGradeLED

www.SpecGradeLED.com

**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

T631LED-58-UNV12-T4-BZ-PC2

Notes:

Type:**WP1**

PULSE20-77378

TECH·D**T631LED**LARGE LED TRAPEZOIDAL
CUT-OFF WALL PACK

JOB INFORMATION	TYPE:
	CATALOG NO.
	PROJECT NAME:
	COMMENTS:
	PREPARED BY:

1051LED

**USE OF PRODUCT**

The intended use of this product is for decorative wall mount, building accents, pedestrian walkways, public access areas, or recreation areas.

HOUSING

Rugged die cast aluminum housing with hinged front frame. 1/2" coin plugs with O-rings for conduit & photocell.

FINISH

Matt-finished, architectural bronze powdercoat over a precise chromate conversion coating. Available in standard dark polyester bronze or consult factory for made to order architectural finishes.

OPTICS

Specular anodized aluminum reflector with clear tempered glass lens. Lens is sealed by one-piece silicon gasket prohibits entrance of outside contaminants.

LED

High output LEDs offer a minimum estimated operating life of 50,000 hours in 2700K, 3000K, 3500K, 4000K, or 5000K (standard) with CRI>83. LEDs placed on high performance aluminum heatsink for reduced junction temperatures and extended life.

EPA

Effective Projected Area (Sq. Ft.): .871 ft² (1 fixture),

DRIVER

Durable and long lasting LED driver operates at 120-277V and boasts a 90% power factor at 50 to 60 Hz with 0-10V Dimming Constant Current. Driver protections includes: Output open load, over-current and short-circuit, and over-temperature with auto recovery. 40°C Min Temp. 40°C Max Temp. 40°C Min Temp. 40°C Max Temp. Step down transformer may be utilized for 480V or 347V applications.

MOUNTING

Cast-in template for mounting directly over a 4" recessed outlet box or 1/2" surface conduit.

LISTINGS/COMPLIANCE

- CEC compliant emergency driver.
- CSA - Listed for wet location.

ORDERING INFO

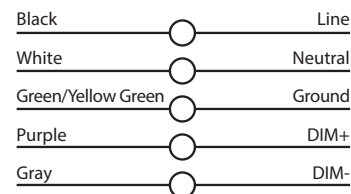
T631LED						
Series	Watt/lumens	Voltage	Color Temperature	Distribution Types	Finish	Options
T-SERIES LED	20 - 20W/2167 lm 30 - 30W/3251 lm 40 - 40W/4335 lm 58 - 58W/6205 lm 84 - 84W/8756 lm 119 - 119W/12354 lm	UNV-120V-277V 347 ¹ - 347V 480 ¹ - 480V	30 - 3000K 35 - 3500K 40 - 4000K 50 ² - 5000K	T1 - Type I T2 - Type II T3 - Type III T4 - Type IV T5 - Type V	BZ³ - Bronze MTO ⁴ - Made to order MGTO ⁵ - Marine grade made to order	PC1 - Photocell 120V PC2 - Photocell 277V WG - Wire guard MS - Motion Sensor (Integral) SDT - Step down transformer EM - Emergency battery (Integral) CEM - Cold pack emergency battery (Integral) SP10 - Surge protection 10KV

Wireless Control

LPH - Limelight by Lutron Integral module with PIR sensor and external antennae, - high mounting height
LPM - Limelight by Lutron Integral module with PIR sensor and external antennae - medium mounting height
LPL - Limelight by Lutron Integral module with PIR sensor and external antennae - low mounting height
LRF - Limelight by Lutron Integral module with external antennae, RF Only

Notes:

1. Step down transformer required.
2. Standard color temperature.
3. Standard distribution type.
4. Standard finish.
5. RAL number required.



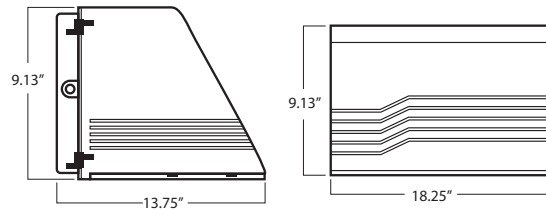
**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

T631LED-58-UNV12-T4-BZ-PC2

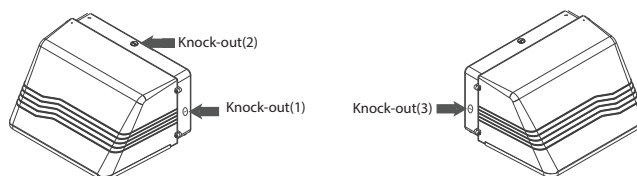
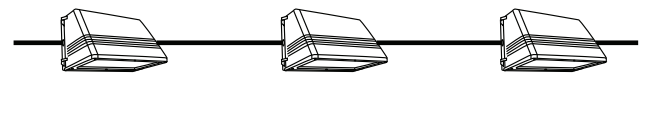
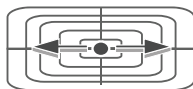
Notes:

Type:**WP1**

PULSE20-77378

Dimensions**B-U-G Rating**

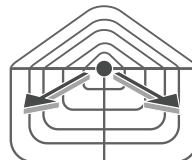
		T2 Optic	T3 Optic	T4 Optic	T5 Optic	
T631LED-20	19.31	2127	2132	2139	2167	Lumen
		110	110	111	112	Efficacy
		B1-U0-G1	B0-U0-G1	B1-U0-G1	B1-U0-G0	Efficacy
T631LED-30	28.97	3191	3198	3208	3251	Lumen
		110	110	111	112	Efficacy
		B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G0	Efficacy
T631LED-40	40.15	4254	4263	4278	4335	Lumen
		106	106	107	108	Efficacy
		B1-U0-G2	B1-U0-G1	B1-U0-G1	B2-U0-G1	Efficacy
T631LED-58	58.12	6089	6103	6125	6205	Lumen
		105	105	105	107	Efficacy
		B2-U0-G2	B1-U0-G2	B1-U0-G2	B3-U0-G1	Efficacy
T631LED-84	83.89	8508	8527	8557	8756	Lumen
		101	102	102	104	Efficacy
		B2-U0-G2	B1-U0-G2	B2-U0-G2	B3-U0-G1	Efficacy
T631LED-119	119.58	11911	11937	11980	12354	Lumen
		100	100	100	103	Efficacy
		B3-U0-G3	B2-U0-G2	B2-U0-G2	B3-U0-G2	Efficacy

EPA= .871ft²**T631LED-Knock-Out Location****Feed through conduit access****DISTRIBUTION TYPE****TYPE I**

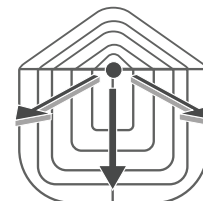
Type I is intended for walkways, roadways or any narrow paths. Typically known for its two-way lateral distribution having a preferred lateral width of 15° at the cone. Type I focuses majority of its light near the center of the pathway for even light disbursement since the light projects laterally at a 15° angel.

**TYPE II**

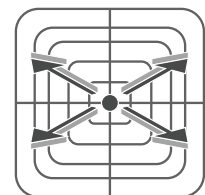
Type II distribution is well suited for expanded walkways, entrance roadway lighting and other applications. Having a lateral width of 18-29° means this type is meant for lighting larger areas.

**TYPE III**

Type III distribution is well suited for roadway lighting, general parking areas and other areas where a larger area of light is required because it gives more coverage further from the point source outward. Type III distribution provides a wide, round pattern and yields an even light disbursement since the light projects outward.

**TYPE IV**

Type IV distribution is best intended for sides of buildings and walls because of its semicircular light pattern. Type IV has a preferred lateral width of 60° make it ideal for parking area and court yard.

**TYPE V**

Type V distribution is intended for mounting at or near center of roadways, center islands of parkways or an intersection. Type V provides central circular or square design pattern, equally across all angles from a central point. It provides the most even pattern of light since light is pushed in all direction from the center.

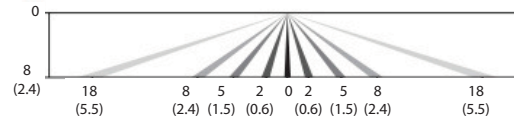
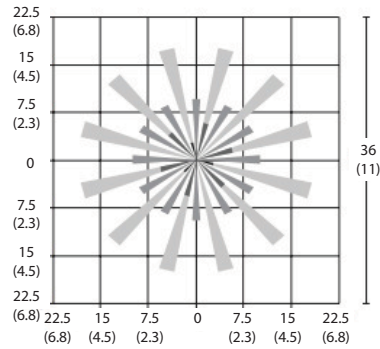
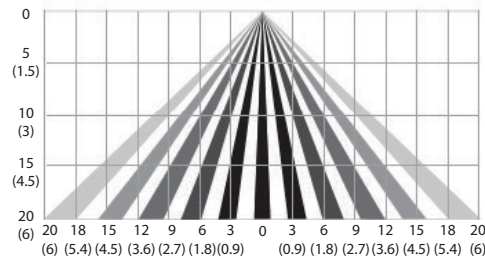
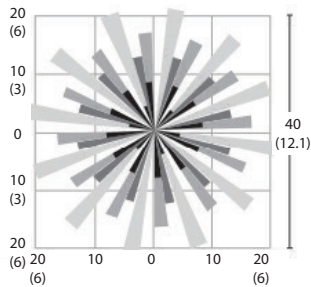
**Job Name:**RNG EXPANSION
Specifier: Wenck (GOLDEN VALLEY)**Catalog Number:**

T631LED-58-UNV12-T4-BZ-PC2

Notes:

Type:**WP1**

PULSE20-77378

PIR Height**LPL - Lutron wireless radio module and sensor (low mounting height 8ft)****LPM - Lutron wireless radio module and sensor (medium mounting height 20ft)**

Technical Memo

To: Allen Hunt, Foristar Methane

From: Lu Zhang, Wenck Associates, Inc.
Brian Kallio, PE (MN), Wenck Associates, Inc.

Date: December 17, 2020

Subject: Fortistar RNG Expansion Stormwater Memo

This memorandum summarizes existing and proposed stormwater conditions for the Fortistar RNG Expansion located in Inver Grove Heights, MN. The site is located within the city of Inver Grove Heights and the Lower Mississippi River Watershed Management Organization (LMWMO) boundaries. The City of Inver Grove Heights provides the following requirements for stormwater management for new developments that include greater than 5,000 square feet of new impervious surfaces:

- The modeled discharge from proposed development must be less than or equal to the existing modeled discharge rate for the Atlas 14, 2-, 10-, and 100-year rainfall events.
- Where achievable, the proposed development must retain the equivalent of 1" of runoff from all of the new and reconstructed impervious surfaces through infiltration,
- The development must include BMPs that reduce Total Suspended Solids (TSS) and Total Phosphorous (TP) by 85% and 55%, respectively.

Site Description

The site is currently vacant and forms overland runoff. The geotechnical report provided by the Northern Technologies, LLC suggested approximately 2 to 9 feet of undocumented fill overlying poorly graded sand on the site. The fill consisted of a wide mix of soil types including sandy lean clay, clayey sand, silty sand, poorly graded sand and poorly graded sand with silt. The fill materials range from Hydrologic Soil Group (HSG) D for the clay-based soils to HSG C for the silt and HSG A for the sand. Based on the soil types and their prevalence as observed in the borings, the runoff models use HSG C soil to determine curve numbers for the hydrologic models. A copy of the geotechnical report is provided in Appendix A and the existing site conditions and drainage are shown in Figure 1.

The proposed development includes the construction of methane processing facility building and associated paved driveway and parking. A paved access road will also be constructed to connect the site and the nearest road access. This project will disturb total of 3.4 acres and result in a net increase of approximately 1.6 acres of new impervious area (including the access road).

The proposed development includes grading much of the site to allow construction and adequate drainage. Stormwater treatment will be provided with an infiltration basin on the west end of the site. Most of the on-site impervious surface runoff will be directed to the infiltration basin for treatment. A small portion of the site and the paved access road will be discharged off-site. Discharges from the impervious surfaces will be pre-treated to remove sediments with a combination of a sump structures with flow attenuating baffle. Proposed site conditions and drainage patterns are shown in Figure 2.

The native soil underlying the undocumented fill in the vicinity of the proposed infiltration basin is poorly graded sand (HSG A) soil with an SP classification. The infiltration rate used in the model is 0.8 in/hr as suggested for HSG A SP soils in the Minnesota Stormwater Manual.

Methodology, Existing Conditions, and Proposed Conditions Analysis

Wenck created a HydroCAD model using survey information, soil boring reports, and NOAA Atlas 14 rainfall data. Atlas 14 is used to obtain the 2-, 10-, and 100-yr 24-hour storm event precipitation. Rainfall totals for the modeled rainfall events are:

	2-yr	10-yr	100-yr
Precipitation Depth (in)	2.79	4.15	7.43

Under the proposed conditions, two culverts will still divert water from the site through the same flow paths as existing conditions, and to the wetland complex to the west. The water quality volume provided by the infiltration basin is adequate to treat 1" runoff from impervious surfaces to comply with the MPCA NPDES permit requirements. A summary of the new impervious surface, retention volume goal, and retention volume provided are provided in Table 1.

Table 1. Water Quality Volume Requirements

Total New Impervious Surface	Water Quality Volume Required	Water Quality Volume Provided
68,915 sf	5,743 cf	5,758 cf

The infiltration basin exceeds the total required water quality volume. About 24,794 square feet (36%) of the new impervious surface is not routed to the infiltration basin and this includes 22,878 sf of the paved access road. The paved access road will flow through a vegetated buffer along the shoulders.

The outlet structure and basin are designed to provide a minimum of two feet of separation between the adjacent structure finished floor elevation (FFE) of 865.00-feet and 100-year high water level (HWL). The 100-year high water level for the basin is 857.8 ft and provides adequate protection for the adjacent structures.

The basin is also designed to provide rate control for site discharges. Table 1 presents the existing and proposed peak discharge rates for the site as a total. The existing and proposed HydroCAD models for the site are included as Appendices B and C.

Table 1. Site Total Existing and Proposed Peak Discharge Rates

Storm Events	Existing Discharge (cfs)	Proposed Discharge (cfs)
--------------	--------------------------	--------------------------

2-yr	5.61	3.57
10-yr	13.53	8.70
100-yr	36.15	31.55

City of Inver Grove Heights requires that implementation of best management practices to reduce TSS and TP by 85% and 55%, respectively. SHSAM and P8 models were set up to determine the efficiency of the proposed infiltration basin.

SHSAM results indicated that for a 15" RCP pipe, the model 44 will be able to provide a removal efficiency of 26.9% of the total suspended solids in the runoff in pretreatment. Additional pretreatment that is not incorporated in the models will occur in the rip rap basin at the storm sewer discharges.

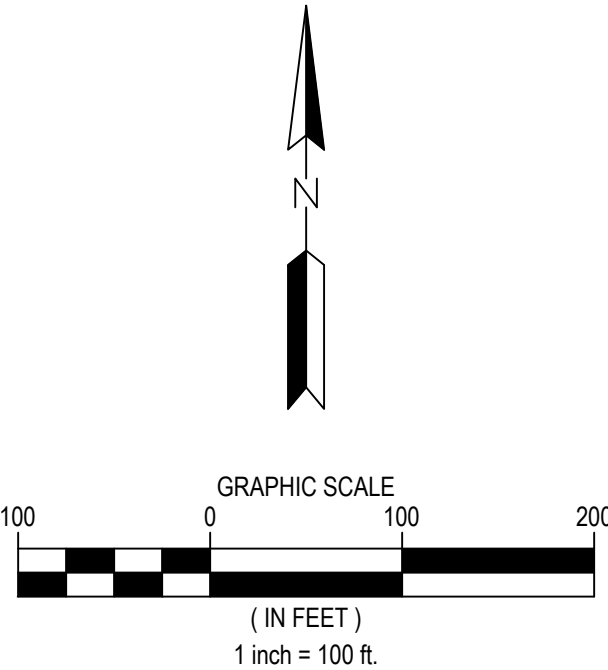
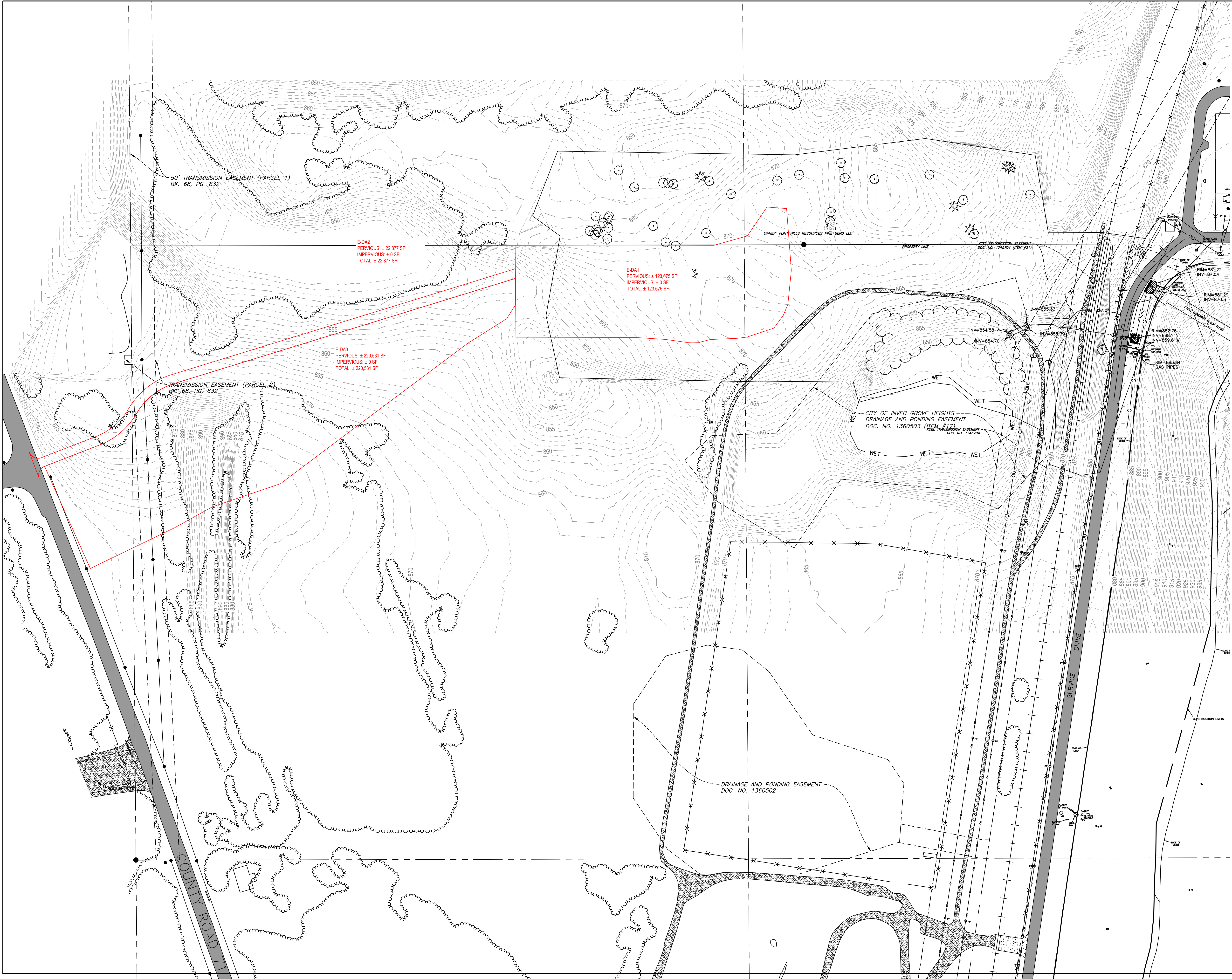
The infiltration basin will be able to remove 91.8% TSS and 72.9% TP discharged into the pond. The access road will have buffer on the sides of the road to help reduce sediment and total phosphorus output from the impervious surfaces. The overall removal is summarized below:

Table 3. P8 Model Water Quality Summary

	TSS	TP
Total Inflow (lbs/yr)	3,241.7	7.8
Removed by Pond (lbs/yr)	1,419.6	3.7
Removed by Sump (lbs/yr)	569	-
Removed to Buffer (lbs/yr)	967.1	1.4
Overall Removal Efficiency	91.2%	65.4%

Conclusion

Wenck evaluated existing and proposed drainage conditions at the site. The infiltration basin and outlet control structure provide rate control for the 2-, 10-, and 100-year events. The basin meets the minimum water quality volume required by the NPDES permit. The proposed construction is designed with industry standards and meets the requirements of the stormwater permit.



LEGEND	
	PROPERTY BOUNDARY
	LOT LINE
	EASEMENT LINE
	SETBACK LINE
	RIGHT OF WAY LINE
	SECTION LINE
	QUARTER LINE
	EXISTING EASEMENT LINE
	EXISTING PROPERTY LINE
	EXISTING RAILROAD TRACK
	EXISTING FENCE LINE
	EXISTING STORM SEWER
	EXISTING UNDERGROUND GAS LINE
	EXISTING OVERHEAD UTILITY LINE
	EXISTING EDGE OF PAVEMENT
	EXISTING EDGE OF GRAVEL
	EXISTING TREE LINE
	EXISTING WETLAND BOUNDARY
	EXISTING ASPHALT SURFACE
	EXISTING GRAVEL SURFACE
	EXISTING CONCRETE SURFACE
	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	EXISTING SANITARY MANHOLE
	EXISTING STORM SEWER INLET
	EXISTING FLARED END SECTION

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA 55077

DATE:	DESCRIPTION:	ISSUE NO.:
12/1/2020	CITY SUBMITTAL	1

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY: MDH	CHKD BY: PWS	APPD BY: JTW
-------------	--------------	--------------

ISSUE DATE: 12/21/2020

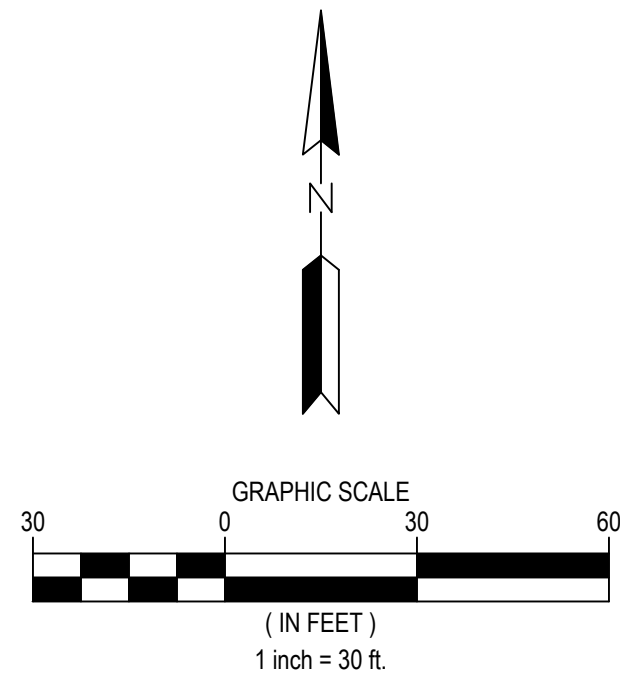
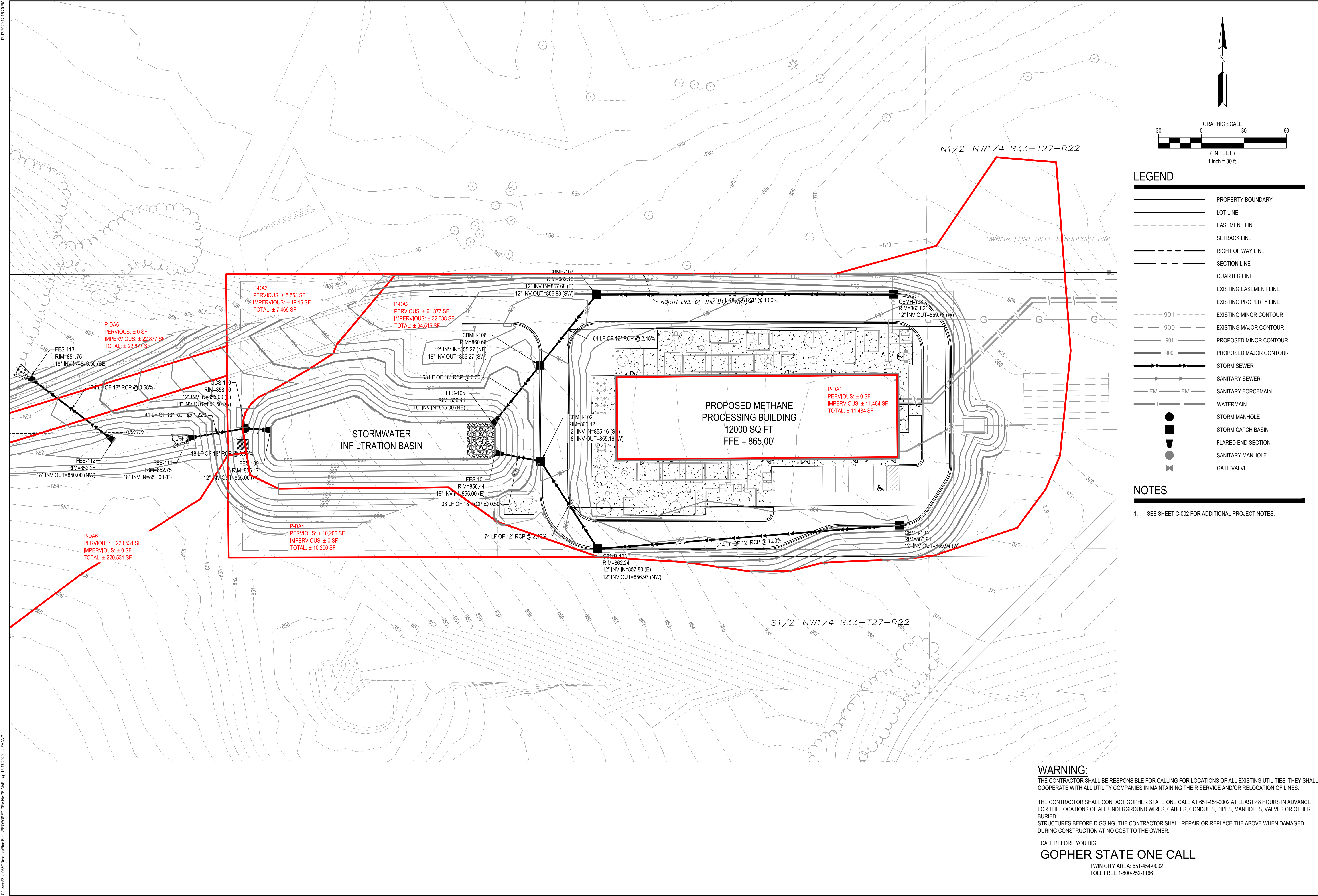
ISSUE NO.: 1

SHEET TITLE:
EXISTING DRAINAGE
MAP

SHEET NO.:
FIG 1

12/17/2020 12:15:20 PM

C:\Users\21a0800\Desktop\Pinelands\PROPOSED DRAINAGE MAP.dwg 12/17/2020 LUT 24HAG



LEGEND

- PROPERTY BOUNDARY
- LOT LINE
- EASEMENT LINE
- SETBACK LINE
- RIGHT OF WAY LINE
- SECTION LINE
- QUARTER LINE
- EXISTING EASEMENT LINE
- EXISTING PROPERTY LINE
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- STORM SEWER
- SANITARY SEWER
- SANITARY FORCEMAIN
- WATERMAIN
- STORM MANHOLE
- STORM CATCH BASIN
- FLARED END SECTION
- SANITARY MANHOLE
- GATE VALVE

NOTES

- SEE SHEET C-002 FOR ADDITIONAL PROJECT NOTES.

