B -02-21-200-018
KX INVESTMENTS LLC
NOLLAR RD
AR AGRICULTURAL

601.76'
S 89°26'20" E

P.O.B.

216.00'
N 89°26'20" W

CENTER SEC. 21

EXISTING PUBLIC UTILITIES EASEMENT AS RECORDED IN LIBER 1756 PAGE 867

20'

50' REAR SETBACK

EX. TRANSFORMER

BM#1

EXISTING WELL

EXISTING BUILDING
5000 SF

480 SF

EXISTING BUILDING
5000 SF

EXISTING SEPTIC TANK

EXISTING SEPTIC FIELD

RESERVE SEPTIC FIELD

B -02-21-300-016
ADVANCED DISPOSAL SERVICES SOLID WASTE MANAGEMENT LLC
1477 E NORTH TERRITORIAL RD
GI GENERAL INDUSTRIAL

EX. GRAVEL PAVING TO REMAIN

"NO PARKING - FIRE LANE" SIGN

"NO PARKING - FIRE LANE" SIGN

PROPOSED CONCRETE PAVING

PROPOSED DUMPSTER PAD & SCREEN WALL

PROPOSED SEPTIC FIELD

PROPOSED SEPTIC TANKS

EX. GRAVEL

DEMO EX. FENCE

PR. WELL

GRAVEL PATH

PROPOSED CONCRETE SIDEWALK

EXIST. SHED

GRAVEL PAVING

SCH-40 @ 2% 6"S
22LF ADS N-12 @ 1.0% 6"R

C.O.

TRANSFORMER
ELECTRIC METER
GAS METER

CONCRETE APRON

CONCRETE APRON

DEMO EX. FENCE

50' SIDE SETBACK

468.74'
N 01°39'20" E

EXISTING INGRESS/ EGRESS & UTILITIES EASEMENT AS RECORDED IN LIBER 2019 PAGE 66

33'

PROPOSED BUILDING
18,000 SF FFE=921.25

DOWNSPOUT TYPICAL

180'

100'

STORM WATER DETENTION BASIN

8"R

6"R
200LF ADS N-12 @ 1.0%

SILTFENCE

61'

OCS

21"R
45LF CMP @ 0.44%

SILTFENCE

50' SIDE SETBACK

OVERFLOW SPILLWAY

LIMIT OF IMPROVEMENTS FOR DRAINAGE CALCULATIONS

50' WETLAND BUFFER

APPROXIMATE WETLAND BOUNDARY

85' FRONT SETBACK

125'

570.44'
N 89°26'20" W

B -02-21-300-001
GOULD, RHORY
6883 NOLLAR RD
GI GENERAL INDUSTRIAL
RESIDENTIAL

470.13'
S 05°06'30" W

NOLLAR RD R.O.W.

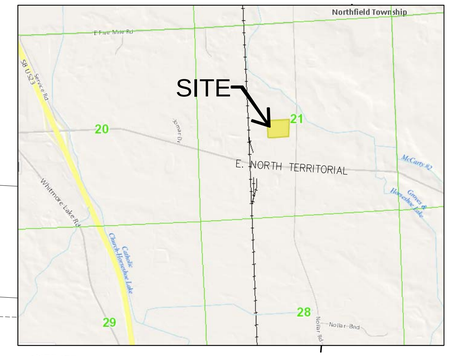
B -02-21-300-015
GYDA LEASING INC
1451 E NORTH TERRITORIAL RD
GI GENERAL INDUSTRIAL

TO NORTH TERRITORIAL RD

33'

EXISTING INGRESS/ EGRESS EASEMENT AS RECORDED IN LIBER 1956 PAGE 484

B -02-21-300-014
ADVANCED DISPOSAL SERVICES
E NORTH TERRITORIAL RD
GI GENERAL INDUSTRIAL-VACANT



VICINITY MAP

GENERAL INFORMATION

PROPERTY LOCATION:
1575 E. North Territorial
Whitmore Lake, Michigan 48189

OWNER:
Ann Arbor Dog Training Club
1575 E. North Territorial
Whitmore Lake, Michigan 48189
B -02-21-300-017

SITE PLANNER/ENGINEER/CONTRACTOR:
Vanston/O'Brien, Inc.
2375 Bishop Circle West
Dexter, Michigan 48130
(734) 424-0661
Gregory Heim, P.E.

SITE INFORMATION

ZONING:	GI GENERAL INDUSTRIAL
EXISTING USE:	CLUB
PROPOSED BUILDING USE:	CLUB
PROPOSED BUILDING AREA:	18,000 SF - 1 Story
EXISTING BUILDING AREA:	10,480 SF - 1 Story

	REQUIRED	PROPOSED
MIN. LOT AREA	5 Acre	6.26 Acres (273,975 SF)
MIN. LOT WIDTH	200'	570'
MAX. LOT COVERAGE	25%	10.4%
MAX. BUILDING HEIGHT	50' max.	25' maximum, 1 story
FRONT SETBACK	85'	125'
SIDE SETBACK	50'	61'
REAR SETBACK	50'	30'

PARKING & LOADING:

1 Space per 3 club members; 166 mem/ 3 = 55 Spaces
Total Required Parking Spaces: 55
Parking Spaces Provided:
58 parking spaces are provided, Including 4 barrier-free spaces

Loading Spaces:
1 Loading Space Provided.

SOILS INFORMATION:

MdA, Matherton sandy loam, 0 to 4 percent slopes, B
FoB, Fox sandy loam, 2 to 6 percent slopes, B
Sb, Sebewa loam, B

THERE IS NO 100 YEAR FLOOD PLAIN LOCATED WITHIN THIS SITE

BENCHMARK #1
SE CORNER TRANSFORMER PAD ELEV. = 819.22 NAVD 88

LEGAL DESCRIPTION:
REWRITE 11/91 NO 21-8A-2A-3 (002) COMMENCING AT CENTER OF SECTION 21, THENCE N 89°26'20" W 216 FEET TO THE POINT OF BEGINNING, THENCE S 05°06'30" W 470.13 FEET, THENCE N 89°26'20" W 570.44 FEET, THENCE N 01°39'20" E 468.74 FEET, THENCE S 89°26'20" E 601.76 FEET TO THE POINT OF BEGINNING, PART OF SW 1/4 SECTION 21 T1S R6E

INGRESS/EGRESS EASEMENT:
33 FOOT WIDE PRIVATE INGRESS AND EGRESS EASEMENT, WHICH HAS A WEST LINE DESCRIBED AS FOLLOWS: COMMENCING AT THE S 1/4 CORNER OF SECTION 21, T1S, R6E, NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN; THENCE N 01°55'10" E 2640.80 FEET ALONG THE N-S 1/4 LINE OF SAID SECTION TO THE CENTER OF SAID SECTION; THENCE S 05°06'30" W 470.13 FEET ALONG THE CENTERLINE OF NOLLAR ROAD; THENCE N 89°26'20" W 650.35 FEET FOR A PLACE OF BEGINNING; THENCE S 01°39'20" W 767.09 FEET FOR A PLACE OF ENDING.

