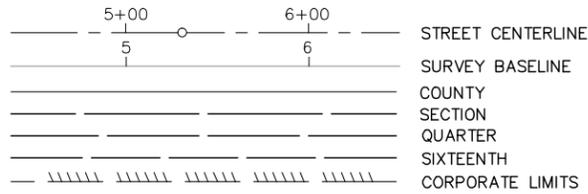
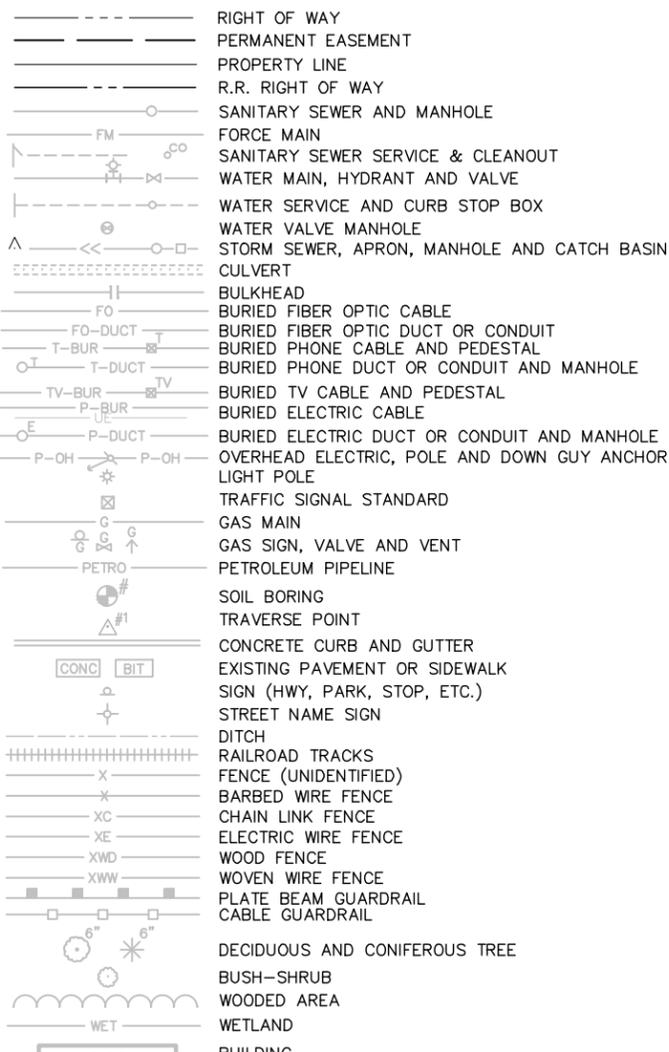


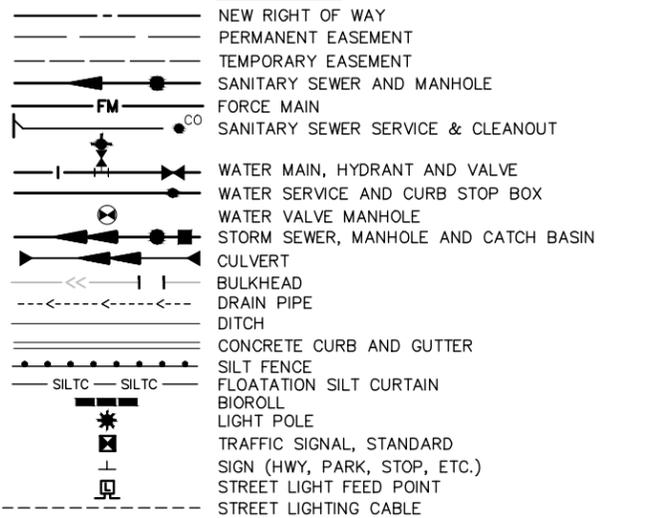
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EXISTING