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND/OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED

STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CALL BEFORE YOU DIG

GOPHER STATE ONE CALL

TWIN CITY AREA: 651-454-0002
TOLL FREE 1-800-252-1166

7500 OLSON MEMORIAL HWY
SUITE 300
GOLDEN VALLEY, MN 55427
PHONE: 763-262-6800
FAX: 952-831-1268
WWW.WENCK.COM

CLIENT:

www.scsengineers.com

SCS ENGINEERS

PROJECT TITLE:

FORTISTAR RNG EXPANSION

INVER GROVE HEIGHTS
DAKOTA COUNTY, MINNESOTA 55077

ISSUE NO.	DESCRIPTION	DATE
1	CITY SUBMITTAL	12/17/2020

CERTIFICATION:

NOT FOR CONSTRUCTION

PROJECT NO.: 7251-20-500

DWN BY:	CHKD BY:	APPD BY:
MDH	PWS	JTW

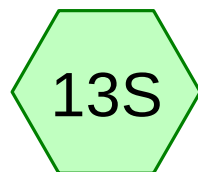
ISSUE DATE: 12/21/2020

ISSUE NO.: 1

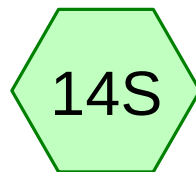
SHEET TITLE:
PROPOSED DRAINAGE MAP

SHEET NO.:
FIG 2

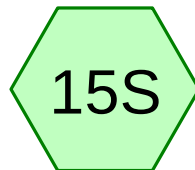
Existing



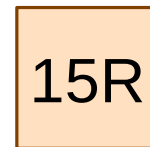
E-DA1



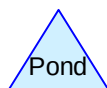
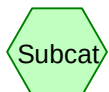
E-DA2



E-DA3



Total Out



Routing Diagram for Fortistar Stormwater

Prepared by {enter your company name here}, Printed 12/17/2020
HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Printed 12/17/2020

Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.427	74	>75% Grass cover, Good, HSG C (13S, 14S, 15S)
8.427	74	TOTAL AREA

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Printed 12/17/2020

Page 3

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
8.427	HSG C	13S, 14S, 15S
0.000	HSG D	
0.000	Other	
8.427		TOTAL AREA

Fortistar Stormwater

Prepared by {enter your company name here}

Printed 12/17/2020

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Page 4

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	8.427	0.000	0.000	8.427	>75% Grass cover, Good	13S, 14S, 15S
0.000	0.000	8.427	0.000	0.000	8.427	TOTAL AREA	

Fortistar Stormwater*MSE 24-hr 3 100-yr Rainfall=7.43"*

Prepared by {enter your company name here}

Printed 12/17/2020

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 13S: E-DA1

Runoff Area=123,675 sf 0.00% Impervious Runoff Depth=4.42"

Tc=6.0 min CN=74/0 Runoff=22.20 cfs 1.046 af

Subcatchment 14S: E-DA2

Runoff Area=22,877 sf 0.00% Impervious Runoff Depth=4.42"

Tc=6.0 min CN=74/0 Runoff=4.11 cfs 0.193 af

Subcatchment 15S: E-DA3

Runoff Area=220,531 sf 0.00% Impervious Runoff Depth=4.42"

Flow Length=300' Slope=0.0460 '/' Tc=26.4 min CN=74/0 Runoff=21.47 cfs 1.864 af

Reach 15R: Total Out

Inflow=36.15 cfs 3.103 af

Outflow=36.15 cfs 3.103 af

Total Runoff Area = 8.427 ac Runoff Volume = 3.103 af Average Runoff Depth = 4.42"**100.00% Pervious = 8.427 ac 0.00% Impervious = 0.000 ac**

Summary for Subcatchment 13S: E-DA1

Runoff = 22.20 cfs @ 12.13 hrs, Volume= 1.046 af, Depth= 4.42"

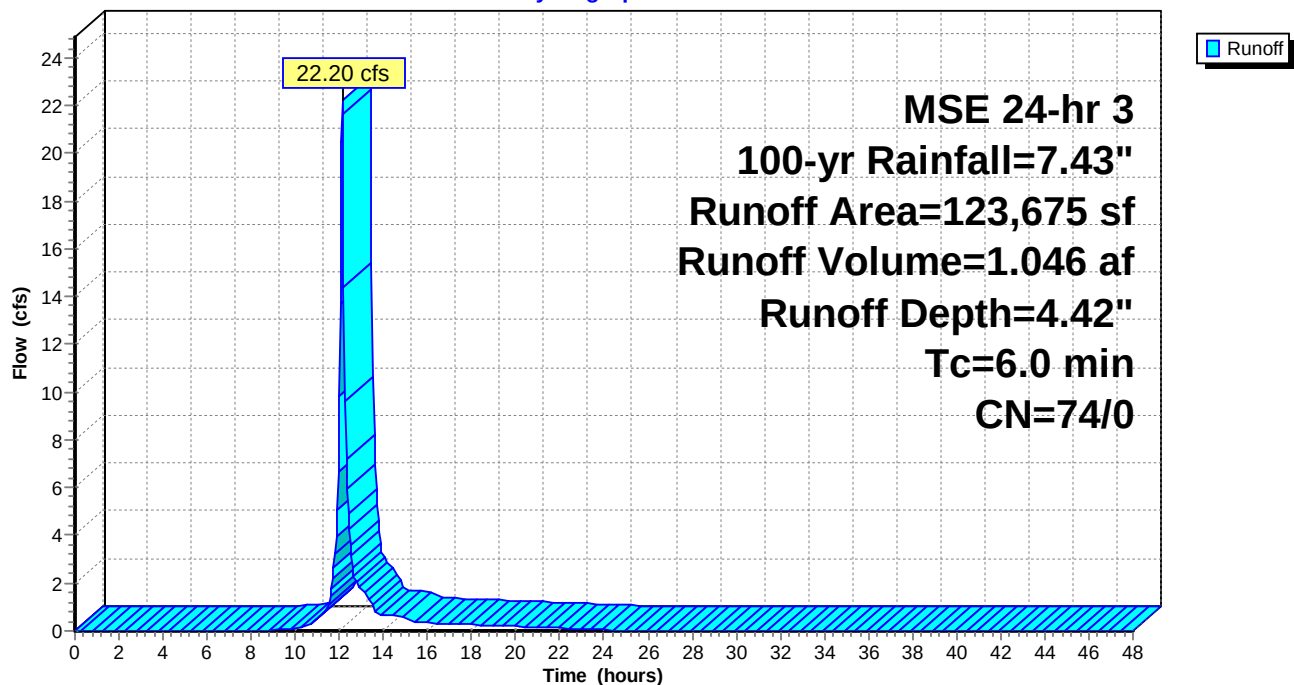
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
123,675	74	>75% Grass cover, Good, HSG C
123,675	74	100.00% Pervious Area

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

Subcatchment 13S: E-DA1

Hydrograph



Summary for Subcatchment 14S: E-DA2

Runoff = 4.11 cfs @ 12.13 hrs, Volume= 0.193 af, Depth= 4.42"

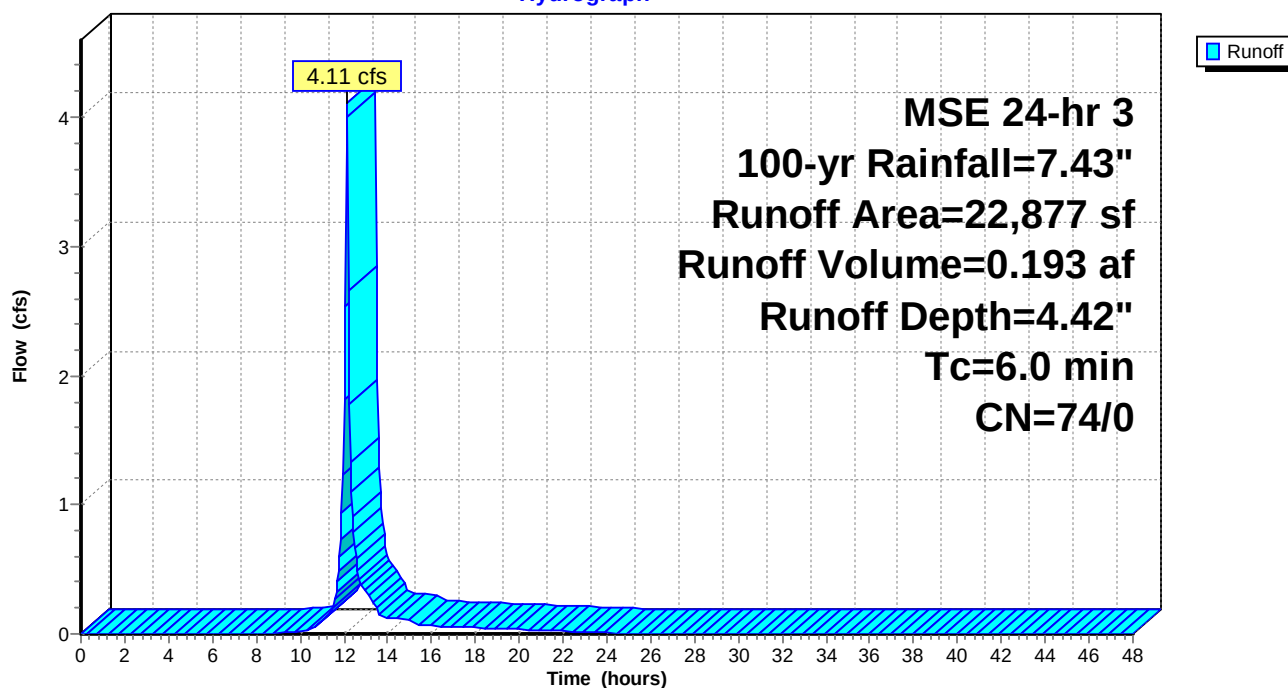
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
22,877	74	>75% Grass cover, Good, HSG C
22,877	74	100.00% Pervious Area

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

Subcatchment 14S: E-DA2

Hydrograph



Summary for Subcatchment 15S: E-DA3

Runoff = 21.47 cfs @ 12.38 hrs, Volume= 1.864 af, Depth= 4.42"

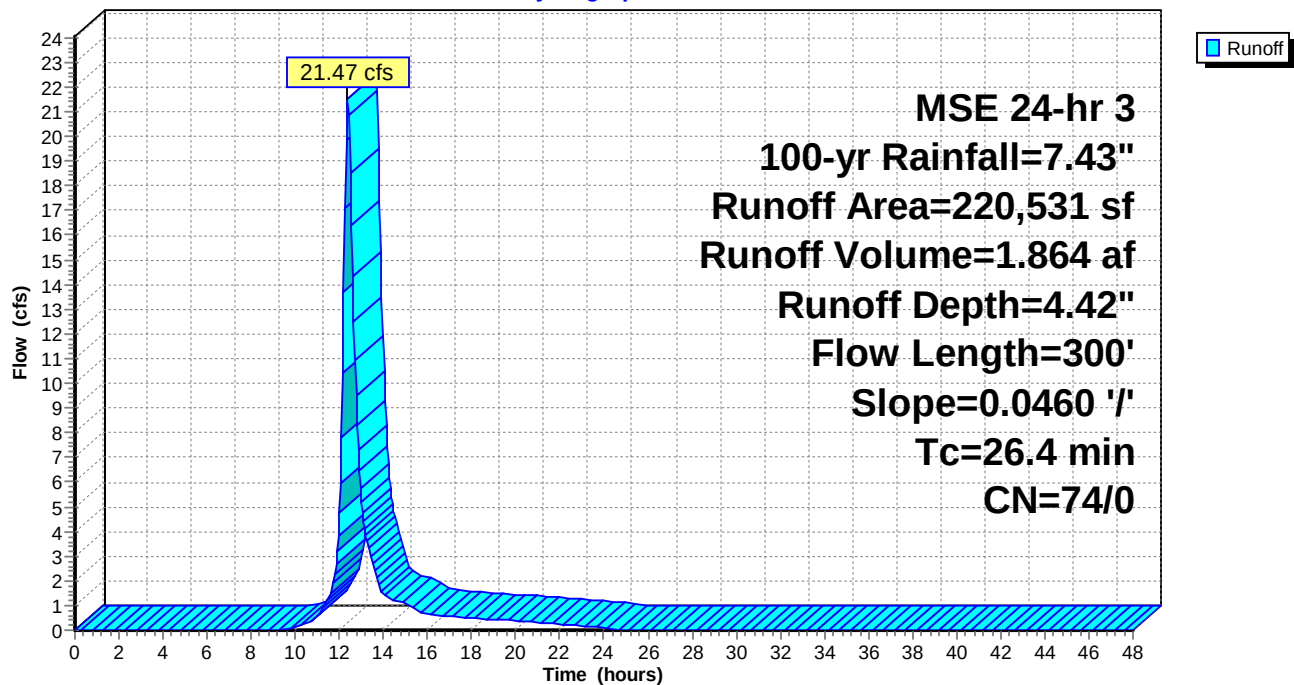
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
220,531	74	>75% Grass cover, Good, HSG C
220,531	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.4	300	0.0460	0.19		Sheet Flow, Grass: Dense n= 0.240 P2= 2.79"

Subcatchment 15S: E-DA3

Hydrograph

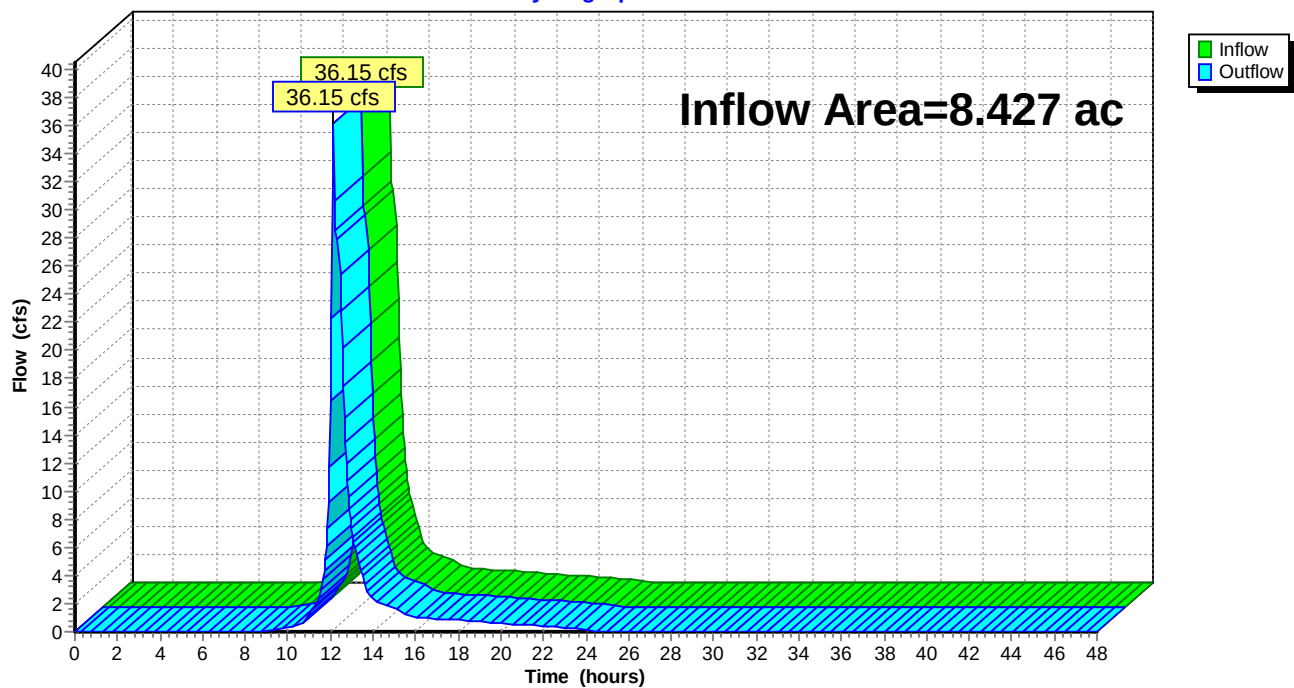


Summary for Reach 15R: Total Out

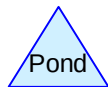
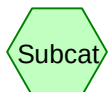
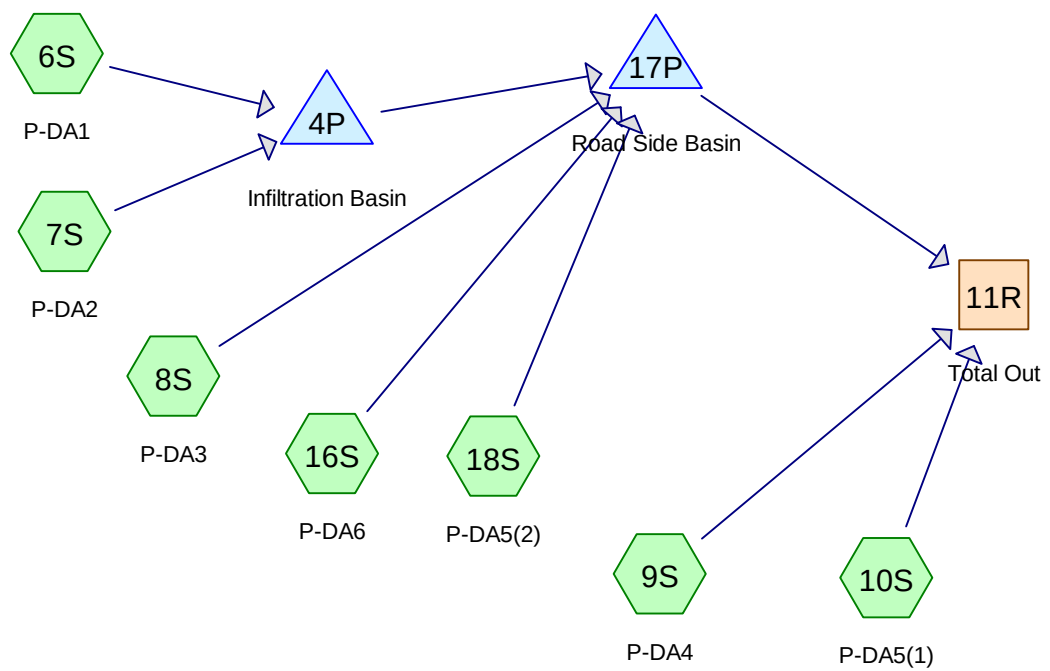
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.427 ac, 0.00% Impervious, Inflow Depth = 4.42" for 100-yr event
Inflow = 36.15 cfs @ 12.15 hrs, Volume= 3.103 af
Outflow = 36.15 cfs @ 12.15 hrs, Volume= 3.103 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 15R: Total Out**Hydrograph**

Proposed



Routing Diagram for Fortistar Stormwater

Prepared by {enter your company name here}, Printed 12/17/2020
HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Printed 12/17/2020

Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.845	74	>75% Grass cover, Good, HSG C (7S, 8S, 9S, 16S)
0.525	98	Half of the road (10S, 18S)
0.793	98	Paved parking, HSG A (7S, 8S)
0.264	98	Unconnected roofs, HSG A (6S)
8.427	79	TOTAL AREA

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Printed 12/17/2020

Page 3

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.057	HSG A	6S, 7S, 8S
0.000	HSG B	
6.845	HSG C	7S, 8S, 9S, 16S
0.000	HSG D	
0.525	Other	10S, 18S
8.427		TOTAL AREA

Fortistar Stormwater

Prepared by {enter your company name here}

Printed 12/17/2020

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Page 4

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	6.845	0.000	0.000	6.845	>75% Grass cover, Good	7S, 8S, 9S, 16S
0.000	0.000	0.000	0.000	0.525	0.525	Half of the road	10S, 18S
0.793	0.000	0.000	0.000	0.000	0.793	Paved parking	7S, 8S
0.264	0.000	0.000	0.000	0.000	0.264	Unconnected roofs	6S
1.057	0.000	6.845	0.000	0.525	8.427	TOTAL AREA	

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

Printed 12/17/2020

Page 5

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	850.50	850.00	42.0	0.0119	0.013	18.0	0.0	0.0
2	17P	850.00	849.50	74.0	0.0068	0.013	18.0	0.0	0.0

Fortistar Stormwater

Prepared by {enter your company name here}

HydroCAD® 10.00-20 s/n 02201 © 2017 HydroCAD Software Solutions LLC

MSE 24-hr 3 100-yr Rainfall=7.43"

Printed 12/17/2020

Page 6

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: P-DA1	Runoff Area=11,484 sf 100.00% Impervious Runoff Depth=7.19" Tc=6.0 min CN=0/98 Runoff=2.82 cfs 0.158 af
Subcatchment 7S: P-DA2	Runoff Area=94,515 sf 34.53% Impervious Runoff Depth=5.38" Tc=6.0 min CN=74/98 Runoff=19.11 cfs 0.972 af
Subcatchment 8S: P-DA3	Runoff Area=7,469 sf 25.65% Impervious Runoff Depth=5.13" Tc=6.0 min CN=74/98 Runoff=1.47 cfs 0.073 af
Subcatchment 9S: P-DA4	Runoff Area=10,206 sf 0.00% Impervious Runoff Depth=4.42" Tc=6.0 min CN=74/0 Runoff=1.83 cfs 0.086 af
Subcatchment 10S: P-DA5(1)	Runoff Area=11,439 sf 100.00% Impervious Runoff Depth=7.19" Tc=6.0 min CN=0/98 Runoff=2.81 cfs 0.157 af
Subcatchment 16S: P-DA6	Runoff Area=220,531 sf 0.00% Impervious Runoff Depth=4.42" Flow Length=1,125' Tc=31.8 min CN=74/0 Runoff=19.32 cfs 1.864 af
Subcatchment 18S: P-DA5(2)	Runoff Area=11,439 sf 100.00% Impervious Runoff Depth=7.19" Tc=6.0 min CN=0/98 Runoff=2.81 cfs 0.157 af
Reach 11R: Total Out	Inflow=31.55 cfs 3.129 af Outflow=31.55 cfs 3.129 af
Pond 4P: Infiltration Basin	Peak Elev=857.63' Storage=18,654 cf Inflow=21.93 cfs 1.130 af Discarded=0.17 cfs 0.340 af Primary=12.35 cfs 0.790 af Outflow=12.52 cfs 1.130 af
Pond 17P: Road Side Basin	Peak Elev=853.11' Storage=5,679 cf Inflow=28.12 cfs 2.885 af Outflow=29.67 cfs 2.885 af

Total Runoff Area = 8.427 ac Runoff Volume = 3.469 af Average Runoff Depth = 4.94"
81.23% Pervious = 6.845 ac 18.77% Impervious = 1.582 ac

Summary for Subcatchment 6S: P-DA1

Runoff = 2.82 cfs @ 12.13 hrs, Volume= 0.158 af, Depth= 7.19"

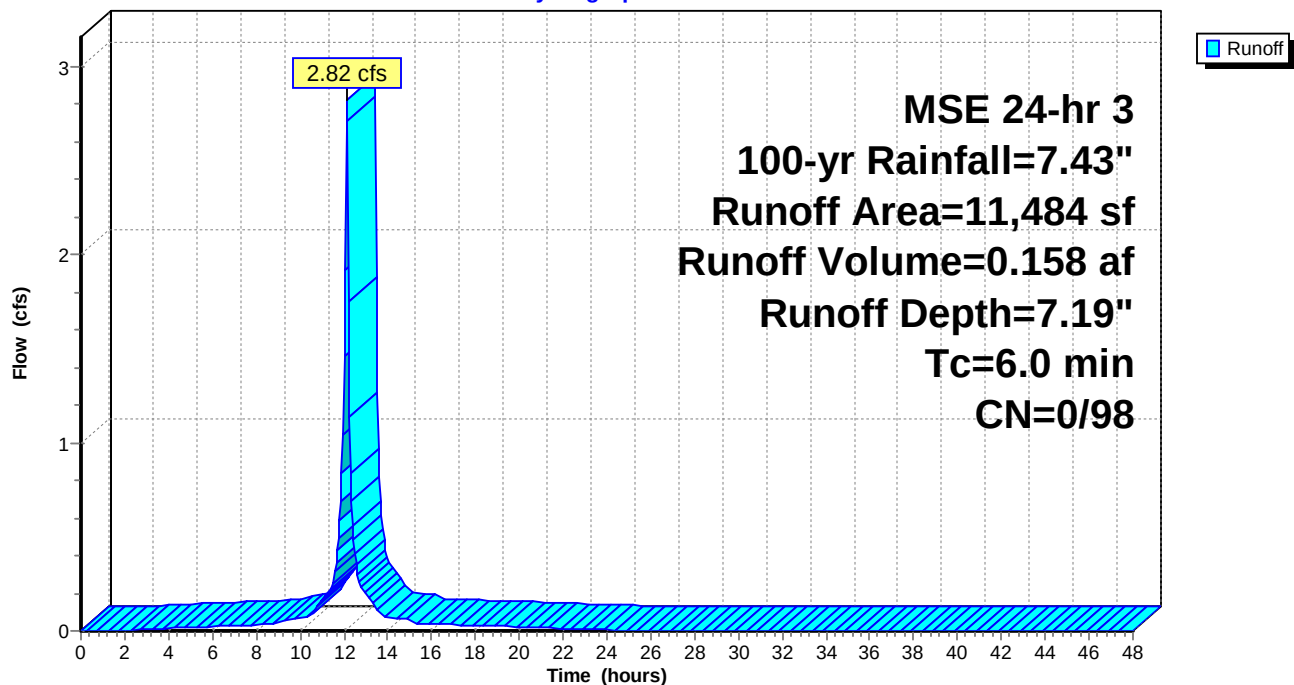
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
11,484	98	Unconnected roofs, HSG A
11,484	98	100.00% Impervious Area

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

Subcatchment 6S: P-DA1

Hydrograph



Summary for Subcatchment 7S: P-DA2

Runoff = 19.11 cfs @ 12.13 hrs, Volume= 0.972 af, Depth= 5.38"

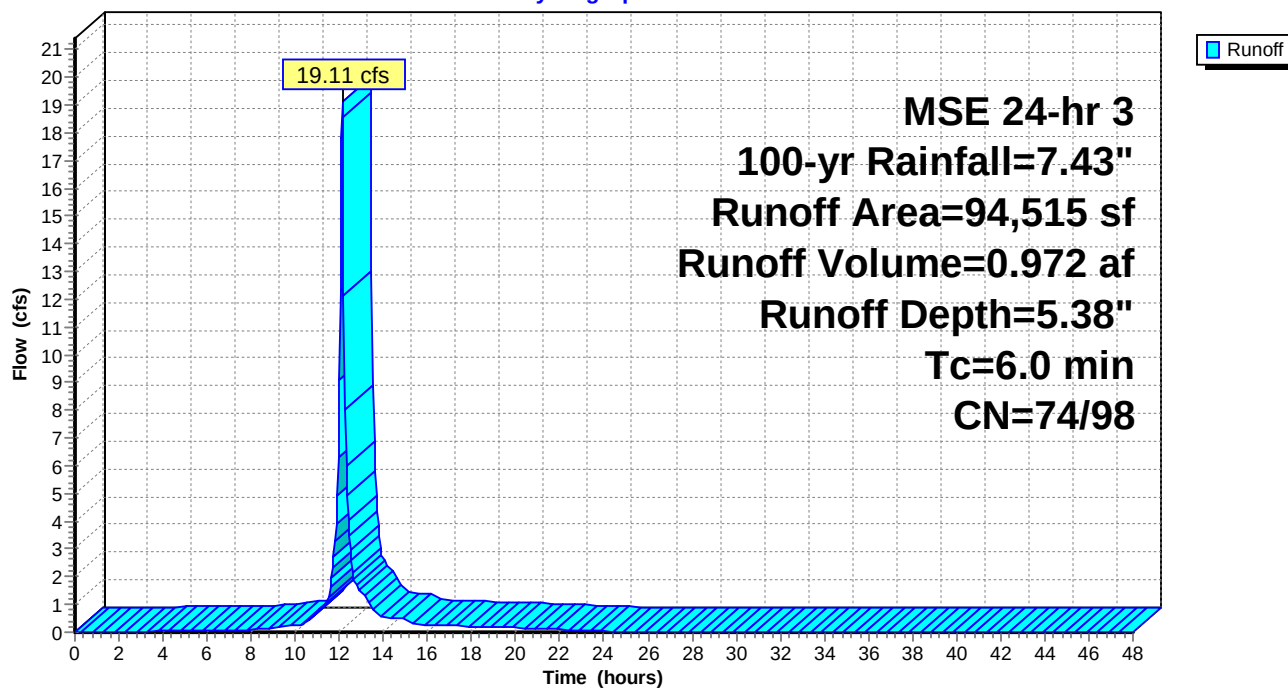
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
61,877	74	>75% Grass cover, Good, HSG C
32,638	98	Paved parking, HSG A
94,515	82	Weighted Average
61,877	74	65.47% Pervious Area
32,638	98	34.53% Impervious Area

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

Subcatchment 7S: P-DA2

Hydrograph



Summary for Subcatchment 8S: P-DA3

Runoff = 1.47 cfs @ 12.13 hrs, Volume= 0.073 af, Depth= 5.13"

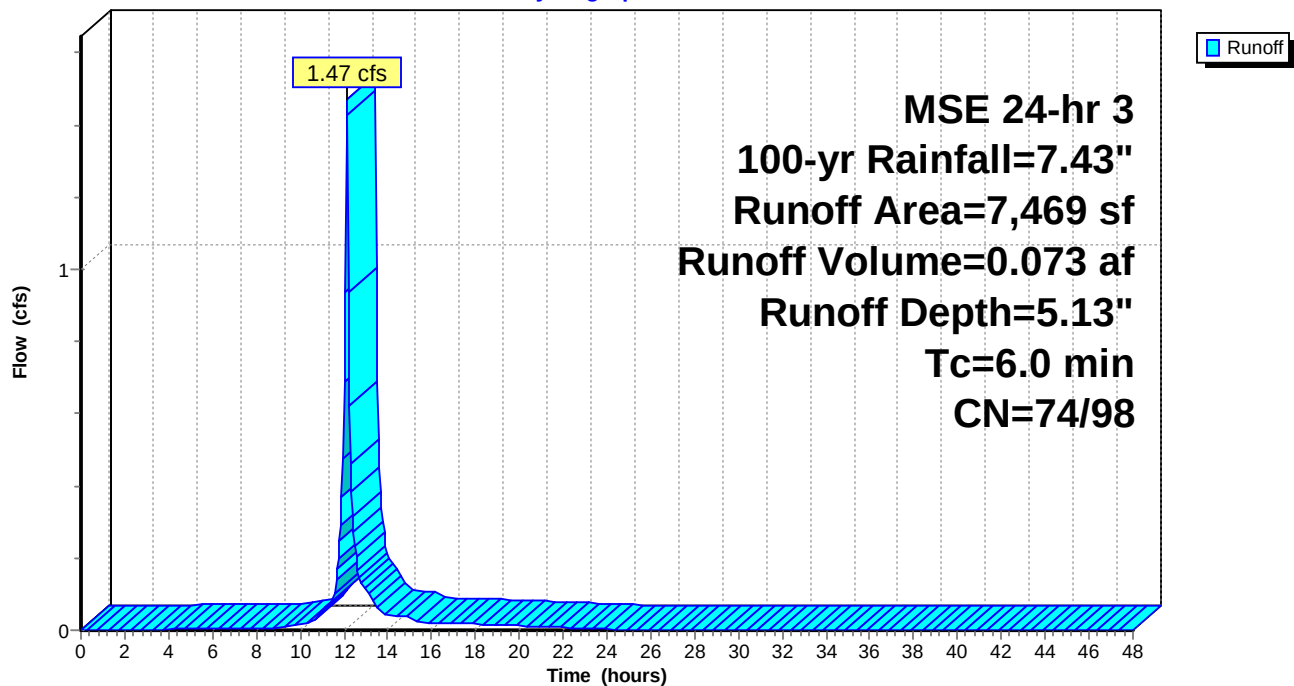
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
5,553	74	>75% Grass cover, Good, HSG C
1,916	98	Paved parking, HSG A
7,469	80	Weighted Average
5,553	74	74.35% Pervious Area
1,916	98	25.65% Impervious Area

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

Subcatchment 8S: P-DA3

Hydrograph



Summary for Subcatchment 9S: P-DA4

Runoff = 1.83 cfs @ 12.13 hrs, Volume= 0.086 af, Depth= 4.42"

