



WORKING DOCUMENT: This Engineer's report is a draft or working document of RCWD staff and does not necessarily reflect action by the RCWD Board of Managers

Permit Application Number: 17-008
Permit Applicant Name: Mahtomedi Ice Arena

Applicant:

Mahtomedi Independent School District #832
Attn. Julie Osterbauer
1520 Mahtomedi Avenue
Mahtomedi, MN 55115
Ph: 651-407-2000
Fx: 651-451-9956
julie.osterbauer@isd832.net

Consultant:

Alex Rogosheske
Rinc 2 Corp.
105 Hardman Court
South St. Paul, MN 55075
Ph: 651-253-3127
Fx: 651-451-9956
Alex.rogosheske@rogo-law.com

Consultant:

David Rey
Anderson Johnson Associates
7575 Golden Valley Road Suite 200
Minneapolis, MN 55427
Ph: 763-544-7129
Fx: 763-544-0531
dave@ajainc.net

Consultant:

Tom Betti
292 Design Group
3533 E. Lake Street
Minneapolis, MN 55406
Ph:
Fx:
tbetti@292designgroup.com

Project Name: Mahtomedi Ice Arena

Purpose: FSD – Final Site Drainage; Construct arena

Site Size: 60.57± acre parcel / 4.20± acres of disturbed area; existing and proposed impervious area is 4.32± acres and 5.57± acres, respectively

Location: 8100 75th Street, Grant

T-R-S: NE ¼, Section 28, T30N, R21W

District Rule: C, D

Recommendations: CAPROC

It is recommended that this Permit Application be given Conditional Approval Pending Receipt of Changes (CAPROC) and outstanding items related to the following items.

Rule D – Erosion and Sediment Control

1. Submit the following information per Rule D.4:
 - (a) Name, address and phone number of party responsible for maintenance of all erosion and sediment control measures.
 - (b) Provide documentation that an NPDES Permit has been applied for and submitted to the Minnesota Pollution Control Agency (MPCA).
 - (c) A Storm Water Pollution Prevention Plan for projects that require an NPDES Permit.

Administrative

2. Submit the permit application with an original signature of the successful bidder to the District.
3. Send one final, signed 11x17 sized plan set to the District, and e-mail a full sized pdf copy to both the District and the District Engineer. Include a list of changes that have been made since approval by the RCWD Board.
4. Submit a copy of the plat or easements establishing drainage or flowage over stormwater management facilities, stormwater conveyances, ponds, wetlands, on-site floodplain up to the 100-year flood elevation, or any other hydrologic feature (if easements are required by the City of Grant).
5. The applicant must memorialize the responsibility for maintenance of stormwater facilities in a document executed by the property owner in a form acceptable to the District and recorded on the deed. Alternatively, a public permittee may meet the perpetual maintenance obligation by executing a programmatic or project-specific maintenance agreement with the District. A draft document should be submitted to the District for consideration prior to execution. (The agreement process requires submittal of the final original signed agreement to the District. If the applicant needs an original of the signed agreement, then two endorsed final agreements should be submitted.)
6. The applicant must submit a copy of receipt from County Recorder and signed/notarized attested easement (if required).
7. Applicant, or authorized representative of applicant, must submit a signed statement that applicant or another party reported to the MPCA and the Minnesota Department of Health: (a) the indicated subsurface contamination, and (b) the disturbance proposed for the site, as it concerns the contamination. The statement must include a copy of the notification unless it was not in writing, in which case the statement is to describe the form and circumstances of the notification. Attachments to the notification should not be submitted unless requested by the District.
8. The applicant or contractor must provide a construction schedule for the underground system (or communicate when the schedule will be provided). (see stipulation 2).

Stipulations: The permit will be issued with the following stipulations as conditions of the permit. By accepting the permit, applicant agrees to these stipulations:

1. An as-built survey of all stormwater BMPs (ponds, rain gardens, trenches, swales, etc.) is to be submitted to the District for verification of compliance with the approved plans.
2. RCWD inspector must be notified prior to installation of underground system and liner.

Exhibits:

1. Plan set containing sheets L1.1, C1.1, C1.2, C1.3, C1.4, C1.5, C2.1, and C2.2 dated 2-10-2017 and received 2-10-2017.
2. Permit application, dated 2-13-2017 and received 2-13-2017.
3. Stormwater Calculations, dated 2-10-2017 and received 2-10-2017, containing narrative, drainage maps, HydroCAD report for the 2-year, 10-year, and 100-year rainfall events for proposed and existing conditions.
4. Environmental Assessment Worksheet dated January 2017 and received 2-14-2017.
5. Geotechnical report dated 7-3-2010 and received 2-10-2017.

Findings:

1. Description – The applicant is proposing an ice hockey arena and associated sidewalks and driveway access. The project will increase the impervious area by 1.25± acres, from 4.32 ± acres to 5.57± acres within the project area. The project will disturb approximately 4.20± acres overall. The majority of the project drains to the proposed BMP and then to an existing pond which discharges to CR 12/Stillwater Road, and then to Washington Lake, the resource of concern. A small portion of the project drains to an existing BMP with discharges across CR 12/Stillwater Road to the Valley Branch Watershed District (VBWD).
2. Stormwater – The applicant is proposing the BMPs as described below for the project:

Proposed BMP Description	Location	Pretreatment:	Volume provided
Lined UGS 1	West of Ice Arena	Sump CB and isolator row	10,362± cubic feet below the outlet
Lined Porous Pavers	Southeast of Ice Arena	N.A. – TSS and rate control only	

Soils within the project area are generally clayey sand (SC) and sandy lean clay (CL) which are HSG C/D. Although there are lenses of HGS B silty sands (SM), these pockets are found to be inadequate to support infiltration. Additionally documented contamination has been reported on site. Thus filtration is acceptable to meet the water quality requirement. Per Rule C.6(c)(1), the Water Quality requirement is 2.2-inches over the new impervious area (1.25± acres) for a total requirement of 9,980± cubic feet.

The proposed project will provide water quality treatment through an underground filtration basin. The porous pavers are only considered for rate control and TSS removal only, as all areas do not have the required 1-foot of sand. The underground storage system has been designed with 1 foot of sand and 0.5 feet of rock above the draitile. The sand drainage layer above the draitile has an infiltration rate of 0.8 in/hr allowing the required drawdown within 72 hours. Adequate pretreatment and separation from the seasonal high water elevation has been provided. An impermeable liner has been placed below the draitile in the underground storage system and below the draitile in the porous pavers section.

The applicant is providing treatment to approximately 89% of the required impervious area and has provided TSS removal for the remainder of the project. The underground filtration basin complies with the design criteria of Rule C.9(c) and the project has complied with the water quality requirement of Rule C.6.

Drainage Area	2-year (cfs)		10-year (cfs)		100-year (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
West (RCWD)	11.17	10.47	42.16	40.42	158.64	157.40
East (VBWD)	1.99	1.99	3.81	3.81	8.52	8.52
Totals	13.16	12.46	45.97	44.23	167.16	165.92

The project is not located within the Flood Management Zone. The submitted information indicates that the project does not increase peak runoff rates, thus in compliance with District Rule C.7. The project satisfies the freeboard requirements of Rule C.9(g).


The applicant has identified the presence of soil contamination within the project site. On sheet C1.2 and C1.4, the applicant indicates a shaded area labeled "contaminated soils". Sheet C1.2 shows the lined porous pavers located over the shaded area, while Sheet C1.4 shows the lined

underground system outside of the shaded area. The District and its Engineer have not independently reviewed the data or information relating to contamination and have not independently evaluated the risk associated with introducing storm water into the soil matrix. Due to the documented presence of contamination, and pursuant to Rules C.6(d)(2) and C.9(a)(4), infiltration BMPs are not required. The applicant is responsible to confer with any agency with authority over site contamination and/or reuse, and otherwise to ensure that site storm water management conforms to sound design practices (including those documented in the MPCA's *Minnesota Stormwater Manual*) and all legal requirements.


An Environmental Assessment Worksheet (EAW), public review and negative declaration were completed by the applicant for this project. The District has reviewed the EAW, only items relating to District stormwater requirements, and concluded the results do not affect the administration of District rules.

3. Wetlands – There are no wetlands located within the project area.
4. Floodplain – The site is not in a regulatory floodplain.
5. Erosion Control – Proposed erosion control methods include silt fence, rock construction entrances, inlet protection, bio-log, and erosion control blanket. An NPDES permit is required for the project. The information listed under the Erosion and Sedimentation Control Recommendations needs to be submitted. Otherwise, the project complies with RCWD Rule D requirements.
6. Drainage Systems – There are no drainage systems on the property.
7. Documenting Easements and Maintenance Obligations – Applicant must execute an agreement with the RCWD for the maintenance of the stormwater facilities to ensure proper functioning.
8. Previous Permit Information – Previous permit information includes 11-001 and 16-107.

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.



Greg Bowles
MN Reg. No 41929



Katherine MacDonald
MN Reg. No 44590

DATE: 16 October 2018

TO: Joe Gustafson, P.E., PTOE, Washington County

FROM: Scott Israelson, P.E., PTOE

RE: **Additional Traffic Analysis**
Mahtomedi Ice Area
Grant, MN

Introduction

This memorandum serves to summarize additional traffic analysis underway for the proposed Ice Arena on 75th Avenue N (CSAH 12) in Grant.

Washington County provided comments on the AUAR for the proposed project. Some of those comments requested additional analysis in support of acquiring access permits from the County.

The *Mahtomedi Ice Arena Traffic Impact Study* was completed in November 2016. That document concluded that the access driveway would function acceptably under Phase I conditions.

Subsequent to that document, a traffic signal was constructed at the intersection of 75th Avenue N & Mahtomedi High School. That new traffic signal could serve as the primary access point during events, which would include diverting exiting traffic through an internal backage road to the new traffic signal. Although this would be a circuitous route from the ice arena, this may provide the best solution for operations and safety.

After discussion with County staff, there could be concerns over the long distance detour from the parking lot to the new traffic signal at the High School entrance, considering the proximity to the immediate unsignalized access.

This analysis has acquired updated traffic counts on 75th Avenue N (CSAH 12) and has updated traffic analysis to show future operations with the driveway operating as the exit point during events.

The County also requested a sensitivity analysis based on different traffic splits, or origin/destination patterns, between eastbound and westbound and how that would affect traffic operations.

Traffic Data

Turning movement counts were performed at the intersection of 75th Avenue N (CSAH 12) & the existing access on October 4, 2018 between 6 PM and 10 PM. The data is attached to this memo. It should be noted that these counts see traffic entering and exiting the driveway to use the ballfields or

soccer fields. It is not likely that these entering and exiting driveway volumes will carry over to the hockey season.

Figure 1 shows the updated existing event peak period traffic volumes - 6:30-7:30 PM (event entering) and 9-10 PM (event exiting).

Intersection Capacity Sensitivity Analysis

County staff commented during AUAR review that 80/20 trip distribution split between west/east may not properly reflect regional ice arena patrons. Since left-turn exiting traffic experiences more delay, it was requested to perform a sensitivity analysis for Phase I exiting conditions to determine if/when southbound left-turn delays become unacceptable.

Table 1 shows the east/west splits, entering and exiting traffic volumes, and expected southbound left-turn movement LOS, control delay, and 95th percentile queue. The analysis uses updated traffic volumes on 75th Avenue N (CSAH 12). It should be noted that the driveway has a left-turn lane and right-turn lane, and that the analysis used a PHF of 0.33 for the southbound approach to simulate event exiting traffic.

Distribution	SB Right Turns	SB Left Turns	Southbound LTL		
			LOS	Control Delay (s)	95th % Queue
80% west/20% east	229	57	B	11.4	23'
75% west/25% east	215	72	B	11.9	30'
70% west/30% east	200	86	B	12.5	40'
65% west/35% east	186	100	B	13.3	50'
60% west/40% east	172	114	B	14.1	63'
55% west/45% east	157	129	C	15.3	80'

Analysis shows that even with an aggressive 55/45 split west to east, exiting left-turn traffic is projected to see acceptable levels of service for Phase I conditions. This is primarily due to low traffic volumes on 75th Avenue N (CSAH 12) between 9 PM and 10 PM.

The Synchro reports are attached to this memo.

The *Mahtomedi Ice Arena Traffic Impact Study* concluded that the driveway would not function acceptably under Phase II conditions during the event exiting peak hour.

Conclusion

A sensitivity analysis using updated traffic volumes on 75th Avenue N (CSAH 12) demonstrates that traffic between 9 PM and 10 PM has enough gaps to allow event exiting traffic to function acceptably under Phase I conditions.

Expansion to the proposed ice arena as proposed under the Phase II scenario would require event control or redirecting event exiting traffic to the traffic signal at Mahtomedi High School. The County has provided the following options for Phase II exiting traffic.

- Install directional signing to encourage event exiting drivers to self-select the traffic signal at Mahtomedi High School.
- Prohibit left-turns out of the driveway with traffic cones and law enforcement, which would require eastbound vehicles to make westbound U-turns at the traffic signal.
- Physically close the gate at the driveway during the event exit peak hour, and implement directional signing to the traffic signal.

Please feel free to contact me with any questions at 612.875.2417 or by email at scott@traffic-impact.com.

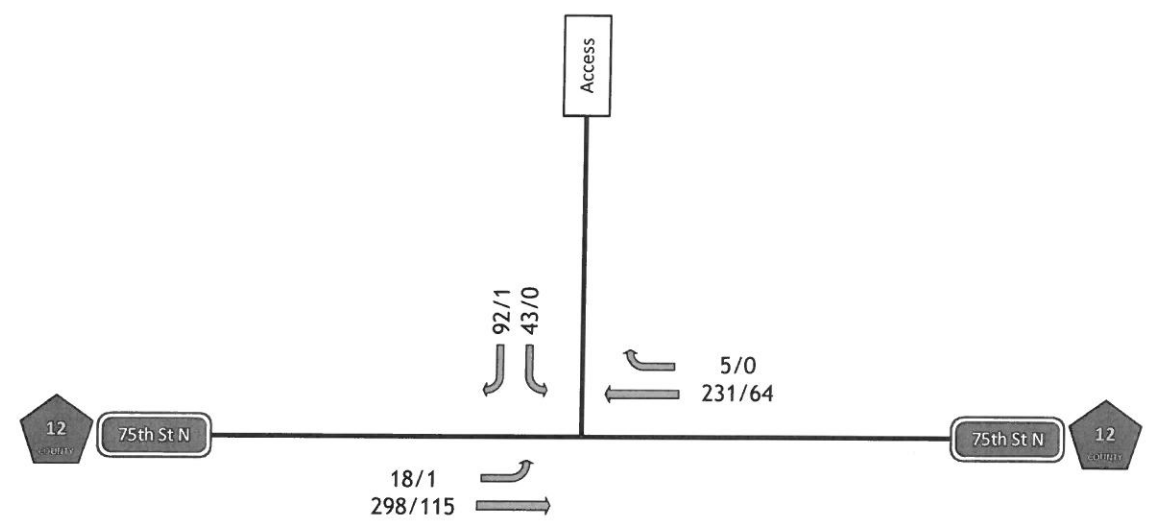
LEGEND

Turn movement

XX/XX/XX 6:30 to 7:30 PM/
XX/XX/XX 9:00 to 10:00 PM
volumes



NOT TO SCALE



Existing Traffic Volumes

Project No: 16-MN7856-1

Figure 1

Date: 16 October 2018

TRAFFIC IMPACT
GROUP, LLC

Mahtomedi Ice Arena - Grant

Intersection Turning Movement Counts

Intersection: 75th St (E-W) and Wildwood Elem/Sports Field Rd (N-S)

Start Date: 10/4/2018

Duration: 18:00-22:00

All Vehicles Full Length (18:00-22:00)																					
Start Time	North Leg (Southbound)					East Leg (Westbound)					South Leg (Northbound)					West Leg (Eastbound)					Int
	U	L	T	R	App	U	L	T	R	App	U	L	T	R	App	U	L	T	R	App	
18:00	0	5	0	7	12	0	0	47	1	48	0	0	0	0	0	0	11	99	0	110	170
18:15	0	3	0	12	15	0	0	66	5	71	0	0	0	0	0	1	3	74	0	78	164
18:30	0	7	0	25	32	0	0	71	0	71	0	0	0	0	0	0	5	72	0	77	180
18:45	0	20	0	48	68	0	0	59	1	60	0	0	0	0	0	6	11	82	0	99	227
19:00	0	11	0	13	24	0	0	59	2	61	0	0	0	0	0	0	1	82	0	83	168
19:15	0	5	0	6	11	0	0	42	2	44	0	0	0	0	0	0	1	62	0	63	118
19:30	0	5	0	2	7	0	0	40	0	40	0	0	0	0	0	0	0	53	0	53	100
19:45	0	0	0	1	1	0	0	30	0	30	0	0	0	0	0	0	0	32	0	32	63
20:00	0	0	0	0	0	0	0	23	0	23	0	0	0	0	0	0	0	35	0	35	58
20:15	0	0	0	0	0	0	0	27	0	27	0	0	0	0	0	0	0	44	0	44	71
20:30	0	0	0	0	0	0	0	23	0	23	0	0	0	0	0	0	0	41	0	41	64
20:45	0	0	0	0	0	0	0	19	0	19	0	0	0	0	0	0	1	70	0	71	90
21:00	0	0	0	0	0	0	0	24	0	24	0	0	0	0	0	0	1	37	0	38	62
21:15	0	0	0	0	0	0	0	12	0	12	0	0	0	0	0	0	0	31	0	31	43
21:30	0	0	0	1	1	0	0	15	0	15	0	0	0	0	0	0	0	24	0	24	40
21:45	0	0	0	0	0	0	0	13	0	13	0	0	0	0	0	0	0	23	0	23	38
Total	0	56	0	115	171	0	0	570	11	581	0	0	0	0	0	7	34	861	0	902	1654
% Approach	0.0%	32.7%	0.0%	67.3%	1	0.0%	0.0%	98.1%	1.9%	1	-	-	-	-	0	0.8%	3.8%	95.5%	0.0%	1	-
% Total	0.0%	3.4%	0.0%	7.0%	10.3%	0.0%	0.0%	34.5%	0.7%	35.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	2.1%	52.1%	0.0%	54.5%	-

R: Right, T: Thru, L: Left, U: U-Turn, App: Approach Total, Int: Intersection Total

Intersection

Int Delay, s/veh 10.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↑	↗	↘	↗
Traffic Vol, veh/h	1	115	64	2	129	157
Future Vol, veh/h	1	115	64	2	129	157
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	391	476

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	93	0	0 252 92
Stage 1	-	-	- 90 -
Stage 2	-	-	- 162 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1514	-	- 741 971
Stage 1	-	-	- 939 -
Stage 2	-	-	- 872 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	- 737 968
Mov Cap-2 Maneuver	-	-	- 737 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 870 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.53	0.491
HCM Control Delay (s)	7.4	-	-	-	15.3	12.3
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	3.2	2.8

Intersection						
Int Delay, s/veh	10.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Traffic Vol, veh/h	1	115	64	2	114	172
Future Vol, veh/h	1	115	64	2	114	172
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	345	521

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	93	0	0 252 92
Stage 1	-	-	- 90 -
Stage 2	-	-	- 162 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1514	-	- 741 971
Stage 1	-	-	- 939 -
Stage 2	-	-	- 872 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	- 737 968
Mov Cap-2 Maneuver	-	-	- 737 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 870 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.469	0.538
HCM Control Delay (s)	7.4	-	-	-	14.1	13
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	2.5	3.3

Intersection

Int Delay, s/veh 10.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↑	↗	↘	↗
Traffic Vol, veh/h	1	115	64	2	100	186
Future Vol, veh/h	1	115	64	2	100	186
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	303	564

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	93	0	252
Stage 1	-	-	90
Stage 2	-	-	162
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1514	-	741
Stage 1	-	-	939
Stage 2	-	-	872
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	737
Mov Cap-2 Maneuver	-	-	737
Stage 1	-	-	936
Stage 2	-	-	870

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.411	0.582
HCM Control Delay (s)	7.4	-	-	-	13.3	13.8
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	2	3.9

Intersection

Int Delay, s/veh 10.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Traffic Vol, veh/h	1	115	64	2	86	200
Future Vol, veh/h	1	115	64	2	86	200
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	261	606

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	93	0	0 252 92
Stage 1	-	-	- 90 -
Stage 2	-	-	- 162 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1514	-	- 741 971
Stage 1	-	-	- 939 -
Stage 2	-	-	- 872 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	- 737 968
Mov Cap-2 Maneuver	-	-	- 737 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 870 -

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	14
HCM LOS			B

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.354	0.626
HCM Control Delay (s)	7.4	-	-	-	12.5	14.7
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	1.6	4.6

Intersection						
Int Delay, s/veh	11.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Traffic Vol, veh/h	1	115	64	2	72	215
Future Vol, veh/h	1	115	64	2	72	215
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	218	652

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	93	0	0 252 92
Stage 1	-	-	- 90 -
Stage 2	-	-	- 162 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1514	-	- 741 971
Stage 1	-	-	- 939 -
Stage 2	-	-	- 872 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	- 737 968
Mov Cap-2 Maneuver	-	-	- 737 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 870 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.296	0.673
HCM Control Delay (s)	7.4	-	-	-	11.9	16
HCM Lane LOS	A	-	-	-	B	C
HCM 95th %tile Q(veh)	0	-	-	-	1.2	5.4

Intersection						
Int Delay, s/veh	12.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Traffic Vol, veh/h	1	115	64	2	58	231
Future Vol, veh/h	1	115	64	2	58	231
Conflicting Peds, #/hr	2	0	0	2	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	400	-	-	400	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	33	33
Heavy Vehicles, %	0	0	4	0	0	0
Mvmt Flow	1	158	88	3	176	700

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	93	0	0 252 92
Stage 1	-	-	- 90 -
Stage 2	-	-	- 162 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1514	-	- 741 971
Stage 1	-	-	- 939 -
Stage 2	-	-	- 872 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1511	-	- 737 968
Mov Cap-2 Maneuver	-	-	- 737 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 870 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	16.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1511	-	-	-	737	968
HCM Lane V/C Ratio	0.001	-	-	-	0.238	0.723
HCM Control Delay (s)	7.4	-	-	-	11.4	17.8
HCM Lane LOS	A	-	-	-	B	C
HCM 95th %tile Q(veh)	0	-	-	-	0.9	6.6



Landmark Environmental, LLC
2042 West 98th Street
Bloomington, MN 55431
Phone: 952-666-2444

www.landmarkenv.com

November 12, 2018

Brad Reifsteck
City Engineer for the City of Grant
701 Xenia Ave. S., Suite 300
Minneapolis, MN 55416

Re: **Wildwood Surface Water Sampling Report**
Bellaire Transfer Station #2, 8678 75th Street North, Grant
MPCA Project Number VP16951

Dear Mr. Reifsteck:

On behalf of the Mahtomedi School District (the School District), Landmark Environmental, LLC (Landmark) has prepared this letter report to document the surface water sampling event conducted at the above referenced property (Property). Semiannual surface water sampling is a requirement of the Amended Conditional Use Permit (Amended CUP) which amends the Conditional Use Permit dated August 16, 2006. The Amended CUP states "The Applicant shall be required to submit bi-annual water quality reports for review by the City Engineer. Water quality shall meet stormwater management levels."