LEGEND

PROPERTY LINE	EXISTING WALL MOUNTED LIGHT FIXTURE
SETBACK	NEW BUILDING MOUNTED LIGHTING
EASEMENT	EXISTING POLE-MOUNTED LIGHT
PROPOSED STORM	EXISTING UTILITY POLE
PROPOSED WATER	EXISTING MANHOLE
PROPOSED UNDERGROUND ELECTRIC & TELEPHONE	EXISTING CLEAN OUT
PROPOSED GAS	NEW CATCH BASIN
PROPOSED SANITARY	EXISTING FIRE HYDRANT
EXISTING STORM	NEW FIRE HYDRANT
EXISTING WATER	EXISTING ELEVATION
EXISTING TELEPHONE	PROPOSED ELEVATION
EXISTING ELECTRIC	
EXISTING UNDERGROUND CABLE	
EXISTING GAS	
EXISTING SANITARY	
EXISTING CENTERLINE OF DITCH	
EXISTING CONTOUR	
PROPOSED CONTOUR	
LINE OF SILT FENCE	
DRAINAGE AREA	

EXISTING BUILDING	
EXISTING GRAVEL SURFACE	
EXISTING ASPHALT PAVING	
EXISTING ASPHALT PAVING TO BE REMOVED	
PROPOSED BUILDING	
PROPOSED GRAVEL PAVING	
PROPOSED CONCRETE	

NORTH

SITE PLAN
SCALE: 1" = 30'-0"

STATE OF MICHIGAN
GREGORY HEIM
ENGINEER
No. 56447
LICENSED PROFESSIONAL ENGINEER

ANN ARBOR DOG TRAINING

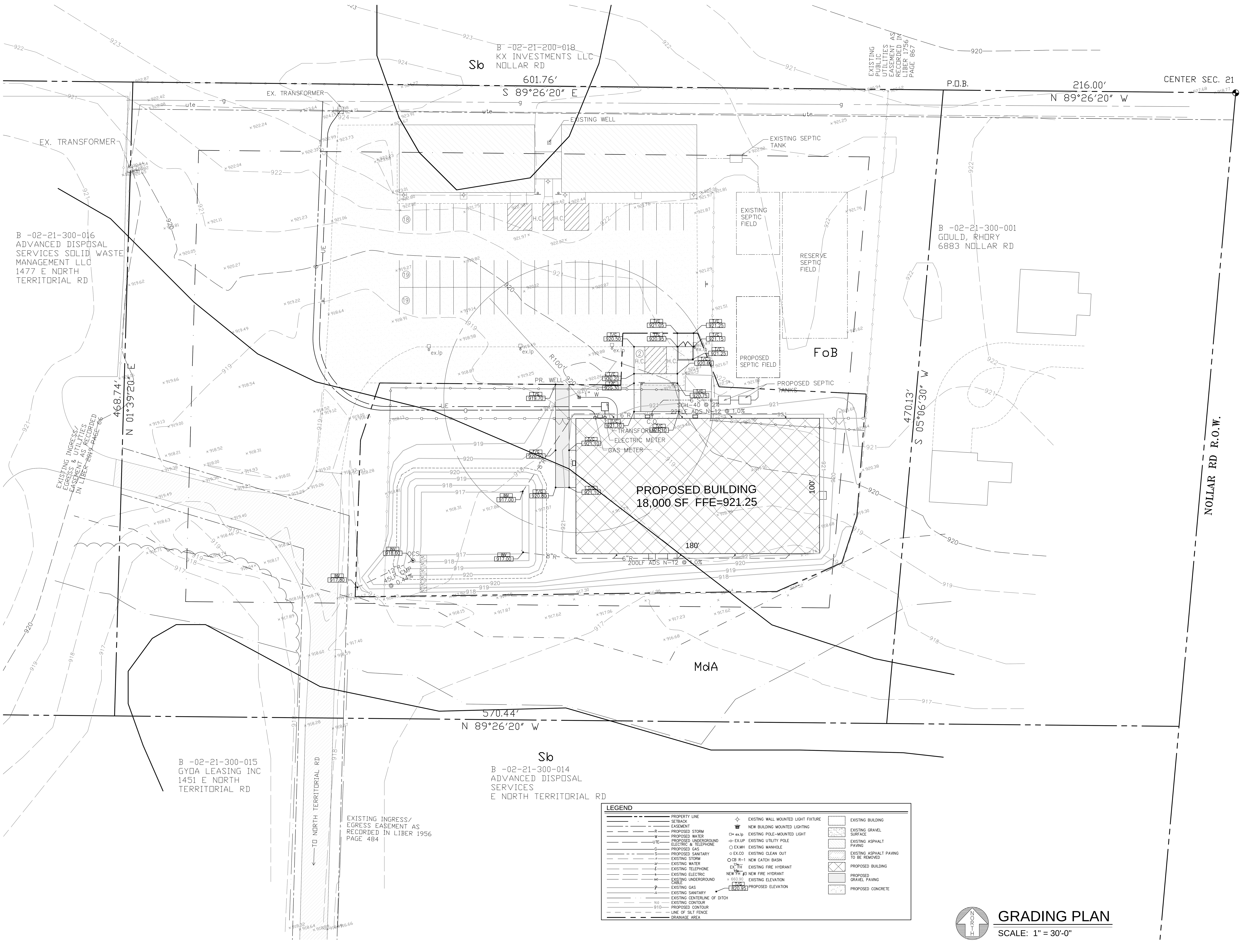
DESIGNERS BUILDERS
Vanston/O'Brien, Inc.
2375 Bishop Circle West
Dexter, MI 48130
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: sales@vanston.com • www.vanston.com

ANN ARBOR DOG TRAINING
1575 E. North Territorial Road
Northfield Township, Michigan

ISSUED FOR:	DATE:
CONDITIONAL USE	3-9-17
SITE PLAN	5-9-17
REVISED	6-5-17

DRAWN BY: GAH/CLN
JOB NO.: -

SITE PLAN
SHEET NO.
C-1


B -02-21-200-018
KX INVESTMENTS LLC
NOLLAR RD
Sb
601.76'
S 89°26'20" E
P.O.B.
216.00'
N 89°26'20" W
CENTER SEC. 21
EX. TRANSFORMER
EXISTING WELL
EXISTING PUBLIC UTILITIES EASEMENT AS RECORDED IN LIBER 1756 PAGE 867
EXISTING SEPTIC TANK
EXISTING SEPTIC FIELD
RESERVE SEPTIC FIELD
PROPOSED SEPTIC FIELD
PROPOSED SEPTIC TANKS
B -02-21-300-016
ADVANCED DISPOSAL SERVICES SOLID WASTE MANAGEMENT LLC
1477 E NORTH TERRITORIAL RD
B -02-21-300-001
GOULD, RHORY
6883 NOLLAR RD
FoB
PR. WELL
TRANSFORMER
ELECTRIC METER
GAS METER
PROPOSED BUILDING
18,000 SF FFE=921.25
100'
180'
200LF ADS N-12 @ 1.0%
OCS
12"R 45LF CMP @ 0.44%
468.74'
N 01°39'20" E
470.13'
S 05°06'30" W
NOLLAR RD R.O.W.
EXISTING INGRESS, EGRESS & UTILITIES EASEMENT AS RECORDED IN LIBER 2819 PAGE 56
MdA
570.44'
N 89°26'20" W
B -02-21-300-015
GYDA LEASING INC
1451 E NORTH TERRITORIAL RD
Sb
B -02-21-300-014
ADVANCED DISPOSAL SERVICES
E NORTH TERRITORIAL RD
TO NORTH TERRITORIAL RD
EXISTING INGRESS/ EGRESS EASEMENT AS RECORDED IN LIBER 1956 PAGE 484
LEGEND
PROPERTY LINE
SETBACK
EASEMENT
PROPOSED STORM
PROPOSED WATER
PROPOSED UNDERGROUND ELECTRIC & TELEPHONE
PROPOSED GAS
PROPOSED SANITARY
EXISTING STORM
EXISTING WATER
EXISTING TELEPHONE
EXISTING ELECTRIC
EXISTING UNDERGROUND CABLE
EXISTING GAS
EXISTING SANITARY
EXISTING CENTERLINE OF DITCH
EXISTING CONTOUR
PROPOSED CONTOUR
LINE OF SILT FENCE
DRAINAGE AREA
EXISTING WALL MOUNTED LIGHT FIXTURE
NEW BUILDING MOUNTED LIGHTING
ex.lp EXISTING POLE-MOUNTED LIGHT
EX.UP EXISTING UTILITY POLE
EX.MH EXISTING MANHOLE
EX.CO EXISTING CLEAN OUT
CB R-1 NEW CATCH BASIN
EX. FH EXISTING FIRE HYDRANT
NEW FH #3 NEW FIRE HYDRANT
x 660.90 EXISTING ELEVATION
T/G 820.95 PROPOSED ELEVATION
EXISTING BUILDING
EXISTING GRAVEL SURFACE
EXISTING ASPHALT PAVING
EXISTING ASPHALT PAVING TO BE REMOVED
PROPOSED BUILDING
PROPOSED GRAVEL PAVING
PROPOSED CONCRETE
GRADING PLAN
SCALE: 1" = 30'-0"