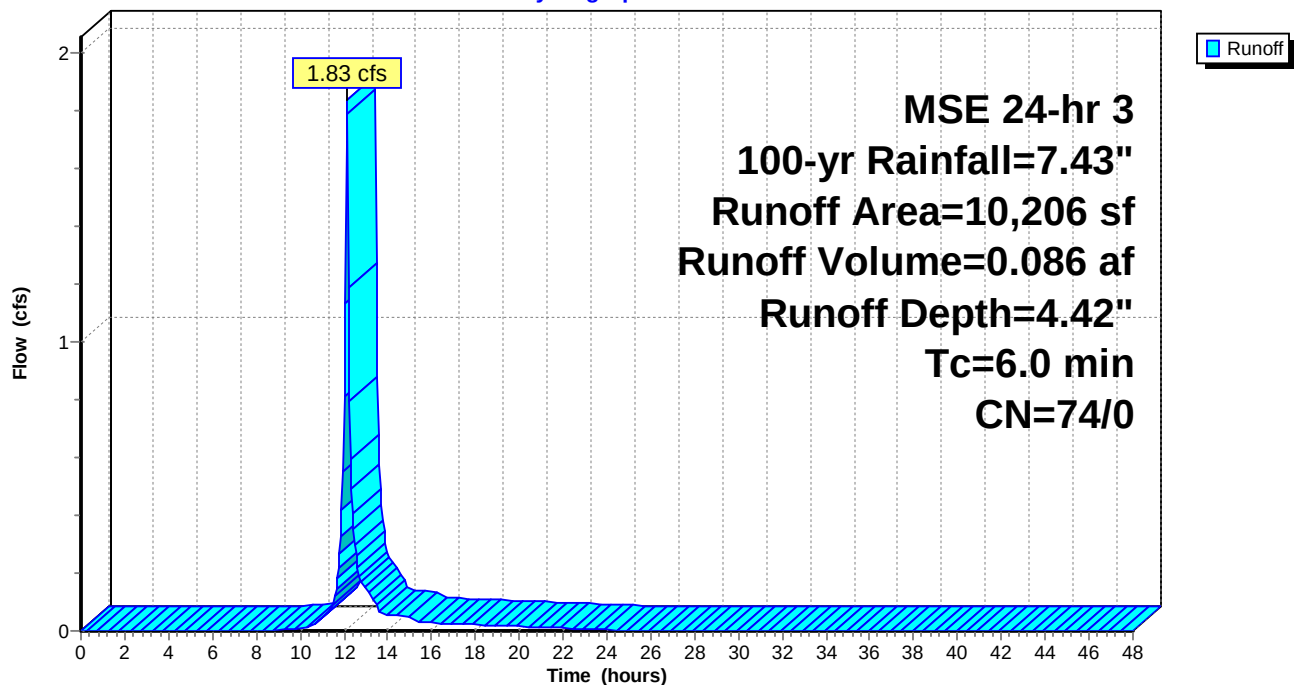
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
10,206	74	>75% Grass cover, Good, HSG C
10,206	74	100.00% Pervious Area

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

Subcatchment 9S: P-DA4

Hydrograph



Summary for Subcatchment 10S: P-DA5(1)

Runoff = 2.81 cfs @ 12.13 hrs, Volume= 0.157 af, Depth= 7.19"

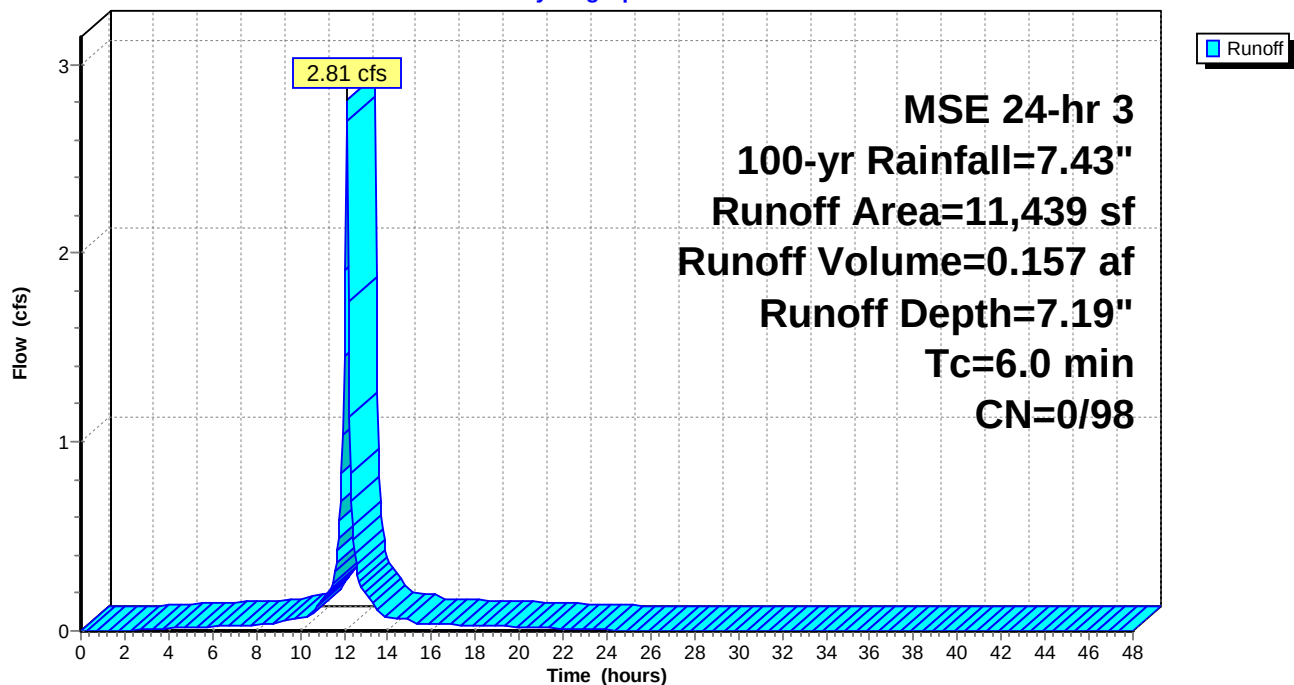
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

	Area (sf)	CN	Description
*	11,439	98	Half of the road
	11,439	98	100.00% Impervious Area

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

Subcatchment 10S: P-DA5(1)

Hydrograph



Summary for Subcatchment 16S: P-DA6

Runoff = 19.32 cfs @ 12.45 hrs, Volume= 1.864 af, Depth= 4.42"

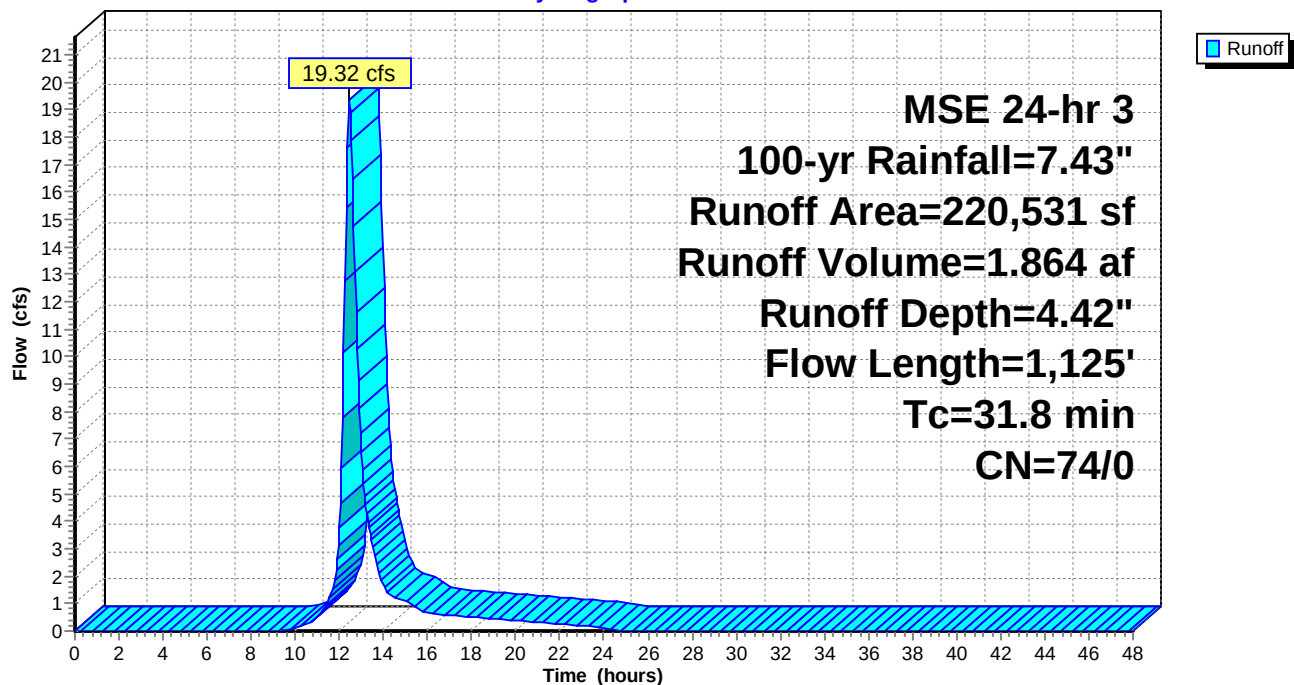
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

Area (sf)	CN	Description
220,531	74	>75% Grass cover, Good, HSG C
220,531	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.4	300	0.0460	0.19		Sheet Flow, Grass: Dense n= 0.240 P2= 2.79"
5.4	825	0.0290	2.55		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
31.8	1,125	Total			

Subcatchment 16S: P-DA6

Hydrograph



Summary for Subcatchment 18S: P-DA5(2)

Runoff = 2.81 cfs @ 12.13 hrs, Volume= 0.157 af, Depth= 7.19"

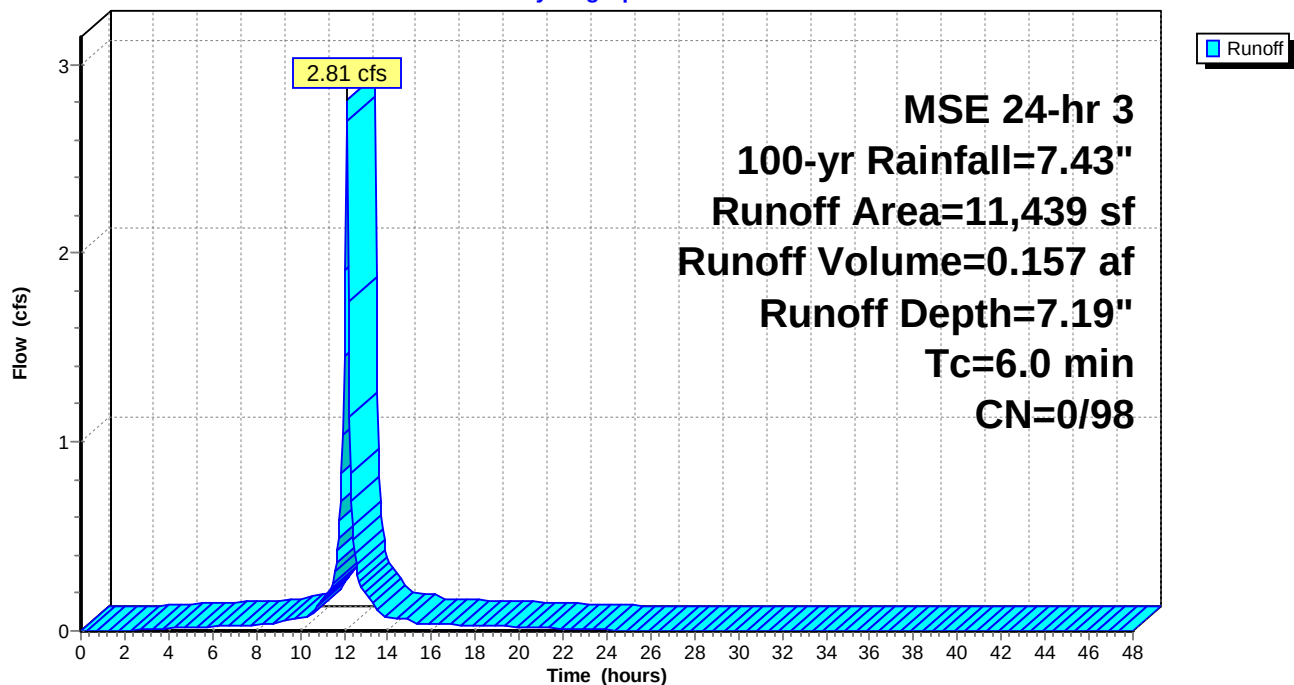
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.43"

	Area (sf)	CN	Description
*	11,439	98	Half of the road
	11,439	98	100.00% Impervious Area

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

Subcatchment 18S: P-DA5(2)

Hydrograph

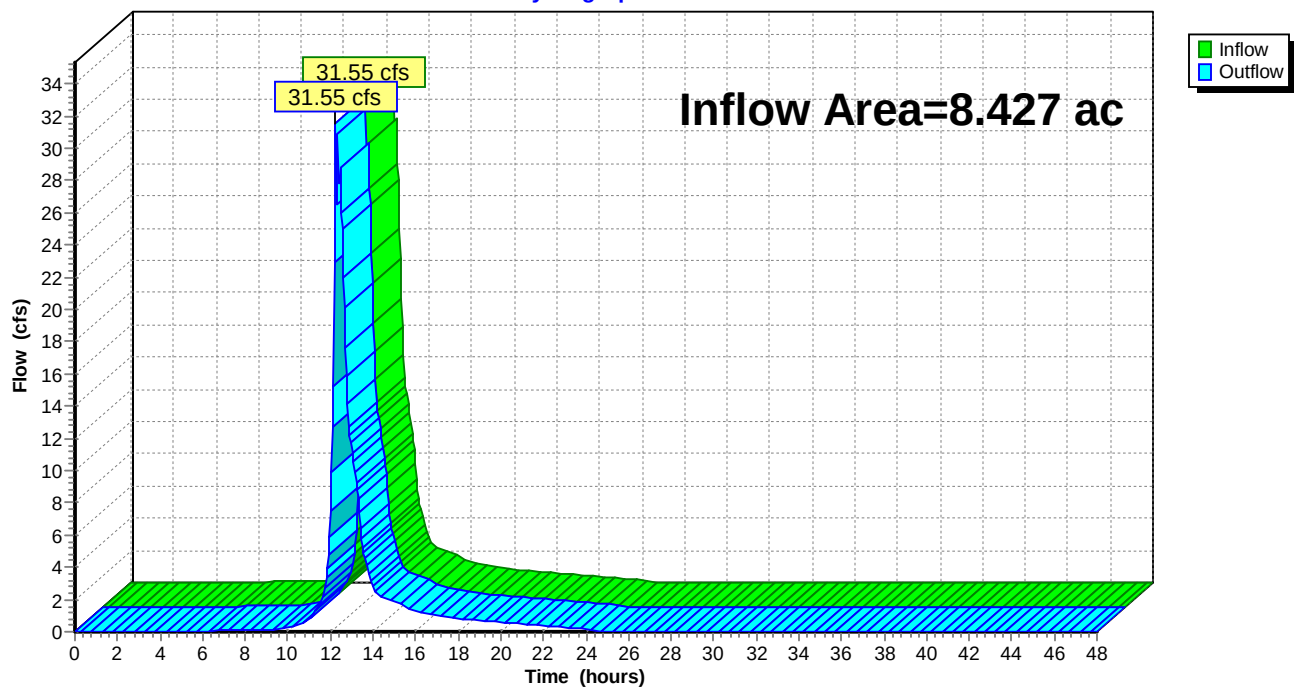


Summary for Reach 11R: Total Out

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

Inflow Area = 8.427 ac, 18.77% Impervious, Inflow Depth = 4.46" for 100-yr event
Inflow = 31.55 cfs @ 12.25 hrs, Volume= 3.129 af
Outflow = 31.55 cfs @ 12.25 hrs, Volume= 3.129 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 11R: Total Out**Hydrograph**

Summary for Pond 4P: Infiltration Basin

Inflow Area = 2.433 ac, 41.62% Impervious, Inflow Depth = 5.57" for 100-yr event
 Inflow = 21.93 cfs @ 12.13 hrs, Volume= 1.130 af
 Outflow = 12.52 cfs @ 12.22 hrs, Volume= 1.130 af, Atten= 43%, Lag= 5.4 min
 Discarded = 0.17 cfs @ 12.22 hrs, Volume= 0.340 af
 Primary = 12.35 cfs @ 12.22 hrs, Volume= 0.790 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 857.63' @ 12.22 hrs Surf.Area= 9,291 sf Storage= 18,654 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 193.7 min (960.7 - 767.0)

Volume	Invert	Avail.Storage	Storage Description
#1	855.00'	33,029 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
855.00	4,981	0	0
856.00	6,535	5,758	5,758
857.00	8,185	7,360	13,118
858.00	9,931	9,058	22,176
859.00	11,774	10,853	33,029

Device	Routing	Invert	Outlet Devices
#1	Device 4	856.00'	6.0" Vert. Orifice/Grate C= 0.600
#2	Primary	858.70'	56.0' long x 3.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Discarded	855.00'	0.800 in/hr Exfiltration over Surface area
#4	Primary	850.50'	18.0" Round Culvert L= 42.0' Ke= 0.500 Inlet / Outlet Invert= 850.50' / 850.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 4	856.70'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.17 cfs @ 12.22 hrs HW=857.62' (Free Discharge)

↑ **3=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=12.07 cfs @ 12.22 hrs HW=857.62' TW=853.08' (Dynamic Tailwater)

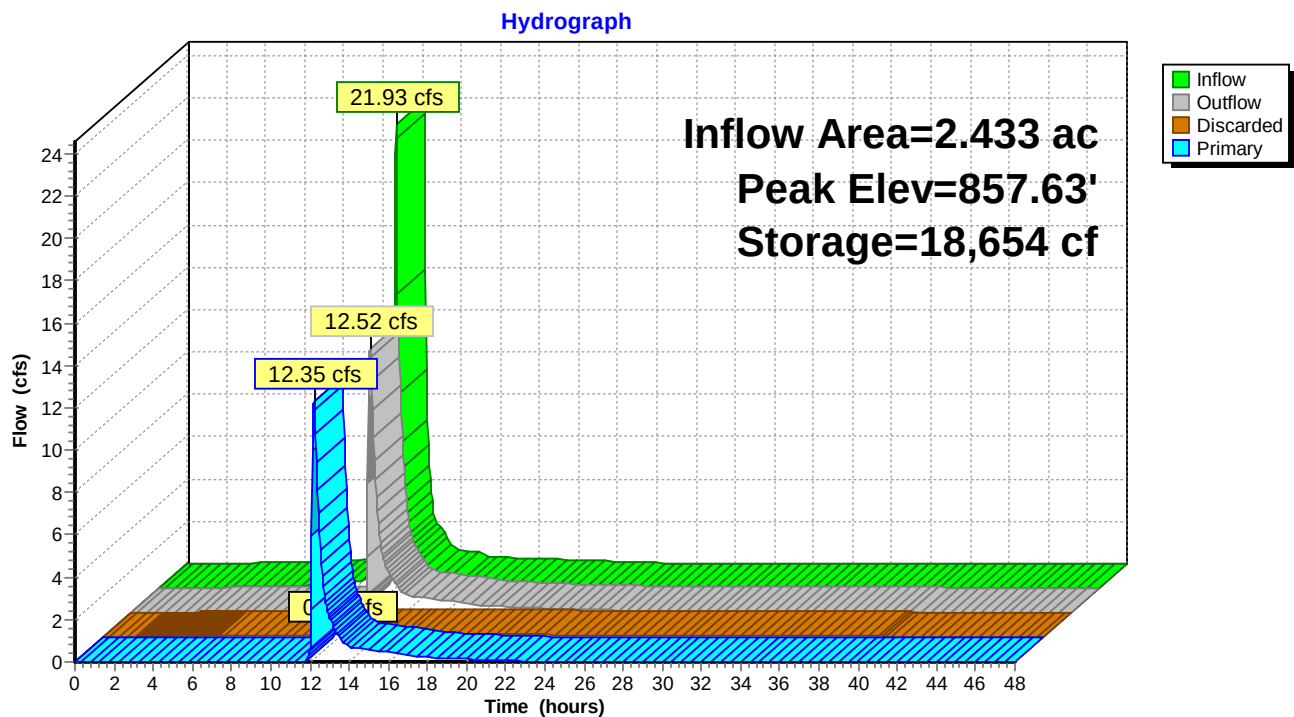
↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

↑ **4=Culvert** (Passes 12.07 cfs of 18.12 cfs potential flow)

↑ **1=Orifice/Grate** (Orifice Controls 1.11 cfs @ 5.63 fps)

↑ **5=Sharp-Crested Rectangular Weir** (Weir Controls 10.96 cfs @ 3.13 fps)

Pond 4P: Infiltration Basin



Summary for Pond 17P: Road Side Basin

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 7.930 ac, 16.64% Impervious, Inflow Depth = 4.37" for 100-yr event
 Inflow = 28.12 cfs @ 12.37 hrs, Volume= 2.885 af
 Outflow = 29.67 cfs @ 12.35 hrs, Volume= 2.885 af, Atten= 0%, Lag= 0.0 min
 Primary = 29.67 cfs @ 12.35 hrs, Volume= 2.885 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 853.11' @ 12.35 hrs Surf.Area= 3,567 sf Storage= 5,679 cf

Plug-Flow detention time= 4.5 min calculated for 2.882 af (100% of inflow)
 Center-of-Mass det. time= 4.6 min (819.4 - 814.8)

Volume	Invert	Avail.Storage	Storage Description
#1	850.00'	9,246 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
850.00	408	0	0
851.00	971	690	690
852.00	2,387	1,679	2,369
853.00	3,456	2,922	5,290
854.00	4,456	3,956	9,246

Device	Routing	Invert	Outlet Devices
#1	Primary	850.00'	18.0" Round RCP_Round 18" L= 74.0' Ke= 0.500 Inlet / Outlet Invert= 850.00' / 849.50' S= 0.0068 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Primary	853.00'	200.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

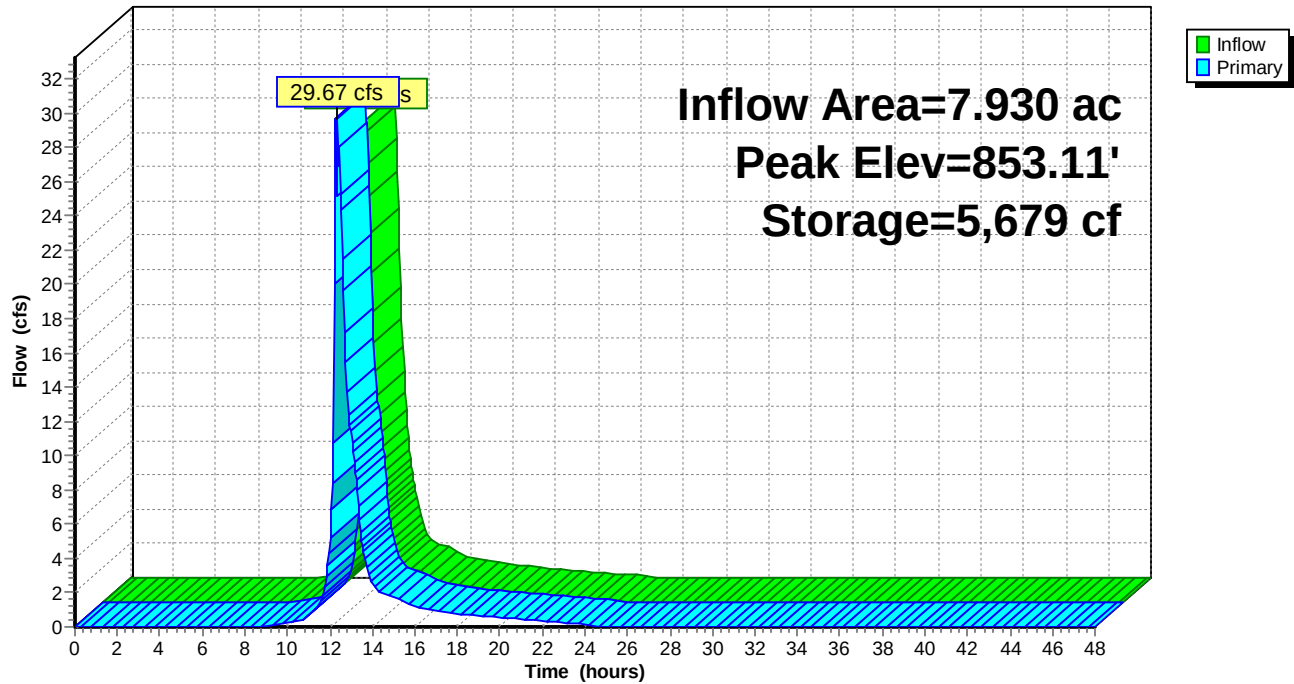
Primary OutFlow Max=29.67 cfs @ 12.35 hrs HW=853.11' TW=0.00' (Dynamic Tailwater)

1=RCP_Round 18" (Barrel Controls 12.20 cfs @ 6.90 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 17.47 cfs @ 0.79 fps)

Pond 17P: Road Side Basin

Hydrograph



Name	Model	Year	Output "Re	Annual Loa	Load Remo	Deposit (in)	Number of Cleanings
SAFLBaffle	42	2006	12	1034.8	121	1.12	0
SAFLBaffle	44	2006	27	1034.8	281.8	2.61	0
SAFLBaffle	55	2006	52	1034.8	536.9	3.19	0
SAFLBaffle	63	2006	59	1034.8	614.5	2.53	0
SAFLBaffle	66	2006	72	1034.8	745	3.07	0
SAFLBaffle	86	2006	81	1034.8	836.2	1.94	0
SAFLBaffle	106	2006	86	1034.8	886.6	1.32	0
SAFLBaffle	42	2007	14	1137.2	155.2	1.44	0
SAFLBaffle	44	2007	27	1137.2	303.4	2.81	0
SAFLBaffle	55	2007	47	1137.2	535.1	3.18	0
SAFLBaffle	63	2007	54	1137.2	615.5	2.54	0
SAFLBaffle	66	2007	68	1137.2	767.8	3.16	0
SAFLBaffle	86	2007	80	1137.2	905.9	2.1	0
SAFLBaffle	106	2007	88	1137.2	995.3	1.48	0
Name	Model	Total Load	Total Load	Removal Ef	Model Heig	Model Dian	Pipe Diameter (inches)
SAFLBaffle	42	2172	276	12.7	2	4	15
SAFLBaffle	44	2172	585	26.9	4	4	15
SAFLBaffle	55	2172	1072	49.4	5	5	18
SAFLBaffle	63	2172	1230	56.6	3	6	24
SAFLBaffle	66	2172	1513	69.7	6	6	24
SAFLBaffle	86	2172	1742	80.2	6	8	30
SAFLBaffle	106	2172	1882	86.6	6	10	36

"P8 Urban Catchment Model, Version 3.5

Run Date 12/17/20
Case Fortistar RNG Expansion PROPOSED FirstDate 01/01/06
Precip(in) 302.8
Title FORTISTAR RNG PROPOSED CONDITIONS LastDate 01/01/16
Rain(in) 268.87
PrecFile MSP Precip File 10-19-17.pcp Events 517
Snow(in) 33.90
PartFile nurp50.p8p TotalHrs 87648
TotalYrs 10.00

Mass Balances by Device and Variable

Device: OVERALL Type: NONE Variable: P0%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	119.5	12.0	1.00
03 infiltrate	14.36	0.00	39.0	3.9	1.00
04 exfiltrate	14.36	0.00	3.9	0.4	0.10
05 filtered	0.00	0.00	35.1	3.5	
06 normal outlet	29.62	0.00	80.5	8.1	1.00
09 total inflow	43.98	0.01	119.5	12.0	1.00
10 surface outflow	29.62	0.00	80.5	8.1	1.00
11 groundw outflow	14.36	0.00	3.9	0.4	0.10
12 total outflow	43.98	0.01	84.4	8.4	0.71
13 total trapped	0.00	0.00	35.1	3.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	29.4	29.4	

Device: OVERALL Type: NONE Variable: P10%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	2160.8	216.1	18.08
03 infiltrate	14.36	0.00	404.3	40.4	10.36
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	404.3	40.4	
06 normal outlet	29.62	0.00	836.1	83.6	10.39
08 sedimen + decay	0.00	0.00	920.4	92.0	
09 total inflow	43.98	0.01	2160.8	216.1	18.08
10 surface outflow	29.62	0.00	836.1	83.6	10.39
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	836.1	83.6	6.99
13 total trapped	0.00	0.00	1324.7	132.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	61.3	61.3	

Device: OVERALL Type: NONE Variable: P30%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	2160.8	216.1	18.08
03 infiltrate	14.36	0.00	98.4	9.8	2.52
04 exfiltrate	14.36	0.00	0.0	0.0	0.00

05 filtered	0.00	0.00	98.4	9.8	
06 normal outlet	29.62	0.00	211.8	21.2	2.63
08 sedimen + decay	0.00	0.00	1850.6	185.1	
09 total inflow	43.98	0.01	2160.8	216.1	18.08
10 surface outflow	29.62	0.00	211.8	21.2	2.63
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	211.8	21.2	1.77
13 total trapped	0.00	0.00	1949.1	194.9	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	90.2	90.2	

Device: OVERALL

Type: NONE

Variable: P50%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	2160.8	216.1	18.08
03 infiltrate	14.36	0.00	20.3	2.0	0.52
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	20.3	2.0	
06 normal outlet	29.62	0.00	48.6	4.9	0.60
08 sedimen + decay	0.00	0.00	2091.9	209.2	
09 total inflow	43.98	0.01	2160.8	216.1	18.08
10 surface outflow	29.62	0.00	48.6	4.9	0.60
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	48.6	4.9	0.41
13 total trapped	0.00	0.00	2112.2	211.3	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	97.8	97.8	

Device: OVERALL

Type: NONE

Variable: P80%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	4321.7	432.2	36.15
03 infiltrate	14.36	0.00	3.9	0.4	0.10
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	3.9	0.4	
06 normal outlet	29.62	0.00	9.8	1.0	0.12
08 sedimen + decay	0.00	0.00	4307.9	430.8	
09 total inflow	43.98	0.01	4321.7	432.2	36.15
10 surface outflow	29.62	0.00	9.8	1.0	0.12
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	9.8	1.0	0.08
13 total trapped	0.00	0.00	4311.8	431.2	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	99.8	99.8	

Device: OVERALL

Type: NONE

Variable: TSS

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	32412.4	3241.7	271.14
03 infiltrate	14.36	0.00	1580.9	158.1	40.50
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	1580.9	158.1	

06 normal outlet	29.62	0.00	3319.0	331.9	41.23
08 sedimen + decay	0.00	0.00	27512.5	2751.6	
09 total inflow	43.98	0.01	32412.4	3241.7	271.14
10 surface outflow	29.62	0.00	3319.0	331.9	41.23
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	3319.0	331.9	27.76
13 total trapped	0.00	0.00	29093.4	2909.7	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	89.8	89.8	

Device: OVERALL

Type: NONE

Variable: TP

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	78.0	7.8	0.65
03 infiltrate	14.36	0.00	12.5	1.2	0.32
04 exfiltrate	14.36	0.00	0.8	0.1	0.02
05 filtered	0.00	0.00	11.6	1.2	
06 normal outlet	29.62	0.00	25.8	2.6	0.32
08 sedimen + decay	0.00	0.00	39.7	4.0	
09 total inflow	43.98	0.01	78.0	7.8	0.65
10 surface outflow	29.62	0.00	25.8	2.6	0.32
11 groundw outflow	14.36	0.00	0.8	0.1	0.02
12 total outflow	43.98	0.01	26.7	2.7	0.22
13 total trapped	0.00	0.00	51.3	5.1	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	65.8	65.8	