Landmark conducted a site visit on October 18, 2018, and collected surface water samples at Stormwater Treatment Area's A and B, Infiltration Area E1, and Wetland D as shown in **Figure 1**. A photo log of the sampling event is provided in **Attachment 1**.

The samples were analyzed for volatile organic compounds (VOCs) and filtered Resource Conservation and Recovery Act (RCRA) metals and compared to the applicable Class 2D Surface Water Chronic, Maximum, and Final Acute Value Standards as shown in **Table 1**. For comparison purposes, the Minnesota Department of Health Health Risk Limits (HRLs) are also provided in **Table 1**. VOCs were not detected at Stormwater Treatment Area A or B, Infiltration Area E1, and Wetland D. No RCRA metals were detected at any of the four sample locations except for background concentrations of barium in Infiltration Area E1 (23.5 ug/L), and Wetland D (210.0 ug/L), which is well below the MPCA health risk limit (HRL) of 2,000 ug/L. Barium occurs naturally in almost all (99.4%) surface waters (*Drinking Water and Health*, June 1978, National Research Council (U.S.) and Safe Drinking Water Committee). **Table 1** also includes historical surface water sampling results for all four sample locations. The laboratory analytical report is included in **Attachment 2**.

As requested by Julie Osterbauer from the School District, future semi-annual surface water sampling reports will be submitted to you by May 1 and October 1 of each year.



Mr. Brad Reifsteck
Page 2 of 2
November 12, 2018

If you have any questions or comments, please contact me at jskramstad@landmarkenv.com or (952) 666-2417.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jason D. Skramstad".

Jason D. Skramstad, P.E.

cc: Julie Osterbauer, Mahtomedi School District

Enclosures:

Figure 1 – Surface Water Sampling Locations

Table 1 – Surface Water Analytical Results

Attachment 1 – Photo Log

Attachment 2 – Laboratory Analytical Report

Figures

Tables

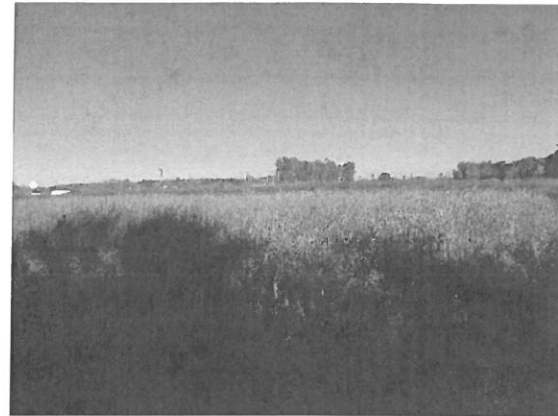
Attachments

Attachment 1
Photo Log

Surface Water Sampling Photo Log
October 18, 2018
Wildwood Elementary School
Mahtomedi, MN



View of measuring for methane and LEL at the V-5 riser pipe for the passive venting system.



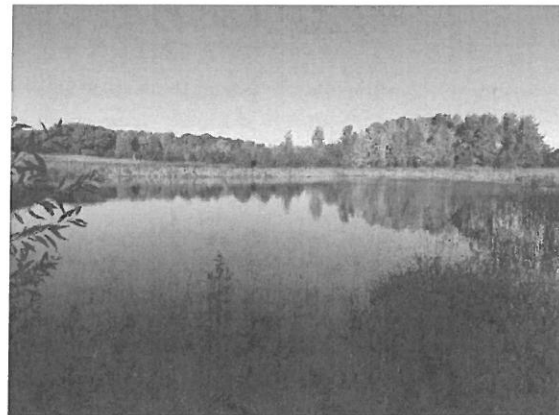
View looking NNW at Infiltration Area E1.



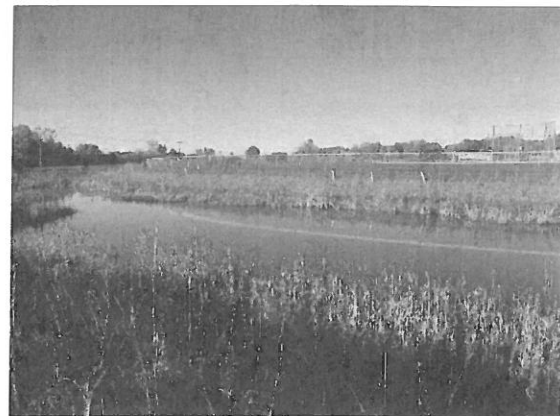
View looking west from the rooftop. Venting system wind turbine located in center of photo.



View of water present at Infiltration Area E1.



View looking NW at surface water Area B.



View looking SW at surface water Area A.

Attachment 2
Laboratory Analytical Report



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

October 26, 2018

Aaron Kuck
Landmark Environmental
2042 W 98th St.
Bloomington, MN 55431

RE: Project: MAH
Pace Project No.: 10452278

Dear Aaron Kuck:

Enclosed are the analytical results for sample(s) received by the laboratory on October 18, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Annika Asp
annika.asp@pacelabs.com
(612)607-1700
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: MAH
Pace Project No.: 10452278

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909

Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certification #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #: 74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia DEP Certification #: 382
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: MAH
Pace Project No.: 10452278

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10452278001	Area B	Water	10/18/18 09:00	10/18/18 12:11
10452278002	Wetland D	Water	10/18/18 09:20	10/18/18 12:11
10452278003	Area E1	Water	10/18/18 09:40	10/18/18 12:11
10452278004	Area A	Water	10/18/18 10:00	10/18/18 12:11
10452278005	HCl Trip Blank	Water	10/18/18 00:00	10/18/18 12:11

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: MAH
Pace Project No.: 10452278

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10452278001	Area B	EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8260B	DS2	70	PASI-M
10452278002	Wetland D	EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8260B	DS2	70	PASI-M
10452278003	Area E1	EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8260B	DS2	70	PASI-M
10452278004	Area A	EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8260B	DS2	70	PASI-M
10452278005	HCl Trip Blank	EPA 6010D	IP	7	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 8260B	DS2	70	PASI-M

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: MAH
Pace Project No.: 10452278

Method: EPA 6010D
Description: 6010D MET ICP, Lab Filtered
Client: Landmark Environmental
Date: October 26, 2018

General Information:

4 samples were analyzed for EPA 6010D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of-custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: MAH
Pace Project No.: 10452278

Method: EPA 7470A
Description: 7470A Mercury, Lab Filtered
Client: Landmark Environmental
Date: October 26, 2018

General Information:

4 samples were analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of-custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: MAH
Pace Project No.: 10452278

Method: EPA 8260B
Description: 8260B VOC
Client: Landmark Environmental
Date: October 26, 2018

General Information:

5 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of-custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 571409

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10452340009

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 3100182)
- Hexachloro-1,3-butadiene

Additional Comments:

Analyte Comments:

QC Batch: 571409

N2: The lab does not hold NELAC/TNI accreditation for this parameter.

- Area A (Lab ID: 10452278004)
 - Dichlorofluoromethane
- Area B (Lab ID: 10452278001)
 - Dichlorofluoromethane

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: MAH
Pace Project No.: 10452278

Method: EPA 8260B
Description: 8260B VOC
Client: Landmark Environmental
Date: October 26, 2018

Analyte Comments:

QC Batch: 571409

N2: The lab does not hold NELAC/TNI accreditation for this parameter.

- Area E1 (Lab ID: 10452278003)
 - Dichlorofluoromethane
- BLANK (Lab ID: 3100180)
 - Dichlorofluoromethane
- HCl Trip Blank (Lab ID: 10452278005)
 - Dichlorofluoromethane
- LCS (Lab ID: 3100181)
 - Dichlorofluoromethane
- MS (Lab ID: 3100182)
 - Dichlorofluoromethane
- MSD (Lab ID: 3100183)
 - Dichlorofluoromethane
- Wetland D (Lab ID: 10452278002)
 - Dichlorofluoromethane