ANN ARBOR DOG TRAINING

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BUILDERS
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ANN ARBOR DOG TRAINING

1575 E. North Territorial Road
Northfield Township, Michigan

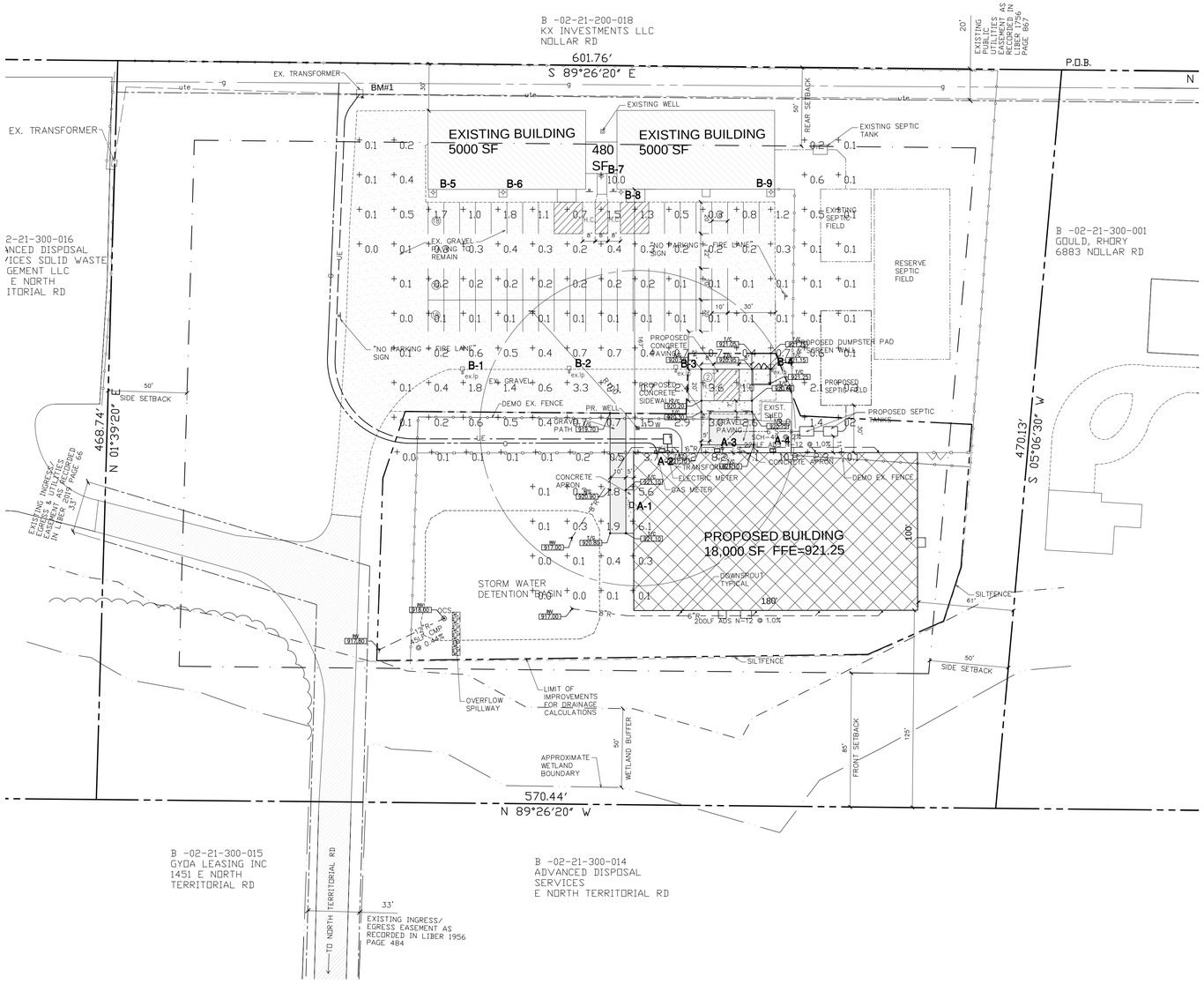
ISSUED FOR:	DATE:
CONDITIONAL USE	3-9-17
SITE PLAN	5-9-17
REVISED	6-5-17

DRAWN BY: GAH/CLN
JOB NO.: -

GRADING PLAN

SHEET NO.

C-2



LIGHTING PLAN

SCALE: 1" = 40'-0"

e-conolight® OUTDOOR

Arrangement

Single
Arm : 0 ft
Offset : -- ft

Layout

Cols (X) Rows (Y)
Layout : Varies Varies
Spacing : Varies Varies ft
Mounting Height : 16 ft
Orient : Varies deg
Tilt : 0 deg

Statistical Analysis

Illuminance Values

Average : 1.14 fc
Maximum : 14.98 fc
Minimum : 0.00 fc
Avg/Min Ratio : N.A. fc
Max/Min Ratio : N.A. fc
Max/Avg Ratio : 13.17 fc

Luminaire Location Summary

N	Arrangement	Lum #	X	Y	Z	Orient	Tilt	Tilt Factor
1	Single		-44.2	-33.0	16.0	180	0	
		A	-44.2	-33.0	16.0	180	0	1.000
2	Single		-26.0	0.0	16.0	90	0	
		A	-26.0	0.0	16.0	90	0	1.000
3	Single		9.0	0.0	16.0	90	0	
		A	9.0	0.0	16.0	90	0	1.000
4	Single		44.3	0.0	16.0	90	0	
		A	44.3	0.0	16.0	90	0	1.000

e-conolight® OUTDOOR

Arrangement

Single
Arm : 1 ft
Offset : -- ft

Layout

Cols (X) Rows (Y)
Layout : Varies Varies
Spacing : Varies Varies ft
Mounting Height : 16 ft
Orient : 90 deg
Tilt : 0 deg

Statistical Analysis

Illuminance Values

Average : 0.55 fc
Maximum : 5.69 fc
Minimum : 0.02 fc
Avg/Min Ratio : 26.98 fc
Max/Min Ratio : 280.63 fc
Max/Avg Ratio : 10.40 fc

Luminaire Location Summary

N	Arrangement	Lum #	X	Y	Z	Orient	Tilt	Tilt Factor
1	Single		-101.0	0.0	16.0	90	0	
		B	-101.0	1.0	16.0	90	0	1.000
2	Single		-34.0	0.0	16.0	90	0	
		B	-34.0	1.0	16.0	90	0	1.000
3	Single		34.0	0.0	16.0	90	0	
		B	34.0	1.0	16.0	90	0	1.000
4	Single		95.4	0.0	16.0	90	0	
		B	95.4	1.0	16.0	90	0	1.000

e-conolight® OUTDOOR

Arrangement

Single
Arm : 1 ft
Offset : -- ft

Layout

Cols (X) Rows (Y)
Layout : Varies Varies
Spacing : Varies Varies ft
Mounting Height : Varies ft
Orient : 270 deg
Tilt : 0 deg

Statistical Analysis

Illuminance Values

Average : 0.67 fc
Maximum : 10.83 fc
Minimum : 0.01 fc
Avg/Min Ratio : 45.63 fc
Max/Min Ratio : 741.66 fc
Max/Avg Ratio : 16.25 fc