Device: OVERALL

Type: NONE

Variable: TKN

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	371.7	37.2	3.11
03 infiltrate	14.36	0.00	68.8	6.9	1.76
04 exfiltrate	14.36	0.00	5.2	0.5	0.13
05 filtered	0.00	0.00	63.6	6.4	
06 normal outlet	29.62	0.00	142.5	14.2	1.77
08 sedimen + decay	0.00	0.00	160.5	16.0	
09 total inflow	43.98	0.01	371.7	37.2	3.11
10 surface outflow	29.62	0.00	142.5	14.2	1.77
11 groundw outflow	14.36	0.00	5.2	0.5	0.13
12 total outflow	43.98	0.01	147.6	14.8	1.23
13 total trapped	0.00	0.00	224.1	22.4	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	60.3	60.3	

Device: OVERALL

Type: NONE

Variable: CU

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	14.5	1.5	0.12
03 infiltrate	14.36	0.00	1.9	0.2	0.05
04 exfiltrate	14.36	0.00	0.1	0.0	0.00
05 filtered	0.00	0.00	1.8	0.2	
06 normal outlet	29.62	0.00	4.0	0.4	0.05

08 sedimen + decay	0.00	0.00	8.5	0.9	
09 total inflow	43.98	0.01	14.5	1.5	0.12
10 surface outflow	29.62	0.00	4.0	0.4	0.05
11 groundw outflow	14.36	0.00	0.1	0.0	0.00
12 total outflow	43.98	0.01	4.2	0.4	0.03
13 total trapped	0.00	0.00	10.3	1.0	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	71.2	71.2	

Device: OVERALL

Type: NONE

Variable: PB

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	5.5	0.5	0.05
03 infiltrate	14.36	0.00	0.4	0.0	0.01
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	0.4	0.0	
06 normal outlet	29.62	0.00	0.9	0.1	0.01
08 sedimen + decay	0.00	0.00	4.1	0.4	
09 total inflow	43.98	0.01	5.5	0.5	0.05
10 surface outflow	29.62	0.00	0.9	0.1	0.01
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	43.98	0.01	0.9	0.1	0.01
13 total trapped	0.00	0.00	4.5	0.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	83.2	83.2	

Device: OVERALL

Type: NONE

Variable: ZN

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	56.4	5.6	0.47
03 infiltrate	14.36	0.00	10.4	1.0	0.27
04 exfiltrate	14.36	0.00	0.8	0.1	0.02
05 filtered	0.00	0.00	9.7	1.0	
06 normal outlet	29.62	0.00	21.6	2.2	0.27
08 sedimen + decay	0.00	0.00	24.4	2.4	
09 total inflow	43.98	0.01	56.4	5.6	0.47
10 surface outflow	29.62	0.00	21.6	2.2	0.27
11 groundw outflow	14.36	0.00	0.8	0.1	0.02
12 total outflow	43.98	0.01	22.4	2.2	0.19
13 total trapped	0.00	0.00	34.0	3.4	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	60.3	60.3	

Device: OVERALL

Type: NONE

Variable: HC

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	43.98	0.01	546.0	54.6	4.57
03 infiltrate	14.36	0.00	43.2	4.3	1.11
04 exfiltrate	14.36	0.00	2.0	0.2	0.05
05 filtered	0.00	0.00	41.3	4.1	
06 normal outlet	29.62	0.00	90.0	9.0	1.12
08 sedimen + decay	0.00	0.00	412.7	41.3	

09 total inflow	43.98	0.01	546.0	54.6	4.57
10 surface outflow	29.62	0.00	90.0	9.0	1.12
11 groundw outflow	14.36	0.00	2.0	0.2	0.05
12 total outflow	43.98	0.01	92.0	9.2	0.77
13 total trapped	0.00	0.00	454.0	45.4	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	83.2	83.2	

Device: Pond

Type: GENERAL

Variable: P0%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	78.9	7.9	1.00
03 infiltrate	14.36	0.00	39.0	3.9	1.00
04 exfiltrate	14.36	0.00	3.9	0.4	0.10
05 filtered	0.00	0.00	35.1	3.5	
06 normal outlet	14.66	0.00	39.8	4.0	1.00
09 total inflow	29.02	0.00	78.9	7.9	1.00
10 surface outflow	14.66	0.00	39.8	4.0	1.00
11 groundw outflow	14.36	0.00	3.9	0.4	0.10
12 total outflow	29.02	0.00	43.7	4.4	0.55
13 total trapped	0.00	0.00	35.1	3.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	44.5	44.5	

Device: Pond

Type: GENERAL

Variable: P10%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	1410.0	141.0	17.88
03 infiltrate	14.36	0.00	404.3	40.4	10.36
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	404.3	40.4	
06 normal outlet	14.66	0.00	427.0	42.7	10.72
08 sedimen + decay	0.00	0.00	578.7	57.9	
09 total inflow	29.02	0.00	1410.0	141.0	17.88
10 surface outflow	14.66	0.00	427.0	42.7	10.72
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	29.02	0.00	427.0	42.7	5.41
13 total trapped	0.00	0.00	983.1	98.3	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	69.7	69.7	

Device: Pond

Type: GENERAL

Variable: P30%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	1410.0	141.0	17.88
03 infiltrate	14.36	0.00	98.4	9.8	2.52
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	98.4	9.8	
06 normal outlet	14.66	0.00	115.2	11.5	2.89
08 sedimen + decay	0.00	0.00	1196.4	119.7	
09 total inflow	29.02	0.00	1410.0	141.0	17.88
10 surface outflow	14.66	0.00	115.2	11.5	2.89

11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	29.02	0.00	115.2	11.5	1.46
13 total trapped	0.00	0.00	1294.9	129.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	91.8	91.8	

Device: Pond

Type: GENERAL

Variable: P50%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	1410.0	141.0	17.88
03 infiltrate	14.36	0.00	20.3	2.0	0.52
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	20.3	2.0	
06 normal outlet	14.66	0.00	27.9	2.8	0.70
08 sedimen + decay	0.00	0.00	1361.9	136.2	
09 total inflow	29.02	0.00	1410.0	141.0	17.88
10 surface outflow	14.66	0.00	27.9	2.8	0.70
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	29.02	0.00	27.9	2.8	0.35
13 total trapped	0.00	0.00	1382.2	138.2	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	98.0	98.0	

Device: Pond

Type: GENERAL

Variable: P80%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	2820.1	282.0	35.75
03 infiltrate	14.36	0.00	3.9	0.4	0.10
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	3.9	0.4	
06 normal outlet	14.66	0.00	5.6	0.6	0.14
08 sedimen + decay	0.00	0.00	2810.5	281.1	
09 total inflow	29.02	0.00	2820.1	282.0	35.75
10 surface outflow	14.66	0.00	5.6	0.6	0.14
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	29.02	0.00	5.6	0.6	0.07
13 total trapped	0.00	0.00	2814.5	281.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	99.8	99.8	

Device: Pond

Type: GENERAL

Variable: TSS

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	21150.6	2115.4	268.15
03 infiltrate	14.36	0.00	1580.9	158.1	40.50
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	1580.9	158.1	
06 normal outlet	14.66	0.00	1726.8	172.7	43.34
08 sedimen + decay	0.00	0.00	17842.9	1784.5	
09 total inflow	29.02	0.00	21150.6	2115.4	268.15
10 surface outflow	14.66	0.00	1726.8	172.7	43.34
11 groundw outflow	14.36	0.00	0.0	0.0	0.00

12 total outflow	29.02	0.00	1726.8	172.7	21.89
13 total trapped	0.00	0.00	19423.8	1942.6	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	91.8	91.8	

Device: Pond

Type: GENERAL

Variable: TP

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	51.1	5.1	0.65
03 infiltrate	14.36	0.00	12.5	1.2	0.32
04 exfiltrate	14.36	0.00	0.8	0.1	0.02
05 filtered	0.00	0.00	11.6	1.2	
06 normal outlet	14.66	0.00	13.0	1.3	0.33
08 sedimen + decay	0.00	0.00	25.6	2.6	
09 total inflow	29.02	0.00	51.1	5.1	0.65
10 surface outflow	14.66	0.00	13.0	1.3	0.33
11 groundw outflow	14.36	0.00	0.8	0.1	0.02
12 total outflow	29.02	0.00	13.8	1.4	0.18
13 total trapped	0.00	0.00	37.2	3.7	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	72.9	72.9	

Device: Pond

Type: GENERAL

Variable: TKN

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	243.7	24.4	3.09
03 infiltrate	14.36	0.00	68.8	6.9	1.76
04 exfiltrate	14.36	0.00	5.2	0.5	0.13
05 filtered	0.00	0.00	63.6	6.4	
06 normal outlet	14.66	0.00	71.4	7.1	1.79
08 sedimen + decay	0.00	0.00	103.5	10.4	
09 total inflow	29.02	0.00	243.7	24.4	3.09
10 surface outflow	14.66	0.00	71.4	7.1	1.79
11 groundw outflow	14.36	0.00	5.2	0.5	0.13
12 total outflow	29.02	0.00	76.6	7.7	0.97
13 total trapped	0.00	0.00	167.2	16.7	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	68.6	68.6	

Device: Pond

Type: GENERAL

Variable: CU

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	9.5	1.0	0.12
03 infiltrate	14.36	0.00	1.9	0.2	0.05
04 exfiltrate	14.36	0.00	0.1	0.0	0.00
05 filtered	0.00	0.00	1.8	0.2	
06 normal outlet	14.66	0.00	2.0	0.2	0.05
08 sedimen + decay	0.00	0.00	5.5	0.6	
09 total inflow	29.02	0.00	9.5	1.0	0.12
10 surface outflow	14.66	0.00	2.0	0.2	0.05
11 groundw outflow	14.36	0.00	0.1	0.0	0.00
12 total outflow	29.02	0.00	2.2	0.2	0.03

13 total trapped	0.00	0.00	7.3	0.7
14 storage increase	0.00	0.00	0.0	0.0
15 mass balance chec	0.00	0.00	0.0	0.0
Reduction (%)	0.00	0.00	77.2	77.2

Device: Pond

Type: GENERAL

Variable: PB

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	3.6	0.4	0.05
03 infiltrate	14.36	0.00	0.4	0.0	0.01
04 exfiltrate	14.36	0.00	0.0	0.0	0.00
05 filtered	0.00	0.00	0.4	0.0	
06 normal outlet	14.66	0.00	0.5	0.0	0.01
08 sedimen + decay	0.00	0.00	2.7	0.3	
09 total inflow	29.02	0.00	3.6	0.4	0.05
10 surface outflow	14.66	0.00	0.5	0.0	0.01
11 groundw outflow	14.36	0.00	0.0	0.0	0.00
12 total outflow	29.02	0.00	0.5	0.0	0.01
13 total trapped	0.00	0.00	3.1	0.3	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	86.6	86.6	

Device: Pond

Type: GENERAL

Variable: ZN

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	37.0	3.7	0.47
03 infiltrate	14.36	0.00	10.4	1.0	0.27
04 exfiltrate	14.36	0.00	0.8	0.1	0.02
05 filtered	0.00	0.00	9.7	1.0	
06 normal outlet	14.66	0.00	10.8	1.1	0.27
08 sedimen + decay	0.00	0.00	15.7	1.6	
09 total inflow	29.02	0.00	37.0	3.7	0.47
10 surface outflow	14.66	0.00	10.8	1.1	0.27
11 groundw outflow	14.36	0.00	0.8	0.1	0.02
12 total outflow	29.02	0.00	11.6	1.2	0.15
13 total trapped	0.00	0.00	25.4	2.5	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	68.6	68.6	

Device: Pond

Type: GENERAL

Variable: HC

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	29.02	0.00	356.7	35.7	4.52
03 infiltrate	14.36	0.00	43.2	4.3	1.11
04 exfiltrate	14.36	0.00	2.0	0.2	0.05
05 filtered	0.00	0.00	41.3	4.1	
06 normal outlet	14.66	0.00	45.8	4.6	1.15
08 sedimen + decay	0.00	0.00	267.6	26.8	
09 total inflow	29.02	0.00	356.7	35.7	4.52
10 surface outflow	14.66	0.00	45.8	4.6	1.15
11 groundw outflow	14.36	0.00	2.0	0.2	0.05
12 total outflow	29.02	0.00	47.8	4.8	0.61
13 total trapped	0.00	0.00	308.9	30.9	

14 storage increase	0.00	0.00	0.0	0.0
15 mass balance chec	0.00	0.00	0.0	0.0
Reduction (%)	0.00	0.00	86.6	86.6

Device: Out Type: SWALE Variable: P0%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	40.7	4.1	1.00
06 normal outlet	14.96	0.00	40.7	4.1	1.00
09 total inflow	14.96	0.00	40.7	4.1	1.00
10 surface outflow	14.96	0.00	40.7	4.1	1.00
12 total outflow	14.96	0.00	40.7	4.1	1.00
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	0.0	0.0	

Device: Out Type: SWALE Variable: P10%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	750.8	75.1	18.46
06 normal outlet	14.96	0.00	409.2	40.9	10.06
08 sedimen + decay	0.00	0.00	341.6	34.2	
09 total inflow	14.96	0.00	750.8	75.1	18.46
10 surface outflow	14.96	0.00	409.2	40.9	10.06
12 total outflow	14.96	0.00	409.2	40.9	10.06
13 total trapped	0.00	0.00	341.6	34.2	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	45.5	45.5	

Device: Out Type: SWALE Variable: P30%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	750.8	75.1	18.46
06 normal outlet	14.96	0.00	96.6	9.7	2.38
08 sedimen + decay	0.00	0.00	654.2	65.4	
09 total inflow	14.96	0.00	750.8	75.1	18.46
10 surface outflow	14.96	0.00	96.6	9.7	2.38
12 total outflow	14.96	0.00	96.6	9.7	2.38
13 total trapped	0.00	0.00	654.2	65.4	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	87.1	87.1	

Device: Out Type: SWALE Variable: P50%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	750.8	75.1	18.46
06 normal outlet	14.96	0.00	20.7	2.1	0.51
08 sedimen + decay	0.00	0.00	730.0	73.0	
09 total inflow	14.96	0.00	750.8	75.1	18.46
10 surface outflow	14.96	0.00	20.7	2.1	0.51
12 total outflow	14.96	0.00	20.7	2.1	0.51
13 total trapped	0.00	0.00	730.0	73.0	
14 storage increase	0.00	0.00	0.0	0.0	

15 mass balance chec	0.00	0.00	0.0	0.0
Reduction (%)	0.00	0.00	97.2	97.2

Device: Out Type: SWALE Variable: P80%

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	1501.6	150.2	36.92
06 normal outlet	14.96	0.00	4.2	0.4	0.10
08 sedimen + decay	0.00	0.00	1497.4	149.8	
09 total inflow	14.96	0.00	1501.6	150.2	36.92
10 surface outflow	14.96	0.00	4.2	0.4	0.10
12 total outflow	14.96	0.00	4.2	0.4	0.10
13 total trapped	0.00	0.00	1497.4	149.8	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	99.7	99.7	

Device: Out Type: SWALE Variable: TSS

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	11261.8	1126.3	276.92
06 normal outlet	14.96	0.00	1592.2	159.2	39.15
08 sedimen + decay	0.00	0.00	9669.6	967.1	
09 total inflow	14.96	0.00	11261.8	1126.3	276.92
10 surface outflow	14.96	0.00	1592.2	159.2	39.15
12 total outflow	14.96	0.00	1592.2	159.2	39.15
13 total trapped	0.00	0.00	9669.6	967.1	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	85.9	85.9	

Device: Out Type: SWALE Variable: TP

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	26.9	2.7	0.66
06 normal outlet	14.96	0.00	12.8	1.3	0.32
08 sedimen + decay	0.00	0.00	14.1	1.4	
09 total inflow	14.96	0.00	26.9	2.7	0.66
10 surface outflow	14.96	0.00	12.8	1.3	0.32
12 total outflow	14.96	0.00	12.8	1.3	0.32
13 total trapped	0.00	0.00	14.1	1.4	
14 storage increase	0.00	0.00	0.0	0.0	
15 mass balance chec	0.00	0.00	0.0	0.0	
Reduction (%)	0.00	0.00	52.3	52.3	

Device: Out Type: SWALE Variable: TKN

Mass Balance Term	Flow_acft	Flow_cfs	Load_lbs	Load_lbs/yr	Conc_ppm
01 watershed inflows	14.96	0.00	128.0	12.8	3.15
06 normal outlet	14.96	0.00	71.1	7.1	1.75
08 sedimen + decay	0.00	0.00	57.0	5.7	
09 total inflow	14.96	0.00	128.0	12.8	3.15
10 surface outflow	14.96	0.00	71.1	7.1	1.75
12 total outflow	14.96	0.00	71.1	7.1	1.75
13 total trapped	0.00	0.00	57.0	5.7	

13 total trapped	0.00	0.00	145.0	14.5
14 storage increase	0.00	0.00	0.0	0.0
15 mass balance chec	0.00	0.00	0.0	0.0
Reduction (%)	0.00	0.00	76.6	76.6
"				

Appendix A



PRELIMINARY

GEOTECHNICAL EXPLORATION AND ENGINEERING REVIEW

Pine Bend RNG Facility

Inver Grove Heights

Minnesota

NTI Project No. 19.MSP06273.000

Prepared For:

Wenck Associates, Inc.
7500 Olson Memorial Highway, Suite 300
Golden Valley, Minnesota 55427



6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651.389.4191 F: 651.389.4190
www.NTIgeo.com

Unearthing confidence™

January 22, 2020

Wenck Associates, Inc.
Attention: Mr. Kevin Pfeiffer, RLA
7500 Olson Memorial Highway, Suite 300
Golden Valley, Minnesota 55427

Subject: Preliminary Geotechnical Exploration and Engineering Review
Pine Bend RNG Facility
Inver Grove Heights, Minnesota
NTI Project No. 19. MSP06273.000

Dear Mr. Pfeiffer,

In accordance with your request and subsequent authorization, Northern Technologies, LLC (NTI) conducted a Geotechnical Exploration for the above referenced project. Our services included advancement of exploration borings and preparation of an engineering report with recommendations developed from our geotechnical services. Our work was performed in general accordance with our proposal dated November 12, 2019.

At the time of this report, the site structure layout has not been finalized. Consequently, this report is issued as a preliminary report. Once the site layout has been finalized, and additional evaluation is performed (if necessary), a final geotechnical report will be issued.

We appreciate the opportunity to have been of service on this project. If there are any questions regarding the soils explored or our review and recommendations, please contact us at your convenience at (651) 389-4191.

Northern Technologies, LLC

A blue ink signature of Debra A. Schroeder, consisting of a stylized 'D' followed by 'Schroeder'.

Debra A. Schroeder, P.E.
Senior Engineer

A blue ink signature of Steven D. Gerber, consisting of a stylized 'S' followed by 'Gerber'.

Steven D. Gerber, P.E.
Senior Engineer

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.

A blue ink signature of Debra A. Schroeder, consisting of a stylized 'D' followed by 'Schroeder'.

Debra A. Schroeder

Date: 01/22/2020 Reg. No. 52743

DAS/sdg

Precision · Expertise · Geotechnical · Materials

FARGO

BISMARCK

GRAND FORKS

INVER GROVE HEIGHTS

RAMSEY

RAPID CITY



Contents

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION.....	2
2.1	Site / Project Description	2
2.2	Scope of Services.....	3
3.0	EXPLORATION PROGRAM RESULTS	3
3.1	Exploration Scope	3
3.2	Subsurface Conditions	3
3.3	Groundwater Conditions.....	4
3.4	Laboratory Test Program.....	5
4.0	ENGINEERING REVIEW AND PRELIMINARY RECOMMENDATIONS.....	5
4.1	Project Scope	5
4.2	Site Preparation	5
4.3	Shallow Foundations.....	8
4.4	Bearing Factor of Safety and Estimate of Settlement.....	9
4.5	Subsurface Drainage.....	9
4.6	Utilities.....	9
4.7	Slab-on-Grade.....	10
4.8	Exterior Foundation Wall Backfill	11
4.9	Surface Drainage	11
4.10	Pavement Construction	11
4.11	Stormwater Infiltration.....	14
4.12	Frost Considerations	14
5.0	CONSTRUCTION CONSIDERATIONS	15
5.1	Excavation Stability	15
5.2	Engineered Fill & Winter Construction.....	15
6.0	CLOSURE	16



PRELIMINARY

GEOTECHNICAL EXPLORATION AND ENGINEERING REVIEW

Pine Bend RNG Facility

NTI Project No. 19.MSP06273.000

1.0 EXECUTIVE SUMMARY

We briefly summarize below our **preliminary** geotechnical recommendations for the proposed project. It should be noted that this report is preliminary and should not be used for construction without additional subsurface investigation and geotechnical engineering evaluation. The summary must be read in complete context with our report.

- The borings encountered topsoil over apparent undocumented fill soils extending to depths ranging from approximately 2.0 to 9.0 feet below the existing grade. The encountered fill soils generally consisted of clayey sand (SC), silty sand (SM), sandy lean clay (CL), poorly graded sand (SP), and poorly graded sand with silt (SP-SM). Native soils consisted of poorly graded sand (SP) and poorly graded sand with silt (SP-SM) with localized loose soil conditions.
- The foundations should not be supported on the existing fill soils. In order to reduce risk of settlement and subsequent structural damage, a complete soil correction to remove the existing undocumented fill soils is recommended.
- Overall, the native in-place soils are suitable for the support for spread footing foundations; however, as noted above there were localized loose layers. **In order to achieve stable and more uniform soil conditions for foundation support and to assist in reducing the potential for excessive differential settlement, subsequent to the removal of the undocumented fill soils, we recommend that the resulting subgrade within the proposed structure footprint be recompacted as indicated in Section 4.2 - Site Preparation of this report.**
- After performing a complete soil correction and recommended native soil recompaction procedures, the structures' linear strip footings and interior column footings (if required) founded on engineered fill may be proportioned using the maximum net allowable soil bearing pressure of 3,500 pounds per square foot (psf).
- Measurable groundwater was not observed at any of the seventeen (17) borings at the time of the field exploration. However, the on-site silt and clay-based fill soils are relatively impervious and are conducive to the development of zones of perched water at varying elevations and locations across the project site.



2.0 INTRODUCTION

2.1 Site / Project Description

Based on the provided information, the proposed Pine Bend RNG Facility project will include a new Renewable Natural Gas Facility (RNG) with an office area, a separate flare station, and stormwater infiltration area.

At the time of this report, NTI understands that the layout of the structures has not been finalized. **Additional analysis and/or borings may be necessary once the project concept is finalized.** The assumptions outlined in Table 1 were utilized in the development of this preliminary report.

Table 1: Project & Site Description

Item	Description
Building Type	Multiple, one-story, slab-on-grade supported structures. The main structure(s) will be approximately 30-feet tall and house natural gas tanks/vessels, pipes, a control room, maintenance room, and an office area. There is also a separate flare station.
Floor Elevation	Base on client provided information, assumed to be at elevation 866.0 feet.
Maximum Change in Site Elevation	Finish site grades are expected to be within 5 feet of existing site grades.
Site Description	
Location of Project	East of Rich Valley Boulevard between 110 th Street East and 117 th Street East in Inver Grove Heights, Minnesota
Existing Land Use / Improvements to Parcel	The property is undeveloped. Based on published satellite imagery, the property appears to have been used for agricultural purposes and that site grading activities have occurred.
Current Ground Cover	The ground surface is covered with grasses, brush, and occasional trees,
Topography at Site	The topography at the site varies. Within the main structure area, there was approximately 7.5 feet of elevation change between the recently completed borings. Overall, there was approximately 18.0 feet of elevation change between the recently completed borings.



2.2 Scope of Services

The purpose of this report is to present a summary of our geotechnical exploration and provide generalized opinions and **preliminary** recommendations regarding the soil conditions and design parameters for founding of the project. Our “scope of services” was limited to the following:

1. Explore the project subsurface by means of seventeen (17) standard penetration test (SPT) borings extending to depths of approximately 20.0 feet below existing grade and conduct laboratory test(s) on representative samples for characterizing the index and engineering properties of the soils at the project site.
2. Prepare a report presenting our findings from our field exploration, laboratory testing, and engineering recommendations for foundation types, footing depths, allowable bearing capacity, estimated settlements, floor slab support, excavation, engineered fill, backfill, compaction, potential construction difficulties related to excavation, backfilling and drainage, pavement design, and estimated stormwater infiltration rates.

3.0 EXPLORATION PROGRAM RESULTS

3.1 Exploration Scope

Site geotechnical drilling occurred on December 10 and 11, 2019. Individual borings were performed at approximate locations as presented on the diagram within the appendices.

NTI located the borings relative to existing site features. NTI estimated the elevation of the borings utilizing a Trimble GeoXH 6000 GPS unit, referencing the NAD 1983 Minnesota GeoID 12A datum. Boring elevations should be considered to be approximate. Please refer to the Boring Location Diagram and the Boring Logs in Appendix C.

Soil samples obtained at the site will be held for 60 days at which time they will be discarded. Please advise us in writing if you wish to have us retain them for a longer period. You will be assessed an additional fee if soil samples are retained beyond 60 days.

The boreholes were backfilled with auger cuttings, or were abandoned using high solids bentonite or neat cement grout as per appropriate local and state statutes. Minor settlement of the boreholes will occur. Owner is responsible for final closure of the boreholes.

3.2 Subsurface Conditions

Based on the results of our geotechnical exploration, Table 2 provides a general depiction of subsurface conditions at the project site.

Additional comment on the evaluation of recovered soil samples is presented within the report attachments. Please refer to the boring logs within Appendix C for a detailed description and depths of stratum at each boring.



Table 2: Observed Subsurface Stratigraphy at Project Site¹

Stratum	Depth to Base of Stratum below existing grade	Material Description	Notes
Surface	2.0 to 16.0 inches	Topsoil	Topsoil classification by visual observation only and not intended to confer conformance with DOT or other municipal standards. Topsoil was not observed at Boring SB-3.
Undocumented Fill	2.0 to 9.0 feet	Apparent undocumented fill soils predominantly consisting of silty sand (SM), poorly graded sand with silt (SP-SM), poorly graded sand (SP), clayey sand (SC), and sandy lean clay (CL).	Variably compacted. Trace organic materials.
Native Soils	To the termination depths of the borings at approximately 20.5.	Glacial deposited soils predominantly consisting of poorly graded sand (SP) and poorly graded sand with silt (SP-SM).	Loose to dense relative density of the granular soils. Locally very dense. Driller noted occasional gravel/cobble layers.

1. Table summary is a generalization of subsurface conditions and may not reflect variation in subsurface strata occurring on site. The general geologic origin of retained soil samples is listed on the boring logs.

3.3 Groundwater Conditions

The drill crew observed the borings for groundwater (if any) during and at the completion of drilling activities. Measurable groundwater was not observed at any of the seventeen (17) borings at the time of the field exploration.

However, the on-site silt and clay-based soils are relatively impervious and are conducive to the development of zones of perched water at varying elevations and locations across the project site.

Overall, the site soils are conducive to movement of groundwater both laterally and vertically over time. The moisture content of such soils can vary annually and per recent precipitation. Such soils and other regional dependent conditions may produce groundwater entry of project excavations.

We direct your attention to other report sections and appendices concerning groundwater issues and subsurface drainage.



3.4 Laboratory Test Program

Our analysis and recommendations of this report are based upon our interpretation of the standard penetration test resistance determined while sampling soils, laboratory test results and experience with similar soils from other sites near the project. The results of such tests are summarized on the boring logs or attached laboratory test reports.

4.0 ENGINEERING REVIEW AND PRELIMINARY RECOMMENDATIONS

It should be noted that this report is preliminary and should not be used for construction without additional subsurface investigation and geotechnical engineering evaluation. The following preliminary recommendations are based on our present knowledge of the project:-

4.1 Project Scope

We assume that the structures will include concrete foundation walls and footings for support of above grade construction. Client provided preliminary foundation loads, and NTI's assumed change in grade is summarized within Table 3. Our assessment of project soils, opinions, and report recommendations are based directly on application of estimated structural loads to site soils.

Table 3: Foundation Loads / Change in Grade / Footing Elevation

Building Element	Load / Condition
Perimeter Strip Footings	5 kips per lineal foot or less
Interior Strip Footings	5 kips per lineal foot or less
Isolated Interior Column Footings	150 kips or less
Exterior Column Footings	150 kips or less
Change in Overall Site Grade (from original ground surface)	5 feet or less
Free Standing Retaining Walls	None Anticipated
Below Grade Level Excavation	None Anticipated

4.2 Site Preparation

Following the clearing and grubbing of site vegetation, we recommend the removal of all topsoil, organic soils, man-made structures (if encountered), and/or any unsuitable material(s) encountered during advancement of project excavations. In addition, existing underground utilities must be removed from within the proposed building pads. Abandoned underground pipes, left in place within green space or below paved areas, should be fully grouted.

Within the proposed structure areas, the borings encountered topsoil over apparent undocumented fill soils extending to depths ranging from approximately 2.0 to 9.0 feet below the existing grade.



The encountered native soils consisted of sand soils with varying densities. The foundations should not be supported on the existing fill soils or on the loose soils. In order to reduce risk of settlement and subsequent structural damage, a complete soil correction to remove the existing undocumented fill is recommended. Also, to achieve stable and more uniform soil conditions for foundation support and to assist in reducing the potential for excessive differential settlement, subsequent to the removal of the undocumented fill soils, we recommend that the resulting subgrade within the proposed structure footprints be surface recompacted.

We recommend that all earthwork improvements and excavations be oversized where fill materials are placed below foundations. The minimum excavation oversize should extend per the requirements outlined in Appendix A. Table 4 provides a summary of excavation necessary to remove unsuitable materials at respective borings.