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area B Lab ID: 10452278001 Collected: 10/18/18 09:00 Received: 10/18/18 12:11 Matrix: Water									
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP, Lab Filtered Analytical Method: EPA 6010D Preparation Method: EPA 3010									
Arsenic, Dissolved	<20.0	ug/L	20.0	3.8	1	10/22/18 11:06	10/23/18 13:01	7440-38-2	
Barium, Dissolved	<10.0	ug/L	10.0	0.18	1	10/22/18 11:06	10/23/18 13:01	7440-39-3	
Cadmium, Dissolved	<3.0	ug/L	3.0	0.26	1	10/22/18 11:06	10/23/18 13:01	7440-43-9	
Chromium, Dissolved	<10.0	ug/L	10.0	0.49	1	10/22/18 11:06	10/23/18 13:01	7440-47-3	
Lead, Dissolved	<10.0	ug/L	10.0	2.0	1	10/22/18 11:06	10/23/18 13:01	7439-92-1	
Selenium, Dissolved	<20.0	ug/L	20.0	5.8	1	10/22/18 11:06	10/23/18 13:01	7782-49-2	
Silver, Dissolved	<10.0	ug/L	10.0	0.38	1	10/22/18 11:06	10/23/18 13:01	7440-22-4	
7470A Mercury, Lab Filtered Analytical Method: EPA 7470A Preparation Method: EPA 7470A									
Mercury, Dissolved	<0.20	ug/L	0.20	0.078	1	10/22/18 11:35	10/23/18 17:54	7439-97-6	
8260B VOC Analytical Method: EPA 8260B									
Acetone	<20.0	ug/L	20.0	9.2	1		10/25/18 19:58	67-64-1	
Allyl chloride	<4.0	ug/L	4.0	0.29	1		10/25/18 19:58	107-05-1	
Benzene	<1.0	ug/L	1.0	0.10	1		10/25/18 19:58	71-43-2	
Bromobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 19:58	108-86-1	
Bromochloromethane	<1.0	ug/L	1.0	0.27	1		10/25/18 19:58	74-97-5	
Bromodichloromethane	<1.0	ug/L	1.0	0.22	1		10/25/18 19:58	75-27-4	
Bromoform	<4.0	ug/L	4.0	0.80	1		10/25/18 19:58	75-25-2	
Bromomethane	<4.0	ug/L	4.0	1.8	1		10/25/18 19:58	74-83-9	
2-Butanone (MEK)	<5.0	ug/L	5.0	0.99	1		10/25/18 19:58	78-93-3	
n-Butylbenzene	<4.0	ug/L	4.0	0.24	1		10/25/18 19:58	104-51-8	
sec-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:58	135-98-8	
tert-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:58	98-06-6	
Carbon tetrachloride	<1.0	ug/L	1.0	0.19	1		10/25/18 19:58	56-23-5	
Chlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:58	108-90-7	
Chloroethane	<1.0	ug/L	1.0	0.49	1		10/25/18 19:58	75-00-3	
Chloroform	<1.0	ug/L	1.0	0.45	1		10/25/18 19:58	67-66-3	
Chloromethane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:58	74-87-3	
2-Chlorotoluene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:58	95-49-8	
4-Chlorotoluene	<1.0	ug/L	1.0	0.13	1		10/25/18 19:58	106-43-4	
1,2-Dibromo-3-chloropropane	<4.0	ug/L	4.0	1.7	1		10/25/18 19:58	96-12-8	
Dibromochloromethane	<4.0	ug/L	4.0	0.12	1		10/25/18 19:58	124-48-1	
1,2-Dibromoethane (EDB)	<1.0	ug/L	1.0	0.24	1		10/25/18 19:58	106-93-4	
Dibromomethane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:58	74-95-3	
1,2-Dichlorobenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 19:58	95-50-1	
1,3-Dichlorobenzene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:58	541-73-1	
1,4-Dichlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:58	106-46-7	
Dichlorodifluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 19:58	75-71-8	
1,1-Dichloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 19:58	75-34-3	
1,2-Dichloroethane	<1.0	ug/L	1.0	0.22	1		10/25/18 19:58	107-06-2	
1,1-Dichloroethene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:58	75-35-4	
cis-1,2-Dichloroethene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:58	156-59-2	
trans-1,2-Dichloroethene	<4.0	ug/L	4.0	0.12	1		10/25/18 19:58	156-60-5	
Dichlorofluoromethane	<1.0	ug/L	1.0	0.14	1		10/25/18 19:58	75-43-4	N2
1,2-Dichloropropane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:58	78-87-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area B Lab ID: 10452278001 Collected: 10/18/18 09:00 Received: 10/18/18 12:11 Matrix: Water									
Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
8260B VOC Analytical Method: EPA 8260B									
1,3-Dichloropropane	<1.0	ug/L	1.0	0.070	1		10/25/18 19:58	142-28-9	
2,2-Dichloropropane	<4.0	ug/L	4.0	0.17	1		10/25/18 19:58	594-20-7	
1,1-Dichloropropene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:58	563-58-6	
cis-1,3-Dichloropropene	<4.0	ug/L	4.0	0.20	1		10/25/18 19:58	10061-01-5	
trans-1,3-Dichloropropene	<4.0	ug/L	4.0	0.18	1		10/25/18 19:58	10061-02-6	
Diethyl ether (Ethyl ether)	<4.0	ug/L	4.0	0.095	1		10/25/18 19:58	60-29-7	
Ethylbenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 19:58	100-41-4	
Hexachloro-1,3-butadiene	<1.0	ug/L	1.0	0.31	1		10/25/18 19:58	87-68-3	
Isopropylbenzene (Cumene)	<1.0	ug/L	1.0	0.18	1		10/25/18 19:58	98-82-8	
p-Isopropyltoluene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:58	99-87-6	
Methylene Chloride	<4.0	ug/L	4.0	0.98	1		10/25/18 19:58	75-09-2	
4-Methyl-2-pentanone (MIBK)	<5.0	ug/L	5.0	0.42	1		10/25/18 19:58	108-10-1	
Methyl-tert-butyl ether	<1.0	ug/L	1.0	0.16	1		10/25/18 19:58	1634-04-4	
Naphthalene	<4.0	ug/L	4.0	0.48	1		10/25/18 19:58	91-20-3	
n-Propylbenzene	<1.0	ug/L	1.0	0.10	1		10/25/18 19:58	103-65-1	
Styrene	<1.0	ug/L	1.0	0.19	1		10/25/18 19:58	100-42-5	
1,1,1,2-Tetrachloroethane	<1.0	ug/L	1.0	0.20	1		10/25/18 19:58	630-20-6	
1,1,2,2-Tetrachloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 19:58	79-34-5	
Tetrachloroethene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:58	127-18-4	
Tetrahydrofuran	<10.0	ug/L	10.0	2.2	1		10/25/18 19:58	109-99-9	
Toluene	<1.0	ug/L	1.0	0.083	1		10/25/18 19:58	108-88-3	
1,2,3-Trichlorobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 19:58	87-61-6	
1,2,4-Trichlorobenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:58	120-82-1	
1,1,1-Trichloroethane	<1.0	ug/L	1.0	0.14	1		10/25/18 19:58	71-55-6	
1,1,2-Trichloroethane	<1.0	ug/L	1.0	0.18	1		10/25/18 19:58	79-00-5	
Trichloroethene	<0.40	ug/L	0.40	0.15	1		10/25/18 19:58	79-01-6	
Trichlorofluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 19:58	75-69-4	
1,2,3-Trichloropropane	<4.0	ug/L	4.0	0.26	1		10/25/18 19:58	96-18-4	
1,1,2-Trichlorotrifluoroethane	<4.0	ug/L	4.0	0.22	1		10/25/18 19:58	76-13-1	
1,2,4-Trimethylbenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:58	95-63-6	
1,3,5-Trimethylbenzene	<1.0	ug/L	1.0	0.12	1		10/25/18 19:58	108-67-8	
Vinyl chloride	<0.20	ug/L	0.20	0.092	1		10/25/18 19:58	75-01-4	
Xylene (Total)	<3.0	ug/L	3.0	0.31	1		10/25/18 19:58	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	101	%	75-125		1		10/25/18 19:58	17060-07-0	
Toluene-d8 (S)	97	%	75-125		1		10/25/18 19:58	2037-26-5	
4-Bromofluorobenzene (S)	103	%	75-125		1		10/25/18 19:58	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Wetland D Lab ID: 10452278002 Collected: 10/18/18 09:20 Received: 10/18/18 12:11 Matrix: Water									
Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010D MET ICP, Lab Filtered Analytical Method: EPA 6010D Preparation Method: EPA 3010									
Arsenic, Dissolved	<20.0	ug/L	20.0	3.8	1	10/22/18 11:06	10/23/18 13:04	7440-38-2	
Barium, Dissolved	210	ug/L	10.0	0.18	1	10/22/18 11:06	10/23/18 13:04	7440-39-3	
Cadmium, Dissolved	<3.0	ug/L	3.0	0.26	1	10/22/18 11:06	10/23/18 13:04	7440-43-9	
Chromium, Dissolved	<10.0	ug/L	10.0	0.49	1	10/22/18 11:06	10/23/18 13:04	7440-47-3	
Lead, Dissolved	<10.0	ug/L	10.0	2.0	1	10/22/18 11:06	10/23/18 13:04	7439-92-1	
Selenium, Dissolved	<20.0	ug/L	20.0	5.8	1	10/22/18 11:06	10/23/18 13:04	7782-49-2	
Silver, Dissolved	<10.0	ug/L	10.0	0.38	1	10/22/18 11:06	10/23/18 13:04	7440-22-4	
7470A Mercury, Lab Filtered Analytical Method: EPA 7470A Preparation Method: EPA 7470A									
Mercury, Dissolved	<0.20	ug/L	0.20	0.078	1	10/22/18 11:35	10/23/18 17:56	7439-97-6	
8260B VOC Analytical Method: EPA 8260B									
Acetone	<20.0	ug/L	20.0	9.2	1		10/25/18 20:14	67-64-1	
Allyl chloride	<4.0	ug/L	4.0	0.29	1		10/25/18 20:14	107-05-1	
Benzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:14	71-43-2	
Bromobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:14	108-86-1	
Bromochloromethane	<1.0	ug/L	1.0	0.27	1		10/25/18 20:14	74-97-5	
Bromodichloromethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:14	75-27-4	
Bromoform	<4.0	ug/L	4.0	0.80	1		10/25/18 20:14	75-25-2	
Bromomethane	<4.0	ug/L	4.0	1.8	1		10/25/18 20:14	74-83-9	
2-Butanone (MEK)	<5.0	ug/L	5.0	0.99	1		10/25/18 20:14	78-93-3	
n-Butylbenzene	<4.0	ug/L	4.0	0.24	1		10/25/18 20:14	104-51-8	
sec-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:14	135-98-8	
tert-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:14	98-06-6	
Carbon tetrachloride	<1.0	ug/L	1.0	0.19	1		10/25/18 20:14	56-23-5	
Chlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:14	108-90-7	
Chloroethane	<1.0	ug/L	1.0	0.49	1		10/25/18 20:14	75-00-3	
Chloroform	<1.0	ug/L	1.0	0.45	1		10/25/18 20:14	67-66-3	
Chloromethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:14	74-87-3	
2-Chlorotoluene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:14	95-49-8	
4-Chlorotoluene	<1.0	ug/L	1.0	0.13	1		10/25/18 20:14	106-43-4	
1,2-Dibromo-3-chloropropane	<4.0	ug/L	4.0	1.7	1		10/25/18 20:14	96-12-8	
Dibromochloromethane	<4.0	ug/L	4.0	0.12	1		10/25/18 20:14	124-48-1	
1,2-Dibromoethane (EDB)	<1.0	ug/L	1.0	0.24	1		10/25/18 20:14	106-93-4	
Dibromomethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:14	74-95-3	
1,2-Dichlorobenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:14	95-50-1	
1,3-Dichlorobenzene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:14	541-73-1	
1,4-Dichlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:14	106-46-7	
Dichlorodifluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:14	75-71-8	
1,1-Dichloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:14	75-34-3	
1,2-Dichloroethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:14	107-06-2	
1,1-Dichloroethene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:14	75-35-4	
cis-1,2-Dichloroethene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:14	156-59-2	
trans-1,2-Dichloroethene	<4.0	ug/L	4.0	0.12	1		10/25/18 20:14	156-60-5	
Dichlorofluoromethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:14	75-43-4	N2
1,2-Dichloropropane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:14	78-87-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Wetland D Lab ID: 10452278002 Collected: 10/18/18 09:20 Received: 10/18/18 12:11 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC									
Analytical Method: EPA 8260B									
1,3-Dichloropropane	<1.0	ug/L	1.0	0.070	1		10/25/18 20:14	142-28-9	
2,2-Dichloropropane	<4.0	ug/L	4.0	0.17	1		10/25/18 20:14	594-20-7	
1,1-Dichloropropene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:14	563-58-6	
cis-1,3-Dichloropropene	<4.0	ug/L	4.0	0.20	1		10/25/18 20:14	10061-01-5	
trans-1,3-Dichloropropene	<4.0	ug/L	4.0	0.18	1		10/25/18 20:14	10061-02-6	
Diethyl ether (Ethyl ether)	<4.0	ug/L	4.0	0.095	1		10/25/18 20:14	60-29-7	
Ethylbenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:14	100-41-4	
Hexachloro-1,3-butadiene	<1.0	ug/L	1.0	0.31	1		10/25/18 20:14	87-68-3	
Isopropylbenzene (Cumene)	<1.0	ug/L	1.0	0.18	1		10/25/18 20:14	98-82-8	
p-Isopropyltoluene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:14	99-87-6	
Methylene Chloride	<4.0	ug/L	4.0	0.98	1		10/25/18 20:14	75-09-2	
4-Methyl-2-pentanone (MIBK)	<5.0	ug/L	5.0	0.42	1		10/25/18 20:14	108-10-1	
Methyl-tert-butyl ether	<1.0	ug/L	1.0	0.16	1		10/25/18 20:14	1634-04-4	
Naphthalene	<4.0	ug/L	4.0	0.48	1		10/25/18 20:14	91-20-3	
n-Propylbenzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:14	103-65-1	
Styrene	<1.0	ug/L	1.0	0.19	1		10/25/18 20:14	100-42-5	
1,1,1,2-Tetrachloroethane	<1.0	ug/L	1.0	0.20	1		10/25/18 20:14	630-20-6	
1,1,2,2-Tetrachloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:14	79-34-5	
Tetrachloroethene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:14	127-18-4	
Tetrahydrofuran	<10.0	ug/L	10.0	2.2	1		10/25/18 20:14	109-99-9	
Toluene	<1.0	ug/L	1.0	0.083	1		10/25/18 20:14	108-88-3	
1,2,3-Trichlorobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:14	87-61-6	
1,2,4-Trichlorobenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:14	120-82-1	
1,1,1-Trichloroethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:14	71-55-6	
1,1,2-Trichloroethane	<1.0	ug/L	1.0	0.18	1		10/25/18 20:14	79-00-5	
Trichloroethene	<0.40	ug/L	0.40	0.15	1		10/25/18 20:14	79-01-6	
Trichlorofluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:14	75-69-4	
1,2,3-Trichloropropane	<4.0	ug/L	4.0	0.26	1		10/25/18 20:14	96-18-4	
1,1,2-Trichlorotrifluoroethane	<4.0	ug/L	4.0	0.22	1		10/25/18 20:14	76-13-1	
1,2,4-Trimethylbenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:14	95-63-6	
1,3,5-Trimethylbenzene	<1.0	ug/L	1.0	0.12	1		10/25/18 20:14	108-67-8	
Vinyl chloride	<0.20	ug/L	0.20	0.092	1		10/25/18 20:14	75-01-4	
Xylene (Total)	<3.0	ug/L	3.0	0.31	1		10/25/18 20:14	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%	75-125		1		10/25/18 20:14	17060-07-0	
Toluene-d8 (S)	98	%	75-125		1		10/25/18 20:14	2037-26-5	
4-Bromofluorobenzene (S)	101	%	75-125		1		10/25/18 20:14	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area E1 Lab ID: 10452278003 Collected: 10/18/18 09:40 Received: 10/18/18 12:11 Matrix: Water									
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP, Lab Filtered Analytical Method: EPA 6010D Preparation Method: EPA 3010									
Arsenic, Dissolved	<20.0	ug/L	20.0	3.8	1	10/22/18 11:06	10/23/18 13:07	7440-38-2	
Barium, Dissolved	23.5	ug/L	10.0	0.18	1	10/22/18 11:06	10/23/18 13:07	7440-39-3	
Cadmium, Dissolved	<3.0	ug/L	3.0	0.26	1	10/22/18 11:06	10/23/18 13:07	7440-43-9	
Chromium, Dissolved	<10.0	ug/L	10.0	0.49	1	10/22/18 11:06	10/23/18 13:07	7440-47-3	
Lead, Dissolved	<10.0	ug/L	10.0	2.0	1	10/22/18 11:06	10/23/18 13:07	7439-92-1	
Selenium, Dissolved	<20.0	ug/L	20.0	5.8	1	10/22/18 11:06	10/23/18 13:07	7782-49-2	
Silver, Dissolved	<10.0	ug/L	10.0	0.38	1	10/22/18 11:06	10/23/18 13:07	7440-22-4	
7470A Mercury, Lab Filtered Analytical Method: EPA 7470A Preparation Method: EPA 7470A									
Mercury, Dissolved	<0.20	ug/L	0.20	0.078	1	10/22/18 11:35	10/23/18 17:58	7439-97-6	
8260B VOC Analytical Method: EPA 8260B									
Acetone	<20.0	ug/L	20.0	9.2	1		10/25/18 20:30	67-64-1	
Allyl chloride	<4.0	ug/L	4.0	0.29	1		10/25/18 20:30	107-05-1	
Benzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:30	71-43-2	
Bromobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:30	108-86-1	
Bromochloromethane	<1.0	ug/L	1.0	0.27	1		10/25/18 20:30	74-97-5	
Bromodichloromethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:30	75-27-4	
Bromoform	<4.0	ug/L	4.0	0.80	1		10/25/18 20:30	75-25-2	
Bromomethane	<4.0	ug/L	4.0	1.8	1		10/25/18 20:30	74-83-9	
2-Butanone (MEK)	<5.0	ug/L	5.0	0.99	1		10/25/18 20:30	78-93-3	
n-Butylbenzene	<4.0	ug/L	4.0	0.24	1		10/25/18 20:30	104-51-8	
sec-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:30	135-98-8	
tert-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:30	98-06-6	
Carbon tetrachloride	<1.0	ug/L	1.0	0.19	1		10/25/18 20:30	56-23-5	
Chlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:30	108-90-7	
Chloroethane	<1.0	ug/L	1.0	0.49	1		10/25/18 20:30	75-00-3	
Chloroform	<1.0	ug/L	1.0	0.45	1		10/25/18 20:30	67-66-3	
Chloromethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:30	74-87-3	
2-Chlorotoluene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:30	95-49-8	
4-Chlorotoluene	<1.0	ug/L	1.0	0.13	1		10/25/18 20:30	106-43-4	
1,2-Dibromo-3-chloropropane	<4.0	ug/L	4.0	1.7	1		10/25/18 20:30	96-12-8	
Dibromochloromethane	<4.0	ug/L	4.0	0.12	1		10/25/18 20:30	124-48-1	
1,2-Dibromoethane (EDB)	<1.0	ug/L	1.0	0.24	1		10/25/18 20:30	106-93-4	
Dibromomethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:30	74-95-3	
1,2-Dichlorobenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:30	95-50-1	
1,3-Dichlorobenzene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:30	541-73-1	
1,4-Dichlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:30	106-46-7	
Dichlorodifluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:30	75-71-8	
1,1-Dichloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:30	75-34-3	
1,2-Dichloroethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:30	107-06-2	
1,1-Dichloroethene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:30	75-35-4	
cis-1,2-Dichloroethene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:30	156-59-2	
trans-1,2-Dichloroethene	<4.0	ug/L	4.0	0.12	1		10/25/18 20:30	156-60-5	
Dichlorofluoromethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:30	75-43-4	N2
1,2-Dichloropropane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:30	78-87-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area E1 Lab ID: 10452278003 Collected: 10/18/18 09:40 Received: 10/18/18 12:11 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
Analytical Method: EPA 8260B									
8260B VOC									
1,3-Dichloropropane	<1.0	ug/L	1.0	0.070	1		10/25/18 20:30	142-28-9	
2,2-Dichloropropane	<4.0	ug/L	4.0	0.17	1		10/25/18 20:30	594-20-7	
1,1-Dichloropropene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:30	563-58-6	
cis-1,3-Dichloropropene	<4.0	ug/L	4.0	0.20	1		10/25/18 20:30	10061-01-5	
trans-1,3-Dichloropropene	<4.0	ug/L	4.0	0.18	1		10/25/18 20:30	10061-02-6	
Diethyl ether (Ethyl ether)	<4.0	ug/L	4.0	0.095	1		10/25/18 20:30	60-29-7	
Ethylbenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:30	100-41-4	
Hexachloro-1,3-butadiene	<1.0	ug/L	1.0	0.31	1		10/25/18 20:30	87-68-3	
Isopropylbenzene (Cumene)	<1.0	ug/L	1.0	0.18	1		10/25/18 20:30	98-82-8	
p-Isopropyltoluene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:30	99-87-6	
Methylene Chloride	<4.0	ug/L	4.0	0.98	1		10/25/18 20:30	75-09-2	
4-Methyl-2-pentanone (MIBK)	<5.0	ug/L	5.0	0.42	1		10/25/18 20:30	108-10-1	
Methyl-tert-butyl ether	<1.0	ug/L	1.0	0.16	1		10/25/18 20:30	1634-04-4	
Naphthalene	<4.0	ug/L	4.0	0.48	1		10/25/18 20:30	91-20-3	
n-Propylbenzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:30	103-65-1	
Styrene	<1.0	ug/L	1.0	0.19	1		10/25/18 20:30	100-42-5	
1,1,1,2-Tetrachloroethane	<1.0	ug/L	1.0	0.20	1		10/25/18 20:30	630-20-6	
1,1,2,2-Tetrachloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:30	79-34-5	
Tetrachloroethene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:30	127-18-4	
Tetrahydrofuran	<10.0	ug/L	10.0	2.2	1		10/25/18 20:30	109-99-9	
Toluene	<1.0	ug/L	1.0	0.083	1		10/25/18 20:30	108-88-3	
1,2,3-Trichlorobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:30	87-61-6	
1,2,4-Trichlorobenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:30	120-82-1	
1,1,1-Trichloroethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:30	71-55-6	
1,1,2-Trichloroethane	<1.0	ug/L	1.0	0.18	1		10/25/18 20:30	79-00-5	
Trichloroethene	<0.40	ug/L	0.40	0.15	1		10/25/18 20:30	79-01-6	
Trichlorofluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:30	75-69-4	
1,2,3-Trichloropropane	<4.0	ug/L	4.0	0.26	1		10/25/18 20:30	96-18-4	
1,1,2-Trichlorotrifluoroethane	<4.0	ug/L	4.0	0.22	1		10/25/18 20:30	76-13-1	
1,2,4-Trimethylbenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:30	95-63-6	
1,3,5-Trimethylbenzene	<1.0	ug/L	1.0	0.12	1		10/25/18 20:30	108-67-8	
Vinyl chloride	<0.20	ug/L	0.20	0.092	1		10/25/18 20:30	75-01-4	
Xylene (Total)	<3.0	ug/L	3.0	0.31	1		10/25/18 20:30	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%	75-125		1		10/25/18 20:30	17060-07-0	
Toluene-d8 (S)	97	%	75-125		1		10/25/18 20:30	2037-26-5	
4-Bromofluorobenzene (S)	101	%	75-125		1		10/25/18 20:30	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area A Lab ID: 10452278004 Collected: 10/18/18 10:00 Received: 10/18/18 12:11 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010D MET ICP, Lab Filtered									
Analytical Method: EPA 6010D Preparation Method: EPA 3010									
Arsenic, Dissolved	<20.0	ug/L	20.0	3.8	1	10/22/18 11:06	10/23/18 13:10	7440-38-2	
Barium, Dissolved	<10.0	ug/L	10.0	0.18	1	10/22/18 11:06	10/23/18 13:10	7440-39-3	
Cadmium, Dissolved	<3.0	ug/L	3.0	0.26	1	10/22/18 11:06	10/23/18 13:10	7440-43-9	
Chromium, Dissolved	<10.0	ug/L	10.0	0.49	1	10/22/18 11:06	10/23/18 13:10	7440-47-3	
Lead, Dissolved	<10.0	ug/L	10.0	2.0	1	10/22/18 11:06	10/23/18 13:10	7439-92-1	
Selenium, Dissolved	<20.0	ug/L	20.0	5.8	1	10/22/18 11:06	10/23/18 13:10	7782-49-2	
Silver, Dissolved	<10.0	ug/L	10.0	0.38	1	10/22/18 11:06	10/23/18 13:10	7440-22-4	
7470A Mercury, Lab Filtered									
Analytical Method: EPA 7470A Preparation Method: EPA 7470A									
Mercury, Dissolved	<0.20	ug/L	0.20	0.078	1	10/22/18 11:35	10/23/18 18:00	7439-97-6	
8260B VOC									
Analytical Method: EPA 8260B									
Acetone	<20.0	ug/L	20.0	9.2	1		10/25/18 20:47	67-64-1	
Allyl chloride	<4.0	ug/L	4.0	0.29	1		10/25/18 20:47	107-05-1	
Benzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:47	71-43-2	
Bromobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:47	108-86-1	
Bromochloromethane	<1.0	ug/L	1.0	0.27	1		10/25/18 20:47	74-97-5	
Bromodichloromethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:47	75-27-4	
Bromoform	<4.0	ug/L	4.0	0.80	1		10/25/18 20:47	75-25-2	
Bromomethane	<4.0	ug/L	4.0	1.8	1		10/25/18 20:47	74-83-9	
2-Butanone (MEK)	<5.0	ug/L	5.0	0.99	1		10/25/18 20:47	78-93-3	
n-Butylbenzene	<4.0	ug/L	4.0	0.24	1		10/25/18 20:47	104-51-8	
sec-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:47	135-98-8	
tert-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:47	98-06-6	
Carbon tetrachloride	<1.0	ug/L	1.0	0.19	1		10/25/18 20:47	56-23-5	
Chlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:47	108-90-7	
Chloroethane	<1.0	ug/L	1.0	0.49	1		10/25/18 20:47	75-00-3	
Chloroform	<1.0	ug/L	1.0	0.45	1		10/25/18 20:47	67-66-3	
Chloromethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:47	74-87-3	
2-Chlorotoluene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:47	95-49-8	
4-Chlorotoluene	<1.0	ug/L	1.0	0.13	1		10/25/18 20:47	106-43-4	
1,2-Dibromo-3-chloropropane	<4.0	ug/L	4.0	1.7	1		10/25/18 20:47	96-12-8	
Dibromochloromethane	<4.0	ug/L	4.0	0.12	1		10/25/18 20:47	124-48-1	
1,2-Dibromoethane (EDB)	<1.0	ug/L	1.0	0.24	1		10/25/18 20:47	106-93-4	
Dibromomethane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:47	74-95-3	
1,2-Dichlorobenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:47	95-50-1	
1,3-Dichlorobenzene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:47	541-73-1	
1,4-Dichlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:47	106-46-7	
Dichlorodifluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:47	75-71-8	
1,1-Dichloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:47	75-34-3	
1,2-Dichloroethane	<1.0	ug/L	1.0	0.22	1		10/25/18 20:47	107-06-2	
1,1-Dichloroethene	<1.0	ug/L	1.0	0.16	1		10/25/18 20:47	75-35-4	
cis-1,2-Dichloroethene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:47	156-59-2	
trans-1,2-Dichloroethene	<4.0	ug/L	4.0	0.12	1		10/25/18 20:47	156-60-5	
Dichlorofluoromethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:47	75-43-4	N2
1,2-Dichloropropane	<4.0	ug/L	4.0	0.16	1		10/25/18 20:47	78-87-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: Area A Lab ID: 10452278004 Collected: 10/18/18 10:00 Received: 10/18/18 12:11 Matrix: Water									
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC Analytical Method: EPA 8260B									
1,3-Dichloropropane	<1.0	ug/L	1.0	0.070	1		10/25/18 20:47	142-28-9	
2,2-Dichloropropane	<4.0	ug/L	4.0	0.17	1		10/25/18 20:47	594-20-7	
1,1-Dichloropropene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:47	563-58-6	
cis-1,3-Dichloropropene	<4.0	ug/L	4.0	0.20	1		10/25/18 20:47	10061-01-5	
trans-1,3-Dichloropropene	<4.0	ug/L	4.0	0.18	1		10/25/18 20:47	10061-02-6	
Diethyl ether (Ethyl ether)	<4.0	ug/L	4.0	0.095	1		10/25/18 20:47	60-29-7	
Ethylbenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 20:47	100-41-4	
Hexachloro-1,3-butadiene	<1.0	ug/L	1.0	0.31	1		10/25/18 20:47	87-68-3	
Isopropylbenzene (Cumene)	<1.0	ug/L	1.0	0.18	1		10/25/18 20:47	98-82-8	
p-Isopropyltoluene	<1.0	ug/L	1.0	0.15	1		10/25/18 20:47	99-87-6	
Methylene Chloride	<4.0	ug/L	4.0	0.98	1		10/25/18 20:47	75-09-2	
4-Methyl-2-pentanone (MIBK)	<5.0	ug/L	5.0	0.42	1		10/25/18 20:47	108-10-1	
Methyl-tert-butyl ether	<1.0	ug/L	1.0	0.16	1		10/25/18 20:47	1634-04-4	
Naphthalene	<4.0	ug/L	4.0	0.48	1		10/25/18 20:47	91-20-3	
n-Propylbenzene	<1.0	ug/L	1.0	0.10	1		10/25/18 20:47	103-65-1	
Styrene	<1.0	ug/L	1.0	0.19	1		10/25/18 20:47	100-42-5	
1,1,1,2-Tetrachloroethane	<1.0	ug/L	1.0	0.20	1		10/25/18 20:47	630-20-6	
1,1,2,2-Tetrachloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 20:47	79-34-5	
Tetrachloroethene	<1.0	ug/L	1.0	0.17	1		10/25/18 20:47	127-18-4	
Tetrahydrofuran	<10.0	ug/L	10.0	2.2	1		10/25/18 20:47	109-99-9	
Toluene	<1.0	ug/L	1.0	0.083	1		10/25/18 20:47	108-88-3	
1,2,3-Trichlorobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 20:47	87-61-6	
1,2,4-Trichlorobenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:47	120-82-1	
1,1,1-Trichloroethane	<1.0	ug/L	1.0	0.14	1		10/25/18 20:47	71-55-6	
1,1,2-Trichloroethane	<1.0	ug/L	1.0	0.18	1		10/25/18 20:47	79-00-5	
Trichloroethene	<0.40	ug/L	0.40	0.15	1		10/25/18 20:47	79-01-6	
Trichlorofluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 20:47	75-69-4	
1,2,3-Trichloropropane	<4.0	ug/L	4.0	0.26	1		10/25/18 20:47	96-18-4	
1,1,2-Trichlorotrifluoroethane	<4.0	ug/L	4.0	0.22	1		10/25/18 20:47	76-13-1	
1,2,4-Trimethylbenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 20:47	95-63-6	
1,3,5-Trimethylbenzene	<1.0	ug/L	1.0	0.12	1		10/25/18 20:47	108-67-8	
Vinyl chloride	<0.20	ug/L	0.20	0.092	1		10/25/18 20:47	75-01-4	
Xylene (Total)	<3.0	ug/L	3.0	0.31	1		10/25/18 20:47	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	101	%	75-125		1		10/25/18 20:47	17060-07-0	
Toluene-d8 (S)	98	%	75-125		1		10/25/18 20:47	2037-26-5	
4-Bromofluorobenzene (S)	101	%	75-125		1		10/25/18 20:47	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: HCl Trip Blank Lab ID: 10452278005 Collected: 10/18/18 00:00 Received: 10/18/18 12:11 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC									
Analytical Method: EPA 8260B									
Acetone	<20.0	ug/L	20.0	9.2	1		10/25/18 19:10	67-64-1	
Allyl chloride	<4.0	ug/L	4.0	0.29	1		10/25/18 19:10	107-05-1	
Benzene	<1.0	ug/L	1.0	0.10	1		10/25/18 19:10	71-43-2	
Bromobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 19:10	108-86-1	
Bromochloromethane	<1.0	ug/L	1.0	0.27	1		10/25/18 19:10	74-97-5	
Bromodichloromethane	<1.0	ug/L	1.0	0.22	1		10/25/18 19:10	75-27-4	
Bromoform	<4.0	ug/L	4.0	0.80	1		10/25/18 19:10	75-25-2	
Bromomethane	<4.0	ug/L	4.0	1.8	1		10/25/18 19:10	74-83-9	
2-Butanone (MEK)	<5.0	ug/L	5.0	0.99	1		10/25/18 19:10	78-93-3	
n-Butylbenzene	<4.0	ug/L	4.0	0.24	1		10/25/18 19:10	104-51-8	
sec-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:10	135-98-8	
tert-Butylbenzene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:10	98-06-6	
Carbon tetrachloride	<1.0	ug/L	1.0	0.19	1		10/25/18 19:10	56-23-5	
Chlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:10	108-90-7	
Chloroethane	<1.0	ug/L	1.0	0.49	1		10/25/18 19:10	75-00-3	
Chloroform	<1.0	ug/L	1.0	0.45	1		10/25/18 19:10	67-66-3	
Chloromethane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:10	74-87-3	
2-Chlorotoluene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:10	95-49-8	
4-Chlorotoluene	<1.0	ug/L	1.0	0.13	1		10/25/18 19:10	106-43-4	
1,2-Dibromo-3-chloropropane	<4.0	ug/L	4.0	1.7	1		10/25/18 19:10	96-12-8	
Dibromochloromethane	<4.0	ug/L	4.0	0.12	1		10/25/18 19:10	124-48-1	
1,2-Dibromoethane (EDB)	<1.0	ug/L	1.0	0.24	1		10/25/18 19:10	106-93-4	
Dibromomethane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:10	74-95-3	
1,2-Dichlorobenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 19:10	95-50-1	
1,3-Dichlorobenzene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:10	541-73-1	
1,4-Dichlorobenzene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:10	106-46-7	
Dichlorodifluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 19:10	75-71-8	
1,1-Dichloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 19:10	75-34-3	
1,2-Dichloroethane	<1.0	ug/L	1.0	0.22	1		10/25/18 19:10	107-06-2	
1,1-Dichloroethene	<1.0	ug/L	1.0	0.16	1		10/25/18 19:10	75-35-4	
cis-1,2-Dichloroethene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:10	156-59-2	
trans-1,2-Dichloroethene	<4.0	ug/L	4.0	0.12	1		10/25/18 19:10	156-60-5	
Dichlorofluoromethane	<1.0	ug/L	1.0	0.14	1		10/25/18 19:10	75-43-4	N2
1,2-Dichloropropane	<4.0	ug/L	4.0	0.16	1		10/25/18 19:10	78-87-5	
1,3-Dichloropropane	<1.0	ug/L	1.0	0.070	1		10/25/18 19:10	142-28-9	
2,2-Dichloropropane	<4.0	ug/L	4.0	0.17	1		10/25/18 19:10	594-20-7	
1,1-Dichloropropene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:10	563-58-6	
cis-1,3-Dichloropropene	<4.0	ug/L	4.0	0.20	1		10/25/18 19:10	10061-01-5	
trans-1,3-Dichloropropene	<4.0	ug/L	4.0	0.18	1		10/25/18 19:10	10061-02-6	
Diethyl ether (Ethyl ether)	<4.0	ug/L	4.0	0.095	1		10/25/18 19:10	60-29-7	
Ethylbenzene	<1.0	ug/L	1.0	0.14	1		10/25/18 19:10	100-41-4	
Hexachloro-1,3-butadiene	<1.0	ug/L	1.0	0.31	1		10/25/18 19:10	87-68-3	
Isopropylbenzene (Cumene)	<1.0	ug/L	1.0	0.18	1		10/25/18 19:10	98-82-8	
p-Isopropyltoluene	<1.0	ug/L	1.0	0.15	1		10/25/18 19:10	99-87-6	
Methylene Chloride	<4.0	ug/L	4.0	0.98	1		10/25/18 19:10	75-09-2	
4-Methyl-2-pentanone (MIBK)	<5.0	ug/L	5.0	0.42	1		10/25/18 19:10	108-10-1	