PROPOSED

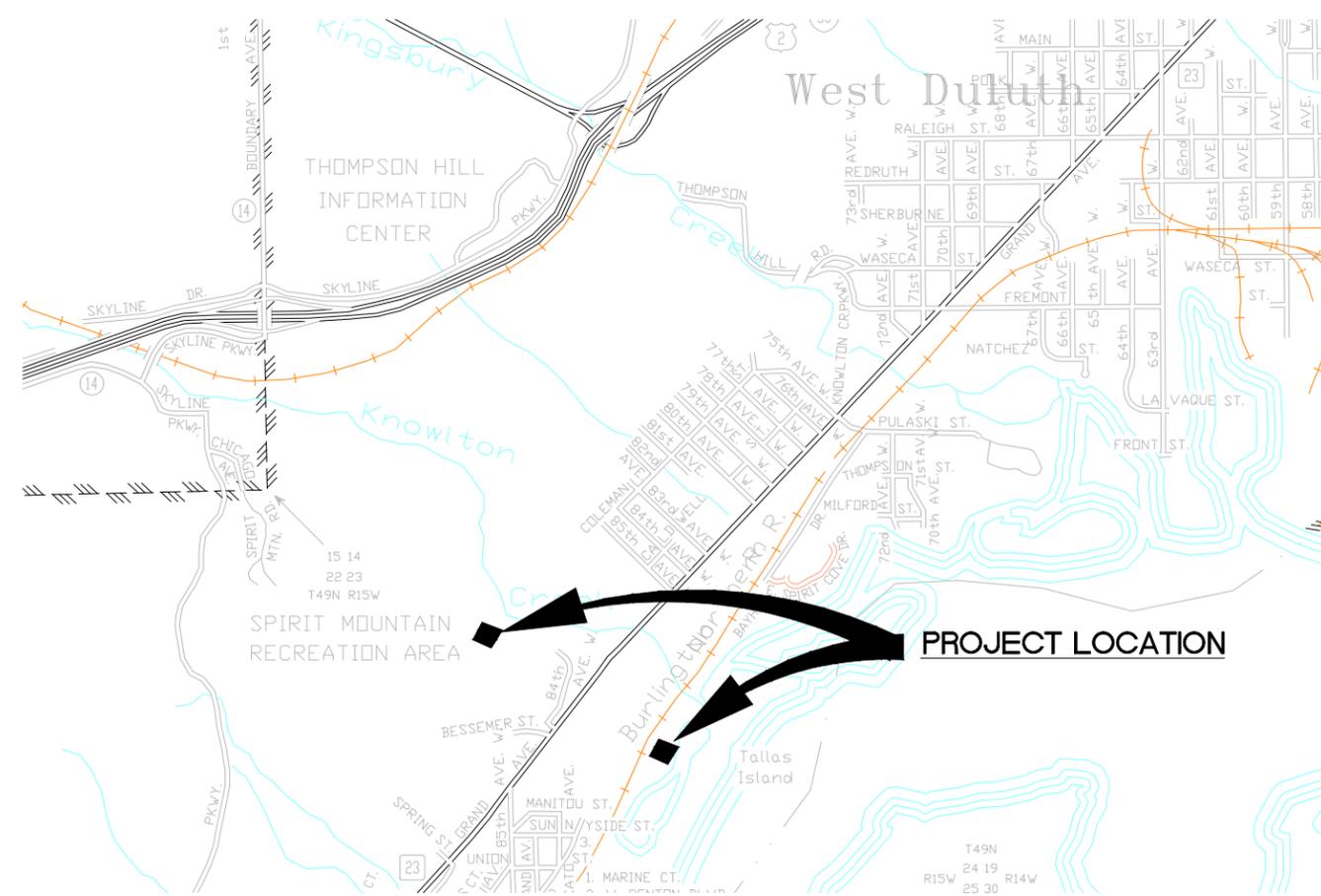


SPIRIT MOUNTAIN CITY OF DULUTH, MINNESOTA

CONSTRUCTION PLANS FOR INFRASTRUCTURE IMPROVEMENTS

CONTRACT "B" PUMP STATIONS

CLIENT PROJECT NO. 129137



NOTE:
THE SUBSURFACE UTILITY QUALITY INFORMATION IN THIS PLAN IS LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02 ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

THE CONTRACTOR SHALL CALL THE GOPHER STATE ONE CALL SYSTEM AT 811 BEFORE COMMENCING EXCAVATION.



SHEET NO.	DESCRIPTION
C1	TITLE SHEET
C2	SITE PLAN MAIN PUMP STATION
C3	SITE PLAN RIVER PUMP STATION
S1	RIVER P.S. FOUNDATION / FLOOR PLAN
S2	RIVER P.S. PRECAST COVER AND ROOF PLANS
S3	RIVER P.S. BUILDING SECTIONS
S4	RIVER P.S. BUILDING SECTION AND DETAILS
S5	MAIN P.S. FOUNDATION / FLOOR PLAN
S6	MAIN P.S. PRECAST CONCRETE COVER PLAN
S7	MAIN P.S. ROOF FRAMING PLAN
S8	MAIN P.S. BUILDING SECTION
S9	MAIN P.S. BUILDING SECTIONS
S10	MAIN P.S. CRANE SUPPORT DETAILS
S11	MAIN P.S. SOIL CORRECTION DIAGRAM
S12-S13	MAIN P.S. STANDARD DETAILS
E1	RIVER P.S. SITE PLAN
E2	RIVER P.S. ELECTRICAL PLAN
E3	RIVER P.S. SCHEDULES
E4	RIVER P.S. RISER AND DETAILS
E5	MAIN P.S. SITE PLAN
E6	MAIN P.S. ELECTRICAL PLAN
E7	MAIN P.S. SCHEDULES
E8	MAIN P.S. RISER AND DETAILS
TORR (21)	TORRENT REFERENCE DRAWINGS

THIS PLAN CONTAINS 45 SHEETS.

PROJECT LOCATION



DULUTH, MINNESOTA



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

Signature: *Jeffery R. Ledin* JEFFERY R. LEDIN P.E.

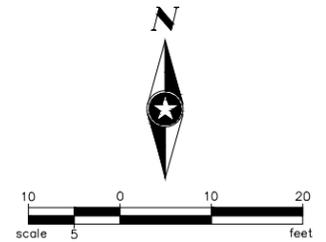
Date: 10/17/2014 Lic. No. 25222

FILE NO.