Table 4: Summary of Soil Correction / Excavation¹

Boring Number	Existing Ground Elevation ² (feet)	Unsuitable Soil / Material	Estimated Depth to Bottom of Unsuitable Materials ³ (feet)	Estimated Bottom of Unsuitable Materials Elevation (feet)
SB-1 ³	854.0	Topsoil / Undocumented Fill	4.0	850.0
SB-2	867.5	Topsoil / Undocumented Fill	6.5	861.0
SB-3	870.5	Undocumented Fill	6.5	864.0
SB-4	870.5	Topsoil / Undocumented Fill	6.5	864.0
SB-5	869.5	Topsoil / Undocumented Fill	4.0	865.5
SB-6	872.0	Topsoil / Undocumented Fill	9.0	863.0
SB-7	871.0	Topsoil / Undocumented Fill	6.5	864.5
SB-8	870.0	Topsoil / Undocumented Fill	6.5	863.5
SB-9	871.0	Topsoil / Undocumented Fill	6.5	864.5
SB-10	869.0	Topsoil / Undocumented Fill	6.5	862.5
SB-11	869.5	Topsoil / Undocumented Fill	4.5	865.0
SB-12	869.0	Topsoil / Undocumented Fill	4.0	865.0
SB-13	868.0	Topsoil / Undocumented Fill	4.0	864.0
SB-14	869.0	Topsoil / Undocumented Fill	2.0	867.0
SB-15	865.5	Topsoil / Undocumented Fill	4.0	861.5
SB-16	864.5	Topsoil / Undocumented Fill	9.0	855.5
SB-17	860.0	Topsoil / Undocumented Fill	6.5	853.5

1. Borings contained trace organic materials and/or apparent fill materials within the collected samples. These areas and other areas exposed during the site grade may require deeper corrections dependent upon the materials encountered during the site grading activities.
2. Based on elevations at the boring locations as noted above in Section 3.1, Exploration Scope.
3. Boring completed outside of the proposed building pads. A full depth correction may not be required and is included within the table for general information only.



Before placement of structural fill, the resulting subgrade (following the recommended over-excavation of the undocumented fill) should be surface compacted with, at minimum, a 7-ton smooth drum vibratory roller (or equivalent) until no further deflection between subsequent passes is observed and a density of at least 98 percent of its standard Proctor maximum dry density is achieved.

The Geotechnical Engineer of Record or their designated representative must review project excavations to verify removal of unsuitable material(s) and adequate bearing support of exposed soils. All such observations should occur prior to the placement of engineering fill, or construction of footings and floor slabs. Any oversizing that is required should be performed in accordance with the diagram and table included in Appendix A.

All excavations should be in conformance with OSHA 1926 Subpart P. The grading contractor should provide a “competent person” as defined in the regulations, to determine the requirements for sloping and benching based on the soil types and groundwater seeps encountered.

Engineered fill required for support of site development below buildings/structures should consist of non-organic, debris-free soils of similar composition to the existing **native** soils.

Portions of the existing on-site, previously-placed fill soils have the potential to be re-used as engineered fill for preparation of the building pads when such soils are conditioned and placed as presented within this report. **However, NTI cautions that due to the due to the previous site use and undocumented nature of the apparent fill soils, there is the potential that zones of debris laden and/or organic soils, may be encountered as well. Organic or debris laden soils would need to be sorted and are not considered to be suitable for reuse.**

Considering that the composition and compaction effort of existing fill soils are not documented, the prediction of the percent of re-usable material is difficult. In addition, the exact delineation of native versus undocumented fill is difficult due to the limited sample size and soil disturbance due to the sampling technique. For this reason, the design team should be aware that there is the potential that there may be some variation in the depth of fill encountered during site excavations as compared to the boring logs.

The on-site, native, non-organic, debris-free soils may be utilized as structural engineered fill when properly moisture conditioned. However, if cleaner granular soils are placed over relatively impervious fill soils, then these areas with granular engineered fill should be provided with a drainage or weep system to prevent a “bathtub affect” from developing. If these zones are not drained, they have the potential to collect water within the void spaces and may undergo significant volumetric change during periods of freeze thaw. This change in volume has the potential to cause distress within the proposed structure.

Placement of structural fill should be observed and tested by an experienced technician or engineer to criteria described in Appendix B. Structural fill with moisture contents outside of the recommended range should be conditioned (dried or wetted) as appropriate prior to placement. All engineered fill for site corrective earthwork and for support of project footings should be tempered for moisture content and placed and compacted as outlined Appendix B.



4.3 Shallow Foundations

The following preliminary bearing recommendations are based on our understanding of the project. You should notify us of any changes made to the project size, location, design, or site grades so we can assess how such changes impact our recommendations. We assume foundation elements will impose maximum vertical loads as previously noted within this report.

In our opinion, you may support the proposed structure by founding strip footings and interior column footings on competent, non-organic native soils or engineered fill, providing such construction complies with the criteria established within this report. **In addition to performing a complete soil correction as recommended in Section 4.2 Site Preparation of this report, we recommend that the subgrade soils be improved by surface compacting with, at minimum:**

- **A 7-ton smooth drum vibratory roller (or equivalent) until no further deflection between subsequent passes is observed and**
- **Density of at least 98 percent of its standard Proctor maximum dry density is achieved.**

After performing the recommended soil correction and soil improvement methods, the design of footings may be based on the Table 5 maximum net allowable soil bearing pressures.

**Table 5: Recommended Maximum Net Allowable Soil Bearing Pressure¹
- Conventional Shallow Foundation Construction**

Location	Criteria
Perimeter Strip Footings, Perimeter Columns: Perimeter strip footings and perimeter column footing supported on documented fill, or competent native soils below depth of frost penetration.	Maximum 3,500 ² psf (All foundations)
Interior Strip Footings: Interior strip footings supported on documented fill, or competent native soils at a depth that provides no less than 6 inches of clearance between the top of footing and underside of floor slab (for sand cushion).	
Interior Column Footings: Supported on documented fill, or competent native soils at a depth that provides no less than 6 inches of clearance between the top of footing and underside of floor slab (for sand cushion).	

1. Maximum net allowable soil bearing pressure recommendations predicated on foundation design and construction complying with recommendations presented within this report. To minimize local failure of supporting soils, it is our opinion foundation construction should comply with the International Building Code (IBC) requirements.
2. In addition to performing a complete soil correction as recommended Section 4.2 Site Preparation of this report, we recommend that the subgrade soils be improved by surface compacting with, at minimum, a 7-ton smooth drum vibratory roller (or equivalent) until no further deflection between subsequent passes is observed and a density of at least 98 percent of its standard Proctor maximum dry density is achieved.

Foundations in unheated areas, such as stoops and canopies, should be based at least 5 feet below the proposed finished grade for frost protection. Footings below structures anticipated to be heated (greater than 60 degrees F) in winter should be constructed at least 3.5 feet below proposed finished grade.



Continuous strip footings under bearing walls should be at least 1 foot wider than the walls they support. Interior footings should be based at least 1.5 feet below design floor elevation

4.4 Bearing Factor of Safety and Estimate of Settlement

We estimate that the native soils, or properly compacted backfill, will provide a theoretical factor of safety of 3 against localized bearing failure when construction complies with report criteria and recommendations and the structural design of the foundations uses the Table 5 maximum net allowable soil bearing pressure recommendation(s).

We estimate that footings loaded per report recommendations may experience long term, total settlement of approximately 1/2 to 1 inch. Differential settlement will be on the order of 25 to 50 percent of total settlement. Generally, the greatest differential settlement occurs between lightly loaded and heavily loaded footings, particularly if heavily loaded footings are located adjacent to lightly loaded strip footings. Most of the settlement will occur on first loading, as the structure is erected.

Furthermore, total and differential movement of footings and floor slabs could be significantly greater than the above estimates if you support construction on frozen soils, the moisture content of the bearing soils significantly changes from in-situ conditions, and snow or ice lenses are incorporated into site earthwork.

4.5 Subsurface Drainage

NTI recommends the installation of a subsurface drain system at the interior base of foundation walls. The subsurface drain system will help to limit moisture accumulation within granular soils placed below interior floors. The subgrade should be sloped to help direct any water toward the drain tile. Drain tile should also be placed around low lying areas, such as elevator pits, and sensitive areas, such as mechanical or electrical rooms.

A drain tile installed at the exterior of the base of foundation walls is recommended to prevent hydrostatic loading on the walls.

As a general guideline, subsurface drainage consists of a geotextile and coarse drainage aggregate encased slotted or perforated pipe extending to sump basin(s). We recommend that exterior drainage be separated from interior drainage to reduce risk of cross flow and moisture infiltration below structure interior.

4.6 Utilities

The Geotechnical Engineer of Record or their designated representative should observe the project excavations to determine that unsuitable materials have been properly removed and adequate bearing support is provided by the exposed soils. The exposed soil at the base should be compacted to 95 percent standard Proctor dry density (ASTM D698). Such observations and testing should be performed prior to backfilling.



The on-site, non-organic, granular, non-debris laden soils are anticipated to be suitable for reuse if properly moisture conditioned and compacted. Replacement backfill required in utility trenches should consist of non-organic material similar to the surrounding soil.

Hard drilling and gravel/cobble layers were encountered at the site. Dependent upon the depth of utility installation, pipe bedding may be required to provide a uniform bearing stratum and for protection of the utility piping when bearing upon the underlying gravel and cobble laden soils.

The stability of embankments along utility excavations is dependent on soil strength, site geometry, moisture content, and any surcharge load for excavated soils and equipment. Cautionary comment on excavation stability is provided within other report sections.

Utility trenches should be backfilled in 6-inch maximum depth loose lifts. It is especially important that you compact trench backfill of underground utilities to minimize future settlement of green space and pavement areas. Please refer to Appendix B for compaction specifications.

We herein note that the Contractor is solely responsible for assessing the stability of and executing underground utility and project excavations using safe methods. Contractor is also responsible for naming the “competent individual” as per Subpart P of 29 CFR 1926.6 (Federal Register - OSHA).

4.7 Slab-on-Grade

The floor slab should be constructed directly over documented engineered fill or non-organic, competent native soil as described in the Site Preparation section. The design of the floor slab may be based on an estimated modulus of subgrade reaction (k) of 175 pci (pounds per square inch per inch of depth).

The final 6 inches of fill below the concrete floor slab should consist of pit run or processed sand (sand cushion) with 100 percent material passing the 1-inch sieve, no more than 40 percent passing the No. 40 sieve and no more than 5 percent material passing the No. 200 Sieve. The moisture content of the sand cushion should be within plus or minus 2 percent of the optimum moisture content determined by the standard Proctor test (ASTM: D 698).

All interior at-grade floors with impervious or near impervious surfacing such as, but not limited to, paint, hardening agent, vinyl tile, ceramic tile, or wood flooring, should include provision for installation of a vapor barrier system. Historically, vapor barrier systems can consist of many different types of synthetic membrane and can be placed either below sand cushion materials or at the underside of the concrete floor. All such issues are contentious and have both positive and negative aspects associated with long term performance of the floor. NTI recommends that the flooring supplier be contacted to provide any specific requirements that may be applicable to their product. Overall, we recommend you install some form of vapor barrier below the project floor (for at-grade and basement construction, as appropriate).



We recommend that you isolate floor slabs from other building components by placement of a nominal ½ inch thick expansion joint between the floor and walls, and/or columns. This construction must also apply a compatible sealant after curing of the floor slab to reduce moisture penetration through the expansion joint. As a minimum, you should install a bond breaker to isolate and reduce binding of building components.

4.8 Exterior Foundation Wall Backfill

Exterior backfill of at-grade foundations walls which do not retain soil should consist of non-organic, debris-free soils. Placement of exterior backfill against at-grade, non-earth retaining foundation walls should be performed concurrent with interior backfill to minimize differential loading, rotation and/or movement of the wall system.

The final one foot of exterior backfill for green areas may consist of clay or silt based topsoil. The final exterior backfill for areas supporting sidewalks and/or pavements should consist of a free draining aggregate base as recommended for the respective construction.

Backfill should be tempered for correct moisture content, then placed and compacted in individual lifts of exterior backfill per criteria presented within Appendix B of our report.

4.9 Surface Drainage

You should maintain positive drainage during and after construction of the project and eliminate ponding of water on site soils. We recommend that you include provisions within construction documents for positive drainage of the site. You should install sumps at critical areas around project excavations to assist in removal of seepage and runoff from site.

We recommend that sidewalks, curbing, pavements, and green space direct drainage away from the structures. We recommend that you provide a 5 percent gradient within 10 feet of the buildings for drainage from lawn, and 2 percent minimum gradient from the buildings for drainage of sidewalks / pavements. All pavements should drain to on-site storm collection, municipal collection system, or roadside ditching.

In order to minimize the potential for water to infiltrate the basement wall backfill, roof runoff should be directed away from buildings by a system of rain gutters, down spouts and splash pads.

4.10 Pavement Construction

The Contractor must realize that the encountered silty sand (SM), clayey sand (SC), and sandy lean clay (CL) soils will be moisture-sensitive and protecting them from inclement weather will aid in maintaining stability. Stripping of the existing topsoil should occur immediately prior to subgrade preparation and base aggregate installation to minimize weather-induced instability.



The apparent undocumented fill soils included varying amounts of organic materials. Organic materials are not suitable for pavement subgrade and should be removed. Pavements constructed over organic soils will not generally perform over the long-term the same as pavements constructed over inorganic soils, and some movement and long-term pavement maintenance should be anticipated if not removed.

Subsequent to removing the existing topsoil, organic soil, and dependent on the owner's tolerance for risk, there are two options recommended.

Option 1 (Complete Subgrade Correction)

The most conservative method of subgrade preparation would be to remove the undocumented fill soils and replace them in their entirety with properly compacted engineered fill. This method of subgrade preparation would provide the most uniform subgrade but would also be the most-costly method of construction and would be relatively atypical method of subgrade preparation.

Option 2 (Partial Subgrade Correction)

For this option, the Owner must accept some risk of future settlement due to the presence of the undocumented fill. These soils have a risk of non-uniformity and may contain additional zones of organics and other unsuitable soils at depth. If the owner is willing to accept the risk of future settlement, these soils may be left in place, provided they can provide a stable subgrade for support of the pavement.

We anticipate that the partial subgrade correction and subsequent construction of the parking lot and drive lane areas will likely consist of stripping the existing topsoil, as well as removing organic soils and unsuitable materials (if encountered) followed by local subgrade corrections as needed.

Applies to Both Options

We assume project traffic will be separated into two distinct classes; heavy duty traffic comprised of delivery trucks and refuse trucks, and light duty traffic comprised of passenger vehicles. Our pavement recommendations are predicated on separation of this traffic.

The resulting subgrade following site grading should first be scarified to a depth of 12 inches and re-compacted. A proof roll test should then be performed to determine soft or unstable subgrade areas. The proof roll should be performed with a tandem axle dump truck loaded to gross capacity (at least 20 tons). Acceptance criteria of the proof roll shall be limited to rut formation no more than one inch (1") depth (front or rear axles) and no pumping (rolling) observed during the visual inspection. Proof roll tests should be observed by an experienced technician or geotechnical engineer prior to placement of the aggregate base course to verify the subgrade will provide adequate pavement support.

If rutting or localized unstable subgrade areas are observed, those areas should be subcut, moisture-conditioned, and re-compacted or removed to a stable depth. Excavations for soil corrections (if any) in paved areas should allow for a 2-foot oversize beyond the edges of the pavement.



Engineered fill, if necessary, should consist of non-organic, debris-free soils of similar composition to the existing exposed subgrade soils. If clean sand materials are utilized as engineered fill overlying less pervious soils, they will need to be adequately drained as to not create a “bathtub” effect. If not adequately drained, there is the potential that groundwater may collect within the void spaces of the sand and result in vertical movements during periods of freeze/thaw.

Individual lifts of engineered fill in proposed paved areas should be tempered for moisture content, placed and compacted as listed in the Compaction Guidelines table in Appendix B.

The performance of stabilometer or similar tests, were beyond the scope of this report; however, they may be performed, upon request, for an additional fee. We estimate that a properly prepared subgrade would have an average stabilometer R value of 20 for the clayey sand and silty sand soils and an average stabilometer R value of 40 for the sand soils.

For a 20-year design pavement life and estimated traffic volumes, Table 6 presents our minimum thickness recommendations for flexible (bituminous) pavement.

Table 6: Recommended Minimum Flexible Pavement Thickness Design Alternative

Pavement Section	Light Duty (Parking Stalls)	Heavy Duty (Drive Lanes / Truck Areas)
Bituminous Wear Course (inches)	1.5	2.0
Bituminous Base Course (inches)	2.0	2.0
Class 5 or 6 Aggregate Base (inches)	6.0	8.0

We recommend rigid Portland cement concrete pavements be constructed at entrance aprons, trash enclosures, and other areas where point loads and turning stresses are more likely to damage the pavement. Based on the performance of concrete pavements at similar sites, we recommend the concrete pavement design alternative listed in Table 7.

Table 7: Recommended Minimum Rigid Pavement Thickness Design Alternative

Pavement Section	Heavy Duty (Drive Lanes / Truck Areas)	Static Loading Areas (Loading Areas, Dumpsters)
Unreinforced Concrete (inches)	6.0	7.0
Class 5 or 6 Aggregate Base (inches)	6.0	6.0

The soils encountered in areas of this site are quite susceptible to loss of strength when wet under dynamic loading conditions. The recommended pavement section is based on the post construction end use of the pavements. Loads during construction may exceed these conditions. Additional stabilization of the subgrade may be required in high traffic construction areas, such as access roads and lay-down yards. This stabilization could be achieved through modification of the pavement section with the addition of crushed stabilizing aggregate or through moisture conditioning and re-compacting. Subgrades should be stabilized prior to the placement of the final pavement section. We recommend that a proof roll be performed immediately before the placement of pavements, especially those exposed to precipitation.



Pavement recommendations assume the aggregate section below paved surfaces will be maintained in a drained condition. This may be accomplished by subsurface piping for eventual discharge into storm sewer, or above grade to ditching, or similar acceptable systems. Lack of surface and subsurface drainage will significantly reduce the capacity and longevity of the pavement systems indicated above.

We recommend pavements receive annual maintenance, as a minimum, to correct damages to the pavement structure, clean and infill cracks which develop, and repair or resurface areas which exhibit reduced subgrade performance. The lack of maintenance can lead to moisture infiltration of the pavement structure and softening of the subgrade soils. This, in turn, can degrade the performance of the pavement system and result in poorly performing pavements with shortened life expectancy.

4.11 Stormwater Infiltration

The soils encountered at Boring SB-1 (performed within the proposed stormwater infiltration area) included clayey sand (SC), poorly graded sand with silt (SP-SM), and poorly graded sand (SP).

Table 8 provides estimated infiltration rates for the soil types encountered at this boring location.

Table 8: Estimated Infiltration Rates¹

Unified Soil Classification System - Soil Type	Estimated Cumulative Infiltration Rate (inches/hour)
Clayey Sand (SC)	0.06
Poorly Graded Sand with Silt (SP-SM)	0.70
Poorly Graded Sand (SP)	0.80

1. All findings are approximate based on correlation of on-site soils to the Minnesota Stormwater Manual, or other published literature.

We recommend that Double-Ring Infiltrometer tests be performed to verify or potentially obtain less conservative rates as compared to the values shown above. NTI would be pleased to perform these services.

The amount of compaction that is achieved during the placement of engineered fill will affect the infiltration of stormwater. We recommend that the soils achieve no more than 90 percent of the maximum dry density as determined by the standard Proctor test (ASTM: D 698) within the stormwater infiltration areas. In addition, construction traffic should be limited, to the extent practical in these areas, to minimize the compaction of the subgrade soils due to wheel loads. There is the potential that the upper zone of soil may need to be loosened via mechanical disking if the area is over-compacted due to construction traffic.

4.12 Frost Considerations

The silt and clay laden fill soils encountered at the site are moderately to highly frost susceptible. Small amounts of groundwater, or infiltrated surface water, can be detrimental to the performance of the slabs and pavements. Exterior slabs and pavements should be expected to heave. If frost action needs to be eliminated in critical areas, then we recommend the use of structural slabs (e.g., as structural stoops in front of building doors



In entrances with concrete plaza areas and ADA accessible ramps where structural support is not practical, we recommend placing non-frost susceptible clean sand (SP) or at a minimum (based on the owner's acceptance of potential risk), low-frost susceptible sand with silt (SP-SM) soils with less than 10 percent material passing the No. 200 sieve beneath these areas. Using drain tile, this area should be connected to the site drainage system if it is surrounded by silt or clay based soils. A 3H: 1V (Horizontal: Vertical) transition zone should be constructed between non or low frost susceptible soils (SP, SP-SM) and other soils to help prevent differential frost movement.

Non-frost susceptible fill should consist of poorly graded sand or gravel with less than 5 percent material passing the No. 200 sieve (SP) and less than 50 percent passing the No. 40 sieve.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation Stability

Excavation depth and sidewall inclination should not exceed those specified in local, state or federal regulations. Excavations may need to be widened and sloped, or temporarily braced, to maintain or develop a safe work environment. Also, contractors should comply with local, state, and federal safety regulations including current OSHA excavation and trench safety standards. Temporary shoring must be designed in accordance with applicable regulatory requirements.

5.2 Engineered Fill & Winter Construction

The Geotechnical Engineer of Record or their designated representative should observe and evaluate excavations to verify removal of topsoil and/or unsuitable material(s), and adequacy of bearing support of exposed soils. Such observation should occur prior to construction of foundations or placement of engineered fill supporting excavations.

Engineered fill should be approved by the Geotechnical Engineer of Record prior to placement. In addition, the engineered fill should be tempered for correct moisture content and then place and compact individual lifts of engineered fill to criteria established within the appendices.

Frozen soil should never be used as engineered fill or backfill nor should you support foundations on frozen soils. Moisture freezing within the soil matrix of fine grained and/or cohesive soils produces ice lenses.

Such soils gain moisture from capillary action and, with continued growth, heave with formation of ice lenses within the soil matrix. Foundations constructed on frozen soils have the potential to settle once ice lenses thaw.

You should protect excavations and foundations from freezing conditions or accumulation of snow, and remove frozen soils, snow, and ice from within excavations, fill section or from below proposed foundations. Replacement soils should consist of similar materials as those removed from the excavation with moisture content, placement and compaction conforming to report criteria.



6.0 CLOSURE

As the widely spaced, small diameter borings provide only a limited amount of data regarding the existing fill, the existing fill may contain soft zones, debris or significantly greater amounts of unsuitable materials than could be reasonably inferred from the boring information. Unsuitable materials may not be discovered during construction and may remain buried within the fill below the slabs and pavements, resulting in greater than anticipated settlements of the slabs and pavements. These risks cannot be eliminated without completely removing the fill, but can be reduced by thorough exploration and testing during site preparation and construction.

Our conclusions and preliminary recommendations are predicated on observation and testing of the earthwork directed by Geotechnical Engineer of Record. Our opinions are based on data assumed representative of the site. However, the area coverage of borings in relation to the entire project is very small. For this and other reasons, we do not warrant conditions below the depth of our borings, or that the strata logged from our borings are necessarily typical of the site. Deviations from our recommendations by plans, written specifications, or field applications shall relieve us of responsibility unless our written concurrence with such deviations has been established.

The scope of services for this project does not include either specifically or by implication any environmental or biological assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This **preliminary** report has been prepared for the exclusive use of Wenck Associates, Inc. for specific application to the proposed Pine Bend RNG Facility project in Inver Grove Heights, Minnesota. Northern Technologies, LLC has endeavored to comply with generally accepted geotechnical engineering practice common to the local area. Northern Technologies, LLC makes no other warranty, expressed or implied.



APPENDIX A

GEOTECHNICAL EVALUATION OF RECOVERED SOIL SAMPLES

FIELD EXPLORATION PROCEDURES

GENERAL NOTES

WATER LEVEL SYMBOL

DESCRIPTIVE TERMINOLOGY

RELATIVE PROPORTIONS

PARTICLE SIZES

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

EXCAVATION OVERSIZE



GEOTECHNICAL EVALUATION OF RECOVERED SOIL SAMPLES

We visually examined recovered soil samples to estimate distribution of grain sizes, plasticity, consistency, moisture condition, color, presence of lenses and seams, and apparent geologic origin. We then classified the soils according using the Unified Soil Classification System (ASTM D2488). A chart describing this classification system and general notes explaining soil sampling procedures are presented within appendices attachments.

The stratification depth lines between soil types on the logs are estimated based on the available data. In-situ, the transition between type(s) may be distinct or gradual in either the horizontal or vertical directions. The soil conditions have been established at our specific boring locations only. Variations in the soil stratigraphy may occur between and around the borings, with the nature and extent of such change not readily evident until exposed by excavation. These variations must be properly assessed when utilizing information presented on the boring logs.

We request that you, your design team or contractors contact NTI immediately if local conditions differ from those assumed by this report, as we would need to review how such changes impact our recommendations. Such contact would also allow us to revise our recommendations as necessary to account for the changed site conditions.

FIELD EXPLORATION PROCEDURES

Soil Sampling – Standard Penetration Boring:

Soil sampling was performed according to the procedures described by ASTM D-1586. Using this procedure, a 2-inch O.D. split barrel sampler is driven into the soil by a 140-pound weight falling 30 inches. After an initial set of six inches, the number of blows required to drive the sampler an additional 12 inches is recorded (known as the penetration resistance (i.e. “N-value”) of the soil at the point of sampling. The N-value is an index of the relative density of cohesionless soils and an approximation of the consistency of cohesive soils.

Soil Sampling – Power Auger Boring:

The boring(s) was/were advanced with a 6 inch nominal diameter continuous flight auger. As a result, samples recovered from the boring are disturbed, and our determination of the depth, extend of various stratum and layers, and relative density or consistency of the soils is approximate.

Soil Classification:

Soil samples were visually and manually classified in general conformance with ASTM D-2488 as they were removed from the sampler(s). Representative fractions of soil samples were then sealed within respective containers and returned to the laboratory for further examination and verification of the field classification. In addition, select samples were submitted for laboratory tests. Individual sample information, identification of sampling methods, method of advancement of the samples and other pertinent information concerning the soil samples are presented on boring logs and related report attachments.



GENERAL NOTES

DRILLING and SAMPLING SYMBOLS		LABORATORY TEST SYMBOLS	
SYMBOL	DEFINITION	SYMBOL	DEFINITION
C.S.	Continuous Sampling	W	Moisture content-percent of dry weight
P.D.	2-3/8" Pipe Drill	D	Dry Density-pounds per cubic foot
C.O.	Cleanout Tube	LL, PL	Liquid and plastic limits determined in accordance with ASTM D 423 and D 424
3 HSA	3 1/4" I.D. Hollow Stem Auger	Q _u	Unconfined compressive strength-pounds per square foot in accordance with ASTM D 2166-66
4 FA	4" Diameter Flight Auger		
6 FA	6" Diameter Flight Auger		
2 1/2 C	2 1/2" Casing		
4 C	4" Casing		
D.M.	Drilling Mud	Pq	Penetrometer reading-tons/square foot
J.W.	Jet Water	S	Torvane reading-tons/square foot
H.A.	Hand Auger	G	Specific Gravity – ASTM D 854-58
NXC	Size NX Casing	SL	Shrinkage limit – ASTM 427-61
BXC	Size BX Casing	Ph	Hydrogen ion content-meter method
AXC	Size AX casing	O	Organic content-combustion method
SS	2" O.D. Split Spoon Sample	M.A.	Grain size analysis
2T	2" Thin Wall Tube Sample	C*	One dimensional consolidation
SH	3" Thin Wall Tube Sample	Q _c	Triaxial Compression
* See attached data Sheet and/or graph			

WATER LEVEL SYMBOL

Water levels shown on the boring logs were determined at the time and under the conditions indicated. In sand, the indicated levels can be considered relatively reliable for most site conditions. In clay soils, it is not possible to determine the ground water level within the normal scope of a test boring investigation, except where lenses or layers of more pervious water bearing soil are present; and then a long period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed soils may not indicate the true level of the ground water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

RELATIVE DENSITY		CONSISTENCY	
TERM	N₆₀ Value (corrected)	TERM	N₆₀ Value (corrected)
Very Loose	0 – 4	Soft	0-4
Loose	5 – 8	Medium	5-8
Medium Dense	9 – 16	Rather Stiff	9 – 15
Dense	16 – 30	Stiff	16 – 30
Very Dense	Over 30	Very Stiff	Over 30

RELATIVE PROPORTIONS

PARTICLE SIZES

TERMS	RANGE	MATERIAL	DESCRIPTION	U.S. SIEVE SIZE
Trace	0 – 5%	Boulders		Over 3"
A little	5 – 15%	Gravel	Coarse	3" to 3/4"
Some	15 – 30%		Medium	3/4" to #4
		Sand	Coarse	#4 to #10
			Medium	#10 to #40
			Fine	#40 to #200
		Silt and Clay	Determined by Hydrometer Test	



CLASSIFICATION of SOILS for ENGINEERING PURPOSES

ASTM Designation D-2487 and D2488 (Unified Soil Classification System)

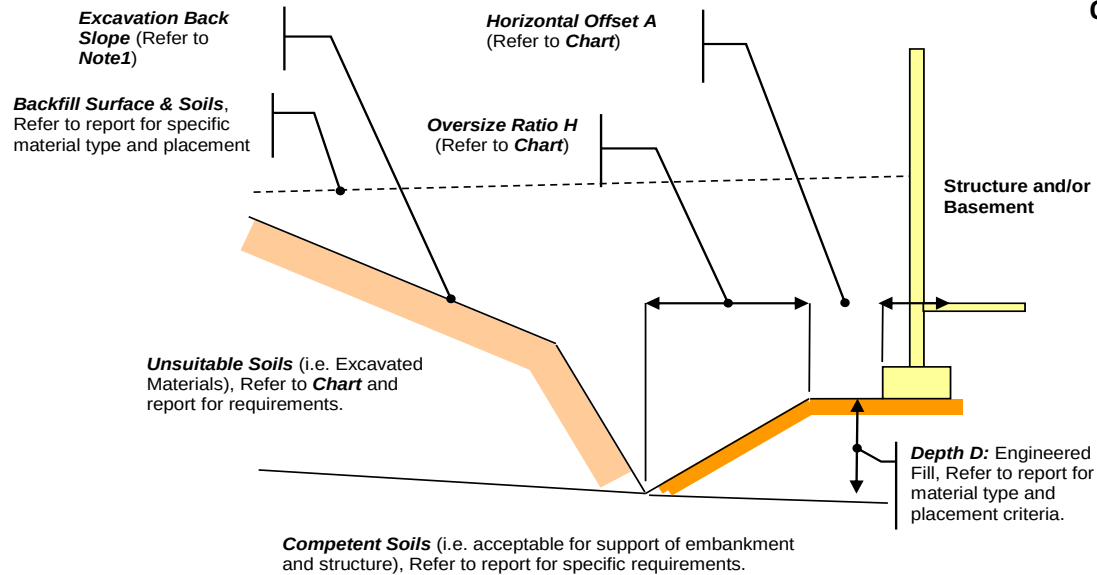
Major Divisions		Group Symbol	Typical Name	Classification Criteria			
Course Grained Soils More than 50% retained on No. 200 sieve *	Gravels 50% or more of coarse fraction retained on No. 4 sieve.	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines.	Cu = D60 / D10 greater than 4. Cz = (D30)2 / (D10 x D60) between 1 & 3.		
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.			
			GM	Silty gravels, gravel-sand-silt mixtures.			
			GC	Clayey gravels, gravel-sand-clay mixtures.			
	Sands More than 50% of coarse fraction passes No. 4 sieve.	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines.	Cu = D60 / D10 greater than 6. Cz = (D30)2 / (D10 x D60) between 1 & 3.		
			SP	Poorly-graded sands and gravelly sands, little or no fines.			
		Sands with Fines	SM	Silty sands, sand-silt mixtures.	Atterberg limits below "A" line, or P.I. less than 4. Atterberg limits above "A" line with P.I. greater than 7.		
			SC	Clayey sands, sand-clay mixtures.			
			Classification on basis of percentage of fines. Less than 5% passing No. 200 Sieve: GW, GP, SW, SP More than 12% passing No. 200 Sieve: GM, GC, SM, SC From 5% to 12% passing No. 200 Sieve: Borderline Classification requiring use of dual symbols.				
			Not meeting both criteria for SW materials.				
Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols.							
Fine Grained Soils More than 50% passes No. 200 sieve *	Silts and Clays Liquid Limit of 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols.			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.				
		OL	Organic silts and organic silty clays of low plasticity.				
		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.				
	Silts and Clays Liquid Limit greater than 50%.	CH	Inorganic clays of high plasticity, fat clays.	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols.			
		OH	Organic clays of medium to high plasticity.				
		Pt	Peat, muck and other highly organic soils.				
		Plasticity Index Chart					



EXCAVATION OVERSIZE

Excavation oversize facilitates distribution of load induced stress within supporting soils. Unless otherwise superseded by report specific requirements, all construction should conform to the minimum oversize and horizontal offset requirements as presented within the diagram and associated chart.