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ANALYTICAL RESULTS

Project: MAH
Pace Project No.: 10452278

Sample: HCl Trip Blank Lab ID: 10452278005 Collected: 10/18/18 00:00 Received: 10/18/18 12:11 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B VOC									
Analytical Method: EPA 8260B									
Methyl-tert-butyl ether	<1.0	ug/L	1.0	0.16	1		10/25/18 19:10	1634-04-4	
Naphthalene	<4.0	ug/L	4.0	0.48	1		10/25/18 19:10	91-20-3	
n-Propylbenzene	<1.0	ug/L	1.0	0.10	1		10/25/18 19:10	103-65-1	
Styrene	<1.0	ug/L	1.0	0.19	1		10/25/18 19:10	100-42-5	
1,1,1,2-Tetrachloroethane	<1.0	ug/L	1.0	0.20	1		10/25/18 19:10	630-20-6	
1,1,2,2-Tetrachloroethane	<1.0	ug/L	1.0	0.17	1		10/25/18 19:10	79-34-5	
Tetrachloroethene	<1.0	ug/L	1.0	0.17	1		10/25/18 19:10	127-18-4	
Tetrahydrofuran	<10.0	ug/L	10.0	2.2	1		10/25/18 19:10	109-99-9	
Toluene	<1.0	ug/L	1.0	0.083	1		10/25/18 19:10	108-88-3	
1,2,3-Trichlorobenzene	<1.0	ug/L	1.0	0.21	1		10/25/18 19:10	87-61-6	
1,2,4-Trichlorobenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:10	120-82-1	
1,1,1-Trichloroethane	<1.0	ug/L	1.0	0.14	1		10/25/18 19:10	71-55-6	
1,1,2-Trichloroethane	<1.0	ug/L	1.0	0.18	1		10/25/18 19:10	79-00-5	
Trichloroethene	<0.40	ug/L	0.40	0.15	1		10/25/18 19:10	79-01-6	
Trichlorofluoromethane	<1.0	ug/L	1.0	0.23	1		10/25/18 19:10	75-69-4	
1,2,3-Trichloropropane	<4.0	ug/L	4.0	0.26	1		10/25/18 19:10	96-18-4	
1,1,2-Trichlorotrifluoroethane	<4.0	ug/L	4.0	0.22	1		10/25/18 19:10	76-13-1	
1,2,4-Trimethylbenzene	<1.0	ug/L	1.0	0.20	1		10/25/18 19:10	95-63-6	
1,3,5-Trimethylbenzene	<1.0	ug/L	1.0	0.12	1		10/25/18 19:10	108-67-8	
Vinyl chloride	<0.20	ug/L	0.20	0.092	1		10/25/18 19:10	75-01-4	
Xylene (Total)	<3.0	ug/L	3.0	0.31	1		10/25/18 19:10	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	100	%	75-125		1		10/25/18 19:10	17060-07-0	
Toluene-d8 (S)	97	%	75-125		1		10/25/18 19:10	2037-26-5	
4-Bromofluorobenzene (S)	103	%	75-125		1		10/25/18 19:10	460-00-4	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

QC Batch: 570613 Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A Analysis Description: 7470A Mercury Water Dissolved
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004

METHOD BLANK: 3096343 Matrix: Water
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury, Dissolved	ug/L	<0.20	0.20	0.078	10/23/18 17:34	

LABORATORY CONTROL SAMPLE: 3096344

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury, Dissolved	ug/L	5	4.4	87	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3096345 3096346

Parameter	Units	10452340006		3096345		3096346		% Rec Limits	Max RPD	Qual
		MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec			
Mercury, Dissolved	ug/L	ND	5	5	5.0	4.9	100	98	80-120	2 20

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

QC Batch: 570604 Analysis Method: EPA 6010D
QC Batch Method: EPA 3010 Analysis Description: 6010D Water Dissolved
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004

METHOD BLANK: 3096307 Matrix: Water
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic, Dissolved	ug/L	<20.0	20.0	3.8	10/23/18 12:11	
Barium, Dissolved	ug/L	<10.0	10.0	0.18	10/23/18 12:11	
Cadmium, Dissolved	ug/L	<3.0	3.0	0.26	10/23/18 12:11	
Chromium, Dissolved	ug/L	<10.0	10.0	0.49	10/23/18 12:11	
Lead, Dissolved	ug/L	<10.0	10.0	2.0	10/23/18 12:11	
Selenium, Dissolved	ug/L	<20.0	20.0	5.8	10/23/18 12:11	
Silver, Dissolved	ug/L	<10.0	10.0	0.38	10/23/18 12:11	

LABORATORY CONTROL SAMPLE: 3096308

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic, Dissolved	ug/L	1000	947	95	80-120	
Barium, Dissolved	ug/L	1000	998	100	80-120	
Cadmium, Dissolved	ug/L	1000	992	99	80-120	
Chromium, Dissolved	ug/L	1000	980	98	80-120	
Lead, Dissolved	ug/L	1000	983	98	80-120	
Selenium, Dissolved	ug/L	1000	968	97	80-120	
Silver, Dissolved	ug/L	500	488	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3096309 3096310

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual	
		10452340003 Result	Spike Conc.	Spike Conc.	MS Result						MSD Result
Arsenic, Dissolved	ug/L	ND	1000	1000	998	1000	99	100	75-125	1	20
Barium, Dissolved	ug/L	210	1000	1000	1190	1180	98	97	75-125	0	20
Cadmium, Dissolved	ug/L	ND	1000	1000	1010	1020	101	102	75-125	0	20
Chromium, Dissolved	ug/L	ND	1000	1000	977	981	98	98	75-125	0	20
Lead, Dissolved	ug/L	ND	1000	1000	953	957	95	96	75-125	0	20
Selenium, Dissolved	ug/L	ND	1000	1000	1000	1010	100	101	75-125	1	20
Silver, Dissolved	ug/L	ND	500	500	505	503	101	101	75-125	0	20

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

QC Batch: 571409 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV 465 W
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004, 10452278005

METHOD BLANK: 3100180 Matrix: Water
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004, 10452278005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	<1.0	1.0	0.20	10/25/18 18:38	
1,1,1-Trichloroethane	ug/L	<1.0	1.0	0.14	10/25/18 18:38	
1,1,1,2,2-Tetrachloroethane	ug/L	<1.0	1.0	0.17	10/25/18 18:38	
1,1,2-Trichloroethane	ug/L	<1.0	1.0	0.18	10/25/18 18:38	
1,1,2-Trichlorotrifluoroethane	ug/L	<4.0	4.0	0.22	10/25/18 18:38	MN
1,1-Dichloroethane	ug/L	<1.0	1.0	0.17	10/25/18 18:38	
1,1-Dichloroethene	ug/L	<1.0	1.0	0.16	10/25/18 18:38	
1,1-Dichloropropene	ug/L	<1.0	1.0	0.20	10/25/18 18:38	
1,2,3-Trichlorobenzene	ug/L	<1.0	1.0	0.21	10/25/18 18:38	
1,2,3-Trichloropropane	ug/L	<4.0	4.0	0.26	10/25/18 18:38	
1,2,4-Trichlorobenzene	ug/L	<1.0	1.0	0.20	10/25/18 18:38	
1,2,4-Trimethylbenzene	ug/L	<1.0	1.0	0.20	10/25/18 18:38	
1,2-Dibromo-3-chloropropane	ug/L	<4.0	4.0	1.7	10/25/18 18:38	
1,2-Dibromoethane (EDB)	ug/L	<1.0	1.0	0.24	10/25/18 18:38	
1,2-Dichlorobenzene	ug/L	<1.0	1.0	0.14	10/25/18 18:38	
1,2-Dichloroethane	ug/L	<1.0	1.0	0.22	10/25/18 18:38	
1,2-Dichloropropane	ug/L	<4.0	4.0	0.16	10/25/18 18:38	
1,3,5-Trimethylbenzene	ug/L	<1.0	1.0	0.12	10/25/18 18:38	
1,3-Dichlorobenzene	ug/L	<1.0	1.0	0.16	10/25/18 18:38	
1,3-Dichloropropane	ug/L	<1.0	1.0	0.070	10/25/18 18:38	
1,4-Dichlorobenzene	ug/L	<1.0	1.0	0.17	10/25/18 18:38	
2,2-Dichloropropane	ug/L	<4.0	4.0	0.17	10/25/18 18:38	
2-Butanone (MEK)	ug/L	<5.0	5.0	0.99	10/25/18 18:38	
2-Chlorotoluene	ug/L	<1.0	1.0	0.16	10/25/18 18:38	
4-Chlorotoluene	ug/L	<1.0	1.0	0.13	10/25/18 18:38	
4-Methyl-2-pentanone (MIBK)	ug/L	<5.0	5.0	0.42	10/25/18 18:38	
Acetone	ug/L	<20.0	20.0	9.2	10/25/18 18:38	
Allyl chloride	ug/L	<4.0	4.0	0.29	10/25/18 18:38	
Benzene	ug/L	<1.0	1.0	0.10	10/25/18 18:38	
Bromobenzene	ug/L	<1.0	1.0	0.21	10/25/18 18:38	
Bromochloromethane	ug/L	<1.0	1.0	0.27	10/25/18 18:38	
Bromodichloromethane	ug/L	<1.0	1.0	0.22	10/25/18 18:38	
Bromoform	ug/L	<4.0	4.0	0.80	10/25/18 18:38	
Bromomethane	ug/L	<4.0	4.0	1.8	10/25/18 18:38	
Carbon tetrachloride	ug/L	<1.0	1.0	0.19	10/25/18 18:38	
Chlorobenzene	ug/L	<1.0	1.0	0.17	10/25/18 18:38	
Chloroethane	ug/L	<1.0	1.0	0.49	10/25/18 18:38	
Chloroform	ug/L	<1.0	1.0	0.45	10/25/18 18:38	
Chloromethane	ug/L	<4.0	4.0	0.16	10/25/18 18:38	
cis-1,2-Dichloroethene	ug/L	<1.0	1.0	0.15	10/25/18 18:38	
cis-1,3-Dichloropropene	ug/L	<4.0	4.0	0.20	10/25/18 18:38	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

METHOD BLANK: 3100180 Matrix: Water
Associated Lab Samples: 10452278001, 10452278002, 10452278003, 10452278004, 10452278005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Dibromochloromethane	ug/L	<4.0	4.0	0.12	10/25/18 18:38	MN
Dibromomethane	ug/L	<4.0	4.0	0.16	10/25/18 18:38	
Dichlorodifluoromethane	ug/L	<1.0	1.0	0.23	10/25/18 18:38	
Dichlorofluoromethane	ug/L	<1.0	1.0	0.14	10/25/18 18:38	N2
Diethyl ether (Ethyl ether)	ug/L	<4.0	4.0	0.095	10/25/18 18:38	
Ethylbenzene	ug/L	<1.0	1.0	0.14	10/25/18 18:38	
Hexachloro-1,3-butadiene	ug/L	<1.0	1.0	0.31	10/25/18 18:38	
Isopropylbenzene (Cumene)	ug/L	<1.0	1.0	0.18	10/25/18 18:38	
Methyl-tert-butyl ether	ug/L	<1.0	1.0	0.16	10/25/18 18:38	
Methylene Chloride	ug/L	<4.0	4.0	0.98	10/25/18 18:38	
n-Butylbenzene	ug/L	<4.0	4.0	0.24	10/25/18 18:38	MN
n-Propylbenzene	ug/L	<1.0	1.0	0.10	10/25/18 18:38	
Naphthalene	ug/L	<4.0	4.0	0.48	10/25/18 18:38	
p-Isopropyltoluene	ug/L	<1.0	1.0	0.15	10/25/18 18:38	
sec-Butylbenzene	ug/L	<1.0	1.0	0.15	10/25/18 18:38	
Styrene	ug/L	<1.0	1.0	0.19	10/25/18 18:38	
tert-Butylbenzene	ug/L	<1.0	1.0	0.15	10/25/18 18:38	
Tetrachloroethene	ug/L	<1.0	1.0	0.17	10/25/18 18:38	
Tetrahydrofuran	ug/L	<10.0	10.0	2.2	10/25/18 18:38	
Toluene	ug/L	<1.0	1.0	0.083	10/25/18 18:38	
trans-1,2-Dichloroethene	ug/L	<4.0	4.0	0.12	10/25/18 18:38	MN
trans-1,3-Dichloropropene	ug/L	<4.0	4.0	0.18	10/25/18 18:38	
Trichloroethene	ug/L	<0.40	0.40	0.15	10/25/18 18:38	
Trichlorofluoromethane	ug/L	<1.0	1.0	0.23	10/25/18 18:38	
Vinyl chloride	ug/L	<0.20	0.20	0.092	10/25/18 18:38	
Xylene (Total)	ug/L	<3.0	3.0	0.31	10/25/18 18:38	
1,2-Dichloroethane-d4 (S)	%	100	75-125		10/25/18 18:38	
4-Bromofluorobenzene (S)	%	101	75-125		10/25/18 18:38	
Toluene-d8 (S)	%	98	75-125		10/25/18 18:38	

LABORATORY CONTROL SAMPLE: 3100181

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	10	9.6	96	75-125	
1,1,1-Trichloroethane	ug/L	10	9.7	97	75-125	
1,1,2,2-Tetrachloroethane	ug/L	10	9.8	98	75-129	
1,1,2-Trichloroethane	ug/L	10	9.5	95	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	10	9.2	92	74-125	
1,1-Dichloroethane	ug/L	10	10.2	102	75-127	
1,1-Dichloroethene	ug/L	10	9.5	95	73-125	
1,1-Dichloropropene	ug/L	10	10	100	75-125	
1,2,3-Trichlorobenzene	ug/L	10	10.4	104	74-126	
1,2,3-Trichloropropane	ug/L	10	9.2	92	75-125	
1,2,4-Trichlorobenzene	ug/L	10	10.5	105	75-125	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