FOSJJ129137

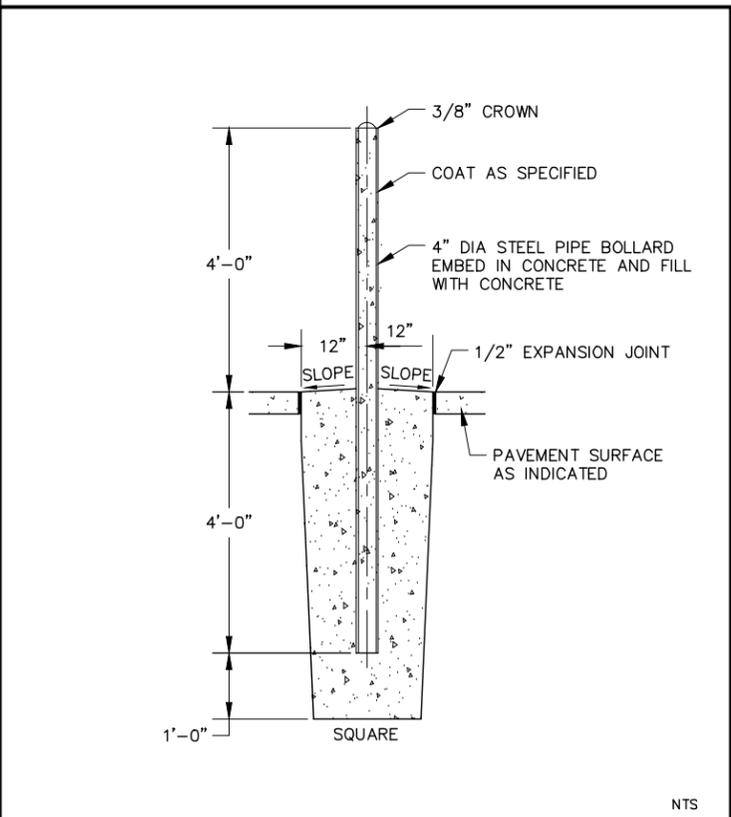
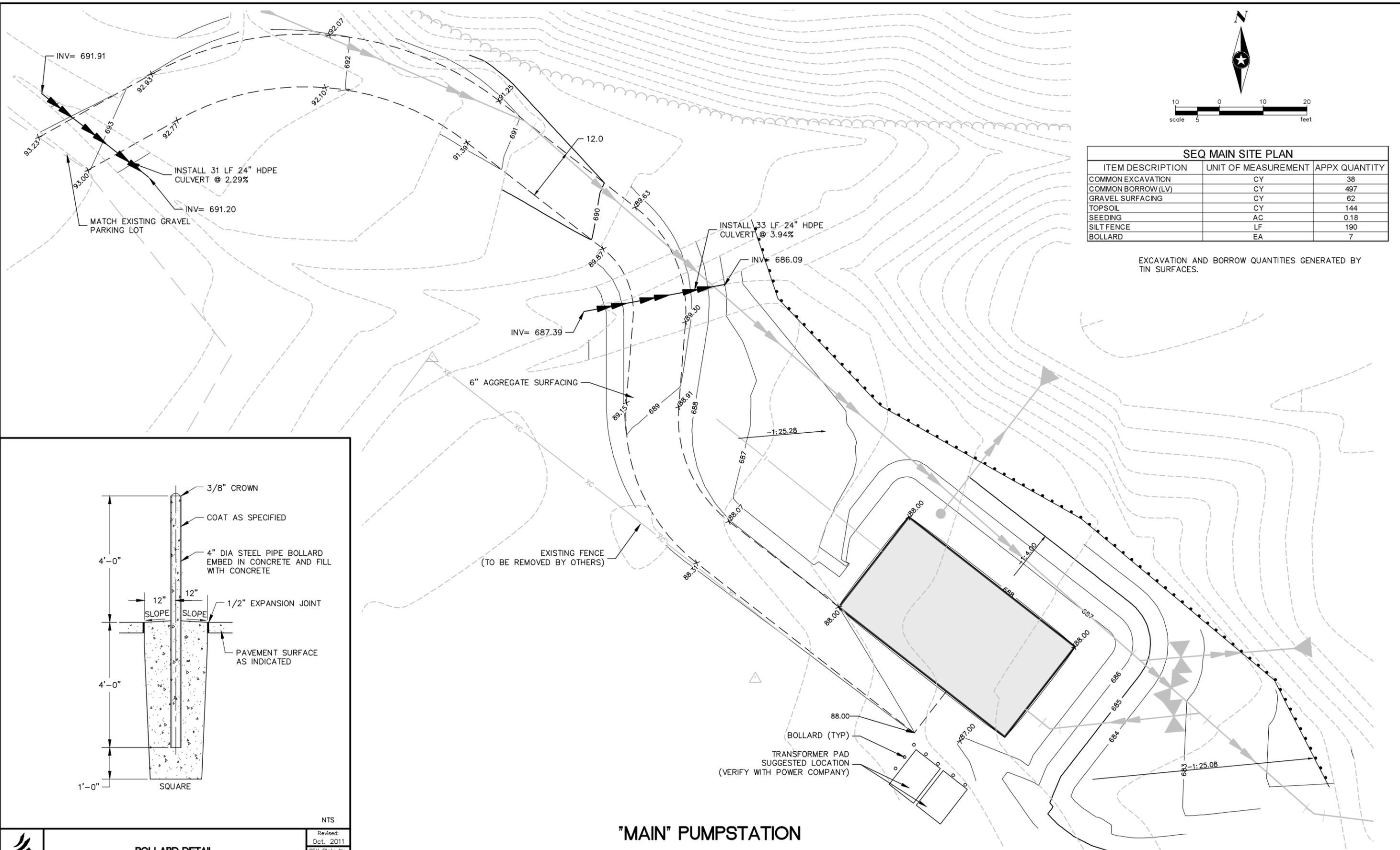
C1

P:\F\J\JOCON\106141\50-Cad\contract B pump house shts\JOCON106141 TL.dwg 10/22/2014 9:00 AM rhaehn



SEQ MAIN SITE PLAN		
ITEM DESCRIPTION	UNIT OF MEASUREMENT	APPX QUANTITY
COMMON EXCAVATION	CY	38
COMMON BORROW (LV)	CY	497
GRAVEL SURFACING	CY	62
TOPSOIL	CY	144
SEEDING	AC	0.18
SILT FENCE	LF	190
BOLLARD	EA	7

EXCAVATION AND BORROW QUANTITIES GENERATED BY TIN SURFACES.



NTS
 Revised:
 Oct. 2011
 SEH Plate No.
 MISC-19

"MAIN" PUMPSTATION

BOLLARD DETAIL

P:\F\J\JOCON\106141\50-Cad\dwg\Pinshits\locm106141_Pump_site_plans.dwg 10/20/2014 10:45 AM rhoehn

DRAWN BY:	RVH			
DESIGNER:	RVH			
CHECKED BY:	JRL			
DESIGN TEAM	NO.	BY	DATE	REVISIONS

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

Jeffery R. Ledin
 JEFFERY R. LEDIN, P.E.
 Date: 10/17/2014 Lic. No. 25222

PHONE: 320.229.4300
 1200 25TH AVENUE SOUTH
 P.O. BOX 1717
 ST. CLOUD, MN 56302-1717
 www.sehinc.com