Figure 1: Excavation Oversize



Definitions

- Oversize Ratio H:** The ratio of the horizontal distance divided by the engineered fill depth (i.e. # Horizontal / Depth D). Refer to Chart for specific requirements.
- Horizontal Offset A:** The horizontal distance between the outside edge of footing or critical position and the crest of the engineered fill section. Refer to Chart for specific requirements.
- Note 1:** Excavation depth and sidewall inclination should not exceed those specified in local, state or federal regulations including those defined by Subpart P of Chapter 27, 29 CFR Part 1926 (of Federal Register). Excavations may need to be widened and sloped, or temporarily braced, to maintain or develop a safe work environment. Contractor is solely responsible for assessing stability under “means and methods”.

Condition	Unsuitable Soil Type	Horizontal Offset A	Oversize Ratio H
Foundation Unit Load equal to or less than 3,000 psf.	SP, SM soils, CL & CH soils with cohesion greater than 1,000 psf	NA	Equal to or greater than one (1) times Depth D
Foundation Unit Load greater than 3,000 psf	SP, SM soils, CL & CH soils with cohesion less than 1,000 psf	NA	Equal to or greater than one (1) times Depth D
Foundation Unit Load equal to or less than 3,000 psf.	Topsoil or Peat	2 feet or width of footing, whichever is greater	Equal to or greater than two (2) times Depth D
Foundation Unit Load greater than 3,000 psf	Topsoil or Peat	5 feet or width of footing, whichever is greater	Equal to or greater than two (3) times Depth D



APPENDIX B

GROUNDWATER ISSUES

PLACEMENT and COMPACTION OF ENGINEERED FILL



GROUNDWATER ISSUES

The following presents additional comment and soil specific issues related to measurement of groundwater conditions at your project site.

Note that our groundwater measurements, or lack thereof, will vary depending on the time allowed for equilibrium to occur in the borings. Extended observation time was not available during the scope of the field exploration program and, therefore, groundwater measurements as noted on the boring logs may or may not accurately reflect actual conditions at your site.

Seasonal and yearly fluctuations of the ground water level, if any, occur. Perched groundwater may be present within sand and silt lenses bedded within cohesive soil formations. Groundwater typically exists at depth within cohesive and cohesionless soils.

We anticipate that a system of sump pits and pumps located outside of the foundation areas would be suitable for control if perched groundwater were to be encountered. If excavations are advanced into a static groundwater table within an underlying granular soil layer a well point system would likely be a more suitable method of control. NTI cautions that such seepage may be heavy and will vary based on seasonal and annual precipitation, and ground related impacts in the vicinity of the project.



PLACEMENT and COMPACTION OF ENGINEERED FILL

Unless otherwise superseded within the body of the Geotechnical Exploration Report, the following criteria shall be utilized for placement of engineered fill on project. This includes, but is not limited to earthen fill placement to improve site grades, fill placed below structural footings, fill placed interior of structure, and fill placed as backfill of foundations.

Engineered fill placed for construction, if necessary, should consist of natural, non-organic, competent soils native to the project area. Such soils may include, but are not limited to gravel, sand, or clays with Unified Soil Classification System (ASTM D2488) classifications of GW, SP, or SM. Use of silt or clayey silt as project fill will require additional review and approval of project Geotechnical Engineer of Record. Such soils have USCS classifications of ML, MH, ML-CL, MH-CH. Use of topsoil, marl, peat, other organic soils construction debris and/or other unsuitable materials as fill is not allowed. Such soils have USCS classifications of OL, OH, Pt.

Engineered fill, classified as clay, should be tempered such that the moisture content at the time of placement is equal to and no more than 3 percent above the optimum content for as defined by the appropriate proctor test. Likewise, engineered fill classified as gravel or sand should be tempered such that the moisture content at the time of placement is within 3 percent of the optimum content.

All engineered fill for construction should be placed in individual 8-inch maximum depth lifts. Each lift of fill should be compacted by large vibratory equipment until the in-place soil density is equal to or greater than the criteria established within the following tabulation.

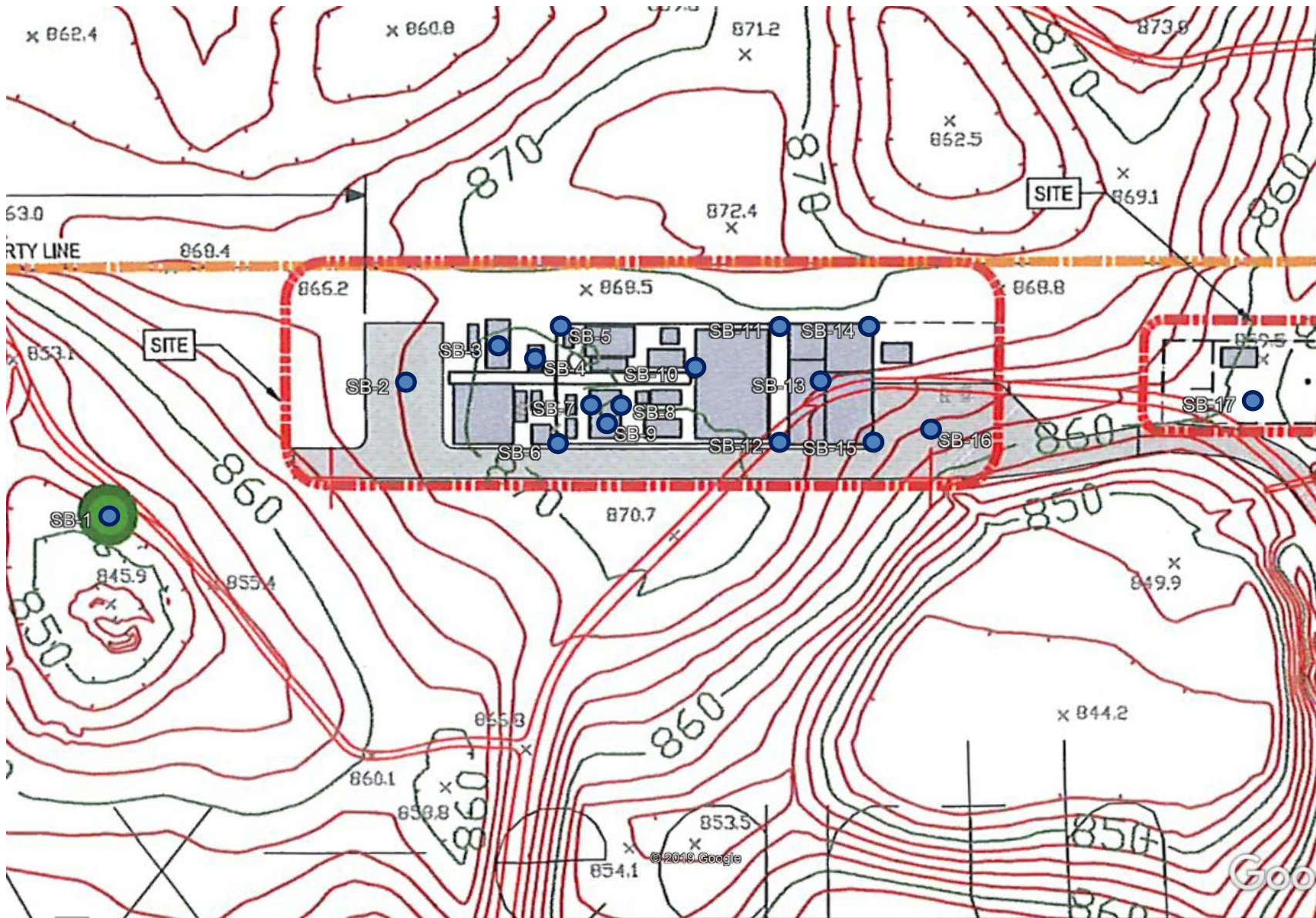
Type of Construction	Compaction Criteria (% respective Proctor) ¹	
	Clay	Sand or Gravel
General Embankment Fill	Min. 95	Min. 95
Engineered Fill below Foundations	NA	Min. 100
Engineered Fill below Floor Slabs	NA	Min. 98
Engineered Fill placed as Pavement Aggregate Base	NA	Min. 100
Engineered Fill placed to within 3 feet of pavement aggregate base	Min. 95	Min. 95
Engineered Fill placed within 3 feet of pavement aggregate base	Min. 100	Min. 100
Note 1 Unless otherwise required, compaction shall be based on the Standard Proctor Test (ASTM D698).		

Density tests should be taken during engineered fill placement to document earthwork has achieved necessary compaction of the material(s). Recommendations for interior fill placement and backfill of foundation walls are presented within other sections of this report.



APPENDIX C

BORING LOCATION DIAGRAM
SOIL BORING LOGS



Boring Location Diagram
 Pine Bend RNG Facility
 Inver Grove Heights, Minnesota
 NTI Project #: 19.MSP06273.000

Completed Soil Borings: ●





NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-1

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 854 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** 1.0 **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.2		TOPSOIL (2.0 Inches)	853.8									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	852.5									
4.0		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, little gravel (Undocumented Fill)	850.0									
5		POORLY GRADED SAND, (SP) brown to light brown, fine to coarse grained, moist, loose to medium dense, trace gravel (Glacial Outwash)										
			SS 2	56	4-4-6 (10)			5				
			SS 3	56	3-3-4 (7)							
			SS 4	56	3-4-6 (10)			3				4
9.0												
10		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense to loose, little gravel (Glacial Outwash)										
			SS 5	78	5-5-6 (11)							
			SS 6	67	3-3-3 (6)							
			SS 7	67	3-3-6 (9)							
15												
19.0												
20		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, dense, trace gravel (Glacial Outwash)										
20.5			SS 8	56	4-8-9 (17)			2				3
Bottom of borehole at 20.5 feet.												



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-2

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 867.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** 0.2 **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		0.2 TOPSOIL (2.0 Inches) 867.3	AU 1									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill) 866.0	SS 2	67	2-2-3 (5)			15				26
4.0		SILTY SAND, (SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill) 863.5	SS 3	56	2-3-3 (6)							
6.5		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill) 861.0	SS 4	67	2-3-3 (6)							
9.0		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, loose, trace gravel (Glacial Outwash) 858.5	SS 5	67	2-3-4 (7)							
11.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, loose to very dense, trace to little gravel (Glacial Outwash) 856.0	SS 6	67	3-3-3 (6)							
			SS 7	78	3-3-3 (6)							
20.5		NOTE: Driller noted gravel/cobble at 20.0 feet. 847.0	SS 8	33	2-12-20 (32)							

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-3

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 870.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

NTI LOG - GENERAL (USE THIS ONE) - NTI-2017-09-14.GDT - 122220 16:25 - R:RAMSEY11-PROJECTS2019 PROJECTS\PINE BEND RNG FACILITY\GEO_19.MSP_06273.000\ENGINEERING REPORTS\GINT\PINE BEND RNG FACILITY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	AU 1									
		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	SS 2	56	2-2-2 (4)							
5			SS 3	56	2-3-4 (7)			6				
6.5												
		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	SS 4	67	3-3-6 (9)							
9.0												
		POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	SS 5	56	3-5-8 (13)							
11.5												
		POORLY GRADED SAND, (SP) light brown, fine to medium grained, moist, dense to medium dense, trace gravel (Glacial Outwash)	SS 6	67	10-9-8 (17)							
		NOTE: Drillers encountered cobbles at 12.0 feet	SS 7	83	5-7-8 (15)							
15												
20			SS 8	56	3-4-8 (12)							
20.5												

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-4

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 870.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** 0.8 **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.2		TOPSOIL (2.0 Inches)	AU 1									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	SS 2	56	1-2-2 (4)							
5		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	SS 3	22	1-1-2 (3)			4				3
6.5		POORLY GRADED SAND WITH SILT, (SP-SM) light brown to brown, fine to coarse grained, moist, loose to dense, trace gravel (Glacial Outwash)	SS 4	67	3-3-4 (7)							
10			SS 5	56	3-3-4 (7)			7				6
15			SS 6	56	3-5-6 (11)							
			SS 7	83	7-8-9 (17)							
20		NOTE: Driller noted gravel/cobble between 17.0 and 20.0 feet.	SS 8	67	7-8-10 (18)							
20.5		Bottom of borehole at 20.5 feet.										



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-5

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility
PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota
DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 869.5 feet **HOLE SIZE** 6 1/2 in.
DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**
DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed
LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---
CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---
NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.8		TOPSOIL (9.0 Inches)	868.8									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	868.0									
4.0		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	865.5									
5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, loose to dense, trace gravel (Glacial Outwash)										
			SS 2	50	2-2-2 (4)			8				8
			SS 3	44	3-4-4 (8)							
			SS 4	61	4-6-7 (13)			4				
			SS 5	100	7-9-10 (19)							
			SS 6	100	8-10-12 (22)							
			SS 7	100	6-9-11 (20)							
19.0												
20		POORLY GRADED SAND, (SP) light brown to brown, fine to coarse grained, moist, dense, trace gravel, occasional gravel layers (Glacial Outwash)	850.5									
20.5			SS 8	94	7-11-17 (28)			4				3
		Bottom of borehole at 20.5 feet.										



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-6

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 872 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.8		TOPSOIL (9.0 Inches)	871.3	SS 1	50	1-2-2 (4)		20				52
2.0		SANDY LEAN CLAY, (CL) dark brown to brown, moist, trace gravel, trace organics (Undocumented Fill)	870.0	SS 2	61	2-2-3 (5)						
4.0		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, trace gravel	868.0									
4.5		(Undocumented Fill)	867.5	SS 3	78	3-3-3 (6)						
6.5		CLAYEY SAND, (SC) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	865.5	SS 4	100	3-3-4 (7)						
9.0		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	863.0	SS 5	94	3-3-4 (7)		4				
		SILTY SAND, (SM) brown to light brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)		SS 6	100	4-5-6 (11)						
		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, loose to medium dense, trace gravel (Glacial Outwash)		SS 7	89	4-6-7 (13)						
20.5			851.5	SS 8	83	5-7-8 (15)						

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-7

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 871 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.9		TOPSOIL (11.0 Inches)	870.1	SS 1	61	2-1-1 (2)						
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	869.5	SS 2	56	2-2-3 (5)						
4.0		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	867.0									
5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	864.5	SS 3	67	2-2-3 (5)		6				4
6.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	862.0	SS 4	78	5-5-7 (12)						
9.0		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	859.5	SS 5	78	4-5-7 (12)						
11.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, very dense to medium dense, trace to little gravel (Glacial Outwash)		SS 6	28	9-14-30 (44)						
				SS 7	100	5-7-8 (15)		4				
20.5			850.5	SS 8	89	5-9-10 (19)						

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-8

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 870 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.5		TOPSOIL (6.0 Inches)	869.5	SS 1	44	1-2-3 (5)		20				55
1.5		SANDY LEAN CLAY, (CL) dark brown, moist, trace gravel (Undocumented Fill)	868.5	SS 2	89	2-2-3 (5)						
5		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)		SS 3	67	3-3-3 (6)		4				8
6.5			863.5									
		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense to dense, trace gravel (Glacial Outwash)		SS 4	100	4-6-6 (12)						
10				SS 5	89	4-7-7 (14)						
				SS 6	100	4-9-9 (18)						
15				SS 7	83	8-11-14 (25)						
19.0			851.0									
20		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, little gravel (Glacial Outwash)		SS 8	78	7-8-7 (15)						
20.5			849.5									
Bottom of borehole at 20.5 feet.												



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-9

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 871 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.4		TOPSOIL (5.0 Inches)	870.6									
2.0		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	869.0									
5		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace to little gravel (Undocumented Fill)										
6.5			864.5					4				5
		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, trace to little gravel (Glacial Outwash)										
10												
								4				4
11.5			859.5									
		POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine to coarse grained, moist, dense, trace gravel (Glacial Outwash)						4				6
15												
19.0		NOTE: Driller noted gravel/cobble at 18.5 feet.	852.0									
20												
20.5		POORLY GRADED SAND, (SP) brown to light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	850.5									
		Bottom of borehole at 20.5 feet.										



BORING NUMBER SB-10

PAGE 1 OF 1

CLIENT <u>Wenck Associates, Inc</u>	PROJECT NAME <u>Pine Bend RNG Facility</u>
PROJECT NUMBER <u>19.MSP06273.000</u>	PROJECT LOCATION <u>Inver Grove Heights, Minnesota</u>
DATE STARTED <u>12/11/19</u> COMPLETED <u>12/11/19</u>	GROUND ELEVATION <u>869 feet</u> HOLE SIZE <u>6 1/2 in.</u>
DRILLING CONTRACTOR <u>NTI</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>3 1/4 in H.S.A</u>	AT TIME OF DRILLING <u>--- No Groundwater observed</u>
LOGGED BY <u>Richard Jett</u> CHECKED BY <u>Deb Schroeder</u>	AT END OF DRILLING <u>---</u>
CAVE IN (ft) <u>---</u> FROST DEPTH (ft) <u>---</u>	AFTER DRILLING <u>---</u>
NOTES <u>Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeolD 12A).</u>	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.9		TOPSOIL (11.0 Inches)	868.1	X	SS 1	61	1-1-2 (3)					
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	867.5	X	SS 2	44	1-2-2 (4)	17				51
		SANDY LEAN CLAY, (CL) brown, moist, trace gravel (Undocumented Fill)										
4.5		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	864.5	X	SS 3	39	2-3-5 (8)					
6.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, dense to medium dense, trace gravel, occasional clay seams (Glacial Outwash)	862.5	X	SS 4	17	5-7-10 (17)					
10												
15												
20												
20.5			848.5	X	SS 8	67	6-8-8 (16)					

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-11

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 869.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.9		TOPSOIL (11.0 Inches)	868.6	SS 1	67	0-1-2 (3)		21				48
		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)		SS 2	28	2-3-4 (7)						
4.5			865.0	SS 3	67	6-5-6 (11)						
6.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, trace gravel (Glacial Outwash) NOTE: Driller noted gravel/cobble at 6.0 feet.	863.0	SS 4	89	4-5-8 (13)						
		POORLY GRADED SAND, (SP) light brown to brown, fine to coarse grained, moist, medium dense to very dense, little gravel (Glacial Outwash) NOTE: Driller noted cobbles between 7.5 and 11.5 feet NOTE: No recovery in Sample No. 9 due to gravel/cobble Auger cuttings sampled.	858.0	SS 5	0	9-19-50 (69)						
11.5				SS 6	0	19-16-13 (29)						
		POORLY GRADED SAND WITH SILT, (SP-SM) brown to light brown, fine to coarse grained, moist, dense to very dense, trace gravel (Glacial Outwash) NOTE: No recovery in Sample No. 6 due to gravel/cobble. Auger cuttings sampled.		SS 7	6	13-32-48 (80)						
19.0			850.5	SS 8	61	10-6-7 (13)		3				
20.5		POORLY GRADED SAND, (SP) brown to light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	849.0									
		Bottom of borehole at 20.5 feet.										



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-12

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/11/19 **COMPLETED** 12/11/19 **GROUND ELEVATION** 869 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.8		TOPSOIL (9.0 Inches)	868.3	SS 1	100	13-9-6 (15)						
2.0		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	867.0	SS 2	83	5-6-5 (11)						
4.0		CLAYEY SAND, (SC) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	865.0									
5		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	862.5	SS 3	72	3-5-4 (9)		4				
6.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, trace gravel, occasional silty sand seams (Glacial Outwash)		SS 4	67	5-5-5 (10)						
10		NOTE: Driller noted gravel/cobble between 5.5 an 10.0 feet.		SS 5	83	5-6-6 (12)						
				SS 6	89	6-8-8 (16)						
15				SS 7	83	6-5-6 (11)						
20				SS 8	94	5-6-7 (13)						
20.5			848.5									

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-13

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility
PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota
DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 868 feet **HOLE SIZE** 6 1/2 in.
DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**
DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed
LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---
CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---
NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.8		TOPSOIL (9.0 Inches)	867.3									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	866.5	SS 1	50	2-2-3 (5)						
				SS 2	56	2-2-3 (5)		12				20
4.0		CLAYEY SAND, (SC) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)	864.0									
5		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, medium dense, trace gravel, occasional silt seams (Glacial Outwash)		SS 3	50	5-6-5 (11)						
				SS 4	67	5-5-4 (9)						
9.0		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, little gravel (Glacial Outwash)	859.0	SS 5	72	7-7-8 (15)						
11.5		NOTE: Drillers encountered cobbles between 10.0 and 16.0 feet	856.5									
13.0		POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine to coarse grained, moist, dense, little gravel (Glacial Outwash)	855.0	SS 6	83	7-9-9 (18)						
				SS 7	78	6-6-6 (12)						
15		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense, trace to little gravel (Glacial Outwash)										
20				SS 8	89	5-6-6 (12)						
20.5			847.5									

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-14

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility
PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota
DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 869 feet **HOLE SIZE** 6 1/2 in.
DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**
DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed
LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---
CAVE IN (ft) --- **FROST DEPTH (ft)** 0.2 **AFTER DRILLING** ---
NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.7		TOPSOIL (8.0 Inches)	868.3									
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse	867.5	SS 1	11	1-1-1						
2.0		grained, moist, trace gravel, trace organics	867.0	SS 2	78	1-2-3						
		(Undocumented Fill)										
		CLAYEY SAND, (SC) brown, fine to coarse grained,										
		moist, trace gravel										
		(Undocumented Fill)										
5		POORLY GRADED SAND WITH SILT, (SP-SM) brown,		SS 3	61	5-5-5						
		fine to coarse grained, moist, medium dense, trace										
		gravel										
		(Glacial Outwash)										
		POORLY GRADED SAND WITH SILT, (SP-SM) light	862.5	SS 4	72	6-6-5		4				5
		brown, fine to coarse grained, moist, medium dense to										
		dense, little gravel										
		(Glacial Outwash)										
		NOTE: Driller noted gravel/cobble between 6.5 and 8.0		SS 5	72	11-17-10						
		feet and between 9.5 and 11.5 feet.										
				SS 6	61	6-5-5						
				SS 7	67	5-6-6						
14.0		POORLY GRADED SAND, (SP) light brown, fine to	855.0									
		coarse grained, moist, medium dense, trace gravel										
		(Glacial Outwash)										
15												
20				SS 8	83	4-6-7						
20.5			848.5									

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-15

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 865.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

NTI LOG - GENERAL (USE THIS ONE) - NTI-2017-09-14.GDT - 122220 16:25 - R:RAMSEY\Y1-PROJECT\SB15-PROJECT\SB15-PINE BEND RNG FACILITY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.8		TOPSOIL (10.0 Inches)	864.7	SS 1	67	2-4-4 (8)						
		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)		SS 2	89	4-3-4 (7)						
4.0			861.5									
5		POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)		SS 3	67	4-6-7 (13)						
				SS 4	56	5-5-4 (9)						
9.0			856.5									
10		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, medium dense to dense, trace gravel (Glacial Outwash)		SS 5	78	6-6-4 (10)		5				
				SS 6	50	4-6-7 (13)						
15		NOTE: Driller noted gravel/cobble at 13.0 feet. NOTE: No recovery in Sample No. 7 due to gravel/cobble. Auger cuttings sampled.		SS 7	100	7-12-13 (25)						
19.0			846.5									
20		POORLY GRADED SAND, (SP) brown, fine to coarse grained, moist, medium dense, some gravel (Glacial Outwash)		SS 8	67	4-6-10 (16)						
20.5			845.0									

Bottom of borehole at 20.5 feet.



NTI
NORTHERN
TECHNOLOGIES, LLC

Inver Grove Heights
6160 Carmen Avenue East
Inver Grove Heights, MN 55076
P: 651-389-4191
www.NTIgeo.com

BORING NUMBER SB-16

PAGE 1 OF 1

CLIENT Wenck Associates, Inc **PROJECT NAME** Pine Bend RNG Facility

PROJECT NUMBER 19.MSP06273.000 **PROJECT LOCATION** Inver Grove Heights, Minnesota

DATE STARTED 12/10/19 **COMPLETED** 12/10/19 **GROUND ELEVATION** 864.5 feet **HOLE SIZE** 6 1/2 in.

DRILLING CONTRACTOR NTI **GROUND WATER LEVELS:**

DRILLING METHOD 3 1/4 in H.S.A **AT TIME OF DRILLING** --- No Groundwater observed

LOGGED BY Richard Jett **CHECKED BY** Deb Schroeder **AT END OF DRILLING** ---

CAVE IN (ft) --- **FROST DEPTH (ft)** --- **AFTER DRILLING** ---

NOTES Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
0.9		TOPSOIL (11.0 Inches)	863.6	SS 1	61	1-2-3 (5)						
1.5		CLAYEY SAND, (SC) dark brown, fine to coarse grained, moist, trace gravel, trace organics (Undocumented Fill)	863.0	SS 2	17	3-3-3 (6)						
4.0		SILTY SAND, (SM) brown, fine to coarse grained, saturated, trace gravel (Undocumented Fill)	860.5	SS 3	56	3-2-3 (5)						
5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, trace gravel (Undocumented Fill)		SS 4	78	2-3-5 (8)		5				5
9.0		POORLY GRADED SAND WITH SILT, (SP-SM) brown to light brown, fine to coarse grained, moist, medium dense, trace gravel (Glacial Outwash)	855.5	SS 5	83	4-6-7 (13)						
11.5		POORLY GRADED SAND, (SP) light brown, fine to coarse grained, moist, very dense to medium dense, little gravel (Glacial Outwash)	853.0	SS 6	72	7-7-10 (17)						
15		NOTE: No recovery in Sample No. 7 due to gravel/cobble. Auger cuttings sampled.		SS 7	0	50/6"						
20				SS 8	67	10-7-7 (14)						
20.5			844.0									

Bottom of borehole at 20.5 feet.



BORING NUMBER SB-17

CLIENT <u>Wenck Associates, Inc</u>		PROJECT NAME <u>Pine Bend RNG Facility</u>	
PROJECT NUMBER <u>19.MSP06273.000</u>		PROJECT LOCATION <u>Inver Grove Heights, Minnesota</u>	
DATE STARTED <u>12/10/19</u>	COMPLETED <u>12/10/19</u>	GROUND ELEVATION <u>860 feet</u>	HOLE SIZE <u>6 1/2 in.</u>
DRILLING CONTRACTOR <u>NTI</u>		GROUND WATER LEVELS:	
DRILLING METHOD <u>3 1/4 in H.S.A</u>		AT TIME OF DRILLING <u>--- No Groundwater observed</u>	
LOGGED BY <u>Richard Jett</u>	CHECKED BY <u>Deb Schroeder</u>	AT END OF DRILLING <u>---</u>	
CAVE IN (ft) <u>---</u>	FROST DEPTH (ft) <u>---</u>	AFTER DRILLING <u>---</u>	
NOTES <u>Elevation determined using Trimble GeoXH 6000 (NAD 1983 Minnesota GeoID 12A).</u>			

[illegible]

NTI LOG - GENERAL (USE THIS ONE) - NTI-2017-09-14.GDT - 1/22/20 16:25 R:\RAMSEY1-PROJECTS\2019 PROJECTS\PINE BEND RNG FACILITY GEO_19.MSP 06273.000ENGINEERING REPORTS\GINT\PINE BEND RNG FACILITY.GPJ

Wetland Delineation Report: PID 200330026011, Inver Grove Heights, MN



Prepared for:
Pine Bend RNG, LLC

1 N. Lexington Avenue
White Plains, NY 10601



Prepared by:

WENCK Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN 55359
Phone: 763-479-4200
Fax: 763-479-4242

Table of Contents

1.0 INTRODUCTION	1-1
1.1 Site Description	1-1
2.0 METHODS.....	2-1
2.1 Onsite Determination	2-1
3.0 RESULTS	3-1
3.1 Desktop Review	3-1
3.2 Onsite Determination	3-1
4.0 CONCLUSION	4-1

MAP FIGURES

1. Site Location
2. National Wetlands Inventory
3. MN DNR Public Waters Inventory
4. Dakota County Soil Survey
5. Delineated Wetland
6. Delineated Wetland Detail

APPENDICES

- A Field Data Sheets

1.0 Introduction

Wenck Associates, Inc. (Wenck) staff conducted an onsite wetland delineation for an approximately 62-acre parcel (PID: 200330026011) in Inver Grove Heights, MN (Figure 1). Field work was conducted on October 16, 2018.

1.1 SITE DESCRIPTION

The project area is an undeveloped parcel adjacent to the Pine Bend landfill. Vegetation is unmanaged and consists of wild forbs and grasses, with a woody area in the northwest corner. The site has experienced grading and excavating activities related to operation of the landfill. Much of the property has been disturbed at some point.

Wetlands are defined in the Federal Register (1982) as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

An area must have 3 elements present to be delineated as a wetland:

- 1) Greater than 50% dominance of hydrophytic plant species.
- 2) A hydric soil substrate.
- 3) Wetland hydrology during the growing season.