LABORATORY CONTROL SAMPLE: 3100181

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	10	10.1	101	75-125	
1,2-Dibromo-3-chloropropane	ug/L	25	22.9	91	64-129	
1,2-Dibromoethane (EDB)	ug/L	10	9.0	90	75-125	
1,2-Dichlorobenzene	ug/L	10	10.1	101	75-125	
1,2-Dichloroethane	ug/L	10	9.2	92	74-125	
1,2-Dichloropropane	ug/L	10	10.2	102	75-125	
1,3,5-Trimethylbenzene	ug/L	10	10	100	75-125	
1,3-Dichlorobenzene	ug/L	10	9.9	99	75-125	
1,3-Dichloropropane	ug/L	10	9.7	97	75-125	
1,4-Dichlorobenzene	ug/L	10	10.1	101	75-125	
2,2-Dichloropropane	ug/L	10	10.2	102	70-125	
2-Butanone (MEK)	ug/L	50	49.4	99	57-130	
2-Chlorotoluene	ug/L	10	10.1	101	75-125	
4-Chlorotoluene	ug/L	10	10.1	101	75-125	
4-Methyl-2-pentanone (MIBK)	ug/L	50	49.1	98	69-137	
Acetone	ug/L	50	50.4	101	32-150	
Allyl chloride	ug/L	10	9.2	92	64-135	
Benzene	ug/L	10	9.7	97	75-126	
Bromobenzene	ug/L	10	9.6	96	75-125	
Bromochloromethane	ug/L	10	10.2	102	75-126	
Bromodichloromethane	ug/L	10	10	100	75-125	
Bromoform	ug/L	10	9.5	95	67-125	
Bromomethane	ug/L	10	12.1	121	30-150	
Carbon tetrachloride	ug/L	10	9.7	97	75-125	
Chlorobenzene	ug/L	10	9.9	99	75-125	
Chloroethane	ug/L	10	10.2	102	64-142	
Chloroform	ug/L	10	10	100	75-125	
Chloromethane	ug/L	10	10.9	109	40-150	
cis-1,2-Dichloroethene	ug/L	10	10.1	101	75-125	
cis-1,3-Dichloropropene	ug/L	10	8.6	86	75-125	
Dibromochloromethane	ug/L	10	9.7	97	75-125	
Dibromomethane	ug/L	10	9.8	98	75-125	
Dichlorodifluoromethane	ug/L	10	10.9	109	61-132	
Dichlorofluoromethane	ug/L	10	10.1	101	75-129 N2	
Diethyl ether (Ethyl ether)	ug/L	10	10.6	106	74-125	
Ethylbenzene	ug/L	10	9.9	99	75-125	
Hexachloro-1,3-butadiene	ug/L	10	11.9	119	75-125	
Isopropylbenzene (Cumene)	ug/L	10	10.1	101	75-125	
Methyl-tert-butyl ether	ug/L	10	10.3	103	73-129	
Methylene Chloride	ug/L	10	9.9	99	72-125	
n-Butylbenzene	ug/L	10	9.5	95	75-125	
n-Propylbenzene	ug/L	10	10.1	101	75-125	
Naphthalene	ug/L	10	9.5	95	65-126	
p-Isopropyltoluene	ug/L	10	10.1	101	75-125	
sec-Butylbenzene	ug/L	10	10.0	100	75-125	
Styrene	ug/L	10	10.0	100	75-125	
tert-Butylbenzene	ug/L	10	10.1	101	75-125	

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

LABORATORY CONTROL SAMPLE: 3100181

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Tetrachloroethene	ug/L	10	9.3	93	75-125	
Tetrahydrofuran	ug/L	100	101	101	30-150	
Toluene	ug/L	10	9.4	94	74-125	
trans-1,2-Dichloroethene	ug/L	10	9.6	96	70-126	
trans-1,3-Dichloropropene	ug/L	10	9.1	91	75-125	
Trichloroethene	ug/L	10	10.1	101	75-125	
Trichlorofluoromethane	ug/L	10	10	100	71-131	
Vinyl chloride	ug/L	10	10.8	108	65-137	
Xylene (Total)	ug/L	30	30.7	102	75-125	
1,2-Dichloroethane-d4 (S)	%			100	75-125	
4-Bromofluorobenzene (S)	%			99	75-125	
Toluene-d8 (S)	%			102	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3100182 3100183

Parameter	Units	MS 10452340009		MSD		MS		MSD		% Rec Limits	Max RPD	Qual
		Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec				
1,1,1,2-Tetrachloroethane	ug/L	ND	10	10	10.1	10.3	101	103	69-130	2	30	
1,1,1-Trichloroethane	ug/L	ND	10	10	11.2	11.6	112	116	72-133	3	30	
1,1,2,2-Tetrachloroethane	ug/L	ND	10	10	10.3	10.7	103	107	60-137	4	30	
1,1,2-Trichloroethane	ug/L	ND	10	10	9.9	9.9	99	99	70-128	1	30	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	10	10	11.9	12.0	119	120	64-147	1	30	
1,1-Dichloroethane	ug/L	ND	10	10	11.5	11.7	115	117	64-136	2	30	
1,1-Dichloroethene	ug/L	ND	10	10	11.4	11.5	114	115	67-139	1	30	
1,1-Dichloropropene	ug/L	ND	10	10	11.6	12.1	116	121	69-131	5	30	
1,2,3-Trichlorobenzene	ug/L	ND	10	10	12.1	12.0	121	120	60-138	1	30	
1,2,3-Trichloropropane	ug/L	ND	10	10	9.7	10.1	97	101	67-129	4	30	
1,2,4-Trichlorobenzene	ug/L	ND	10	10	11.7	11.5	117	115	71-125	2	30	
1,2,4-Trimethylbenzene	ug/L	ND	10	10	11.1	11.5	111	115	67-130	4	30	
1,2-Dibromo-3-chloropropane	ug/L	ND	25	25	24.6	24.7	98	99	52-141	0	30	
1,2-Dibromoethane (EDB)	ug/L	ND	10	10	9.1	9.2	91	92	66-130	1	30	
1,2-Dichlorobenzene	ug/L	ND	10	10	10.6	10.8	106	108	72-126	2	30	
1,2-Dichloroethane	ug/L	ND	10	10	9.7	10	97	100	64-125	3	30	
1,2-Dichloropropane	ug/L	ND	10	10	10.7	11.4	107	114	65-128	7	30	
1,3,5-Trimethylbenzene	ug/L	ND	10	10	11.2	11.8	112	118	63-139	5	30	
1,3-Dichlorobenzene	ug/L	ND	10	10	10.7	11.2	107	112	70-128	4	30	
1,3-Dichloropropane	ug/L	ND	10	10	9.9	10.5	99	105	70-131	5	30	
1,4-Dichlorobenzene	ug/L	ND	10	10	10.8	11.2	108	112	74-125	4	30	
2,2-Dichloropropane	ug/L	ND	10	10	11.8	12.3	118	123	58-137	4	30	
2-Butanone (MEK)	ug/L	ND	50	50	50.7	50.6	101	101	45-132	0	30	
2-Chlorotoluene	ug/L	ND	10	10	11.1	11.7	111	117	66-134	6	30	
4-Chlorotoluene	ug/L	ND	10	10	11.3	11.6	113	116	70-132	3	30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	50	50	52.7	54.2	105	108	54-143	3	30	
Acetone	ug/L	ND	50	50	52.5	54.8	105	110	51-150	4	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MAH
Pace Project No.: 10452278

Parameter	Units	3100182		3100183		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
		10452340009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result							
Allyl chloride	ug/L	ND	10	10	10.6	10.9	106	109	52-150	3	30	
Benzene	ug/L	ND	10	10	10.7	10.9	107	109	62-140	2	30	
Bromobenzene	ug/L	ND	10	10	10.5	11.1	105	111	70-128	5	30	
Bromochloromethane	ug/L	ND	10	10	10.8	11.2	108	112	65-131	3	30	
Bromodichloromethane	ug/L	ND	10	10	10.6	11.0	106	110	74-127	3	30	
Bromoform	ug/L	ND	10	10	10	10.2	100	102	59-125	2	30	
Bromomethane	ug/L	ND	10	10	11.9	12.8	119	128	30-149	8	30	
Carbon tetrachloride	ug/L	ND	10	10	11.2	11.6	112	116	67-134	3	30	
Chlorobenzene	ug/L	ND	10	10	10.6	11.1	106	111	72-131	5	30	
Chloroethane	ug/L	ND	10	10	9.4	11.5	94	115	55-150	21	30	
Chloroform	ug/L	ND	10	10	10.6	11.2	106	112	67-125	5	30	
Chloromethane	ug/L	ND	10	10	11.0	10.8	110	108	43-148	1	30	
cis-1,2-Dichloroethene	ug/L	ND	10	10	11.4	11.4	114	114	62-132	0	30	
cis-1,3-Dichloropropene	ug/L	ND	10	10	9.4	9.8	94	98	63-129	4	30	
Dibromochloromethane	ug/L	ND	10	10	10	10.3	100	103	67-127	4	30	
Dibromomethane	ug/L	ND	10	10	10.5	10.7	105	107	68-132	2	30	
Dichlorodifluoromethane	ug/L	ND	10	10	11.1	13.2	111	132	59-144	17	30	
Dichlorofluoromethane	ug/L	ND	10	10	9.3	11.4	93	114	63-144	21	30	N2
Diethyl ether (Ethyl ether)	ug/L	ND	10	10	10.8	11.1	108	111	52-139	3	30	
Ethylbenzene	ug/L	ND	10	10	10.9	11.2	109	112	75-131	3	30	
Hexachloro-1,3-butadiene	ug/L	ND	10	10	14.8	14.0	148	140	58-146	5	30	M1
Isopropylbenzene (Cumene)	ug/L	ND	10	10	11.3	11.8	113	118	71-132	5	30	
Methyl-tert-butyl ether	ug/L	ND	10	10	11.0	11.0	110	110	65-130	0	30	
Methylene Chloride	ug/L	ND	10	10	10.6	10.5	106	105	66-125	1	30	
n-Butylbenzene	ug/L	ND	10	10	11.5	11.7	115	117	57-141	2	30	
n-Propylbenzene	ug/L	ND	10	10	11.4	11.9	114	119	70-131	4	30	
Naphthalene	ug/L	ND	10	10	11.2	11.3	112	113	48-134	1	30	
p-Isopropyltoluene	ug/L	ND	10	10	12.0	12.4	120	124	66-136	3	30	
sec-Butylbenzene	ug/L	ND	10	10	11.9	12.4	119	124	69-134	5	30	
Styrene	ug/L	ND	10	10	10.5	10.9	105	109	65-134	3	30	
tert-Butylbenzene	ug/L	ND	10	10	11.4	12.0	114	120	71-130	5	30	
Tetrachloroethene	ug/L	ND	10	10	10.4	11.1	104	111	69-135	6	30	
Tetrahydrofuran	ug/L	ND	100	100	98.5	105	98	105	48-150	6	30	
Toluene	ug/L	ND	10	10	10.3	10.8	103	108	68-132	4	30	
trans-1,2-Dichloroethene	ug/L	ND	10	10	10.9	11.1	109	111	61-134	2	30	
trans-1,3-Dichloropropene	ug/L	ND	10	10	9.6	9.6	96	96	66-125	0	30	
Trichloroethene	ug/L	ND	10	10	11.0	11.7	110	117	64-136	6	30	
Trichlorofluoromethane	ug/L	ND	10	10	9.9	12.2	99	122	65-146	20	30	
Vinyl chloride	ug/L	ND	10	10	10.8	12.9	108	129	51-150	18	30	
Xylene (Total)	ug/L	ND	30	30	33.3	35.5	111	118	69-135	6	30	
1,2-Dichloroethane-d4 (S)	%						103	102	75-125			
4-Bromofluorobenzene (S)	%						101	101	75-125			
Toluene-d8 (S)	%						101	102	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: MAH
Pace Project No.: 10452278

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
TNTC - Too Numerous To Count
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

WORKORDER QUALIFIERS

WO: 10452278
[1] Samples were received outside of the recommended temperature range of 0-6 degrees Celsius. The samples were received from the field on ice.

ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
MN The reporting limit has been raised in accordance with Minnesota Statutes 4740.2100 Subpart 8. C, D. Reporting Limit Evaluation Rule.
N2 The lab does not hold NELAC/TNI accreditation for this parameter.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MAH
Pace Project No.: 10452278

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10452278001	Area B	EPA 3010	570604	EPA 6010D	570788
10452278002	Wetland D	EPA 3010	570604	EPA 6010D	570788
10452278003	Area E1	EPA 3010	570604	EPA 6010D	570788
10452278004	Area A	EPA 3010	570604	EPA 6010D	570788
10452278001	Area B	EPA 7470A	570613	EPA 7470A	570926
10452278002	Wetland D	EPA 7470A	570613	EPA 7470A	570926
10452278003	Area E1	EPA 7470A	570613	EPA 7470A	570926
10452278004	Area A	EPA 7470A	570613	EPA 7470A	570926
10452278001	Area B	EPA 8260B	571409		
10452278002	Wetland D	EPA 8260B	571409		
10452278003	Area E1	EPA 8260B	571409		
10452278004	Area A	EPA 8260B	571409		
10452278005	HCl Trip Blank	EPA 8260B	571409		

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Do

WO#: 10452278

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed



10452278

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Landmark Environmental	Report To: Aaron Kuck	Company Name: Landmark Environmental	Accounts Payable	Company Name: Landmark Environmental	Attention:
Address: 2042 West 98th Street	Copy To:	Address: separadise@landmarkenv.com		Address: separadise@landmarkenv.com	
Bloomington, MN 55431		Purchase Order No.:		Pace Quote Reference: Annika Asp	
Email To: akuck@landmarkenv.com		Project Name: City of Rochester MAH		Pace Project Manager: Chris Bremer, 612-607-9390	
Phone: 952-666-2421 Fax: n/a		Project Number:		Pace Profile #: 35807 #2	
Requested Due Date/TAT: N/A					

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER WW

Site Location: _____ STATE: MN

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW WASTE WATER PRODUCT SL SOIL/SOLID CL OIL WP AIR AR OTHER OT TISSUE TS	SAMPLE ID (A-Z, 0-9, /, -) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		# OF CONTAINERS	UNPRESERVED H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	PRESERVATIVES	ANALYSIS TESTS (Y/N)	TEMP IN °C	RECEIVED ON Ice (Y/N)	CUSTODY SEALED Cooler (Y/N)	SAMPLES INTACT (Y/N)
					COMPOSITE START	COMPOSITE END/GRAB								
1		Area B	WT G	G	10/18/18	9:00	1				6.4			Y
2		wetland D	↓		10/18/18	9:20	1							Y
3		Area E1	↓		10/18/18	9:40	1							Y
4		Area A	↓		10/18/18	10:00	1							Y
5		HCl Trip Blank					2							Y
6		metals												Y
7														
8														
9														
10														
11														
12														

ADDITIONAL COMMENTS

Lab filter RCRA metals samples

RELINQUISHED BY/AFFILIATION: *RA* DATE: 10/18/18 TIME: 12:11

ACCEPTED BY/AFFILIATION: *CofS Pace* DATE: 10/18/18 TIME: 12:11

SAMPLER NAME AND SIGNATURE: *Aaron Kuck*

PRINT Name of SAMPLER: Aaron Kuck

SIGNATURE of SAMPLER: *[Signature]* DATE Signed (MM/DD/YYYY): 10/18/18

Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-0-020rev.07, 15-Feb-2008 Page 28 of 30

Sample Condition Upon Receipt Client Name: **Landmark Environmental** Project #: **WO# : 10452278**

Courier: Fed Ex UPS USPS Client
 Commercial Pace SpeedDee Other: _____
 Tracking Number: _____

WO# : 10452278
 PM: AKA Due Date: 10/25/18
 CLIENT: LANDMARK ENV

Custody Seal on Cooler/Box Present? Yes No Seals Intact? Yes No
 Optional: Proj. Due Date: _____ Proj. Name: _____

Packing Material: Bubble Wrap Bubble Bags None Other: _____ Temp Blank? Yes No

Thermometer Used: G87A9170600254 G87A9155100842 Type of Ice: Wet Blue None Dry Melted

Cooler Temp Read (°C): 6.2 Cooler Temp Corrected (°C): 6.4 Biological Tissue Frozen? Yes No N/A
 Temp should be above freezing to 6°C Correction Factor: 10.2 Date and Initials of Person Examining Contents: 10/18/18 CS

USDA Regulated Soil (N/A, water sample)
 Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No
 If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

	Yes	No	N/A	COMMENTS:
Chain of Custody Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		1.
Chain of Custody Filled Out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		2.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		3.
Sampler Name and/or Signature on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		5.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		6.
Rush Turn Around Time Requested?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		7.
Sufficient Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		8.
Correct Containers Used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		9.
-Pace Containers Used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Containers Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		10.
Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> N/A	11. Note if sediment is visible in the dissolved container
Is sufficient information available to reconcile the samples to the COC? Matrix: <u>W</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		12.
All containers needing acid/base preservation have been checked?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> N/A	13. <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> NaOH Positive for Res. Chlorine? Y N
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH >9 Sulfide, NaOH >12 Cyanide) Exceptions (VOA) Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> N/A	Sample # Initial when completed: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> N/A	14. <u>see exceptions</u>
Trip Blank Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> N/A	15.
Trip Blank Custody Seals Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased): <u>177018</u>				

CLIENT NOTIFICATION/RESOLUTION
 Person Contacted: _____ Date/Time: _____ Field Data Required? Yes No
 Comments/Resolution: _____

Project Manager Review: Anna Asp Date: 10/19/18
 Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).
 label: Andrew



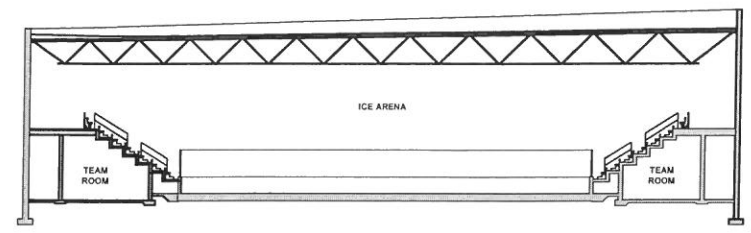
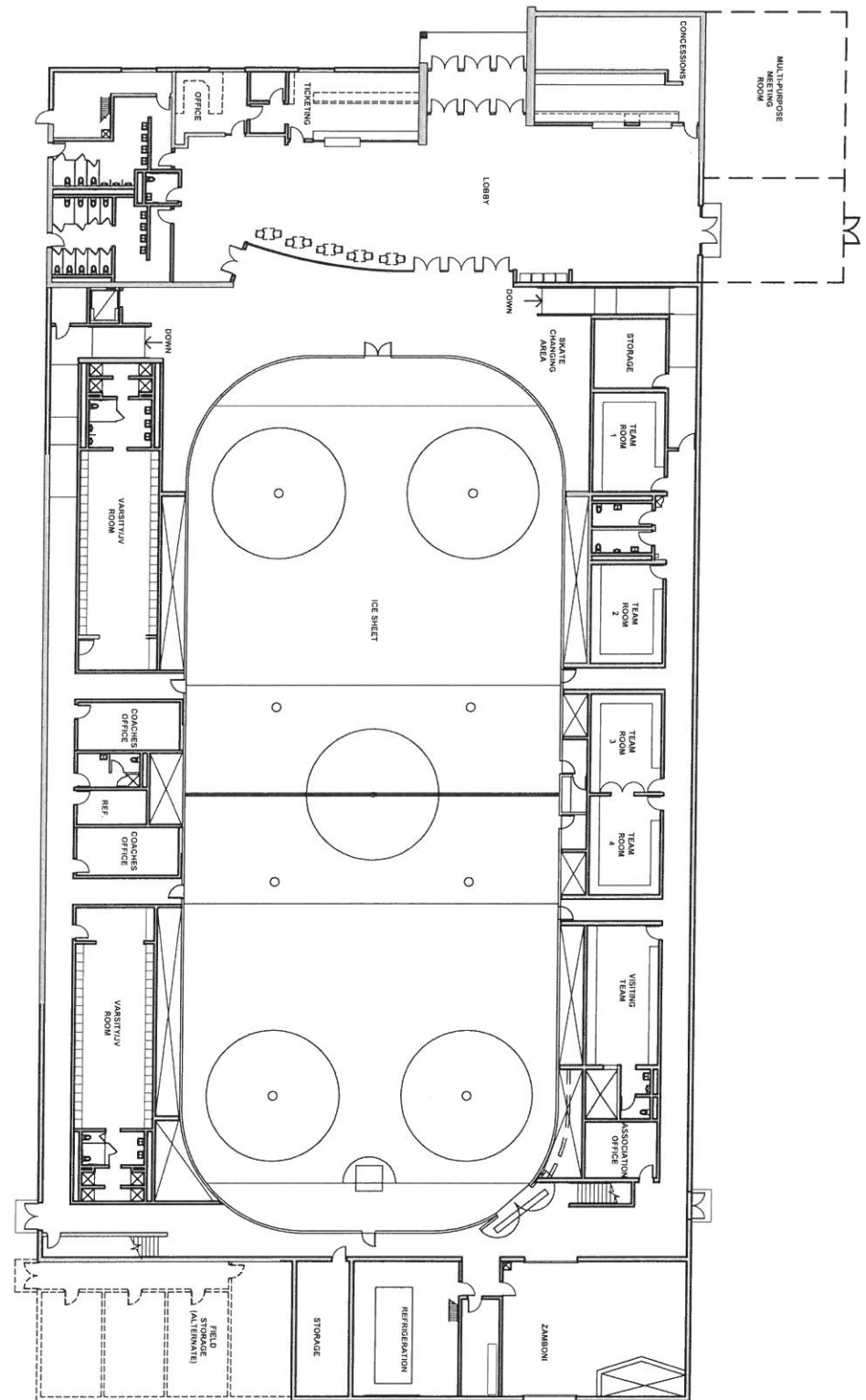
Document Name:
Headspace Exception