**ON HILL IMPROVEMENTS
 SPIRIT MOUNTAIN
 DULUTH, MN**

**PUMP STATION
 SITE / GRADING PLANS**

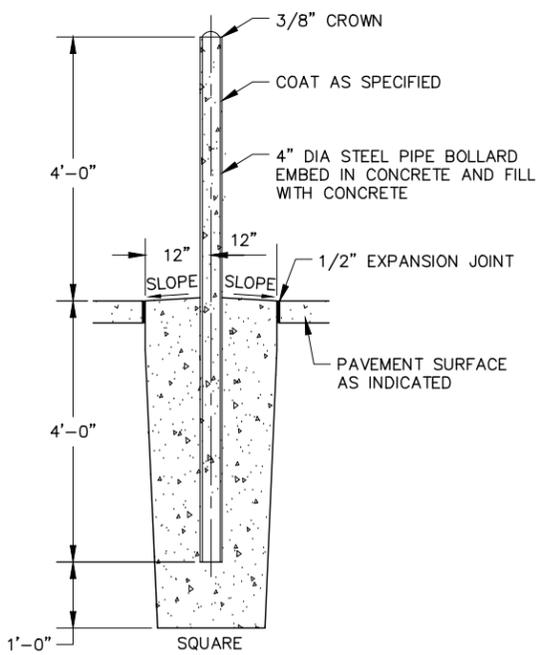
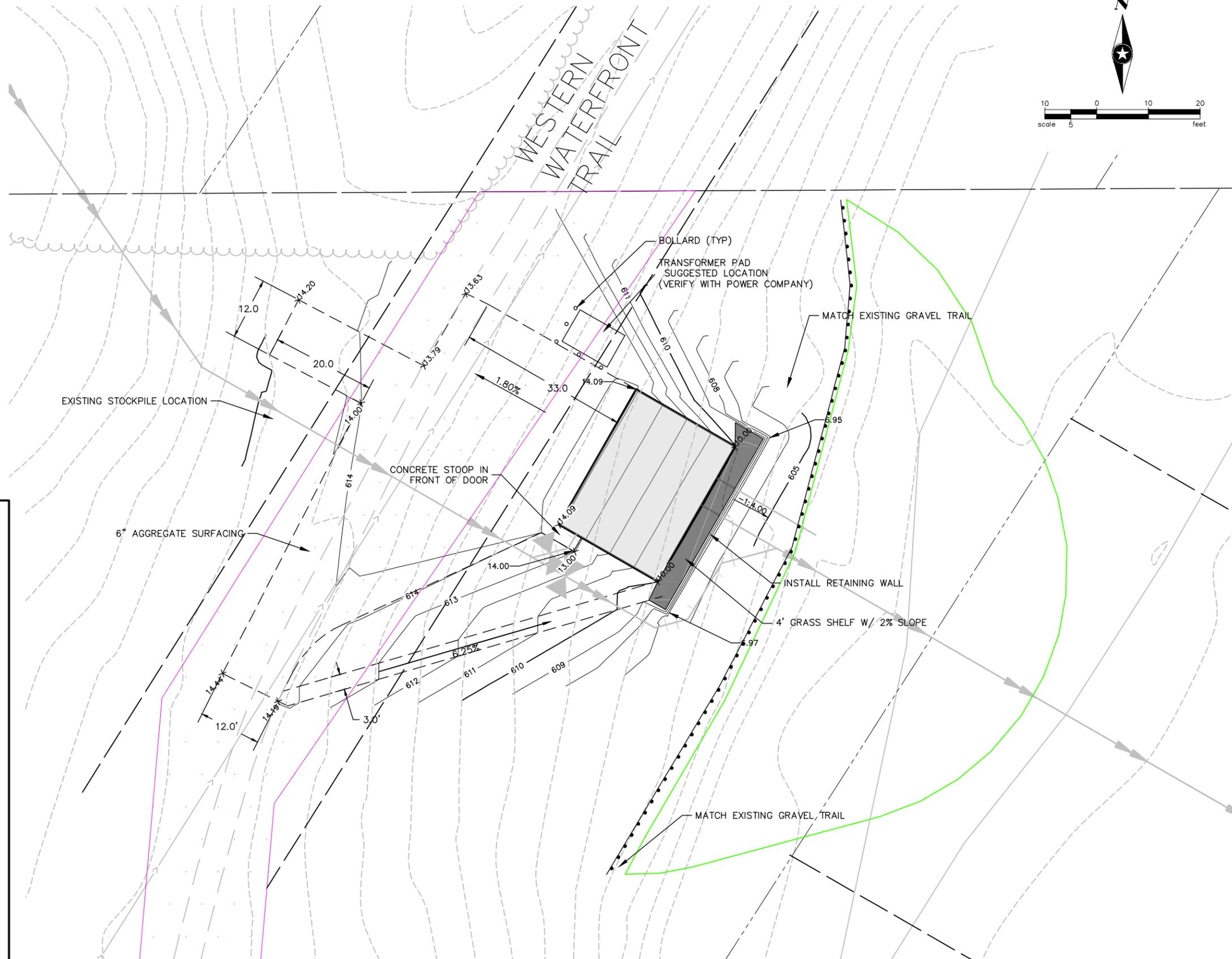
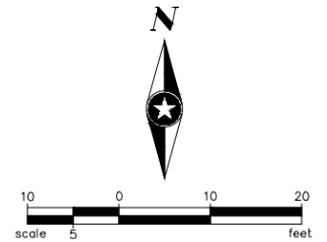
FILE NO.
 FOSJ129137

C2

SEQ RIVER SITE PLAN		
ITEM DESCRIPTION	UNIT OF MEASUREMENT	APPX QUANTITY
COMMON EXCAVATION	CY	10
COMMON BORROW (LV)	CY	369
GRAVEL SURFACING	CY	58
TOPSOIL	CY	40
SEEDING	AC	0.05
SILT FENCE	LF	140
RETAINING WALL	SF	165
BOLLARD	EA	5

NOTE: WET WELL CONSTRUCTION FROM CONTRACT A GENERATES A STOCKPILE OF MATERIAL TO BE USED AS FILL AT SITE PLAN.

EXCAVATION AND BORROW QUANTITIES GENERATED BY TIN SURFACES.



NTS

	BOLLARD DETAIL	
	Revised:	Oct. 2011
	SEH Plate No.	
	MISC-19	

DRAWN BY:	RVH			
DESIGNER:	RVH			
CHECKED BY:	JRL			
DESIGN TEAM	NO.	BY	DATE	REVISIONS



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

Jeffery R. Ledin
JEFFERY R. LEDIN, P.E.
Date: 10/17/2014 Lic. No. 25222

	PHONE: 320.229.4300
	1200 25TH AVENUE SOUTH
	P.O. BOX 1717
	ST. CLOUD, MN 56302-1717
www.sehinc.com	

ON HILL IMPROVEMENTS
SPIRIT MOUNTAIN
DULUTH, MN

PUMP STATION
SITE / GRADING PLANS

FILE NO.
FOSJ129137

C3

P:\F\J\JOCON\106141\50-Cad\dwg\Pinshits\locan106141_Pump_site_plans.dwg 10/20/2014 10:46 AM rhoehn



**FOSTER, JACOBS,
& JOHNSON, INC.**

PROFESSIONAL ENGINEERS
345 CANAL PARK DRIVE (218) 722-3060
SUITE 200 FAX (218) 722-1931
DULUTH, MN 55802 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:

BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date:	10/22/14
Project No.:	S-14005
Filename:	s14005-E1.dwg
Drawn By:	TRL
Checked By:	TRL