Luminaire Location Summary

N	Arrangement	Lum #	X	Y	Z	Orient	Tilt	Tilt Factor
5	Single		-107.0	-5.0	16.0	270	0	
		B	-107.0	-6.0	16.0	270	0	1.000
6	Single		-62.5	-5.0	16.0	270	0	
		B	-62.5	-6.0	16.0	270	0	1.000
7	Single		0.0	5.0	12.0	270	0	
		B	0.0	4.0	12.0	270	0	1.000
8	Single		12.5	-5.0	16.0	270	0	
		B	12.5	-6.0	16.0	270	0	1.000
9	Single		107.0	-5.0	16.0	270	0	
		B	107.0	-6.0	16.0	270	0	1.000

e-conolight® OUTDOOR

Luminaire A Proposed

IES Filename : E-AL3L315NZ.IES
Description : E-AL3L315NZ
LED wall pack. Black metal housing with integrated heat sink.
Two Cree CXA3050 LED arrays

Light Loss Factor : 0.72
Number of Lamps : 1
Lamp Lumens : -1 lms
Luminaire Watts : 151 W

e-conolight® OUTDOOR

Luminaire B Existing

IES Filename : E-DD1L68C1.IES
Description : E-DD1L68C1
Gray painted metal fixture with one mounting arm on the back.One LED array.
One type CXA array

Light Loss Factor : 0.72
Number of Lamps : 1
Lamp Lumens : -1 lms
Luminaire Watts : 66 W

ANN ARBOR DOG TRAINING

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ANN ARBOR DOG TRAINING
1575 E. North Territorial Road
Northfield Township, Michigan

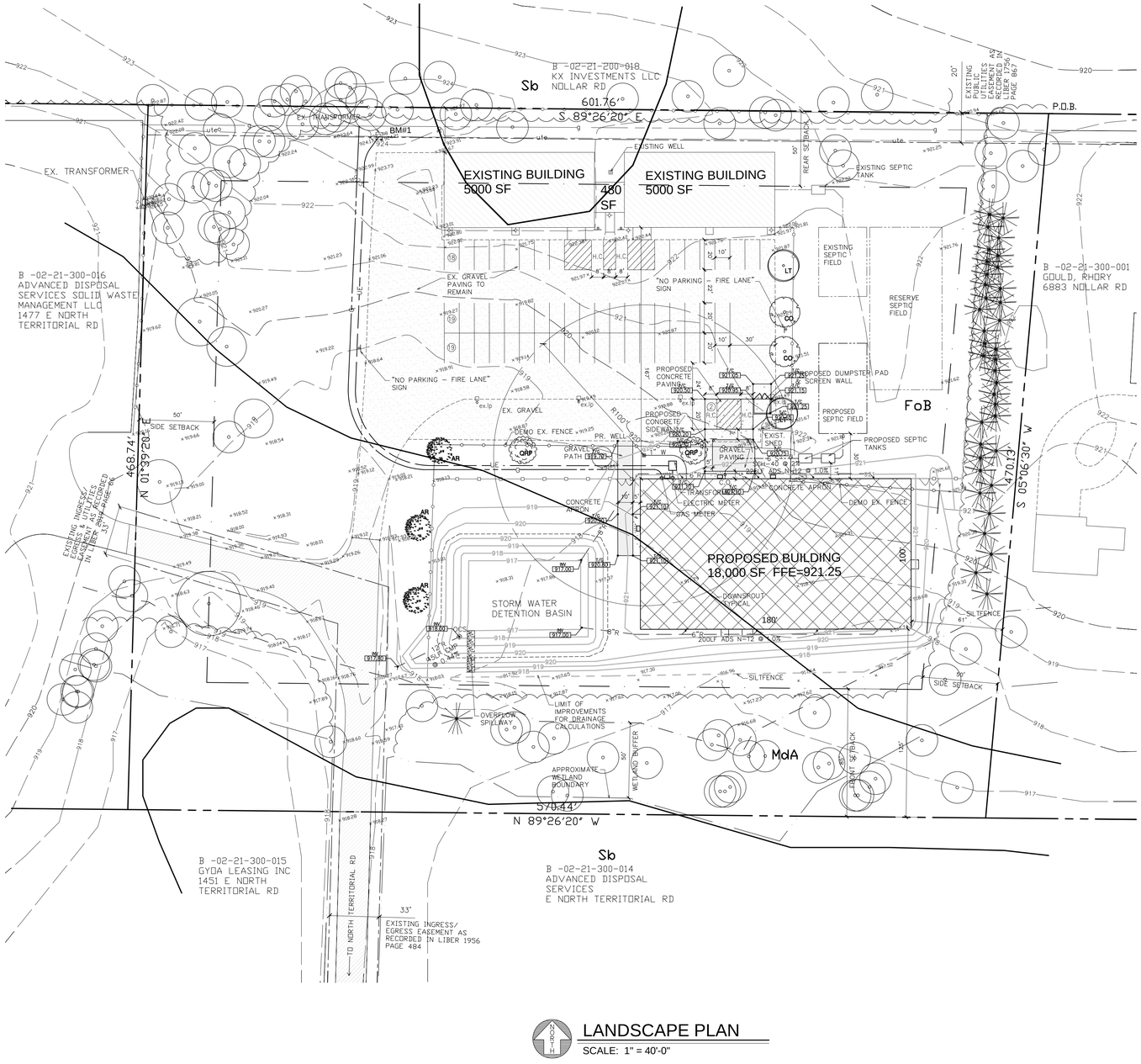
ISSUED FOR:	DATE:
CONDITIONAL USE	3-9-17
SITE PLAN	5-9-17
REVISED	6-5-17

DRAWN BY: GAH
JOB NO.: ---

LIGHTING PLAN

SHEET NO.

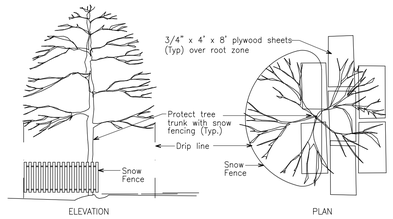
C-3



NORTH

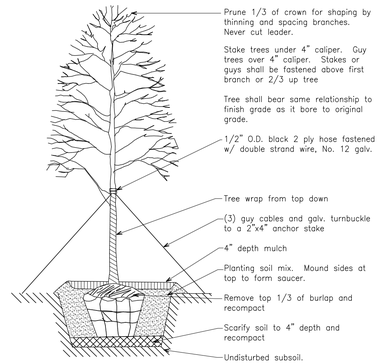
LANDSCAPE PLAN

SCALE: 1" = 40'-0"



STANDARD TREE PROTECTION

NOTE: Pull back fencing to install plywood when access in root zone is necessary.



DECIDUOUS TREE PLANTING DETAIL

Landscape Notes

1. All plant material shall meet current American Association of Nurserymen, Inc. (AAN) standard for nursery stock. (ANSI 260.1 – 1973)
2. Landscape installation shall be in accordance with the American Association of Nursery standards and with the township/City's landscape requirements.
3. Planting schedules: 1) Deciduous material shall be planted from March 15 for spring planting and from October 1 until the ground freezes for fall planting. 2) Evergreen material shall be planted from March 1 through May 31 for Spring plantings and from August 1 through September 30 for all fall planting.
4. Mulch plant beds, individual tree and shrub planting pits uniform depth of 4 inches.
5. Provide weed mat for greenbelt and foundation plantings.
6. All planting beds are to be edged. Recommended either "Permaloc Aluminum" edging or "Black Diamond" plastic edging.
7. All areas with stone cover shall have weed mat.
8. All landscaping to be continuously maintained.
9. All site improvements detailed on this plan are to be completed prior to issuance of final certificate of occupancy.
10. All construction to conform to the latest applicable Township/City regulations.
11. R.O.W. areas to be seeded or sod.
12. Tree protection consists of:
    A. Yellow ribbon barriers for large areas not disturbed by construction.
    B. Stakes 10' on center and wood snow fence around individual and groups of individual trees.
    C. Trees to be removed will be tagged with red ribbon.