Document Revised: 06 Nov 2017
Page 1 of 1

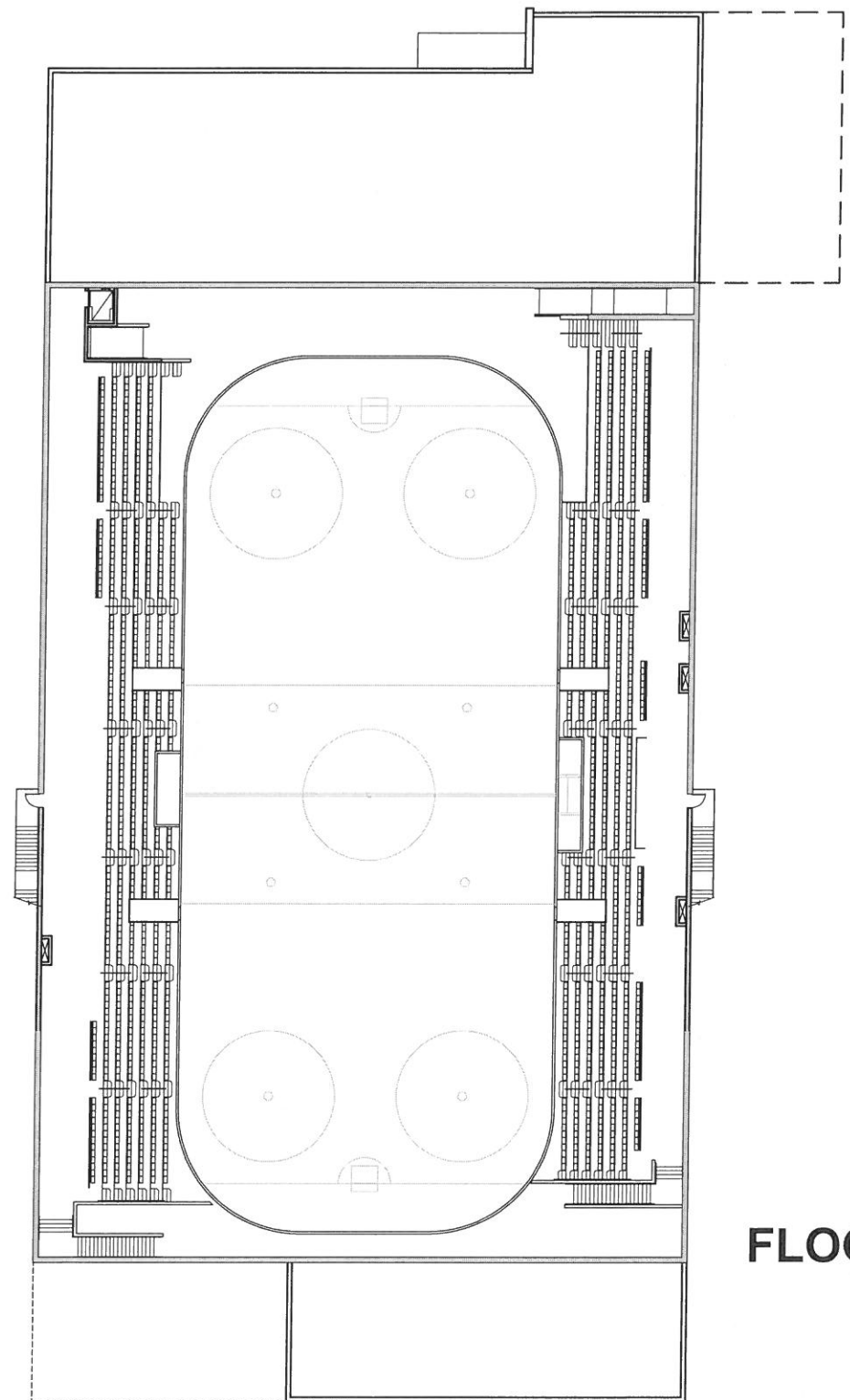
Document No.:
F-MN-C-276-Rev.00

Issuing Authority:
Pace Minnesota Quality Office

Sample ID	Headspace > 6mm	Headspace < 6mm	No Headspace	Total Vials
Area B	0	0	3	3
Wetland D	0	0	3	3
Area E1	0	0	3	3
Area A	0	0	3	3
Blank	1	1	0	2



SECTION

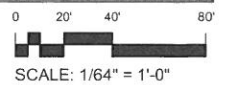


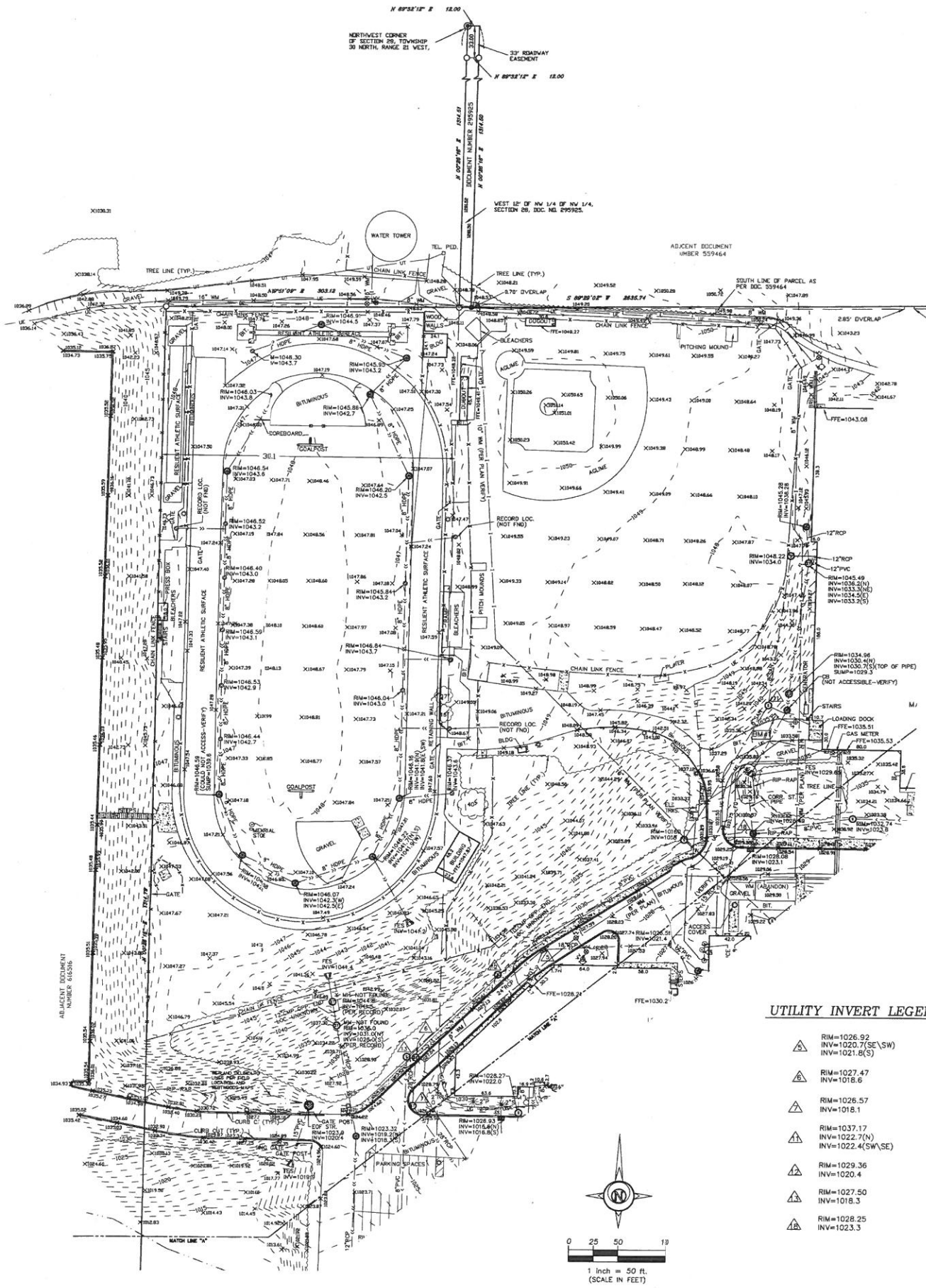
FLOOR PLANS

MAHTOMEDI ICE ARENA CONCEPT

292DESIGNGROUP

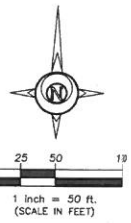
08.03.15





UTILITY INVERT LEGEND

- ▲ RIM=1026.92
INV=1020.7(SE)(SW)
INV=1021.8(S)
- ▲ RIM=1027.47
INV=1018.6
- ▲ RIM=1026.57
INV=1018.1
- ▲ RIM=1037.17
INV=1022.7(N)
INV=1022.4(SW)(SE)
- ▲ RIM=1029.36
INV=1020.4
- ▲ RIM=1027.50
INV=1018.3
- ▲ RIM=1028.25
INV=1023.3



LEGAL DESCRIPTION

That part of the 5th Half of the Northeast Quarter of Section 28, Township 30 North, Range 21 West, Grant Township, Washington County, Minnesota, which lies Westerly and Northwesterly of the Northwesterly line of Minnesota Department of Natural Resources Trail (formerly known as the Soo Line Railroad right-of-way) and which lies Northerly of the Northerly line of Washington County Highway Right of Way Plat No. 19, according to the plat thereof on file and of record in the office of the County Recorder, Washington County, Minnesota, Excepting from said South Half of the Northeast Quarter that parcel described as follows: Commencing at a point 1113.2 feet West and 33 feet North of the East Quarter of said Section 28, which point is on the North right-of-way of County Road #2 for the point of beginning; thence North a distance of 100 feet; thence East a distance of 177.95 feet to the Westerly right-of-way line of the Minneapolis, St. Paul & Sault Ste. Marie Railroad; thence Southwesterly with an inside angle of 102 degrees 11 minutes and along the Westerly right-of-way line of said Railroad a distance of 127 feet to the North right-of-way line of said County Road #2; thence West along the North right-of-way line of said County Road #2 a distance of 100 feet to the point of beginning.

That part of the Southeast Quarter of the Northwest Quarter of Section 28, Township 30 North, Range 21 West, which lies Easterly of the West 995.7 feet of said Southeast Quarter of Section 28. (This parcel is subject to C.S.A.H. No. 12)

The Westerly 30 feet of the Southeast Quarter of the Northwest Quarter of Section 28, Township 30 North, Range 21 West. (This parcel is subject to C.S.A.H. No. 12)

The Southeast Quarter of the Northwest Quarter of Section 28, Township 30 North, Range 21 West. (Parcel subject to C.S.A.H. No. 12)

The Westerly Two (2) 1/2 feet of the Northwest Quarter of the Northwest Quarter (NW 1/4 of NW 1/4) of Section Twenty-Eight (28), Township 30 North (T30N), Range 21 West (R21W), of the Fourth Principal Meridian, Washington County, Minnesota. Doc. No. 259225

The East 303.1 feet of the Southeast Quarter of the Northeast Quarter of Section 29, Township 30 North, Range 21 West, and that part of the Northeast Quarter of the Southeast Quarter lying north of a 100 foot strip of land formerly owned by Mpls. & St. Paul Suburban Railway and that part of said railway all lying Easterly of a line 303.1 feet West (measured at right angles to the southerly prolongation of the line of the Northeast Quarter of said Section 29) of Section 29, Township 30 North, Range 21 West, Washington County, Minnesota. (Subject to ingress and egress per Doc. No. 616515) Doc. No. 299316

That part of the West Half (W1/2) of the Southwest Quarter (SW1/4) of Section 28, Township 30 North, Range 21 West, Washington County, Minnesota lying north of a one hundred (100) foot strip of land formerly owned by Minneapolis and St. Paul Suburban Railroad. Doc. No. 323464

That part of the Northeast 1/4 of the Northwest 1/4 of the Southwest 1/4 of Section 28, Township 30 North, Range 21 West, Washington County, Minnesota, lying North of a 100 foot strip formerly owned by Minneapolis and St. Paul Suburban Railway, Subject to County Road No. 12. Doc. No. 332970

A strip, 100 feet wide, for right of way of Interurban Railroad, lying within the Northwest 1/4 of the Southwest 1/4 of Section 28, Township 30 North Range 21 West, Subject to County Road 12. Doc. No. 286451

That part of the East 1/2 lying North of the 100 foot strip of land formerly owned by the Minneapolis and St. Paul Suburban Railway in the Southwest 1/4 of Section 28, Township 30 North, Range 21 West, Washington County, Minnesota. Doc. No. 350233 vague description.

That part of the East 1/2 lying North of the 100 foot strip of land formerly owned by the Minneapolis and St. Paul Suburban Railway in the Southwest 1/4 of Section 28, Township 30 North, Range 21 West, Washington County, Minnesota. Doc. No. 303463 vague description.

Note: Above parcels are subject to C.S.A.H. No. 12, Washington County Highway Right of Way Plans Nos. 19 and 79, and Highway Right of Way Easements 297806 and 297807

GENERAL NOTES

- Background information is based on a survey on the ground performed by Clark Engineering Corporation on June - August, 2010 exclusively for this project.
- All dimensions depicted on this survey are in feet and decimals of a foot, unless otherwise indicated.
- For the purpose of this survey, no title work was provided regarding legal descriptions and easements of record. It is the responsibility of the client to obtain title work and easements of record before design and/or construction of any utility or structure. Legal descriptions and easements of record were researched at the Washington County Recorder by Clark Engineering Corp. to the best of our ability.
- For the purpose of this survey, a Gopher State One-Call public utility locate ticket (No. 100205783 and 100205822) was prepared. Private utility locations were not identified as part of this survey. The contractor must verify all utility locations prior to construction/excavation. Note: State law requires underground utilities to be located 48 hours prior to excavation. GOPHER STATE ONE-CALL: (651) 454-3002
- Property lines from access to public right-of-way. As shown on this survey.
- Contractor to verify all underground utilities prior to construction of new improvements. Which includes and is not limited to pipe sizes, types of pipes, inverts, directions of flow, utility type and all other elements related to each underground utility.
- Underground utility lines are shown based on visible surface features, partial record marks, and records of the City of Mahtomedi, Northern Natural Gas, Access Comm. Tech., Quest Comm., Comcast, Xcel Energy and Gas Pipeline Co. Lp. Private underground lines, including electric cables, lawn sprinkler lines and fuel tank lines, appear to exist on site but are not shown. Other private utility lines may exist.
- Shards, precast concrete bumpers, moveable signs and markers in parking lots, small parking/traffic signs (on property and in streets) are not shown.
- Building corners, facials and knee walls are not shown.
- The northerly portion of the survey on sheets 4 and 5 are based on Clark Engineering Corporation's survey Comm. No. CE 41 as shown.
- Wetland delineations provide by Westwood Professional Services in 2010 and Peterson Environmental in 2002 as noted on survey.

AREA

AREA = 6,488,745± Sq. Ft. (148.96 ACRES)

BENCHMARKS

BM #1 Top nut of drain 40'-1/2" feet west of the Mahtomedi Middle School loading dock as shown Elevation: 1036.25 feet

CERTIFICATION

I hereby certify that this survey, plan or map was prepared by me or under my direct supervision and that I am a duly Registered Land Surveyor under the laws of the State of Minnesota.

Paul A. Johnson Dated: 10-04-10

Paul A. Johnson, Land Surveyor
Minnesota License No. 10938

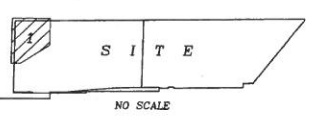
LEGEND:

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- Found/Set P.K. Nail
- Found Monument
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- × 900.0 Existing Spot Elevation
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- ▨ Curb Line
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- Fire Conn./Standpipe
- Fire Hydrant
- Cleanout
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- Roof Drain
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- Utility Pole
- Guy Wire
- Signal Pole
- Flag Pole
- Bollard/Guard Post
- Light Pole
- Deciduous Tree
- Coniferous Tree
- FTE Finished Floor Elevation
- TN Top Nut Hydrant
- RM Structure Rim Elevation
- INV Structure Invert Elevation

TREE LEGEND

- M DENOTES MAPLE
- RB DENOTES RIVER BIRCH
- CH DENOTES CHERRY
- O DENOTES OAK
- P DENOTES PINE
- S DENOTES SPRUCE
- L DENOTES LINDEN
- J DENOTES JUNIPER
- LD DENOTES LOCUST
- H DENOTES HACKBERRY
- A DENOTES ASH

SHEET LAYOUT

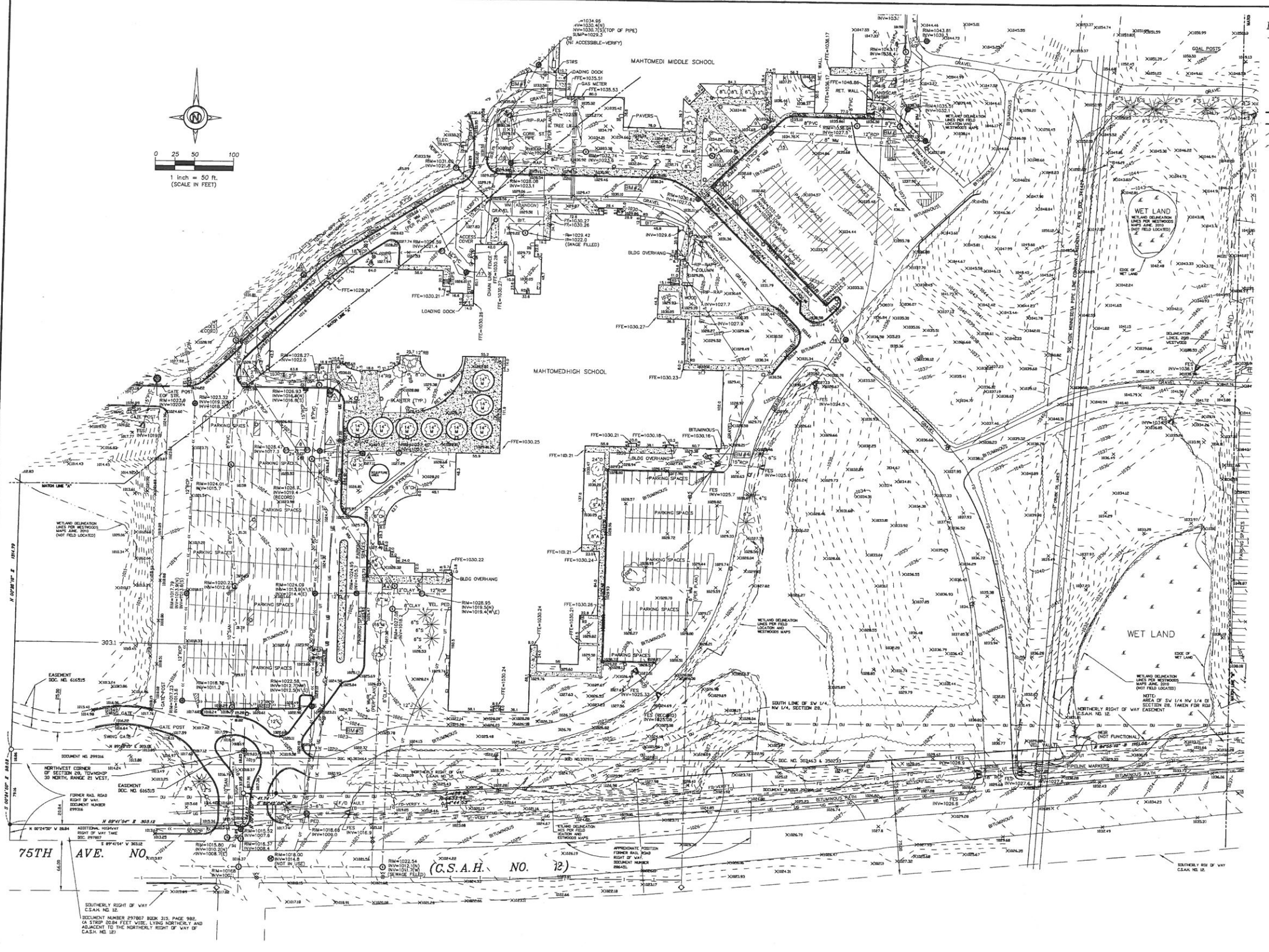
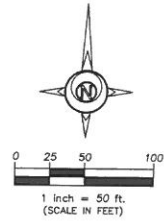