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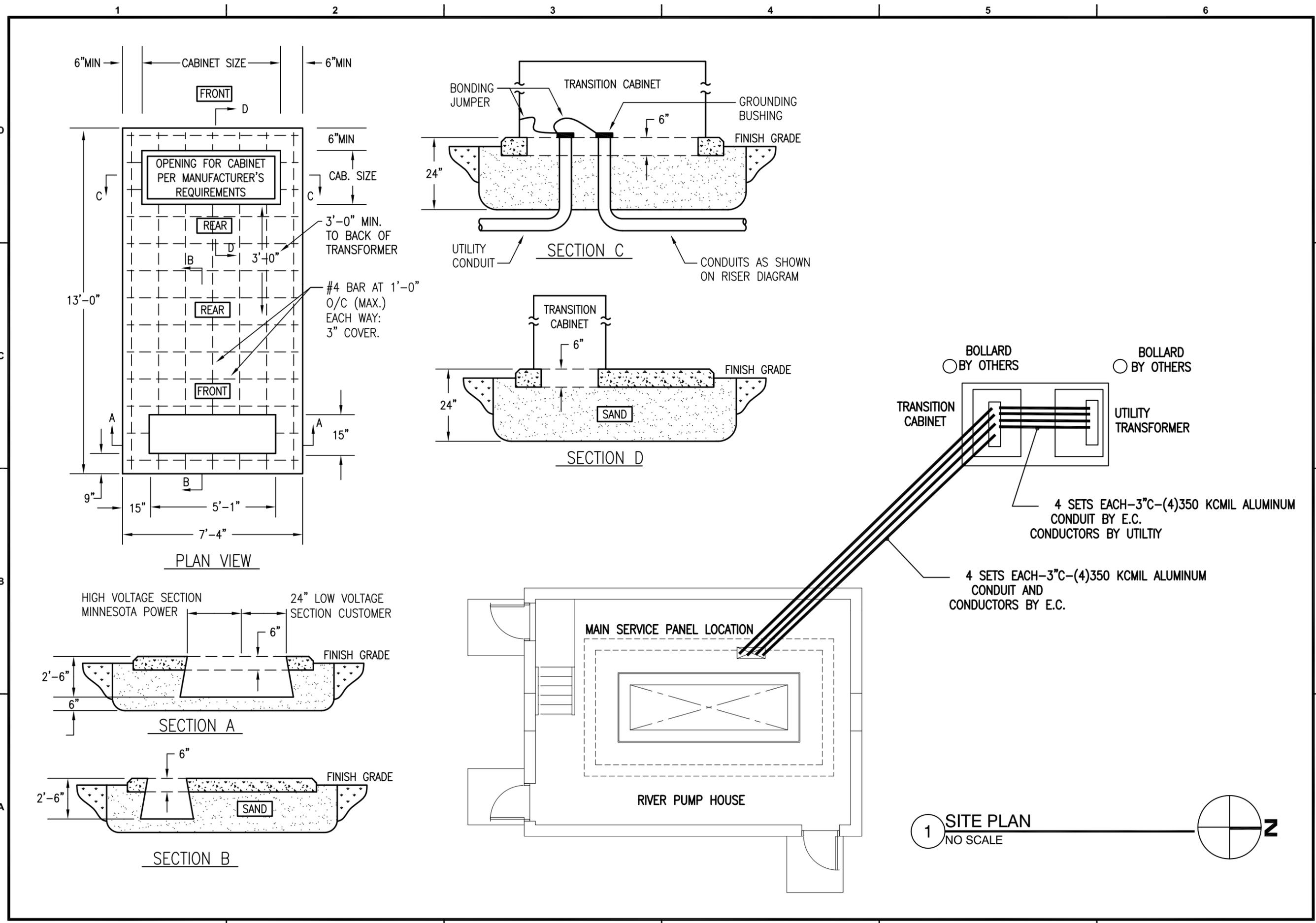
Terence R. Larson
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

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Sheet Title:
**River Pump
Station
Site Plan**

Sheet Number:

E1





**FOSTER, JACOBS,
& JOHNSON, INC.**

PROFESSIONAL ENGINEERS

345 CANAL PARK DRIVE (218) 722-3060
SUITE 200 FAX (218) 722-1931
DULUTH, MN 55802 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date:	10/22/14
Project No.:	S-14005
Filename:	s14005-e2.dwg
Drawn By:	TRL
Checked By:	TRL

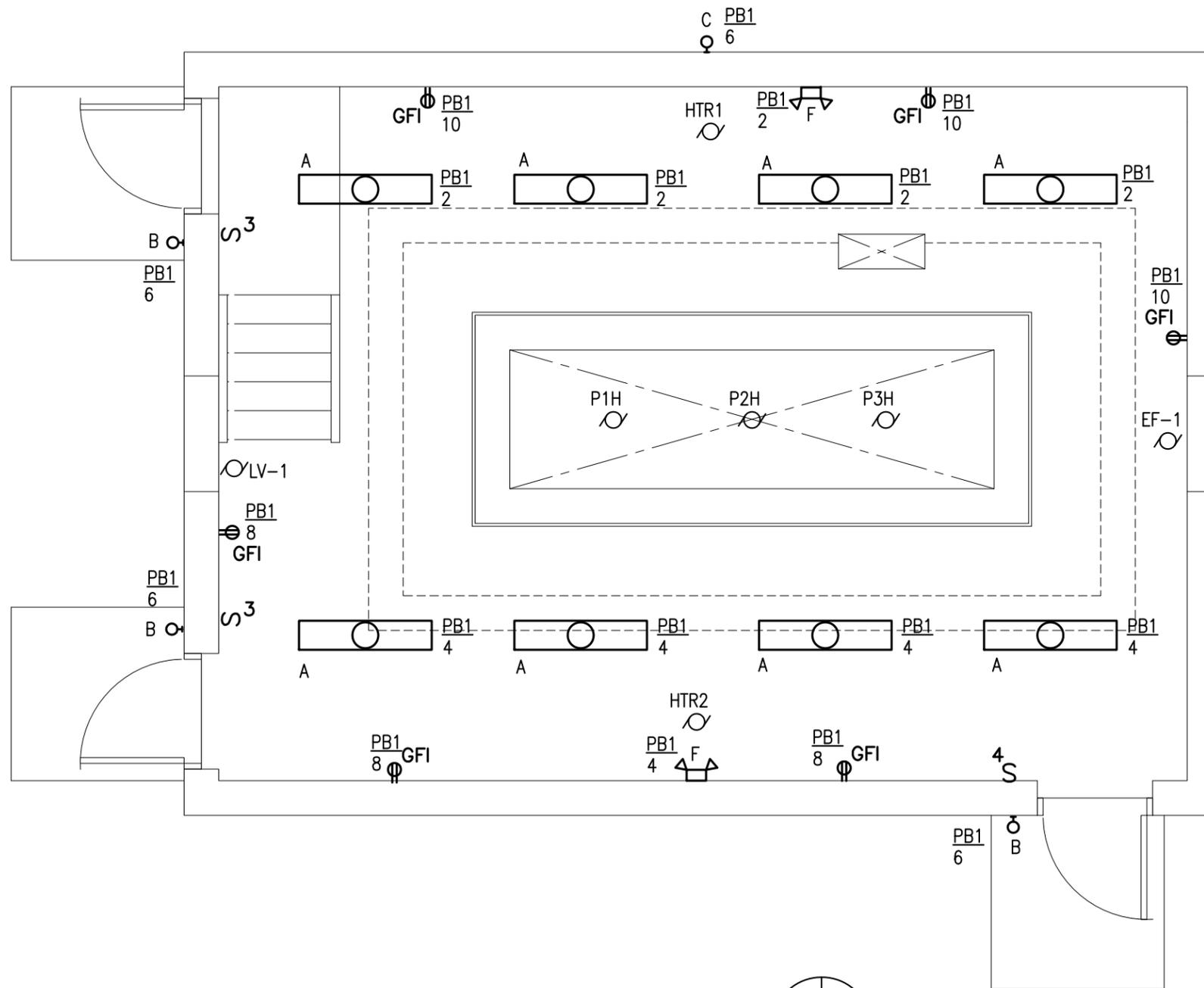
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Terence R. Larson
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Sheet Title:
**River Pump
Station
Electrical Plan**