2.0 Methods

2.1 ONSITE DETERMINATION

An onsite wetland investigation was conducted by using the on-site methodology set forth in the 1987 USACE Wetlands Delineation Manual (1987 Manual) and the 2010 U.S. Army Corps of Engineers *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (Regional Supplement). Potential wetland areas were examined according to guidelines set forth in these documents and wetland boundaries were determined through analysis of the vegetation, soils, and hydrology.

Plant species at both wetland and upland transect points were identified and assigned a wetland indicator status according to the North American Digital Flora: National Wetland Plant List, version 2.4.0 U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC. (2016). In the text of this report and on the enclosed data forms, the plant indicator status follows the plant's scientific or common name unless a status has not been assigned. According to the 1987 Manual and Regional Supplement, the hydrophytic plant criteria are met when more than 50% of the dominant species within the vegetative strata were assigned an obligate (OBL), facultative wet (FACW), or facultative (FAC) wetland status.

The presence of current wetland hydrology was determined through direct observation of the primary or secondary wetland hydrology indicators as defined in the 1987 Manual and Regional Supplement. The presence of a single primary indicator is sufficient to conclude that wetland hydrology is present. The direct observation of two or more secondary wetland hydrology indicators is required to conclude that wetland hydrology is present.

Hydric soils were determined through use of the Version 8.1, NRCS Field Indicators of Hydric Soils in the United States. Soils were examined and classified by digging soil pits at sample point transects using a Dutch auger. If the soils exhibited indicators of hydric soils as defined by USDA Soil Conservation Service (1994) - a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part - they were determined to be hydric.

Data sheets were completed for each investigation point and are included in Appendix C. Field-delineated wetland boundaries were recorded using a sub-meter Trimble R1. The GPS data were then used to create the wetland boundary shapefiles in ArcMap as presented in the report figures.

Wetlands are classified in the Results section by their Eggers and Reed, Circular 39, and Cowardin classification systems based on observed field conditions.

3.0 Results

3.1 DESKTOP REVIEW

The National Wetlands Inventory does not show any mapped features within the project area (Figure 2).

The Minnesota DNR Public Waters Inventory does not show any mapped features within the project area (Figure 3).

The Dakota County Soil Survey (Figure 4) indicates that the project area is dominated by 411B Waukegan silt loam, 41B Estherville sandy loam, 1816 Kennebec variant silt loam, and 611 Hawick gravelly sandy loam map units. These indicate a site underlain by sandy outwash with or without a loamy or silty sediment mantle.

3.2 ONSITE DETERMINATION

One wetland basin was delineated within the project area (Figure 5).

Wetland 1

Wetland 1 is a 1.02-acre basin classified by Wenck as:

- Type 1 and Type 2 (Circular 39)
- PEM1B (Cowardin)
- Seasonally Flooded Basin and Fresh (wet) Meadow (Eggers and Reed)

The Type 1 areas were associated with open mudflat areas. The majority of the basin was Type 2.

Two sampling transects were conducted. Wetland point W1-Wet1 featured almost two feet of loamy fill over native hydric soil. Upland point W1-Up1 featured loamy fill to at least 30 inches. Wetland point W1-Wet2 featured six inches of dark brown (10YR 3/2) coarse sandy loam over depleted (10YR 4/2 with redox) coarse sandy loam. Upland point W1-Wet2 featured 19 inches of relatively recent sandy sediment deposit over a non-hydric, sandy native profile.

Vegetation at the first wetland point was dominated by green ash (*Fraxinus pennsylvanica*, FACW), American elm (*Ulmus americana*, FACW) and box elder (*Acer negundo*, FAC). The first upland point was dominated by green ash, raspberry (*Rubus idaeus*, FACU), and giant ragweed (*Ambrosia trifida*, FAC). The second wetland point was dominated entirely by reed canary grass (*Phalaris arundinacea*, FACW). The second upland point was dominated by reed canary grass, Canada thistle (*Cirsium arvense*, FACU), and vetch (*Vicia cracca*, UPL)

Observed primary wetland hydrology indicators included A1 (Standing Water), A2 (High Water Table), and A3 (Saturation).

Wetland 1 looking east/northeast from W1-Wet1



4.0 Conclusion

One wetland was identified within the project area. Activities which impact or potentially impact wetlands or other jurisdictional waters may be regulated by the USACE (under Section 404 of the Clean Water Act), the Local Government Unit administering the Wetland Conservation Act and the Minnesota Department of Natural Resources under the Protected Waters program. No grading or filling in wetland basins or other jurisdictional waters should commence until all necessary permits have been obtained or a finding of no jurisdiction has been obtained from applicable regulatory agencies. This wetland delineation meets the standards and criteria described in the 1987 Manual and Regional Supplement and the results represent the conditions present at the time of the field investigation.

Sincerely,

Wenck Associates, Inc.



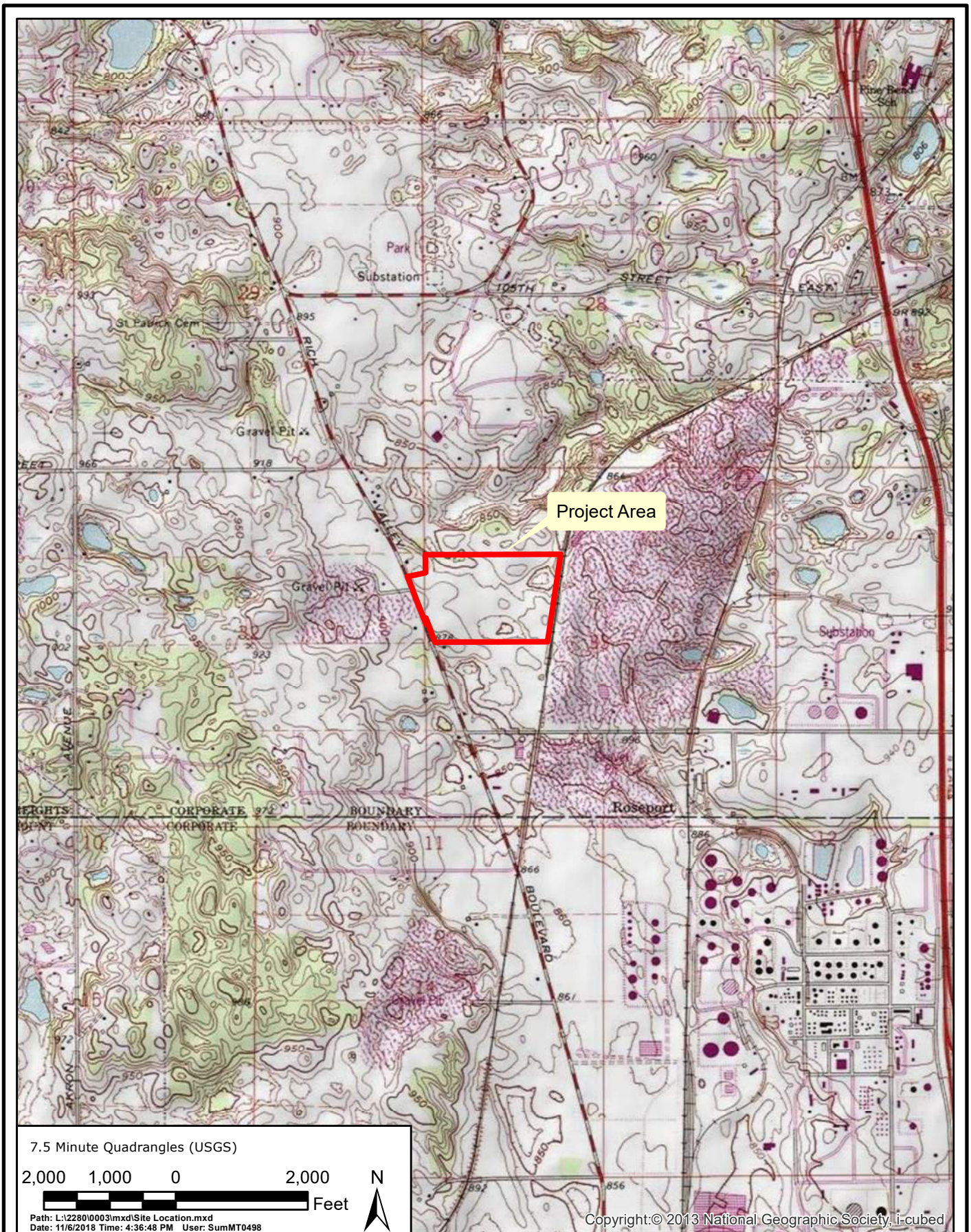
Matthew Summers, PSS #55941
Environmental Scientist

November 19, 2018

Date

Figures

1. Site Location Map
2. National Wetlands Inventory
3. MN DNR Public Waters Inventory
4. Dakota County Soil Survey
5. Delineated Wetlands
6. Delineated Wetlands Detail



PINE BEND RNG, LLC

Site Location Map



Responsive partner. Exceptional outcomes.

NOV 2018

Figure 1

Legend

 Project Area

2014 National Wetland Inventory:

 1 - Seasonally Flooded Basin or Flat



PINE BEND RNG, LLC

National Wetland Inventory



WENCK

Responsive partner. Exceptional outcomes.

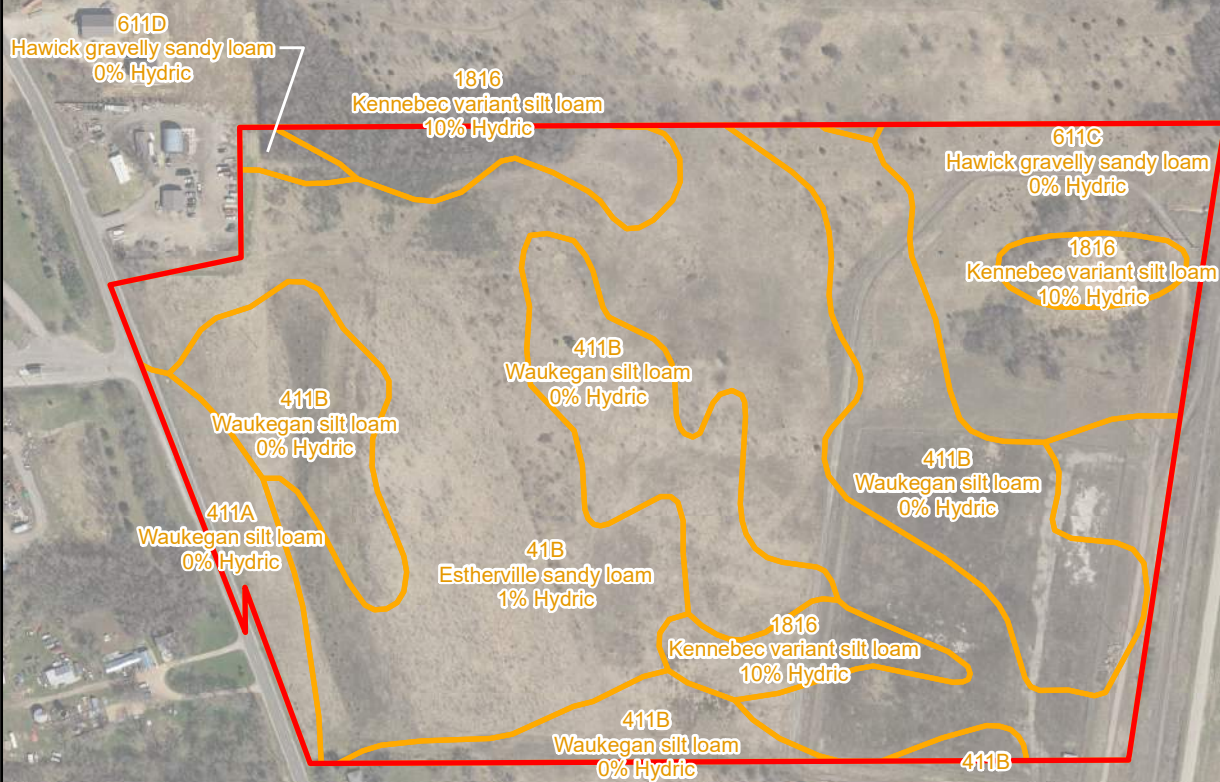
NOV 2018

Figure 2



Legend

- Project Area
- Soil Survey Map Unit



2016 Aerial Photograph (Source: MN GEO)
2018 SSURGO Dataset (Source: USDA)

400 200 0 400 Feet

Path: L:\2280\0003\mxd\Soil.mxd
Date: 11/6/2018 Time: 4:47:45 PM User: SumMT0498



PINE BEND RNG, LLC

Dakota County Soil Survey



WENCK

Responsive partner. Exceptional outcomes.

NOV 2018

Figure 4

Legend

-  Project Area
-  Sample Point
-  Delineated Wetland



PINE BEND RNG, LLC

Delineated Wetland

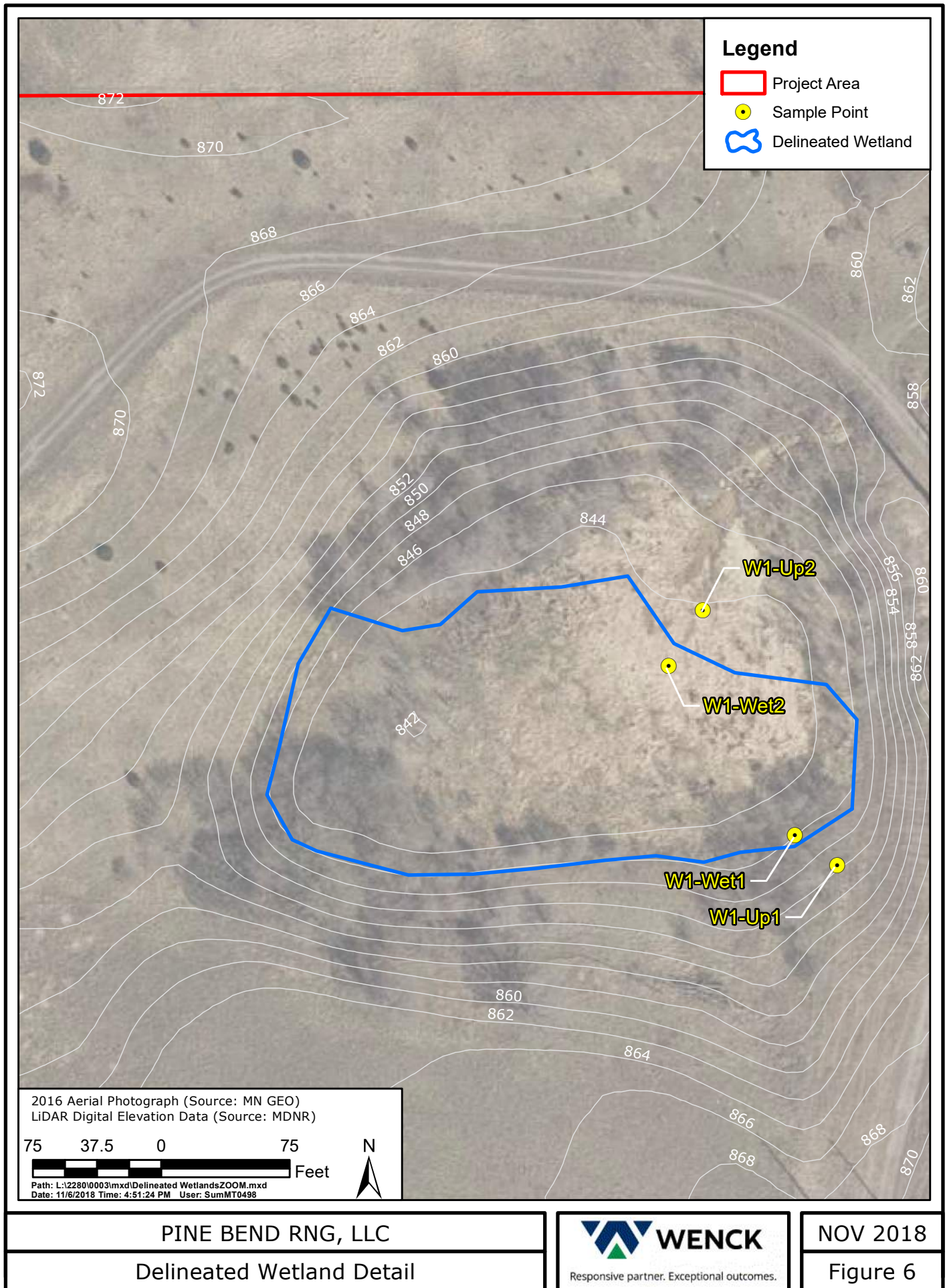


WENCK

Responsive partner. Exceptional outcomes.

NOV 2018

Figure 5



Field Data Sheets

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Pine Bend West Parcel City/County: Inver Grove Heights Sampling Date: 10/16/18
 Applicant/Owner: Republic Services Pine Bend Landfill State: MN Sampling Point: UPL 1
 Investigator(s): Matthew Summers, Wenck Associates, Inc. Section, Township, Range: S33 T27 R22
 Landform (hillside, terrace, etc.): basin Local relief (concave, convex, none): concave
 Slope (%): - Lat: 44.785690 Long: -93.061421 Datum: NAD83
 Soil Map Unit Name: 41B Estherville sandy loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks:	

VEGETATION – Use scientific names of plants.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Tree Stratum</th> <th style="text-align: left;">(Plot size: <u>30</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Sapling/Shrub Stratum</th> <th style="text-align: left;">(Plot size: <u>15</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Herb Stratum</th> <th style="text-align: left;">(Plot size: <u>5</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td><i>Poa pratensis</i></td><td style="text-align: center;">70</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FAC</td></tr> <tr><td>2.</td><td><i>Solidago canadensis</i></td><td style="text-align: center;">40</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FACU</td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr><td>6.</td><td></td><td></td><td></td><td></td></tr> <tr><td>7.</td><td></td><td></td><td></td><td></td></tr> <tr><td>8.</td><td></td><td></td><td></td><td></td></tr> <tr><td>9.</td><td></td><td></td><td></td><td></td></tr> <tr><td>10.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td style="text-align: center;">110</td> <td colspan="2" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Woody Vine Stratum</th> <th style="text-align: left;">(Plot size: <u> </u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table>	Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.					3.					4.					5.							=Total Cover			Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.					3.					4.					5.							=Total Cover			Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.	<i>Poa pratensis</i>	70	Yes	FAC	2.	<i>Solidago canadensis</i>	40	Yes	FACU	3.					4.					5.					6.					7.					8.					9.					10.							110	=Total Cover		Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.							=Total Cover			Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.0%</u> (A/B) Prevalence Index worksheet: <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>70</u></td> <td>x 3 = <u>210</u></td> </tr> <tr> <td>FACU species <u>40</u></td> <td>x 4 = <u>160</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>110</u> (A)</td> <td><u>370</u> (B)</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = <u>3.36</u></td> </tr> </table> Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u> </u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤3.0¹ <u> </u> 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation¹ (Explain) ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>70</u>	x 3 = <u>210</u>	FACU species <u>40</u>	x 4 = <u>160</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>110</u> (A)	<u>370</u> (B)	Prevalence Index = B/A = <u>3.36</u>	
Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.	<i>Poa pratensis</i>	70	Yes	FAC																																																																																																																																																																			
2.	<i>Solidago canadensis</i>	40	Yes	FACU																																																																																																																																																																			
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
6.																																																																																																																																																																							
7.																																																																																																																																																																							
8.																																																																																																																																																																							
9.																																																																																																																																																																							
10.																																																																																																																																																																							
		110	=Total Cover																																																																																																																																																																				
Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Total % Cover of:	Multiply by:																																																																																																																																																																						
OBL species <u>0</u>	x 1 = <u>0</u>																																																																																																																																																																						
FACW species <u>0</u>	x 2 = <u>0</u>																																																																																																																																																																						
FAC species <u>70</u>	x 3 = <u>210</u>																																																																																																																																																																						
FACU species <u>40</u>	x 4 = <u>160</u>																																																																																																																																																																						
UPL species <u>0</u>	x 5 = <u>0</u>																																																																																																																																																																						
Column Totals: <u>110</u> (A)	<u>370</u> (B)																																																																																																																																																																						
Prevalence Index = B/A = <u>3.36</u>																																																																																																																																																																							
Remarks: (Include photo numbers here or on a separate sheet.) No herbaceous vegetation layer present. Mudflat.																																																																																																																																																																							

SOIL

Sampling Point: UPL 1**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-14	10YR 3/2	100					Loamy/Clayey	clay loam
14-25	10YR 4/3						Loamy/Clayey	sandy clay loam

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Sandy Gleyed Matrix (S4)
☐ Histic Epipedon (A2)	☐ Sandy Redox (S5)
☐ Black Histic (A3)	☐ Stripped Matrix (S6)
☐ Hydrogen Sulfide (A4)	☐ Dark Surface (S7)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1)
☐ 2 cm Muck (A10)	☐ Loamy Gleyed Matrix (F2)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Matrix (F3)
☐ Thick Dark Surface (A12)	☐ Redox Dark Surface (F6)
☐ Sandy Mucky Mineral (S1)	☐ Depleted Dark Surface (F7)
☐ 5 cm Mucky Peat or Peat (S3)	☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

☐ Coast Prairie Redox (A16)
☐ Iron-Manganese Masses (F12)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):**Type: _____
Depth (inches): _____**Hydric Soil Present?** Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ True Aquatic Plants (B14)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Gauge or Well Data (D9)
☐ Sparsely Vegetated Concave Surface (B8)	☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
<u>X</u> Geomorphic Position (D2)
☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Water Table Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Saturation Present?	Yes _____	No <u>X</u>	Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Pine Bend West Parcel City/County: Inver Grove Heights Sampling Date: 10/16/18
 Applicant/Owner: Republic Services Pine Bend Landfill State: MN Sampling Point: W1-Up1
 Investigator(s): Matthew Summers, Wenck Associates, Inc. Section, Township, Range: S33 T27 R22
 Landform (hillside, terrace, etc.): back slope Local relief (concave, convex, none): none
 Slope (%): 15% Lat: 44.785236 Long: -93.057648 Datum: NAD83
 Soil Map Unit Name: 611C Hawick gravelly sandy loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil X, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks: 30+" of fill material present over native topsoil	

VEGETATION – Use scientific names of plants.

<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Tree Stratum</th> <th style="text-align: center;">(Plot size: <u>30</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u>Fraxinus pennsylvanica</u></td><td></td><td style="text-align: center;">10</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FACW</td></tr> <tr><td>2. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>3. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>4. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>5. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td style="text-align: center;">10</td> <td colspan="2" style="text-align: center;">=Total Cover</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sapling/Shrub Stratum</th> <th style="text-align: center;">(Plot size: <u>15</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>2. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>3. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>4. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>5. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td></td> <td colspan="2" style="text-align: center;">=Total Cover</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Herb Stratum</th> <th style="text-align: center;">(Plot size: <u>5</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u>Rubus idaeus</u></td><td></td><td style="text-align: center;">60</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FACU</td></tr> <tr><td>2. <u>Ambrosia trifida</u></td><td></td><td style="text-align: center;">30</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FAC</td></tr> <tr><td>3. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>4. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>5. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>6. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>7. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>8. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>9. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>10. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td style="text-align: center;">90</td> <td colspan="2" style="text-align: center;">=Total Cover</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Woody Vine Stratum</th> <th style="text-align: center;">(Plot size: <u> </u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr><td>2. <u> </u></td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td></td> <td colspan="2" style="text-align: center;">=Total Cover</td> </tr> </tbody> </table>	Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1. <u>Fraxinus pennsylvanica</u>		10	Yes	FACW	2. <u> </u>					3. <u> </u>					4. <u> </u>					5. <u> </u>							10	=Total Cover		Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1. <u> </u>					2. <u> </u>					3. <u> </u>					4. <u> </u>					5. <u> </u>								=Total Cover		Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1. <u>Rubus idaeus</u>		60	Yes	FACU	2. <u>Ambrosia trifida</u>		30	Yes	FAC	3. <u> </u>					4. <u> </u>					5. <u> </u>					6. <u> </u>					7. <u> </u>					8. <u> </u>					9. <u> </u>					10. <u> </u>							90	=Total Cover		Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status	1. <u> </u>					2. <u> </u>								=Total Cover		Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.7%</u> (A/B) Prevalence Index worksheet: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: center;">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>10</u></td> <td>x 2 = <u>20</u></td> </tr> <tr> <td>FAC species <u>30</u></td> <td>x 3 = <u>90</u></td> </tr> <tr> <td>FACU species <u>60</u></td> <td>x 4 = <u>240</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>350</u> (B)</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = <u>3.50</u></td> </tr> </tbody> </table> Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤3.0¹ <u> </u> 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation¹ (Explain) ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>10</u>	x 2 = <u>20</u>	FAC species <u>30</u>	x 3 = <u>90</u>	FACU species <u>60</u>	x 4 = <u>240</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>350</u> (B)	Prevalence Index = B/A = <u>3.50</u>	
Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1. <u>Fraxinus pennsylvanica</u>		10	Yes	FACW																																																																																																																																																																			
2. <u> </u>																																																																																																																																																																							
3. <u> </u>																																																																																																																																																																							
4. <u> </u>																																																																																																																																																																							
5. <u> </u>																																																																																																																																																																							
		10	=Total Cover																																																																																																																																																																				
Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1. <u> </u>																																																																																																																																																																							
2. <u> </u>																																																																																																																																																																							
3. <u> </u>																																																																																																																																																																							
4. <u> </u>																																																																																																																																																																							
5. <u> </u>																																																																																																																																																																							
			=Total Cover																																																																																																																																																																				
Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1. <u>Rubus idaeus</u>		60	Yes	FACU																																																																																																																																																																			
2. <u>Ambrosia trifida</u>		30	Yes	FAC																																																																																																																																																																			
3. <u> </u>																																																																																																																																																																							
4. <u> </u>																																																																																																																																																																							
5. <u> </u>																																																																																																																																																																							
6. <u> </u>																																																																																																																																																																							
7. <u> </u>																																																																																																																																																																							
8. <u> </u>																																																																																																																																																																							
9. <u> </u>																																																																																																																																																																							
10. <u> </u>																																																																																																																																																																							
		90	=Total Cover																																																																																																																																																																				
Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1. <u> </u>																																																																																																																																																																							
2. <u> </u>																																																																																																																																																																							
			=Total Cover																																																																																																																																																																				
Total % Cover of:	Multiply by:																																																																																																																																																																						
OBL species <u>0</u>	x 1 = <u>0</u>																																																																																																																																																																						
FACW species <u>10</u>	x 2 = <u>20</u>																																																																																																																																																																						
FAC species <u>30</u>	x 3 = <u>90</u>																																																																																																																																																																						
FACU species <u>60</u>	x 4 = <u>240</u>																																																																																																																																																																						
UPL species <u>0</u>	x 5 = <u>0</u>																																																																																																																																																																						
Column Totals: <u>100</u> (A)	<u>350</u> (B)																																																																																																																																																																						
Prevalence Index = B/A = <u>3.50</u>																																																																																																																																																																							
Remarks: (Include photo numbers here or on a separate sheet.) No herbaceous vegetation layer present. Mudflat.																																																																																																																																																																							

SOIL

Sampling Point: W1-Up1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-30	10YR 3/2	100					Loamy/Clayey	loamy fill, mixed brown colors

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Sandy Gleyed Matrix (S4)
☐ Histic Epipedon (A2)	☐ Sandy Redox (S5)
☐ Black Histic (A3)	☐ Stripped Matrix (S6)
☐ Hydrogen Sulfide (A4)	☐ Dark Surface (S7)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1)
☐ 2 cm Muck (A10)	☐ Loamy Gleyed Matrix (F2)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Matrix (F3)
☐ Thick Dark Surface (A12)	☐ Redox Dark Surface (F6)
☐ Sandy Mucky Mineral (S1)	☐ Depleted Dark Surface (F7)
☐ 5 cm Mucky Peat or Peat (S3)	☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

☐ Coast Prairie Redox (A16)
☐ Iron-Manganese Masses (F12)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):**
 Type: _____
 Depth (inches): _____
Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ True Aquatic Plants (B14)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Gauge or Well Data (D9)
☐ Sparsely Vegetated Concave Surface (B8)	☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
☐ Geomorphic Position (D2)
☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Water Table Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Saturation Present?	Yes _____	No <u>X</u>	Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Pine Bend West Parcel City/County: Inver Grove Heights Sampling Date: 10/16/18
 Applicant/Owner: Republic Services Pine Bend Landfill State: MN Sampling Point: W1-Up2
 Investigator(s): Matthew Summers, Wenck Associates, Inc. Section, Township, Range: S33 T27 R22
 Landform (hillside, terrace, etc.): foot slope Local relief (concave, convex, none): none
 Slope (%): 4 Lat: 44.785651 Long: -93.057943 Datum: NAD83
 Soil Map Unit Name: 1816 Kennebec variant silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33.3%</u> (A/B)																
1.																					
2.																					
3.																					
4.																					
5.																					
		=Total Cover			Prevalence Index worksheet: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Total % Cover of:</td> <td style="width: 50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>50</u></td> <td>x 2 = <u>100</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>20</u></td> <td>x 4 = <u>80</u></td> </tr> <tr> <td>UPL species <u>20</u></td> <td>x 5 = <u>100</u></td> </tr> <tr> <td>Column Totals: <u>90</u> (A)</td> <td><u>280</u> (B)</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = <u>3.11</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>50</u>	x 2 = <u>100</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>20</u>	x 4 = <u>80</u>	UPL species <u>20</u>	x 5 = <u>100</u>	Column Totals: <u>90</u> (A)	<u>280</u> (B)	Prevalence Index = B/A = <u>3.11</u>	
Total % Cover of:	Multiply by:																				
OBL species <u>0</u>	x 1 = <u>0</u>																				
FACW species <u>50</u>	x 2 = <u>100</u>																				
FAC species <u>0</u>	x 3 = <u>0</u>																				
FACU species <u>20</u>	x 4 = <u>80</u>																				
UPL species <u>20</u>	x 5 = <u>100</u>																				
Column Totals: <u>90</u> (A)	<u>280</u> (B)																				
Prevalence Index = B/A = <u>3.11</u>																					
		=Total Cover																			
Sapling/Shrub Stratum (Plot size: <u>15</u>)																					
1.																					
2.																					
3.																					
4.																					
5.																					
		=Total Cover																			
Herb Stratum (Plot size: <u>5</u>)																					
1.	<i>Phalaris arundinacea</i>	50	Yes	FACW	Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u> </u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤3.0 ¹ <u> </u> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2.	<i>Cirsium arvense</i>	20	Yes	FACU																	
3.	<i>Vicia cracca</i>	20	Yes	UPL																	
4.																					
5.																					
6.																					
7.																					
8.																					
9.																					
10.																					
		90 =Total Cover																			
Woody Vine Stratum (Plot size: <u> </u>)																					
1.																					
2.																					
		=Total Cover																			
Remarks: (Include photo numbers here or on a separate sheet.) No herbaceous vegetation layer present. Mudflat.																					