    The barrier or fence surrounding the tree or group of trees shall be located no closer to the tree than the tree's drip line. If this is not possible, the barrier shall be no closer than 6 feet from the trunk of the tree or group of trees.
13. There will be no outside storage on site.
14. Seed Mix

* Temporary planting mixture for erosion control.
  - –Seed Oats 30 pounds per acre
  - –Annual Rye 10 pounds per acre

* Permanent planting mixture on all disturbed areas, excluding BMPs.
  - –Scaldis Hard Fescue 12 pounds per acre
  - –Danson's Creeping Red Fescue 6 pounds per acre
  - –Perennial Rye 20 pounds per acre
  - –Buffalo Grass 20 pounds per acre
  - –Creeping Bent 0.5 pounds per acre
  - –Little Blue Stem 20 pounds per acre
  - –Sheep Fescue 15 pounds per acre

Existing soil nutrient levels shall be tested by an independent soil testing laboratory before fertilizers are appied.

15. Rain Water Garden / Infiltration Basin Plantings

* Within areas above the first flush elevation of the infiltration basins, seeding and/or live plantings are allowed. Only native seeds (as defined by Michigan Flora, www.michiganflora.net) are allowed for permanent soil stabilization. Annual seeds are allowed in an amount necessary to temporarily stabilize the limits of disturbance.
* Within areas below the first flush elevation of the infiltration basins, only live plantings are allowed in a storm water system of any kind. Native plants are preferred. Cultivars and non–native perennials are allowable if approved by WCWRC. Plants listed on the WCWRC Rain Garden Plant List are acceptable. Invasive species are not allowed (see the City of Ann Arbor's invasive species list).

16. Large trees shall not be planted directly on top of utility pipes or service leads.

PLANT LIST

TREES

KEY	QTY	SPECIES	SIZE	SPECS
AR	3	Acer rubrum 'Autumn Blaze' Autumn Blaze Red Maple	2.5" cal	B&B
CO	2	Celtis occidentalis Hackberry	2.5" cal	B&B
LT	2	Liriodendron tulipifera Tulip Poplar	2.5"cal	B&B
QRP	2	Quercus x warei 'Long' Regal Prince Oak	2.5" cal	B&B

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ANN ARBOR DOG TRAINING

1575 E. North Territorial Road
Northfield Township, Michigan

ISSUED FOR:	DATE:
CONDITIONAL USE	3-9-17
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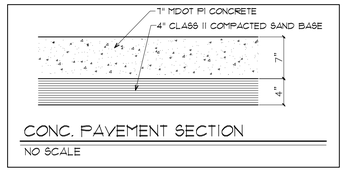
REVISED	6-5-17

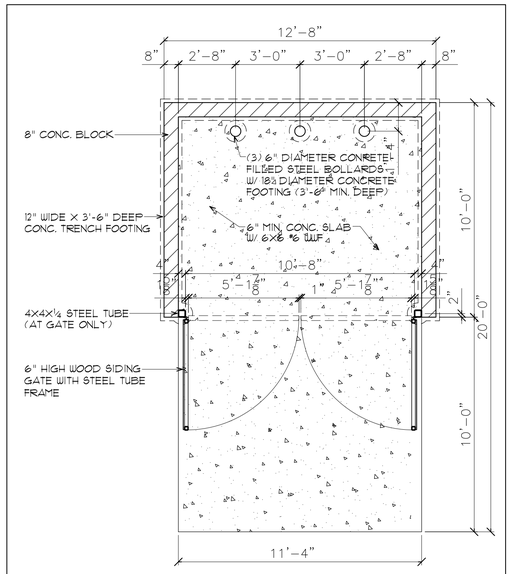
DRAWN BY: GAH
JOB NO.: ---

LANDSCAPE PLAN
SHEET NO.
C-4

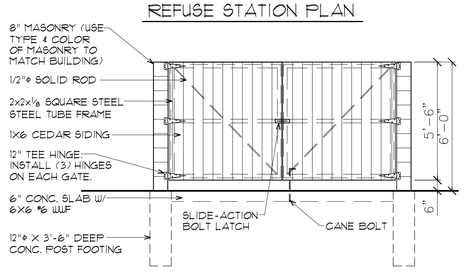


CONC. PAVEMENT SECTION

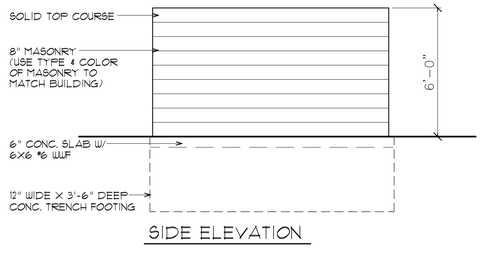
NO SCALE



REFUSE STATION PLAN



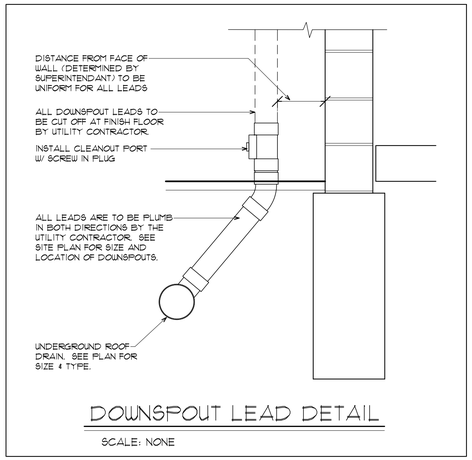
FRONT ELEVATION



SIDE ELEVATION

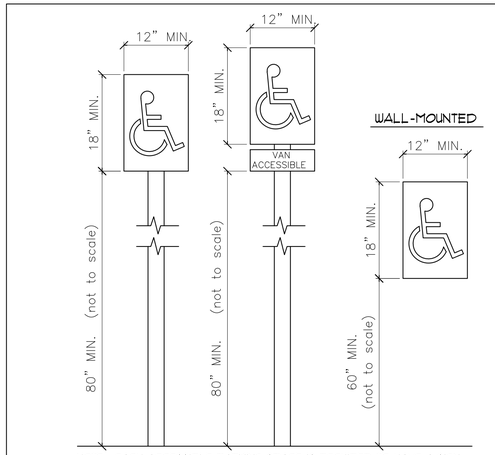
MASONRY DUMPSTER DETAIL

NO SCALE



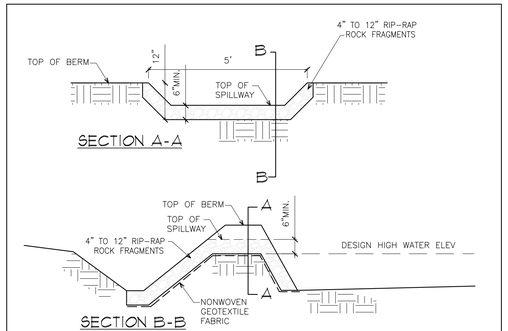
DOWNSPOUT LEAD DETAIL

SCALE: NONE



NOTE: EACH ACCESSIBLE PARKING SPACE IS REQUIRED TO HAVE A SIGN. THE SIGN SHALL BE CENTERED IN THE PARKING SPACE. VAN ACCESSIBLE SPACES SHALL BE DESIGNATED "VAN ACCESSIBLE" ON THE FACE OF THE SIGN OR SHALL HAVE AN ADDITIONAL SIGN "VAN ACCESSIBLE" MOUNTED BELOW THE REQUIRED SIGN.