Sheet Number:
E2



1 ELECTRICAL PLAN
NO SCALE

PANEL SCHEDULE										
PANEL		PB1		AMPS		100		GRD. BUS		
LOCATION		RIVER STATION		VOLTS		120/208		O.C.P DEVICE		MCB
MOUNTING		SURFACE		PHASE		3		FED FROM		30 KVA TRANSFORMER
PB1 PROVIDE WITH PART A				WIRE		4		REMARKS		
RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	A	B	C	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.
	SPARE	20/3	1	X			2	20/1	INTERIOR LIGHTS	
			3		X		4	20/1	INTERIOR LIGHTS	
			5			X	6	20/1	EXTERIOR LIGHTS	
	SPARE	30/1	7	X			8	20/1	RECEPTACLES	
	SPARE	20/1	9		X		10	20/1	RECEPTACLES	
	SPARE	20/1	11			X	12	20/1	SPARE	
	SPARE	20/1	13	X			14	20/1	SPARE	
	SPARE	20/1	15		X		16	20/1	SPARE	
	SPARE	20/1	17			X	18	20/1	SPARE	
	SPARE	20/1	19	X			20	20/1	SPARE	
	RECEPTACLE	20/1	21		X		22	20/1	SPARE	
	PLC PANEL	20/1	23			X	24	20/1	SPARE	
	P1 MOTOR HEATER	10/1	25	X			26	20/1	SPARE	
	P1 MOTOR HEATER	10/1	27		X		28	20/1	SPARE	
	P1 MOTOR HEATER	10/1	29			X	30	20/1	FAN & LOUVRE	

LUMINAIRE SCHEDULE						
TYPE	MANUFACTURER	MODEL	VOLTS	LAMP	DESCRIPTION	NOTES
A	COLUMBIA METALUX LITHONIA	VT-LD2-55-DR-W-120V-L840-CD2-W	120V	5500 LUMEN 80W LED	VAPORTIGHT LED, ACRYLIC LENS FIBERGLASS BODY, SS LATCHES 4000K, WET LABEL, WIDE DISTRIBUTION	
B	COLUMBIA LUMARK LITHONIA	XTOR1A OR EQUAL	120	720 LUMEN 13W LED	LED WALLPACK, DARK SKY COMPLIANT METAL HOUSING, BRONZE 5000K, PHOTOCELL	
C	COLUMBIA LUMARK LITHONIA	XTOR3A OR EQUAL OR EQUAL	120	2240 LUMEN 30W LED	LED WALLPACK, DARK SKY COMPLIANT METAL HOUSING, BRONZE 5000K, PHOTOCELL	
F	DUAL-LITE SURE-LITE LITHONIA	UMB9 OR EQUAL	UNV	12VDC (2)8W PAR	EMERGENCY LIGHT, WEATHERPROOF DOUBLE HEAD, FIBERGLASS BODY REMOTE CAPACITY, TEST SWITCH	

MOTOR AND EQUIPMENT SCHEDULE																													
IDENTITY	LOCATION	DESCRIPTION	MOTOR BY	VOLTAGE	PHASE	LOAD	UNITS	STARTER				CONTROL				DISCONNECT				WIRE SIZE	PANEL	CIRCUIT	MOP	NOTES					
								MANUAL MOTOR SW.	MAGNETIC	VARIABLE FREQ DRIVE	BY	ELEC THERMOSTAT	PRESS. OR FLOAT SW.	START/STOP	TEMP. CONTROL	LIGHT SWITCH	MANUAL MOTOR SW.	BY	FUSED SWITCH						NON FUSED SWITCH	MANUAL MOTOR SW.	RECEPTACLE	BY	
HTR1	RIVER PUMP STATION	HEATER 1	O	480	3	10	KW														#12	SWBD		20A					
HTR2	RIVER PUMP STATION	HEATER 2	O	480	3	10	KW																	20A					
EF-1	RIVER PUMP STATION	EXHAUST FAN 1	O	120	1	3/4	HP	X															#12	PB1	30	20A			
LV-1	RIVER PUMP STATION	LOUVRE 1	O	120	1	FRAC	HP	X																#12	PB1	30	20A		
P1H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1																			#14	PB1	25	10A		
P2H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1																				#14	PB1	27	10A	
P3H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1																					#14	PB1	29	10A

NOTES

ABBREVIATIONS
 E - ELECTRICAL CONTRACTOR
 M - MECHANICAL CONTRACTOR
 G - GENERAL CONTRACTOR
 O - OTHERS
 U - WITH UNIT



**FOSTER, JACOBS,
& JOHNSON, INC.**

PROFESSIONAL ENGINEERS
 345 CANAL PARK DRIVE (218) 722-3060
 SUITE 200 FAX (218) 722-1931
 DULUTH, MN 55802 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
 CONTRACT "B"
 PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
 Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
 AT FULL SIZE
 (IF NOT 1" - SCALE ACCORDINGLY)

Issue Date: 10/22/14
 Project No.: S-14005
 Filename: s14005-E3.dwg
 Drawn By: TRL
 Checked By: TRL

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 Terence R. Larson
 Reg. No. 17136
 Date: October 22, 2014

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Sheet Title:
**River Pump
 Station
 Schedules**

Sheet Number:

E3



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PROFESSIONAL ENGINEERS
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SUITE 200 FAX (218) 722-1931
DULUTH, MN 55802 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date: 10/22/14
Project No.: S-14005
Filename: s14005-E5.dwg
Drawn By: TRL
Checked By: TRL