SOIL

Sampling Point: W1-Up2**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-19	10YR 4/3	100					Sandy	stratified lfs and fsl
19-30	10YR 3/2	100					Sandy	loamy sand
30-40	10YR 3/2	95	7.5YR 5/6	5	C	M	Loamy/Clayey	sandy loam

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Sandy Gleyed Matrix (S4)
☐ Histic Epipedon (A2)	☐ Sandy Redox (S5)
☐ Black Histic (A3)	☐ Stripped Matrix (S6)
☐ Hydrogen Sulfide (A4)	☐ Dark Surface (S7)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1)
☐ 2 cm Muck (A10)	☐ Loamy Gleyed Matrix (F2)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Matrix (F3)
☐ Thick Dark Surface (A12)	☐ Redox Dark Surface (F6)
☐ Sandy Mucky Mineral (S1)	☐ Depleted Dark Surface (F7)
☐ 5 cm Mucky Peat or Peat (S3)	☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

☐ Coast Prairie Redox (A16)
☐ Iron-Manganese Masses (F12)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):**
 Type: _____
 Depth (inches): _____
Hydric Soil Present? Yes _____ No X**Remarks:**

Top layer may be sediment delta from gully upslope of basin based on color and stratified layering. There is a lot of recent sandy alluvium leading away from the gully.

HYDROLOGY

Wetland Hydrology Indicators:Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ True Aquatic Plants (B14)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Gauge or Well Data (D9)
☐ Sparsely Vegetated Concave Surface (B8)	☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
☐ Geomorphic Position (D2)
☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Water Table Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Saturation Present?	Yes <u>X</u>	No _____	Depth (inches): <u>28</u>

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Pine Bend West Parcel City/County: Inver Grove Heights Sampling Date: 10/16/18
 Applicant/Owner: Republic Services Pine Bend Landfill State: MN Sampling Point: W1-Wet1
 Investigator(s): Matthew Summers, Wenck Associates, Inc. Section, Township, Range: S33 T27 R22
 Landform (hillside, terrace, etc.): Toe slope Local relief (concave, convex, none): concave
 Slope (%): _____ Lat: 44.785280 Long: -93.057758 Datum: NAD83
 Soil Map Unit Name: 611C Hawick gravelly sandy loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: 23" of fill material present over native topsoil	

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Fraxinus pennsylvanica</u>		<u>25</u>	<u>Yes</u>	<u>FACW</u>
2. <u>Ulmus americana</u>		<u>25</u>	<u>Yes</u>	<u>FACW</u>
3. <u>Acer negundo</u>		<u>25</u>	<u>Yes</u>	<u>FAC</u>
4. _____				
5. _____				
		<u>75</u>	=Total Cover	
Sapling/Shrub Stratum	(Plot size: <u>15</u>)			
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
			=Total Cover	
Herb Stratum	(Plot size: <u>5</u>)			
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
			=Total Cover	
Woody Vine Stratum	(Plot size: _____)			
1. _____				
2. _____				
			=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>50</u>	x 2 = <u>100</u>
FAC species <u>25</u>	x 3 = <u>75</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>75</u> (A)	<u>175</u> (B)
Prevalence Index = B/A = <u>2.33</u>	

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet.)
 No herbaceous vegetation layer present. Mudflat.

SOIL

Sampling Point: W1-Wet1**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-23	10YR 3/2	98	5YR 5/6	2	C	M	Loamy/Clayey	loamy fill
23-30	10YR 2/1	90	5YR 5/6	10	C	M	Loamy/Clayey	clay loam, original surface horizon

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Sandy Gleyed Matrix (S4)
☐ Histic Epipedon (A2)	☐ Sandy Redox (S5)
☐ Black Histic (A3)	☐ Stripped Matrix (S6)
☐ Hydrogen Sulfide (A4)	☐ Dark Surface (S7)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1)
☐ 2 cm Muck (A10)	☐ Loamy Gleyed Matrix (F2)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Matrix (F3)
☐ Thick Dark Surface (A12)	☐ Redox Dark Surface (F6)
☐ Sandy Mucky Mineral (S1)	☐ Depleted Dark Surface (F7)
☐ 5 cm Mucky Peat or Peat (S3)	☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

☐ ? Coast Prairie Redox (A16)
☐ Iron-Manganese Masses (F12)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (F22)
☒ X Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):**
 Type: _____
 Depth (inches): _____
Hydric Soil Present? Yes ☒ No ☐**Remarks:**

Soil likely meets hydric criteria based on landscape position and observed hydrology indicators

HYDROLOGY

Wetland Hydrology Indicators:Primary Indicators (minimum of one is required; check all that apply)

☒ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☒ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ True Aquatic Plants (B14)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☒ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Gauge or Well Data (D9)
☒ X Sparsely Vegetated Concave Surface (B8)	☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
☒ X Geomorphic Position (D2)
☒ X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☒	No ☐	Depth (inches): <u>3</u>
Water Table Present?	Yes ☒	No ☐	Depth (inches): <u>0</u>
Saturation Present?	Yes ☒	No ☐	Depth (inches): <u>0</u>

(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Pine Bend West Parcel City/County: Inver Grove Heights Sampling Date: 10/16/18
 Applicant/Owner: Republic Services Pine Bend Landfill State: MN Sampling Point: W1-Wet2
 Investigator(s): Matthew Summers, Wenck Associates, Inc. Section, Township, Range: S33 T27 R22
 Landform (hillside, terrace, etc.): basin Local relief (concave, convex, none): none
 Slope (%): - Lat: 44.785561 Long: -93.058024 Datum: NAD83
 Soil Map Unit Name: 1816 Kennebec variant silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks:	

VEGETATION – Use scientific names of plants.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Tree Stratum</th> <th style="text-align: center;">(Plot size: <u>30</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Sapling/Shrub Stratum</th> <th style="text-align: center;">(Plot size: <u>15</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Herb Stratum</th> <th style="text-align: center;">(Plot size: <u>5</u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td><u>Phalaris arundinacea</u></td><td style="text-align: center;">100</td><td style="text-align: center;">Yes</td><td style="text-align: center;">FACW</td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.</td><td></td><td></td><td></td><td></td></tr> <tr><td>6.</td><td></td><td></td><td></td><td></td></tr> <tr><td>7.</td><td></td><td></td><td></td><td></td></tr> <tr><td>8.</td><td></td><td></td><td></td><td></td></tr> <tr><td>9.</td><td></td><td></td><td></td><td></td></tr> <tr><td>10.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td style="text-align: center;">100</td> <td colspan="2" style="text-align: right;">=Total Cover</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Woody Vine Stratum</th> <th style="text-align: center;">(Plot size: <u> </u>)</th> <th style="text-align: center;">Absolute % Cover</th> <th style="text-align: center;">Dominant Species?</th> <th style="text-align: center;">Indicator Status</th> </tr> <tr><td>1.</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.</td><td></td><td></td><td></td><td></td></tr> <tr> <td colspan="2"></td> <td colspan="3" style="text-align: right;">=Total Cover</td> </tr> </table>	Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.					3.					4.					5.							=Total Cover			Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.					3.					4.					5.							=Total Cover			Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.	<u>Phalaris arundinacea</u>	100	Yes	FACW	2.					3.					4.					5.					6.					7.					8.					9.					10.							100	=Total Cover		Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status	1.					2.							=Total Cover			Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B) Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>100</u></td> <td>x 2 = <u>200</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>200</u> (B)</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = <u>2.00</u></td> </tr> </table> Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u>X</u> 2 - Dominance Test is >50% <u>X</u> 3 - Prevalence Index is ≤3.0¹ <u> </u> 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation¹ (Explain) ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>100</u>	x 2 = <u>200</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>200</u> (B)	Prevalence Index = B/A = <u>2.00</u>	
Tree Stratum	(Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Sapling/Shrub Stratum	(Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Herb Stratum	(Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.	<u>Phalaris arundinacea</u>	100	Yes	FACW																																																																																																																																																																			
2.																																																																																																																																																																							
3.																																																																																																																																																																							
4.																																																																																																																																																																							
5.																																																																																																																																																																							
6.																																																																																																																																																																							
7.																																																																																																																																																																							
8.																																																																																																																																																																							
9.																																																																																																																																																																							
10.																																																																																																																																																																							
		100	=Total Cover																																																																																																																																																																				
Woody Vine Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status																																																																																																																																																																			
1.																																																																																																																																																																							
2.																																																																																																																																																																							
		=Total Cover																																																																																																																																																																					
Total % Cover of:	Multiply by:																																																																																																																																																																						
OBL species <u>0</u>	x 1 = <u>0</u>																																																																																																																																																																						
FACW species <u>100</u>	x 2 = <u>200</u>																																																																																																																																																																						
FAC species <u>0</u>	x 3 = <u>0</u>																																																																																																																																																																						
FACU species <u>0</u>	x 4 = <u>0</u>																																																																																																																																																																						
UPL species <u>0</u>	x 5 = <u>0</u>																																																																																																																																																																						
Column Totals: <u>100</u> (A)	<u>200</u> (B)																																																																																																																																																																						
Prevalence Index = B/A = <u>2.00</u>																																																																																																																																																																							
Remarks: (Include photo numbers here or on a separate sheet.) No herbaceous vegetation layer present. Mudflat.																																																																																																																																																																							

SOIL

Sampling Point: W1-Wet2**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 3/2	98	5YR 5/6	2	C	M	Loamy/Clayey	coarse sandy loam, 10% gravel
6-16	10YR 4/2	90	5YR 5/6	10	C	M	Loamy/Clayey	coarse sandy loam, 10% gravel
								too wet to auger past 16"

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Sandy Gleyed Matrix (S4)
☐ Histic Epipedon (A2)	☐ Sandy Redox (S5)
☐ Black Histic (A3)	☐ Stripped Matrix (S6)
☐ Hydrogen Sulfide (A4)	☐ Dark Surface (S7)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1)
☐ 2 cm Muck (A10)	☐ Loamy Gleyed Matrix (F2)
☒ Depleted Below Dark Surface (A11)	☒ Depleted Matrix (F3)
☐ Thick Dark Surface (A12)	☐ Redox Dark Surface (F6)
☐ Sandy Mucky Mineral (S1)	☐ Depleted Dark Surface (F7)
☐ 5 cm Mucky Peat or Peat (S3)	☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

☐ ? Coast Prairie Redox (A16)
☐ Iron-Manganese Masses (F12)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):**
 Type: _____
 Depth (inches): _____
Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☒ High Water Table (A2)	☐ Aquatic Fauna (B13)
☒ Saturation (A3)	☐ True Aquatic Plants (B14)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Gauge or Well Data (D9)
☐ Sparsely Vegetated Concave Surface (B8)	☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
☒ Geomorphic Position (D2)
☒ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches): _____
Water Table Present?	Yes ☒	No ☐	Depth (inches): <u>3</u>
Saturation Present?	Yes ☒	No ☐	Depth (inches): <u>0</u>

(includes capillary fringe)

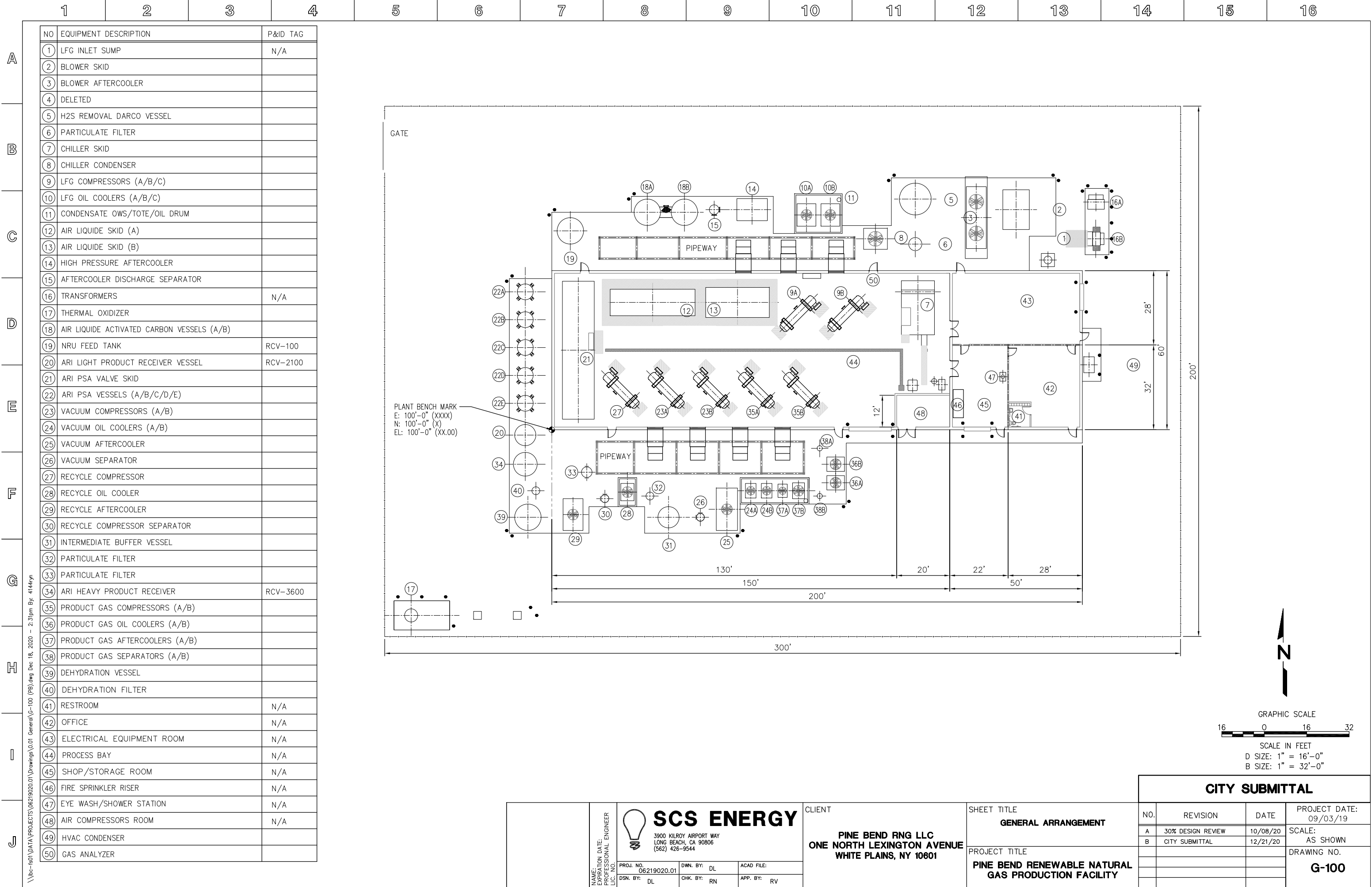
Wetland Hydrology Present? Yes ☒ No ☐

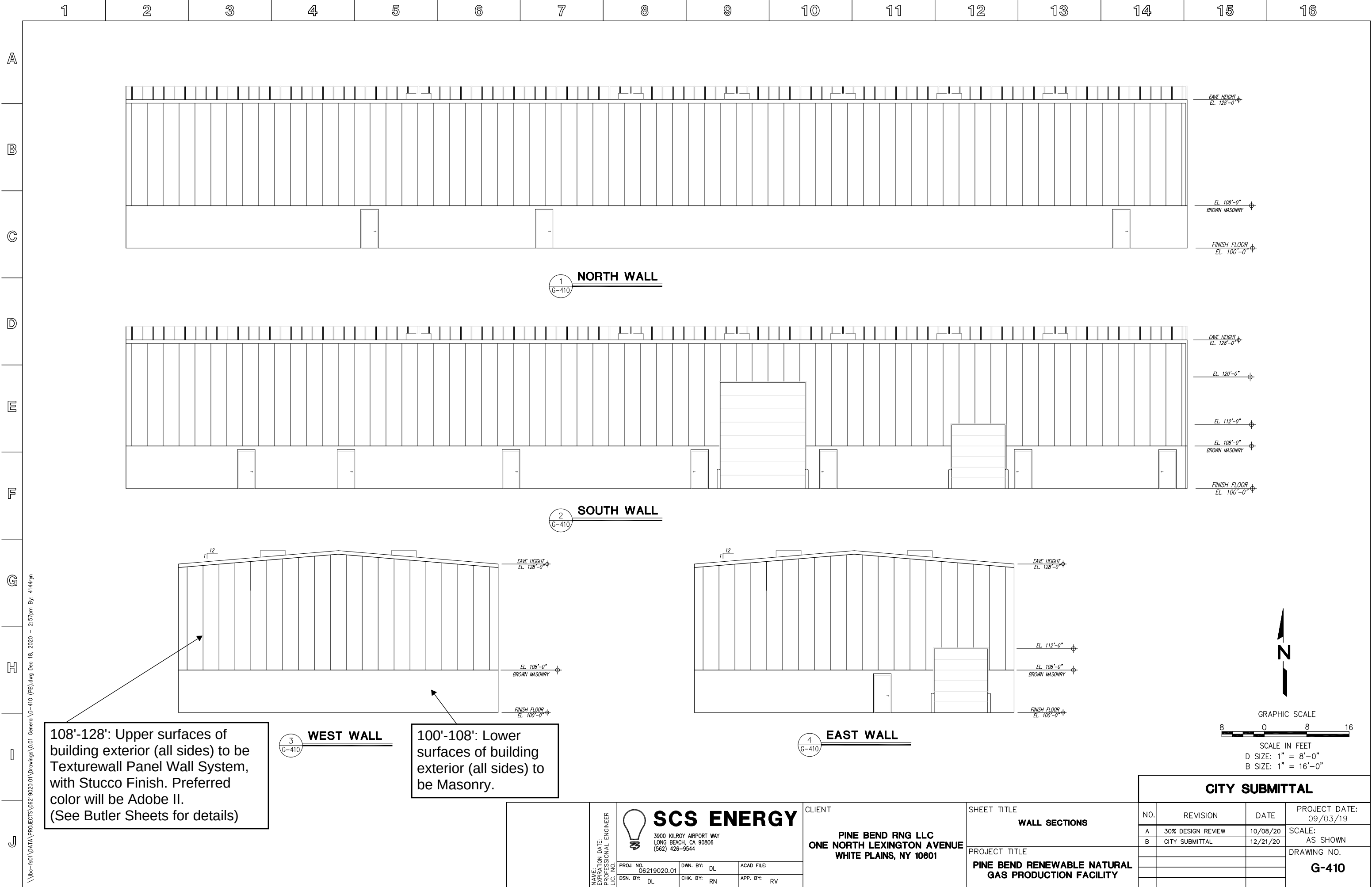
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



Responsive partner.
Exceptional outcomes.





1
G-410
NORTH WALL

2
G-410
SOUTH WALL

3
G-410
WEST WALL

4
G-410
EAST WALL

108'-128': Upper surfaces of building exterior (all sides) to be Texturewall Panel Wall System, with Stucco Finish. Preferred color will be Adobe II. (See Butler Sheets for details)

100'-108': Lower surfaces of building exterior (all sides) to be Masonry.

NAME:
EXPIRATION DATE:
PROFESSIONAL ENGINEER
LIC. NO.:



SCS ENERGY

3900 KILROY AIRPORT WAY
LONG BEACH, CA 90806
(562) 428-9544

PROJ. NO. 06219020.01	DWN. BY: DL	ACAD FILE:
DSN. BY: DL	CHK. BY: RN	APP. BY: RV

CLIENT
**PINE BEND RNG LLC
ONE NORTH LEXINGTON AVENUE
WHITE PLAINS, NY 10801**

SHEET TITLE
WALL SECTIONS

PROJECT TITLE
**PINE BEND RENEWABLE NATURAL
GAS PRODUCTION FACILITY**

CITY SUBMITTAL				
NO.	REVISION	DATE	PROJECT DATE: 09/03/19	
A	30% DESIGN REVIEW	10/08/20	SCALE: AS SHOWN	
B	CITY SUBMITTAL	12/21/20	DRAWING NO. G-410	

INFORMATION ONLY



TEXTUREWALL™ PANEL WALL SYSTEM

Add a classic stucco appearance with lasting durability and enhanced efficiency.

The classic beauty of stucco. The enhanced performance of a Butler® building system. You can add this attractive combination of benefits with the TextureWall™ panel wall system. The textured look of this system makes it particularly ideal in instances where local building ordinances require a masonry or stucco exterior.

Choose the TextureWall system to add the beauty of stucco in applications such as retail centers, churches, recreational and community facilities, and more.

CREATE CLASSIC BEAUTY

The exterior face of the TextureWall system features the Texture-Cote™ finish system—a hard aggregate-fiber-reinforced polymer finish that creates its characteristic stucco appearance. The metal interior face is finished in an attractive, virtually flat finish with a polyester white color that is USDA approved. This can act as a finished interior wall or can be used for the application of other wall materials.

CUSTOMIZE THE LOOK

The rich textured surface of the Texture-Cote finish system is available in four attractive color options. Each is designed to complement other building materials, including Butler wall and roof systems. And with its 42-inch panel width, the TextureWall system creates a stunning monolithic stucco appearance.



Aspen White II

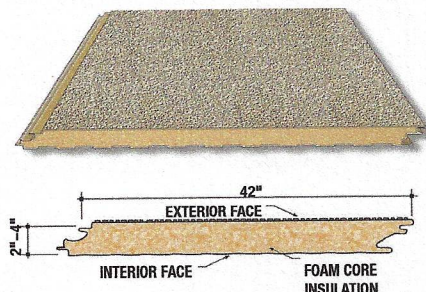
Adobe II



White II

Gray II

Note: Colors shown may vary from actual samples due to variations in the printing process. Colors and color availability subject to change without notice.



ASSURE LASTING DURABILITY

The TextureWall system's durable surface resists the effects of impact, abrasion, and harsh weather. And unlike field-applied finishes that are vulnerable to damp or cold weather during installation, TextureWall panels can be erected in virtually any weather condition.

BUILT-IN ENERGY EFFICIENCY

The TextureWall system's factory-installed foam core insulation and thermal break joint design

deliver excellent energy efficiency, with an R-value from 15 to 32 depending on panel thickness. The factory-applied joint sealant provides a complete wall system weather barrier. Panels are offered in 2- to 4-inch thicknesses.

FAST INSTALLATION

Installation of the Texture-Cote system can be performed from the exterior of the building, which saves time and money.

COMPARE OUR WARRANTY

While many field-applied systems offer a prorated 5-year warranty on the coating material only, Butler stands behind the Texture-Cote finish system with a full 10-year warranty on material and application.

TEXTUREWALL™ PANEL WALL SYSTEM

PANEL-TO-STRUCTURE ATTACHMENT

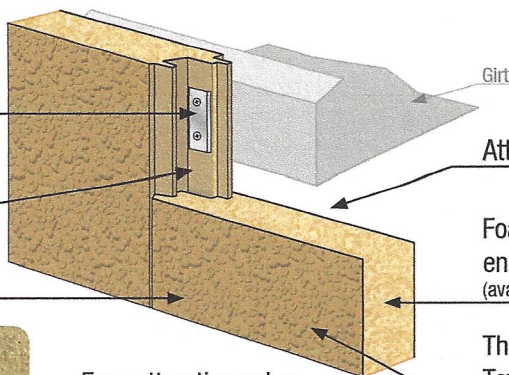
Concealed clip provides easy exterior installation and clean look

Thermal break joint to enhance energy efficiency

The classic textured look of stucco, with a 10-year finish warranty



Four attractive colors



Attractive interior surface

Foam core insulation to enhance energy efficiency (available in 2"-4" thicknesses)

The added durability of the Texture-Cote™ finish system



KEY BENEFITS

- ✓ The classic textured look of stucco satisfies many local building codes requiring masonry or stucco exteriors
- ✓ 10-year finish warranty
- ✓ Can be erected in virtually all weather conditions
- ✓ Foam core insulation and thermal break joint enhance energy efficiency
- ✓ Attractive interior metal panel provides finished look without the need for additional materials
- ✓ The added durability of the Texture-Cote™ finish system
- ✓ Four attractive colors
- ✓ Wide 42" panels create a monolithic appearance



BUTLER OFFERS YOU MORE

Butler Builders provide complete construction services with single-source responsibility

- Reputable professionals with extensive knowledge of local building codes

Maximize your building's performance with a complete Butler® system solution

- Innovative structural, wall, and roof systems
- Precision engineered for seamless integration



Butler Manufacturing
Kansas City, MO
816-968-3000

Butler Buildings Canada
Burlington, ON, Canada
905-332-7786

www.butlermfg.com



Butler® building products are constantly being improved; therefore, the information contained herein is subject to change without notice. Before finalizing project details, contact your nearest Butler Builder® or Butler Manufacturing™ for the latest information. Galvalume is a registered trademark of BIEC International, Inc. USGBC logo is a registered trademark owned by the U.S. Green Building Council and is used by permission. IAS is a subsidiary company of the International Code Council. The ENERGY STAR name and the ENERGY STAR symbol are registered trademarks of the United States Environmental Protection Agency.

© 2017 BlueScope Buildings North America, Inc. All rights reserved. Butler Manufacturing™ is a division of BlueScope Buildings North America, Inc. Find your independent Butler Builder® at www.butlerbuilder.com.

Form No. 5218 03/17

Luminaire Schedule							
Symbol	Qty	Label	Arrangement	LLF	Description	Arr. Watts	Lum. Lumens
	6	E	SINGLE	0.900	PEMCO TV2C32X10U41K-P14 PHOTOCELL MOUNT AT 10FT	20.16	2299
	10	WP	SINGLE	0.594	SPECGRADE DELA-100-40K-60-V01GR-WM905-NDIM VIA REMOTE PHOTOCELL MOUNT AT 20FT (LLF ADJUST FOR 100W)	100	14268
	4	WP1	SINGLE	0.900	RAYON T631LED-58-UNV12-T4-BZ-PC2 MOUNT AT 10FT	58.12	6122

Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	
SITE GROUND	Illuminance	Fc	1.38	30.7	0.0	N.A.	N.A.	



TYPE E



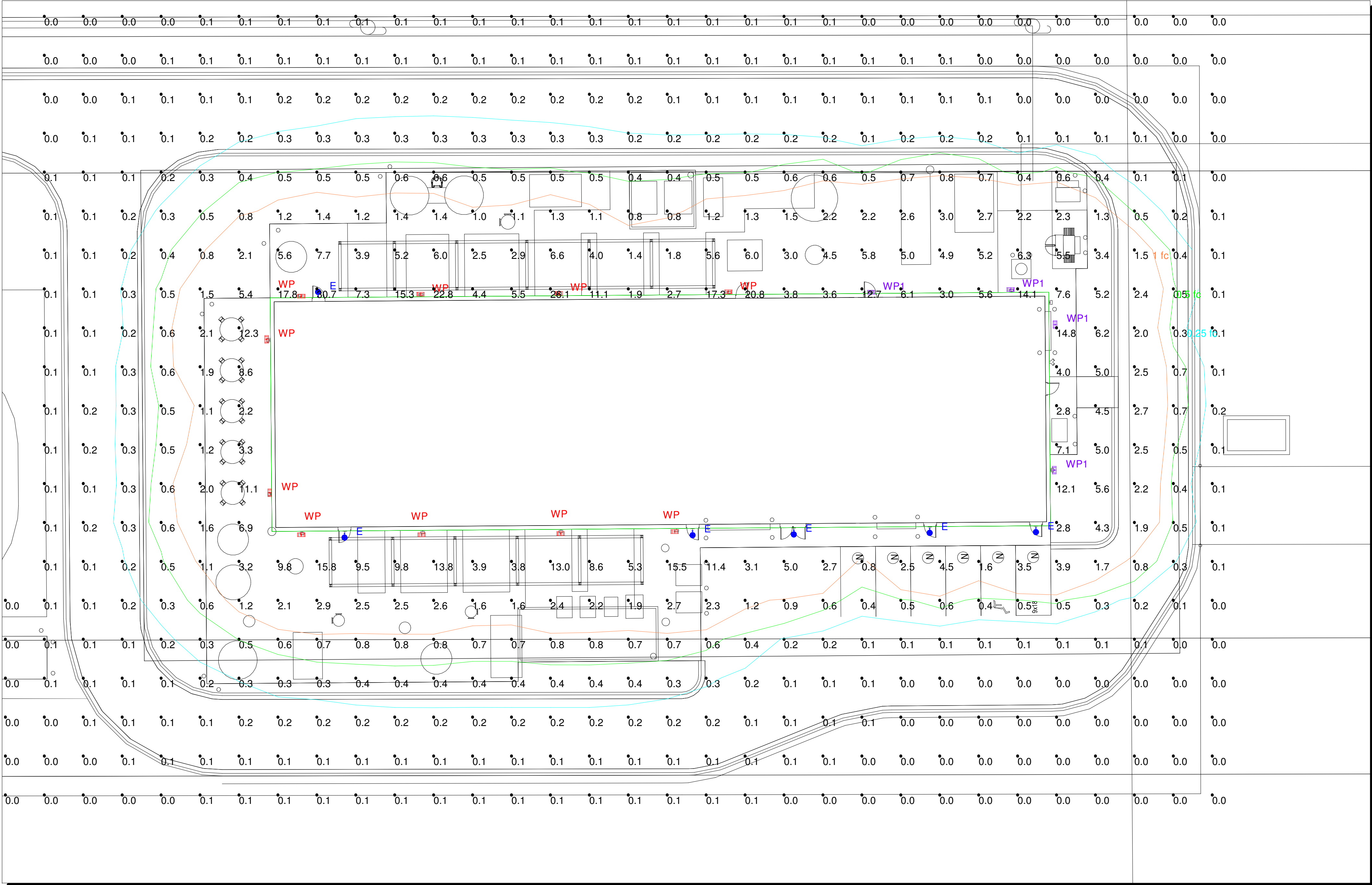
TYPE WP



TYPE WP1

GENERAL NOTES:

- A. PULSE PRODUCTS DOES NOT ASSUME RESPONSIBILITY FOR THE INTERPRETATION OF THIS CALCULATION OR COMPLAINT TO THE LOCAL, STATE, OR FEDERAL LIGHTNG CODES OR ORDINANCES.
- B. LIGHTING LAYOUT IS NOT INTENDED FOR CONSTRUCTION DOCUMENTS BUT ONLY TO ILLUSTRATE THE PERFORMANCE OF THE PRODUCT.
- C. ALL READINGS/CALCULATIONS SHOWN ARE SHOWN ON OBJECTS/SURFACES.



Plan View
Scale: 1 inch= 16 Ft.



#	Date	Comments

Revisions			

Drawn By: SANDY	RNG EXPANSION
Checked By: JILL	
Date:12/18/2020	
Scale: AS NOTED	INVER GROVE HEIGHTS, MN