BARRIER-FREE PARKING SIGN



OVERFLOW SPILLWAY DETAIL

NO SCALE

WASHTENAW COUNTY — DETENTION VOLUME CALCULATIONS

PROPOSED DRAINAGE CALCULATION

	ACRES		ON-SITE
Impervious Area (0.95)	0.44	C=	0.61
Pervious Area (0.30)	0.70	A=	1.33 ACRES
Impervious Area (0.85)	0.07		
Bankfull Basin (1.0)	0.13		
ALLOWABLE RELEASE RATE=			0.15 CFS/AC
$Q_{a(on-site)}$ = ALLOWABLE RELEASE RATE x A =			0.20 CFS

FIRST FLUSH VOLUME

V_{ff} =(1")(1/12")(43560SF/1ac) x A x C= **V_{ff} =** 2945 cf

Pre-Development Bankfull Volume

2-year/24 hour storm event	**P=**	2.35 in.
Pre-Development CN	**CN=**	58
S = 1000/CN - 10=	**S=**	7.241 in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.100 in.
Total Site Area (sf) excl. S-C BMPs	**A=**	58060 sf
V_{bf-pre} = Q/12 x A	**V_{bf-pre}=**	483 cf

Pervious Cover Post-Development Bankfull Volume

2-year/24 hour storm event	**P=**	2.35 in.
Pervious Cover CN	**CN=**	61
S = 1000/CN - 10=	**S=**	6.393 in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.154 in.
Pervious Cover Area (sf)	**Ap=**	30455 sf
$V_{bf-per\ post}$ = Q/12 x Ap	**$V_{bf-per\ post}$=**	390 cf

Impervious Cover Post-Development Bankfull Volume

2-year/24 hour storm event	**P=**	2.35 in.
Impervious Cover CN	**CN=**	97
S = 1000/CN - 10=	**S=**	0.349 in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	1.978 in.
Impervious Cover Area (sf)	**Ai=**	27605 sf
$V_{bf-imp\ post}$ = Q/12 x Ai	**$V_{bf-imp\ post}$=**	4550 cf

Pervious Cover Post-Development 100-Year Volume

100-year storm event	**P=**	5.11 in.
Pervious Cover CN	**CN=**	61
S = 1000/CN - 10=	**S=**	6.393 in.
Q_{100per} = (P-0.2S)^2 / (P+0.8S)	**$Q_{100-per}$=**	1.436 in.
Pervious Cover Area (sf)	**$A_{100-per}$=**	30455 sf
$V_{100-per\ post}$ = Q/12 x Ap	**$V_{100-per\ post}$=**	3644 cf

Impervious Cover Post-Development 100-Year Volume

100-year storm event	**P=**	5.11 in.
Impervious Cover CN	**CN=**	97
S = 1000/CN - 10=	**S=**	0.349 in.
Q_{100imp} = (P-0.2S)^2 / (P+0.8S)	**$Q_{100-imp}$=**	4.714 in.
Impervious Cover Area (sf)	**$A_{100-imp}$=**	27605 sf
$V_{100-imp}$= Q/12 x A_{100imp}	**$V_{100-imp}$=**	10844 cf

Runoff Summary

V_{ff} =	**2945 cf**
V_{bf-pre}=	**483 cf**
$V_{bf-per\ post}$=	390 cf
$V_{bf-imp\ post}$=	4550 cf
$V_{bf-post}$=	**4940 cf**
V_p=	**0 cf**
$V_{100-per}$ =	3644 cf
$V_{100-imp}$ =	10844 cf
V_{100}=	**14488 cf**

On-Site Infiltration Requirement

Greator of First Flush volume or Difference between pre and post development bankfull volumes

Bankfull Volume Difference = $V_{bf-post}$ -V_{bf-pre} = **4457 cf**

INFILTRATION DESIGN

Required Infiltration	$V_{req-inf}$ =	4457 cf
Depth of basin storage	d =	1 ft
Field Infiltration Rate	I_f =	0.5 in/hr
Design Infiltration Rate I_d =I_f /2	I_d =	0.25 in/hr
Infiltration period	t_i =	6 hr
Infiltration Interface Area	A_i =	4100 sf
Initial Infiltration Volume		
V_i =A_i x I_d(in/hr) x 1(ft)/12(in) x t_i (hr)=	V_i =	512 cf
Basin Storage Volume	V_b =	4100 cf
Total Proposed Infiltration	**V_{inf}=**	**4612 cf**

On-Site Infiltration Proposed

On-Site design soil infiltration rate I_d =	0.25 in/hr
PROPOSED INFILTRAION V_{inf} =	**4612 cf**
INFILTRATION PERIOD T_i =	**54.0 hr**

DRAINAGE AREA CALCULATIONS

Pre-Development	Cover Type	Soil Type	AREA(sf)	AREA(ac)	C Value	CN	CN*A
BbB	Meadow	B	58060	1.333	0.30	58	77
		TOTAL	58060	1.333	Weighted CN	58	
Post-Development	**Cover Type**	**Soil Type**	**AREA(sf)**	**AREA(ac)**	**C Value**	**CN**	**CN*A**
Impervious	Pavement	B	1195	0.027	0.95	98	3
	Pond	B	5500	0.126	1	98	12
	Gravel	B	2910	0.067	0.85	85	6
	Building	B	18000	0.413	0.95	98	40
		TOTAL	27605	0.634	Weighted CN	97	
Pervious	Lawn	B	30455	0.699	0.30	61	43
		TOTAL	30455	0.699	Weighted CN	61	

Time of Concentration

Flow Type	K	Elev. Change	Length (L)	Slope % (S)	$S^{0.5}$	$V=K*S^{0.5}$	T_c=L / (V*3600)
Sheet Flow	0.48	4.0	300	1.300	1.140	0.547	0.152
Waterway	1.20	0.5	100	1.300	1.140	1.368	0.020
Small Tributary	2.10	0.0	0	0.000	0.000	0.000	0.000

T_c= 0.17 hr

Q_p = 238.6 x $T_c^{0.82}$= Q_p = 1007.77 cfs/in-mi^2

Total Site Area (ac) excl. SC-BMPs A= 1.33 ac

Q_{100} = $Q_{100-per}$ + $Q_{100-imp}$ = Q_{100}= 6.15 in

Peak Flow (PF) = Q_p x Q_{100} x A / 640 PF= 12.91 cfs

Δ = PF(cfs) - 0.15(cfs/ac)*A(ac) Δ= 12.71 cfs

V_d = Δ / PF x V_{100} **V_d= 14263 cf**

REQUIRED DETENTION VOLUME WITH INFILTRATION

V_{det} = V_0 -V_{inf} = V_{det} = 9651 cf

BASIN STORAGE PROVIDED

ELEV.	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT3)	
920.6	8935	0.6	5,041	17,592	**Freeboard**
920	7867	1	7,054	12,552	**Design Volume**
919	6240	1	5,498	5,498	
918	4756	1	4,100	4,100	**Infiltration**
917	3443	0	0	0	

BOTTOM OF BASIN	X_b =	917.00
INFILTRATION	X_I =	918.00
FIRST FLUSH	X_{FF} =	917.72
BANKFULL	X_{BF} =	918.60
100 YEAR	X_{ℓ} =	919.59