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BOUNDARY & TOPOGRAPHIC SURVEY FOR:
MAHTOMEDI PUBLIC SCHOOLS
PROJECT:
MAHTOMEDI HIGH AND WILDWOOD ELEM SITES
MAHTOMEDI, MINNESOTA

DATE	REVISIONS
DRAWN BY	DSB
CHECKED BY	PAJ
DATE	10/04/10
PROJECT NO.	C10512
SHEET NO.	1
Sheet 1 OF 6	



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- TNH Top Nut Hydrant
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- INV Structure Invert Elevation

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- L DENOTES LINDEN
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- H DENOTES HACKBERRY
- A DENOTES ASH

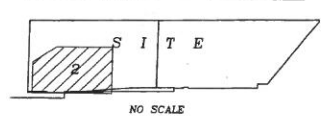
UTILITY INVERT LEGEND

- | | | |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------|
| △ RIM=1027.55
INV=1023.8(N)
SUMP=1019.8 | △ RIM=1026.86
INV=1016.6 | △ RIM=1030.80
INV=1024.8(W)
INV=1024.7(SW) |
| △ RIM=1027.46
INV=1023.2(N)
INV=NOT VISIBLE(SW)
SUMP=1020.0 | △ RIM=1034.71
INV=1026.5 | △ RIM=1025.97
INV=1022.0 |
| △ RIM=1027.07
INV=1016.6(NE)
INV=1020.3(E)
INV=1009.5(W/S)
INV=NOT VISIBLE(N) | △ RIM=1033.51
INV=1025.9 | △ RIM=1046.17
INV=1037.5(N)
INV=1035.0(S)
INV=1039.8(W) |
| △ RIM=1026.64
INV=1023.4 | △ RIM=1034.09
INV=1027.2(N)
INV=1027.9(E)
INV=1027.0(SW) | △ RIM=1031.61
INV=1026.6(NE/SW)
INV=1026.4(SE) |

BENCHMARKS

- BM #2 Top of 4" x 4" x 4" feet south of the south end of Mahtomedi Middle School as shown shows Elevation = 1034.89 feet
- BM #3 Top of 4" x 4" x 4" feet southeast of the southeast corner of Mahtomedi Middle School as shown shows Elevation = 1039.28 feet
- BM #4 Top of 4" x 4" x 4" feet south of the east wing of Mahtomedi High School as shown shows Elevation = 1036.31 feet
- BM #5 Top of 4" x 4" x 4" feet west of the southwest corner of Mahtomedi High School as shown shows Elevation = 1027.06 feet

SHEET LAYOUT

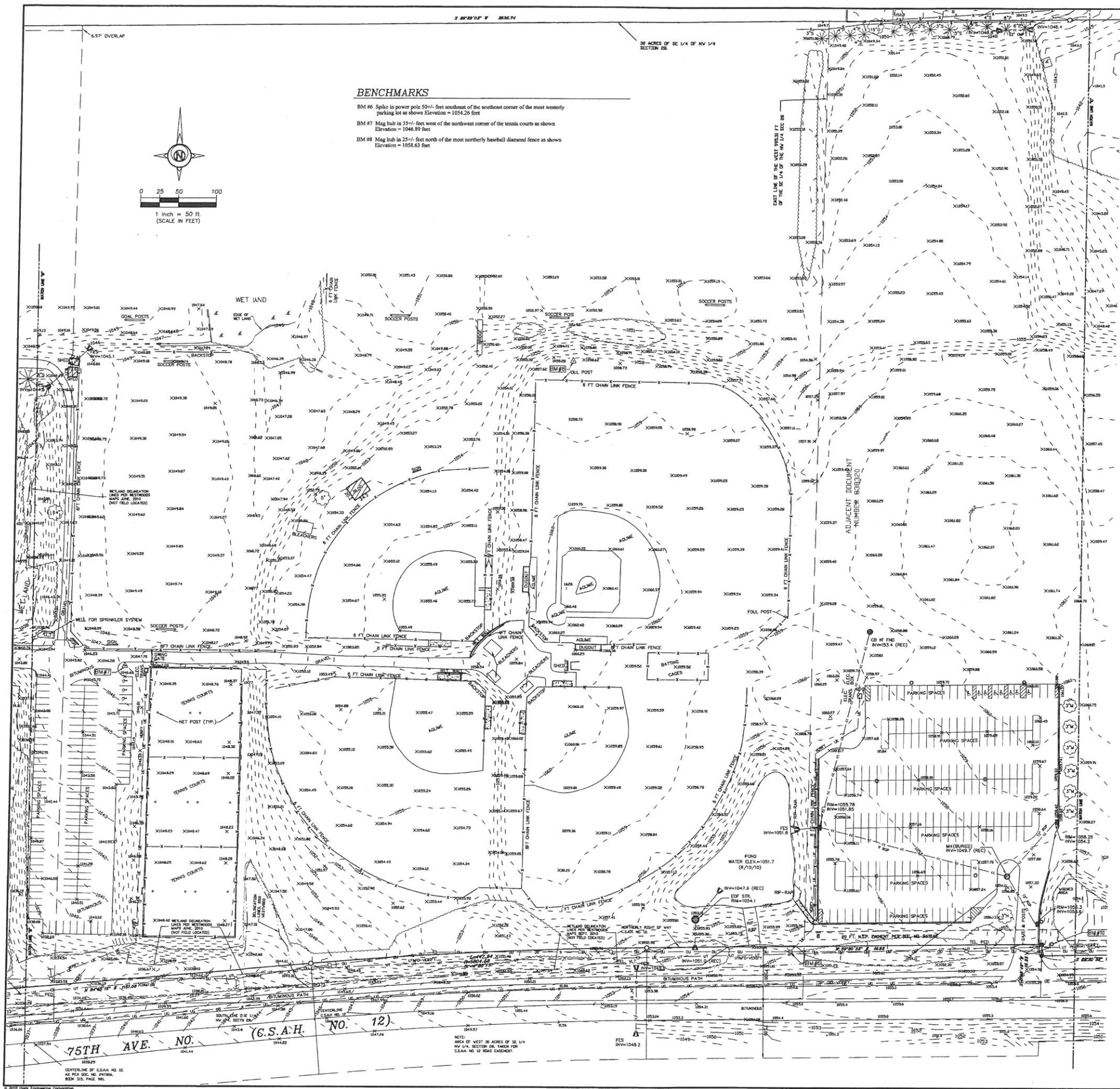


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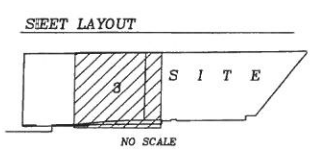
BOUNDARY & TOPOGRAPHIC SURVEY FOR:
MAHTOMEDI PUBLIC SCHOOLS
PROJECT
MAHTOMEDI HIGH AND WILDWOOD ELEM SITES
MAHTOMEDI, MINNESOTA

DATE	REVISIONS
DRAWN BY DSB	CHECKED BY PAJ
DATE 10/04/10	PROJECT NO. C10512
SHEET NO. 2	Sheet 2 OF 6



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 - TNH Tap Nut Hydrant
 - RM Structure Rim Elevation
 - INV Structure Invert Elevation

- TREE LEGEND**
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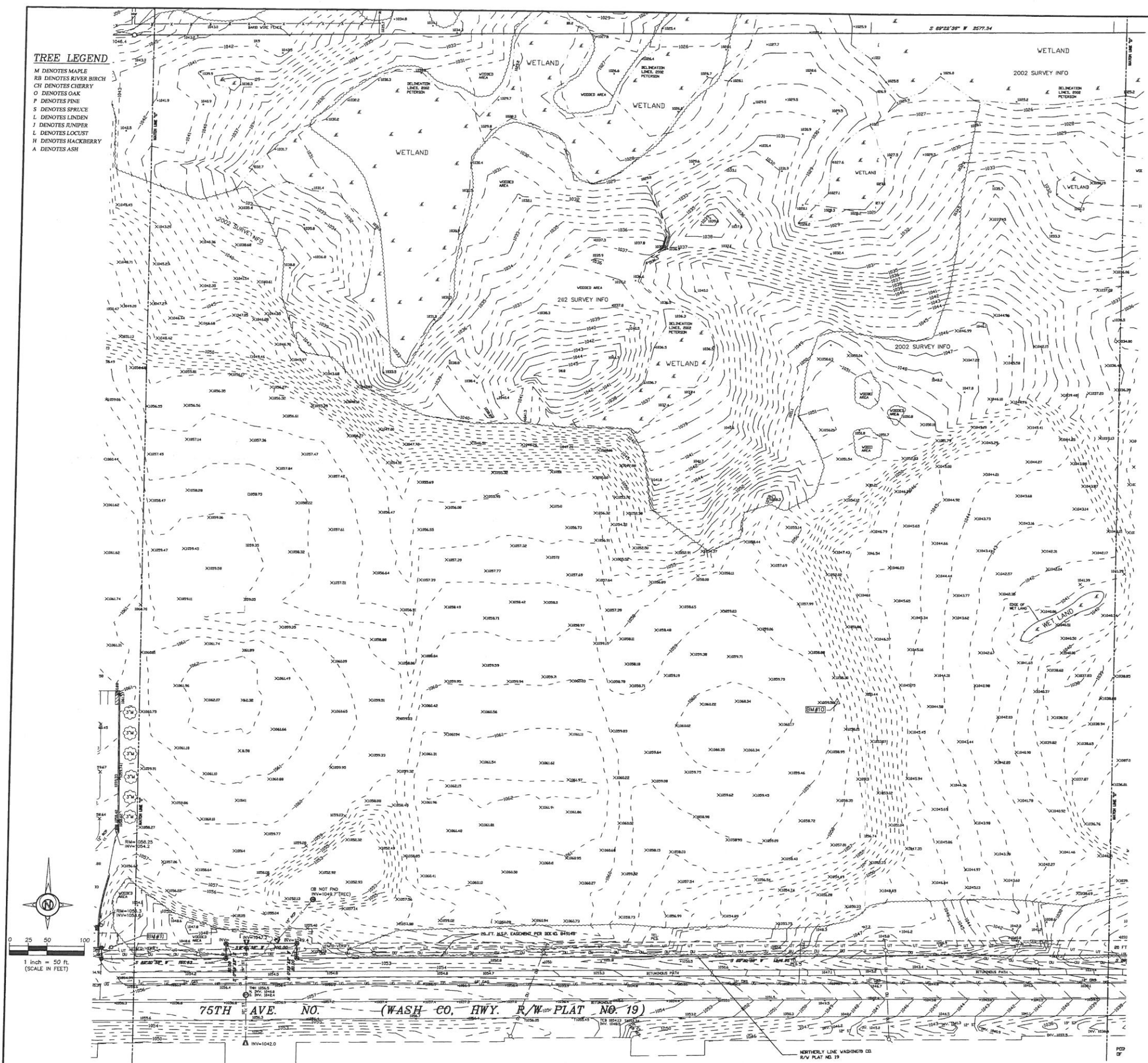
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REVISIONS	
DRAWN BY	DSB
CHECKED BY	PAJ
DATE	10/04/10
PROJECT NO.	C10512
SHEET NO.	3

Sheet 3 of 6

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TREE LEGEND

- M DENOTES MAPLE
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- S DENOTES SPRUCE
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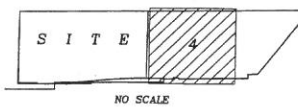
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- INV Structure Invert Elevation

BENCHMARKS

BM #10 1/4" high in center of east line of most easterly soccer field as shown Elevation = 1058.85 feet
 BM #11 1/4" high in light pole 15'-4" east of the east line of the most easterly parking lot entrance as shown Elevation = 1056.56 feet

SHEET LAYOUT



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BOUNDARY & TOPOGRAPHIC SURVEY FOR:
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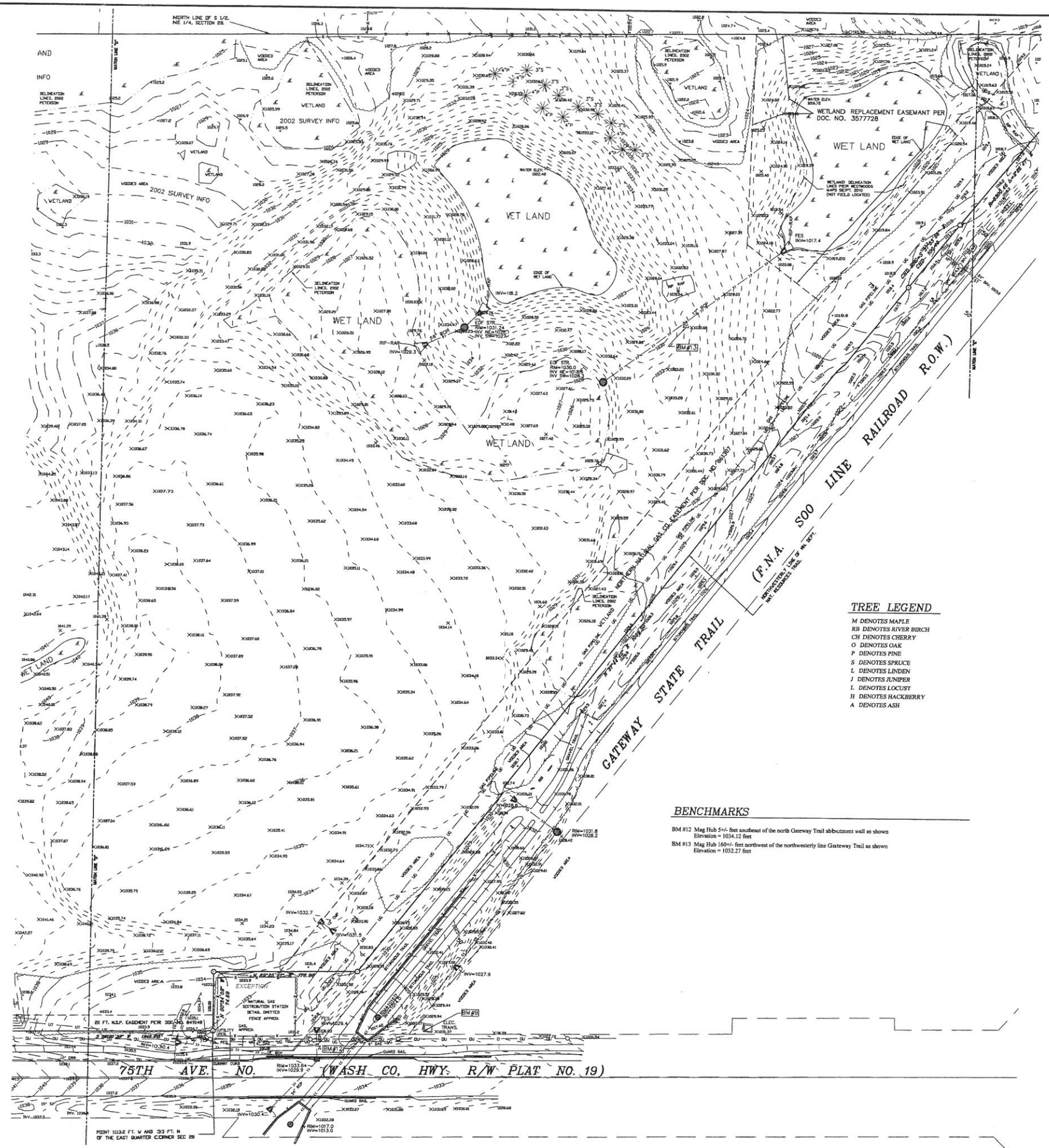
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4

Sheet 4 of 6



LEGEND:

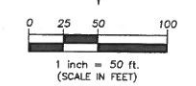
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TREE LEGEND

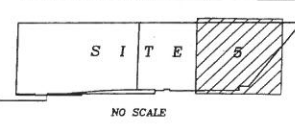
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BENCHMARKS

BM #12 Mag Hub 5+/- feet southeast of the north Gateway Trail abutment wall as shown
Elevation = 1034.12 feet
BM #13 Mag Hub 160+/- feet northwest of the northwestern line Gateway Trail as shown
Elevation = 1032.27 feet



SHEET LAYOUT



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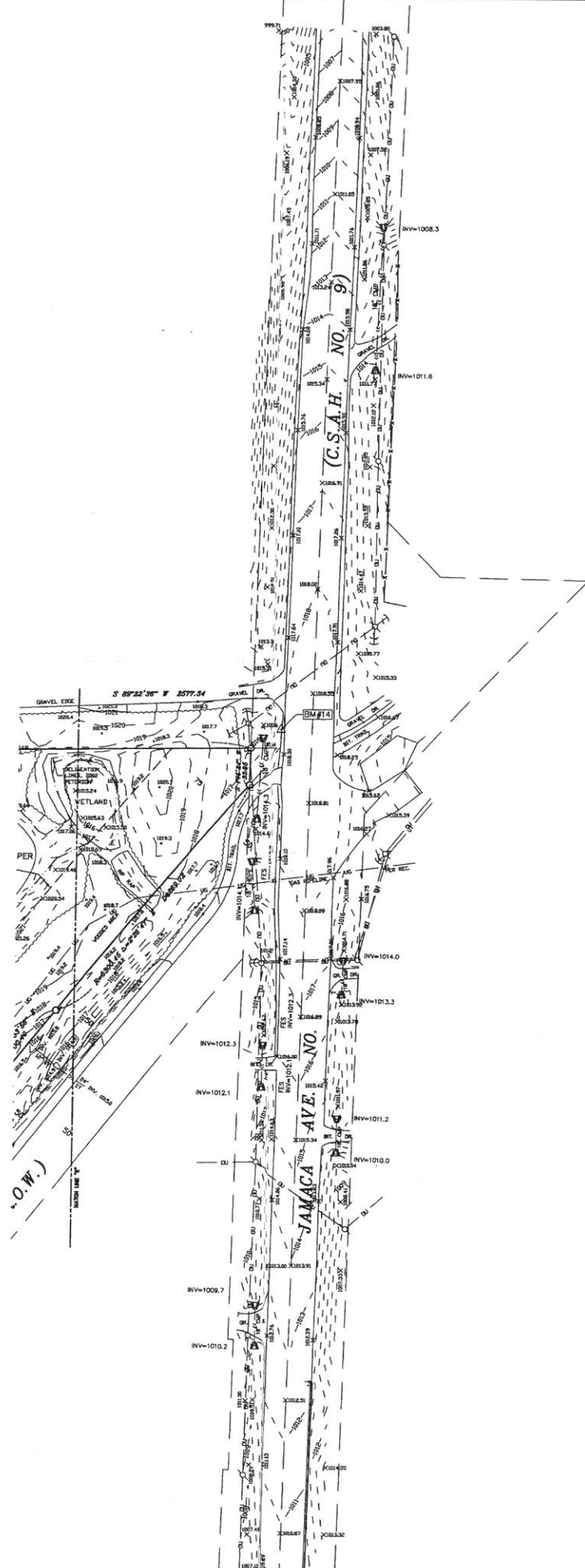
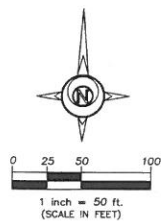
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	SHEET NO.
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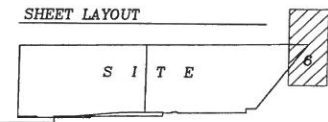
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- T.N.H. Top Nut Hydrant
- R.M. Structure Rim Elevation
- I.V. Structure Invert Elevation

BENCHMARKS

BM #14 Mag Hub 35+/- feet northeast of the northeast property corner as shown
Elevation = 1017.95 feet

SHEET LAYOUT



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SHEET NO.