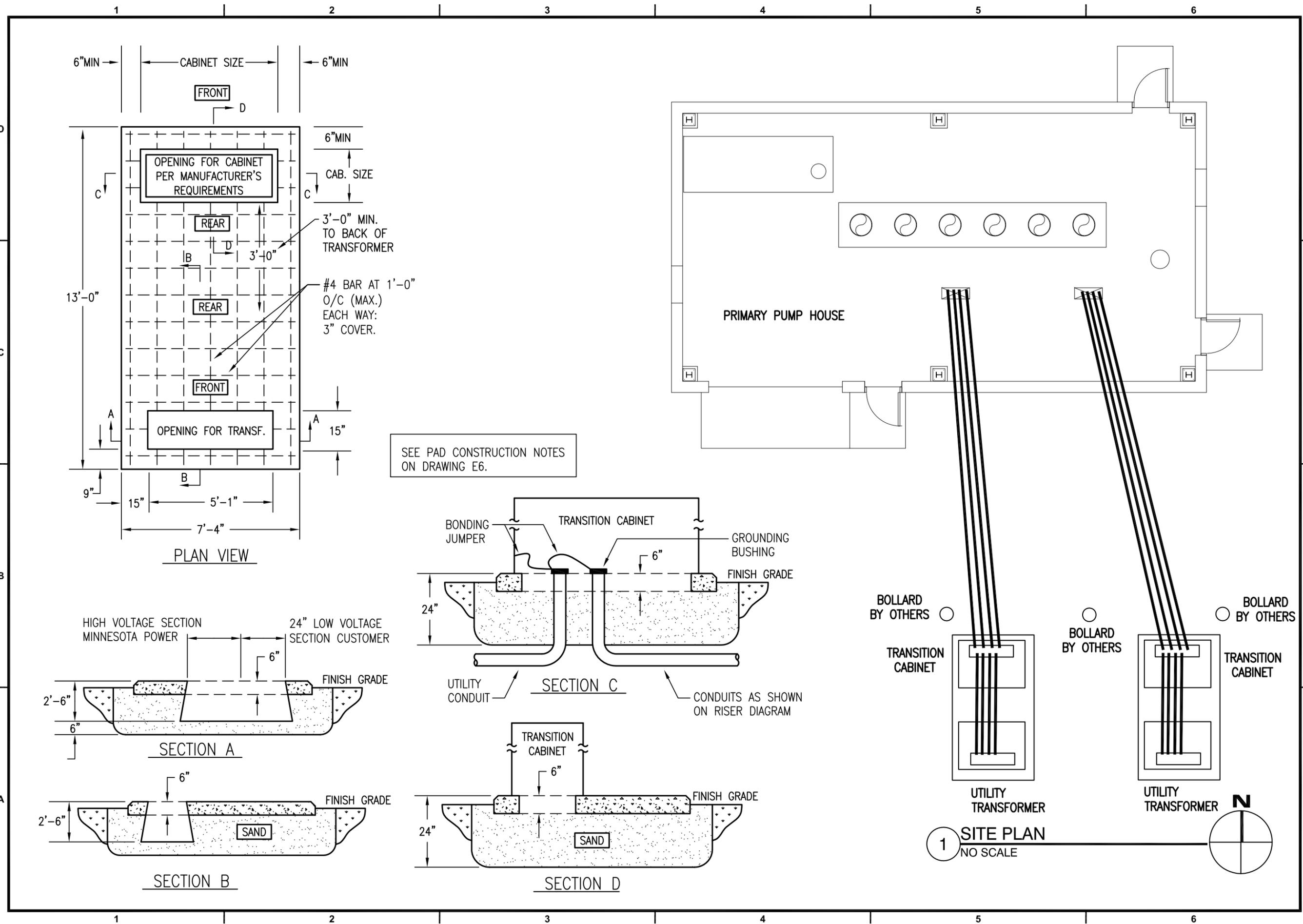
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Sheet Title:
**Primary Pump Station
Site Plan**

Sheet Number:

E5





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& JOHNSON, INC.**

PROFESSIONAL ENGINEERS
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SUITE 200 FAX (218) 722-1931
DULUTH, MN 55802 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date:	10/22/14
Project No.:	S-14005
Filename:	s14005-E6.dwg
Drawn By:	TRL
Checked By:	TRL

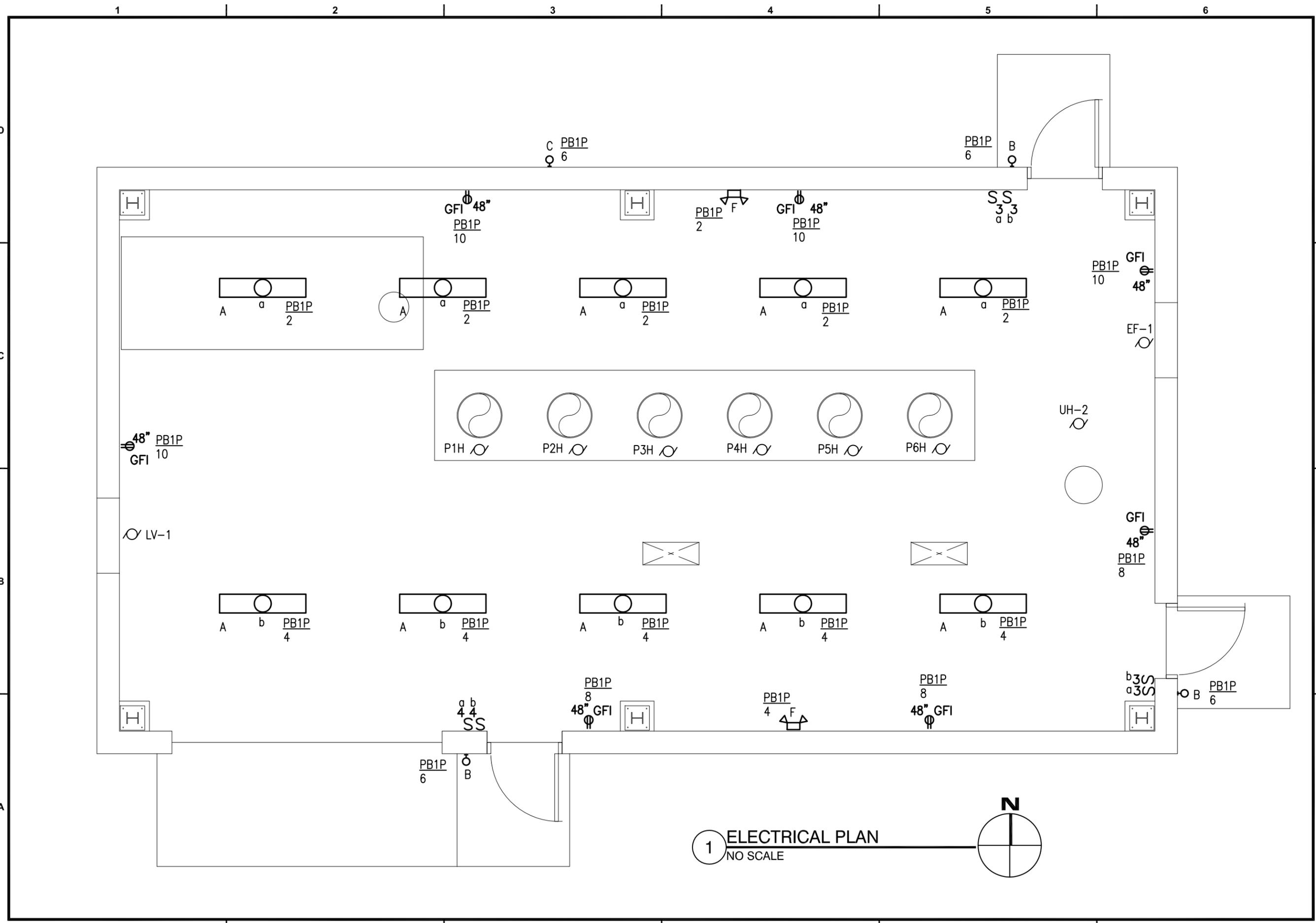
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Date: October 22, 2014