PROPOSED OUTLET CONTROL

BANKFULL FLOOD

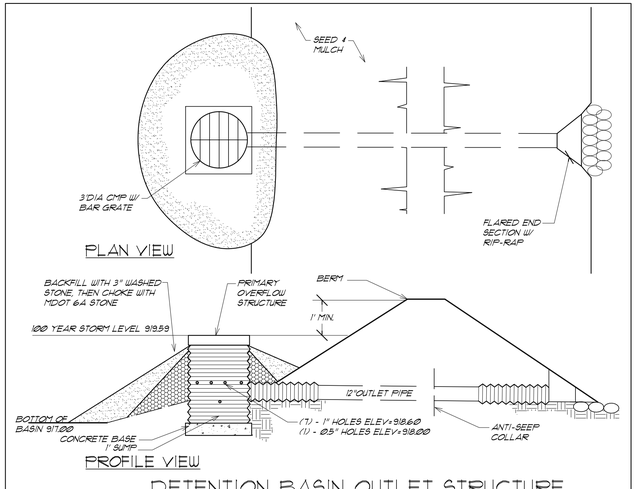
A PORTION OF THE BANKFULL VOLUME SHALL BE STORED FOR INFILTRATION
THE REMAINING VOLUME SHALL DISCHARGE THROUGH HOLES AT THE TOP OF THE INFILTRATION STORAGE Xi
REMAINING VOLUME = 328 CF
QBF = REMAINING VOLUME x (1 / 24HRS) x (1 / 3600SEC) = 0.004 CFS
PLACE OPENINGS AT INFILTRATION STORAGE ELEVATION = 918.00
have = 2/3 x (XBF - Xi) = 0.40 FT
A = QBF / { O.62 * SQRT(2*32.2*have)} = 0.001 SF
A 0.5 INCH DIAMETER ORIFICE HAS AN AREA OF 0.001 SF
A/ 0.001 = 0.88
THEREFORE, USE 1 0.5 INCH DIAMETER HOLES AT ELEV. = 918.00

100 YEAR FLOOD

Q_a = ALLOWABLE RELEASE RATE x AREA SITE IN ACRES= 0.20 CFS
Q_a IS A PEAK OR MAXIMUM FLOW. CALCULATE THE MAXIMUM FLOW PASSING THROUGH BANKFULL ORIFICES, USING THE TOTAL HEAD, AND SUBTRACT FROM Q_a TO DETERMINE THE ORIFICE SIZE TO RELEASE THE 100 YEAR STORM VOLUME:
Q_{BF} = 0.62x#HOLES$_{FF}$xAREA EACH HOLE$_{FF}$x(2*32.2*(X_{100}-X))$^{0.5}$
Q_{BF} = 0.01 CFS
Q_a - (Q_{BF}) = 0.19 CFS
A= Q_a / (0.62 * (2 *32.2 * (X_{100}-X_{BF})$^{0.5}$) = 0.039 SF
A 1 INCH DIAMETER ORIFICE HAS AN AREA OF 0.005 SF
A/ 0.005 = 7.10
THEREFORE, USE THE FOLLOWING NUMBER OF 1" DIAMETER HOLES:
7 HOLES AT ELEV. = 918.60

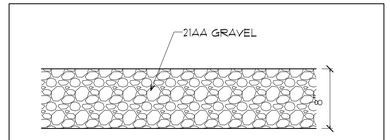
SUMMARY OF REQUIRED STANDPIPE HOLES:

ELEVATION	# OF HOLES	DIAMETER OF HOLES	
918.60	**7**	**1**	**in.**
918.00	**1**	**0.5**	**in.**



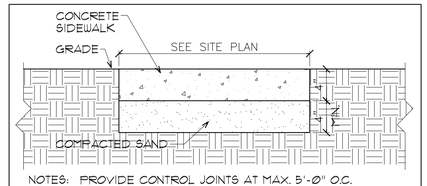
DETENTION BASIN OUTLET STRUCTURE

NO SCALE



TYPICAL GRAVEL SECTION

SCALE: NONE



NOTES: PROVIDE CONTROL JOINTS AT MAX. 5'-Ø" O.C.
PROVIDE EXPANSION JOINTS AT MAX. 20'-0" O.C.

CONCRETE SIDEWALK DETAIL

NO SCALE

ANN ARBOR DOG TRAINING

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS

2375 Bishop Circle West
Dexter, MI 48130
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: sales@vanston.com ◦ www.vanston.com

ANN ARBOR DOG TRAINING
1575 E. North Territorial Road
Northfield Township, Michigan

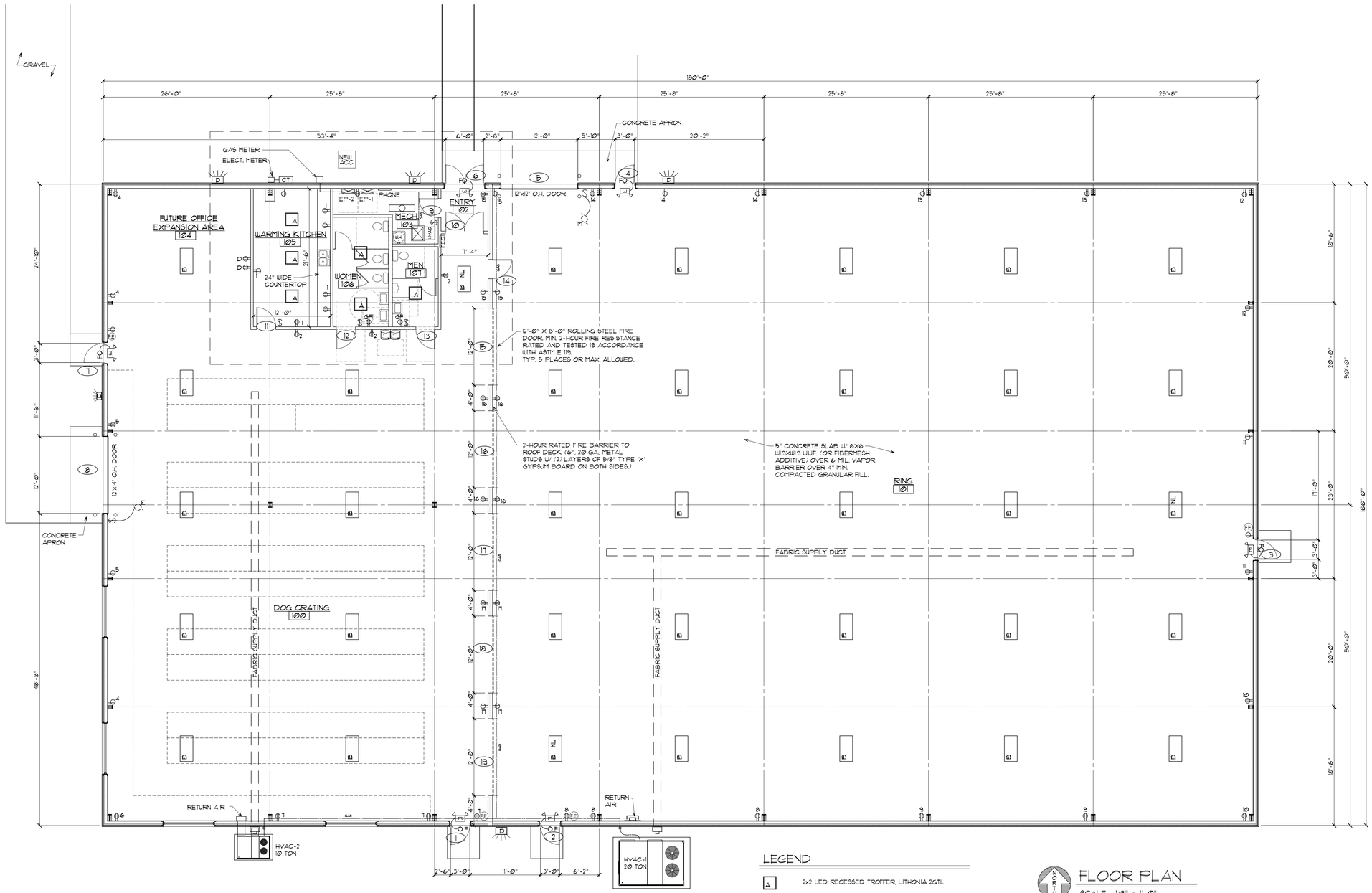
ISSUED FOR:	DATE:
CONDITIONAL USE	3-9-17
SITE PLAN	5-9-17
REVISED	6-5-17

DRAWN BY: GAH/CLN
JOB NO.: –

DETAIL SHEET

SHEET NO.