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Sheet 6 of 6

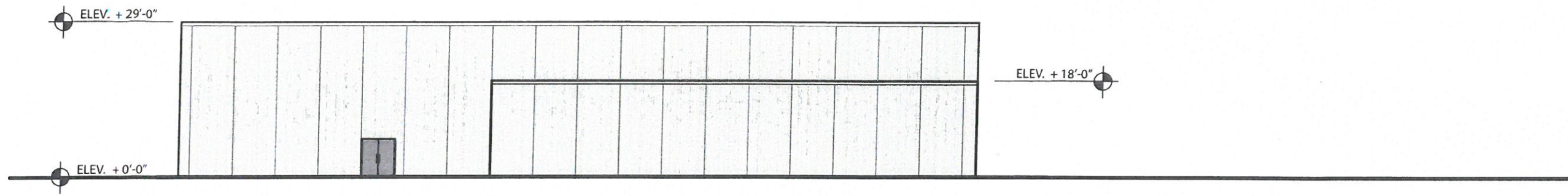


ENLARGED FRONT ELEVATION

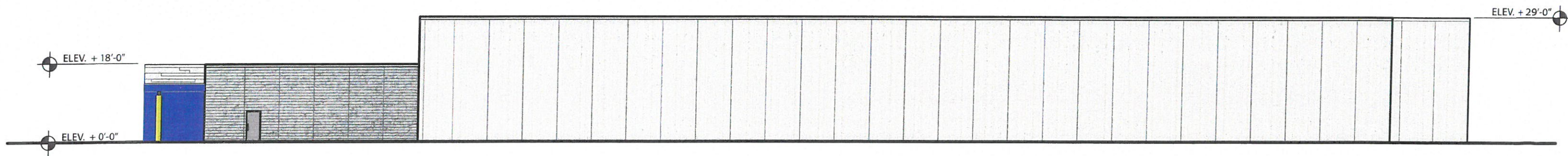
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Mahtomedi Youth Hockey Association
Ice Arena Feasibility Study

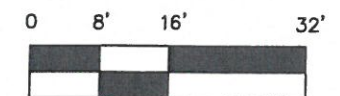
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BACK ELEVATION



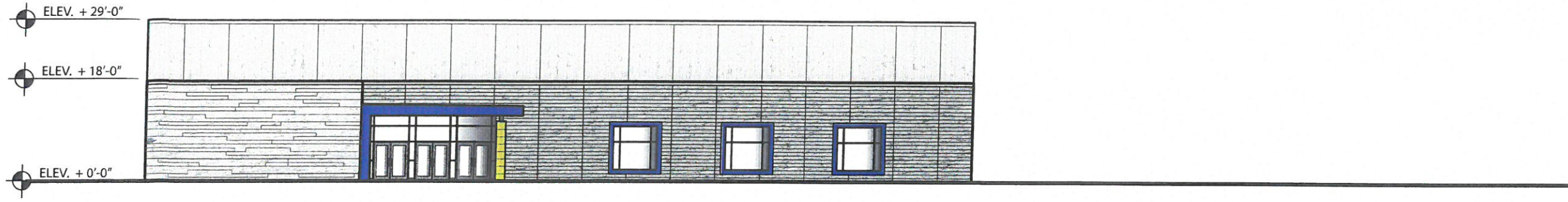
SIDE ELEVATION



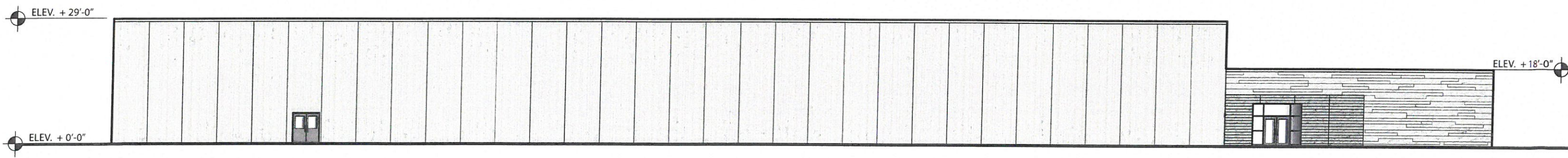
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Mahtomedi Youth Hockey Association
Ice Arena Feasibility Study

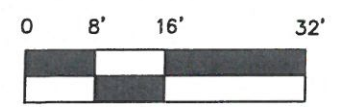
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FRONT ELEVATION



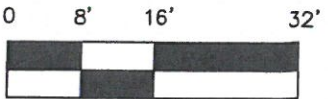
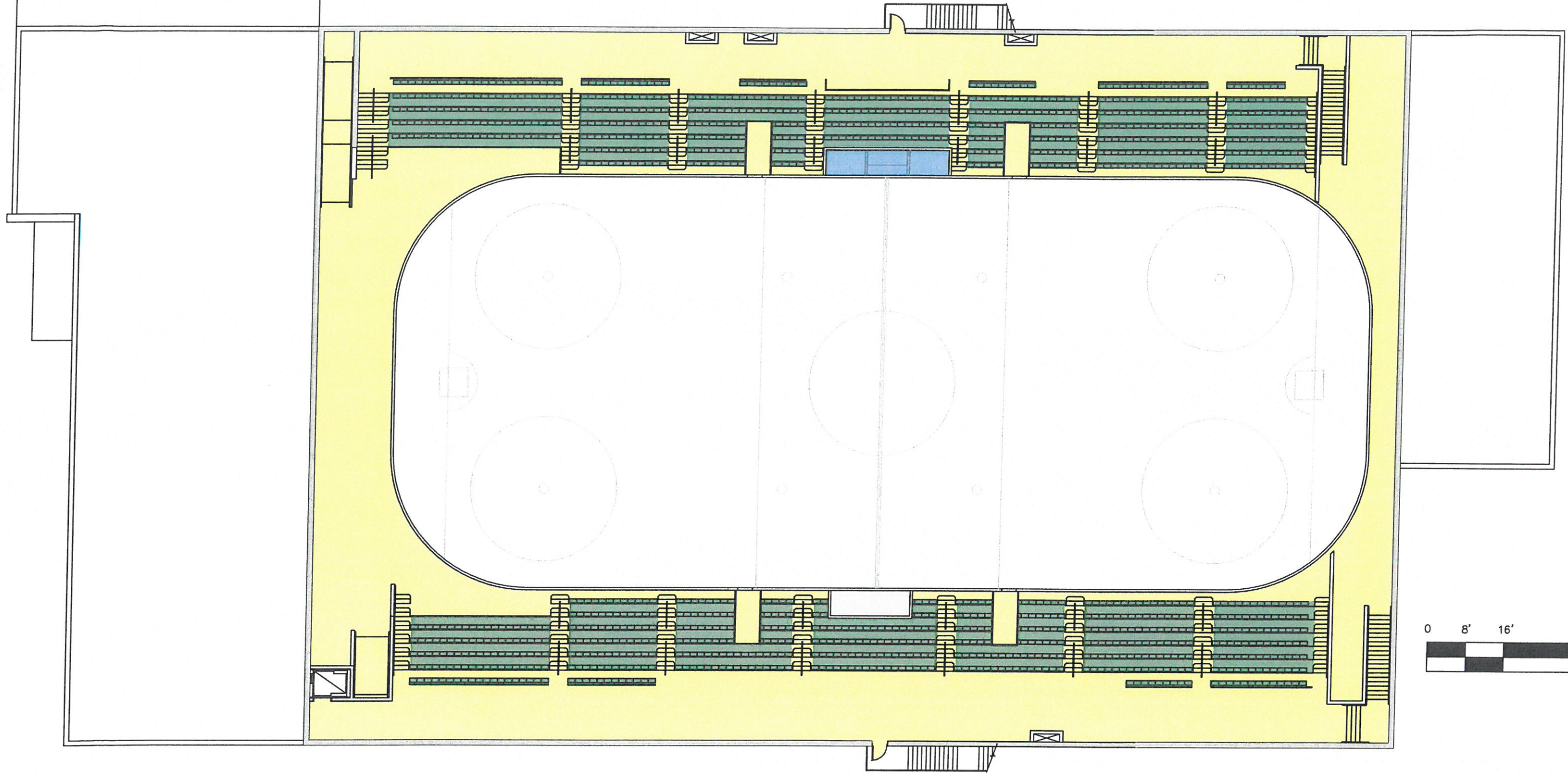
SIDE ELEVATION



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Ice Arena Feasibility Study

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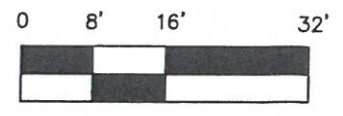
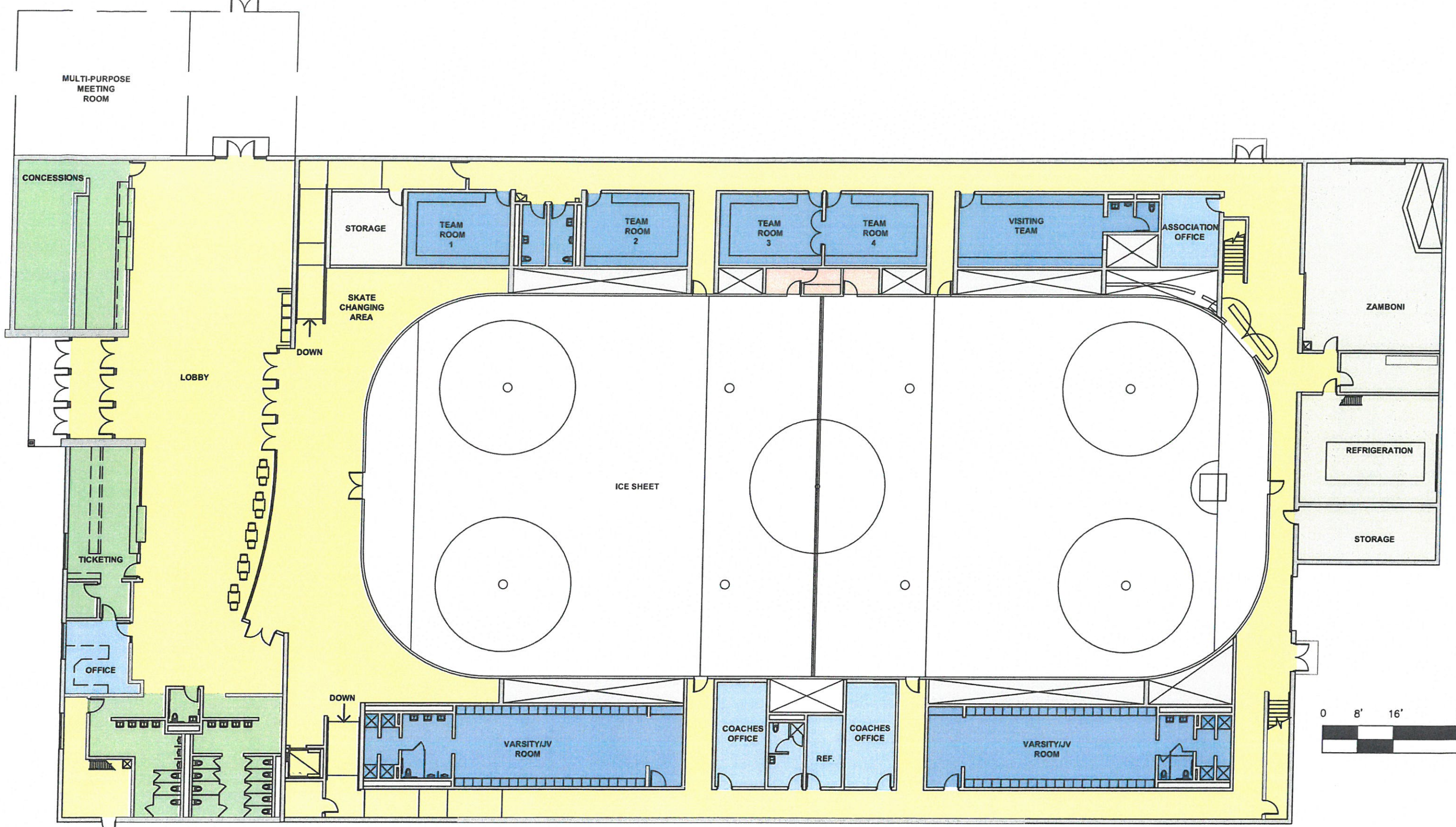
FLOOR PLAN - BLEACHER LEVEL

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date: 05.06.2016

Mahtomedi Youth Hockey Association

Ice Arena Feasibility Study

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292 DESIGN



FLOOR PLAN - ICE LEVEL

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Mahtomedi Youth Hockey Association

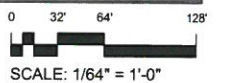
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MAHTOMEDI ICE ARENA CONCEPT SITE PLAN

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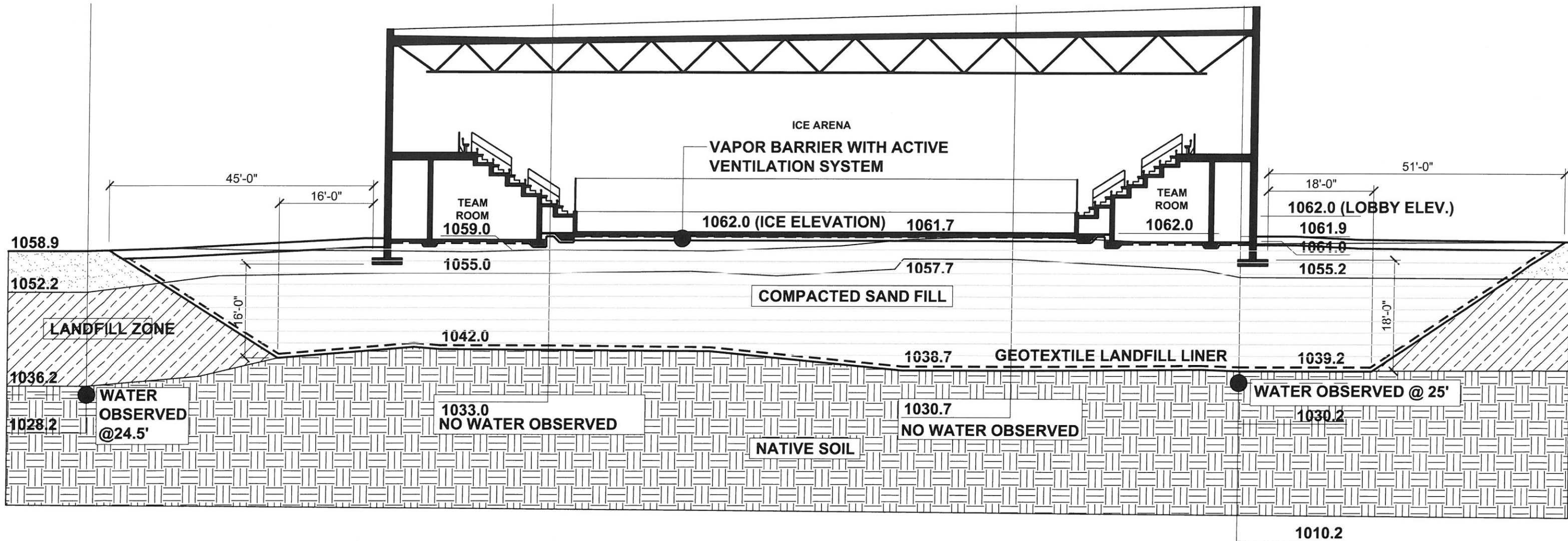


SOIL BORING
ST-1

SOIL BORING
ST-5

SOIL BORING
ST-7

SOIL BORING
ST-9



BUILDING SECTION

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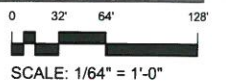
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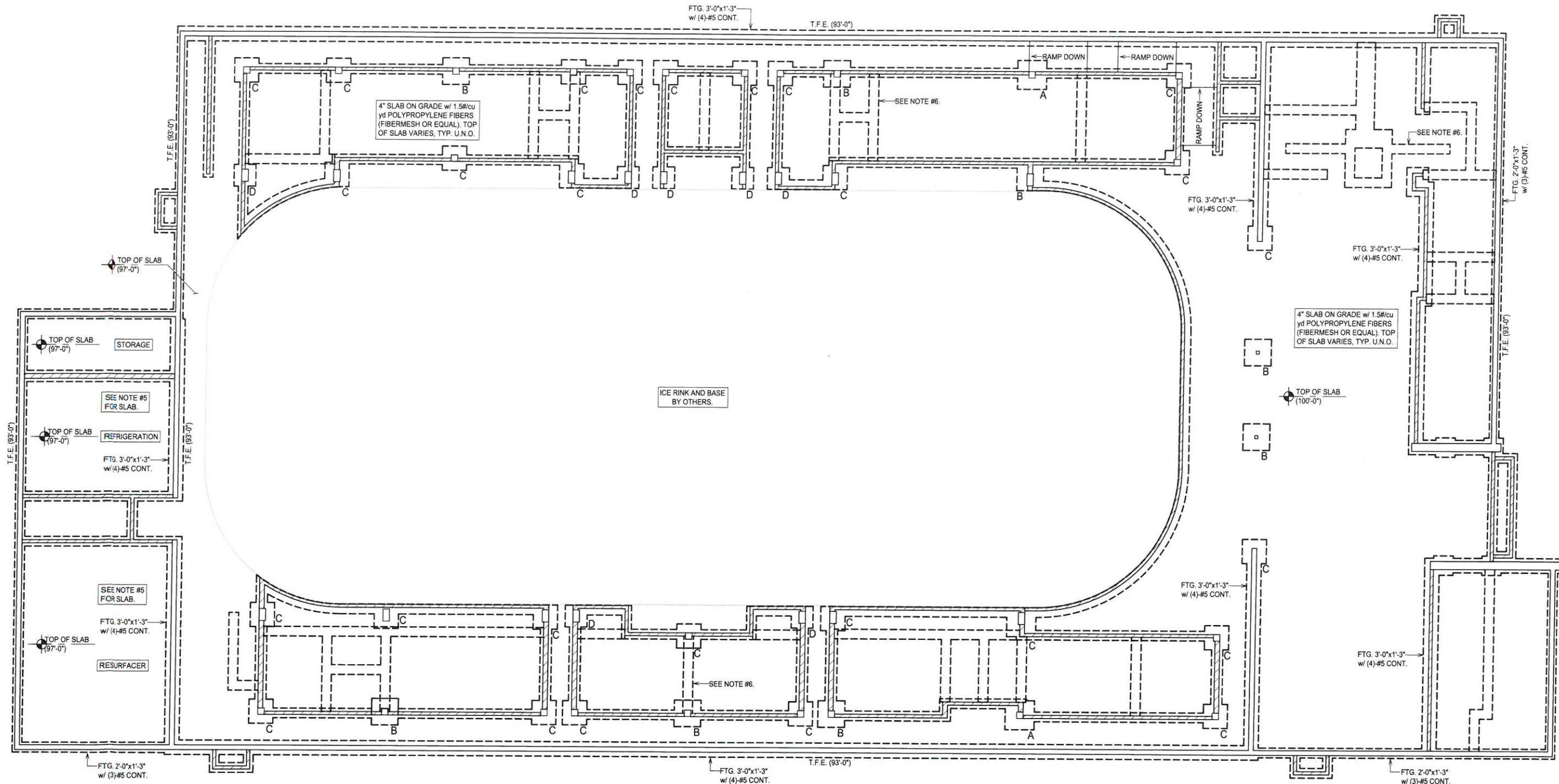


MAHTOMEDI ICE ARENA CONCEPT SITE PLAN

292DESIGNGROUP

10.18.17





SPREAD FOOTING SCHEDULE			
MARK	SIZE	REINFORCING EACH WAY, U.N.O.	NOTES
A	6'-0" x 6'-0" x 1'-5"	9-#5	-
B	5'-6" x 5'-6" x 1'-4"	8-#6	-
C	5'-0" x 5'-0" x 1'-3"	7-#5	-
D	4'-6" x 4'-6" x 1'-2"	6-#5	-
E	4'-0" x 4'-0" x 1'-1"	5-#4	-

1 PRELIMINARY FOUNDATION PLAN

- 3/32" = 1'-0"
- FOUNDATION NOTES:**
- REFERENCE ELEVATION EQUALS 100'-0" FINISH FIRST FLOOR. SEE PLAN FOR ELEVATIONS NOTED (-) FROM REFERENCE.
 - FOOTING ELEVATIONS GIVEN TO TOP OF FOOTING.
 - FOOTINGS ARE CENTERED BELOW WALLS, PIERS AND COLUMNS, U.N.O.
 - SOIL BEARING PRESSURE ASSUMED TO BE $F_s = 4000$ PSF.
 - SEE DETAILS X/SX AND X/SX FOR SLAB ON GRADE CONTROL AND CONSTRUCTION JOINTS. PROVIDE 4" THICK CONCRETE ON GRADE WITH 6#6 - W2.9/W2.9 WWF TYPICAL, U.N.O. PROVIDE 6" THICK CONCRETE SLAB ON GRADE W/ #4 @ 12" o.c. EACH WAY CENTERED IN SLAB AT ICE RESURFACER AREA AND REFRIGERATION AREA. SEE PLAN FOR LOCATION. AND AT EXTERIOR APRONS. PROVIDE 5" CONCRETE SLABS AT ALL STOOPS FOR MAN DOORS.
 - PROVIDE THICKENED SLAB FOOTING 2'-0" x 0'-8" W/ (2)-#5 CONT. UNDER ALL NON-BEARING CMU WALLS, U.N.O. SEE ARCH. FOR ALL CMU WALL LOCATIONS.

I hereby certify this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the laws of the state of Minnesota

Date: xx.xx.2015 Reg. No: xxxxx



ORIG. ISSUE DATE: XX.XX.XXXX
REVISIONS: XX.XX.XXXX

Mahtomedi Ice Arena Study

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