C-5



LEGEND

A	2x2 LED RECESSED TROFFER, LITHONIA 2GTL
B	2X4 LED HIGH-BAY, LITHONIA IBH (12,000 LUMENS)
B EM	SAME AS 'B' W/ BATTERY BACKUP
B NL	SAME AS 'B' ON A NIGHT LIGHT CIRCUIT
C	4'-0" LONG, 2 TUBE, CHAIN HUNG, FLUORESCENT LIGHT FIXTURE
D	LED, 16 WATT, WALL-MOUNTED, DOWN LIGHT, EXTERIOR FIXTURE.
	X EXIT SURFACE MOUNTED EMERGENCY EXIT SIGN SHALL BE "LED" W/ BATTERY BACK UP. LITHONIA # LQM6W3R 120/277 EL
	XI EXIT/COMBO SAME AS TYPE EBU AND X EXCEPT COMBINATION. LITHONIA # LHQM6W3R 120/277 N.
FQ	REMOTE EMERGENCY EGRESS UNIT VIA 'E'.
	BATH EXHAUST FAN
	NEW DUPLEX ELECTRICAL RECEPTACLE. NUMBER DEFINES CIRCUIT.
D	SAME AS ABOVE - ON DEDICATED CIRCUIT
$	SWITCH
$3	THREE-WAY SWITCH
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER IN CABINET

FLOOR PLAN

SCALE: 1/8" = 1'-0"

HVAC, PLUMBING & ELECTRICAL GENERAL NOTES:

1. These drawings are to be considered as design drawings only, and are meant to establish minimum requirements for the project.
2. Work not identified on the drawings, however, required by code and/or required to provide complete operable systems shall be the subcontractors responsibility.
3. Subcontractor shall be responsible for final shop drawings, properly engineered and containing all information as may be required by the local Building Department for issuance of the building permit. Sealed drawings shall not be part of the subcontractors responsibility.

MECHANICAL NOTES:

1. All supply air ducts shall be wrapped with insulation.
2. HVAC contractor shall be responsible for all roof curbs, wall penetrations, curbs, flashings and sealants as required.
3. Supply and return air duct sizes to be determined by mechanical contractor.
4. Gas piping sizes shall be determined by mechanical contractor.

PLUMBING NOTES:

1. All sanitary piping shall be SCH. 40 PVC.
2. All hot and cold water piping shall be type K copper.
3. All cold water piping shall be insulated.

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ANN ARBOR DOG TRAINING

1575 E. North Territorial Road
Northfield Township, Michigan

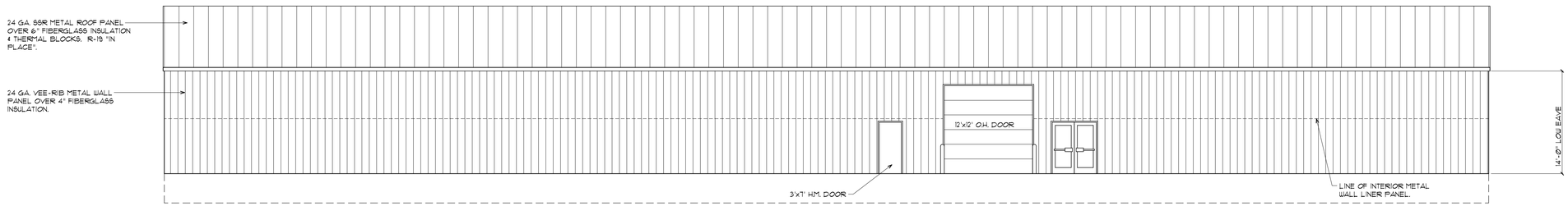
ISSUED FOR:	DATE:
REVIEW	5-31-12
PROPOSAL	6-5-12
REVISED	4-26-16
REVISED	5-3-16
PROPOSAL	7-11-16
REVISED	5-17-17

DRAWN BY: CLN/SA
JOB NO.: –

FLOOR PLAN

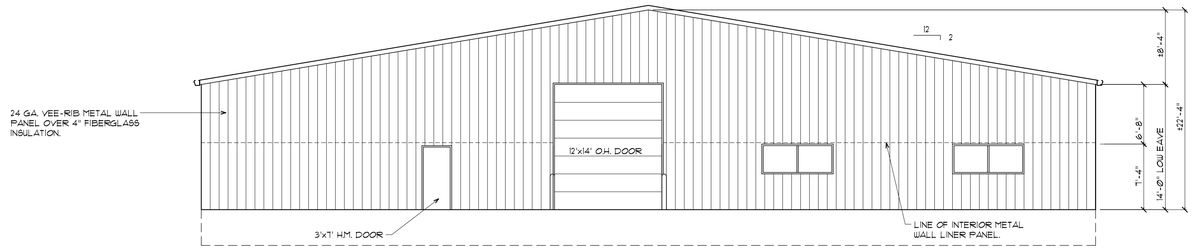
SHEET NO.

A-1



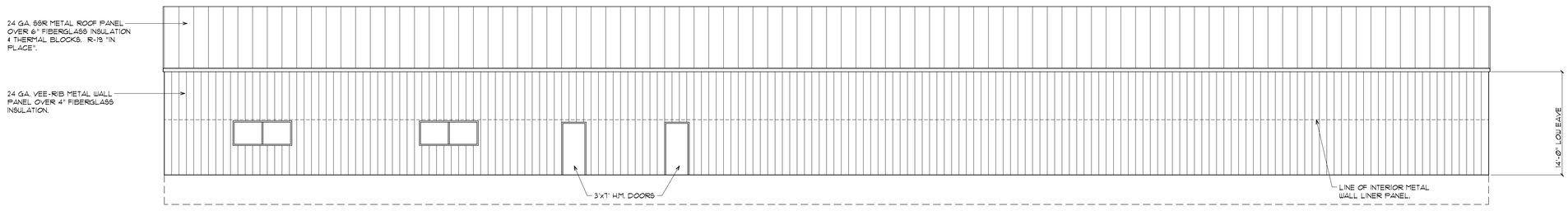
NORTH ELEVATION

SCALE: 1/8" = 1'-Ø"



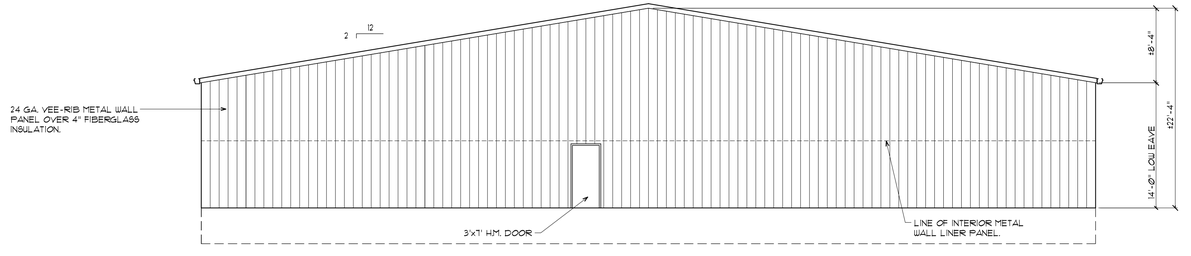
WEST ELEVATION

SCALE: 1/8" = 1'-Ø"



SOUTH ELEVATION

SCALE: 1/8" = 1'-Ø"



EAST ELEVATION

SCALE: 1/8" = 1'-Ø"

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REVISED	5-3-16
PROPOSAL	7-11-16
REVISED	5-17-17

DRAWN BY: CLN
JOB NO.: –

ELEVATIONS

SHEET NO.

A-2