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Sheet Title:
**Primary Pump Station
Electrical Plan**

Sheet Number:
E6



PANEL SCHEDULE											
PANEL		PB1-P		AMPS		100		GRD. BUS			
LOCATION		PRIMARY STATION		VOLTS		120/208		O.C.P DEVICE			MCB
MOUNTING		SURFACE		PHASE		3		FED FROM			30 KVA TRANSFORMER
PB1P PROVIDE WITH PART A				WIRE		4		REMARKS			
RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	A	B	C	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.	
	SPARE	20/3	1	X			2	20/1	INTERIOR LIGHTS		
			3		X		4	20/1	INTERIOR LIGHTS		
			5			X	6	20/1	EXTERIOR LIGHTS		
	SPARE	30/1	7	X			8	20/1	RECEPTACLES		
	SPARE	20/1	9		X		10	20/1	RECEPTACLES		
	SPARE	20/1	11			X	12	20/1	SPARE		
	SPARE	20/1	13	X			14	20/1	SPARE		
	SPARE	20/1	15		X		16	20/1	SPARE		
	SPARE	20/1	17			X	18	20/1	SPARE		
	SPARE	20/1	19	X			20	20/1	SPARE		
	RECEPTACLE	20/1	21		X		22	20/1	SPARE		
	PLC PANEL	20/1	23			X	24	10/1	P4 MOTOR HEATER		
	P1 MOTOR HEATER	10/1	25	X			26	10/1	P5 MOTOR HEATER		
	P2 MOTOR HEATER	10/1	27		X		28	10/1	P6 MOTOR HEATER		
	P3 MOTOR HEATER	10/1	29			X	30	20/1	FAN & LOUVRE		

LUMINAIRE SCHEDULE						
TYPE	MANUFACTURER	MODEL	VOLTS	LAMP	DESCRIPTION	NOTES
A	COLUMBIA METALUX LITHONIA	VT-LD2-55-DR-W-120V-L840-CD2-W	120V	5500 LUMEN 80W LED	VAPORTIGHT LED, ACRYLIC LENS FIBERGLASS BODY, SS LATCHES 4000K, WET LABEL, WIDE DISTRIBUTION	
B	COLUMBIA LUMARK LITHONIA	XTOR1A OR EQUAL	120	720 LUMEN 13W LED	LED WALLPACK, DARK SKY COMPLIANT METAL HOUSING, BRONZE 5000K, PHOTOCELL	
C	COLUMBIA LUMARK LITHONIA	XTOR3A OR EQUAL OR EQUAL	120	2240 LUMEN 30W LED	LED WALLPACK, DARK SKY COMPLIANT METAL HOUSING, BRONZE 5000K, PHOTOCELL	
F	DUAL-LITE SURE-LITE LITHONIA	UMB9 OR EQUAL	UNV	12VDC (2)8W PAR	EMERGENCY LIGHT, WEATHERPROOF DOUBLE HEAD, FIBERGLASS BODY REMOTE CAPACITY, TEST SWITCH	

MOTOR AND EQUIPMENT SCHEDULE																							
IDENTITY	LOCATION	DESCRIPTION	MOTOR BY	VOLTAGE	PHASE	LOAD	UNITS	STARTER			CONTROL				DISCONNECT			WIRE SIZE	PANEL	CIRCUIT	MOP	NOTES	
								MANUAL MOTOR SW.	MAGNETIC	VARIABLE FREQ DRIVE	ELEC THERMOSTAT	PRESS. OR FLOAT SW.	START/STOP	TEMP. CONTROL	LIGHT SWITCH	MANUAL MOTOR SW.	FUSED SWITCH						NON FUSED SWITCH
HTR1	PRIMARY PUMP STATION	HEATER 1	O	480	3	10 KW				U	X									#12	SWBD-A	20A	
HTR2	PRIMARY PUMP STATION	HEATER 2	O	480	3	10 KW				U	X									#12	SWBD-B	20A	
EF-1	PRIMARY PUMP STATION	EXHAUST FAN 1	O	120	1	3/4 HP	X			O	X									#12	PB1-P	30	20A
LV-1	PRIMARY PUMP STATION	LOUVRE 1	O	120	1	FRAC HP	X			O	X									#12	PB1-P	30	20A
P1H	PRIMARY PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	25	10A
P2H	PRIMARY PUMP STATION	PUMP 2 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	27	10A
P3H	PRIMARY PUMP STATION	PUMP 3 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	29	10A
P4H	PRIMARY PUMP STATION	PUMP 4 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	24	10A
P5H	PRIMARY PUMP STATION	PUMP 5 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	26	10A
P6H	PRIMARY PUMP STATION	PUMP 6 MOTOR HEATER	O	120	1					O	X									#14	PB1-P	28	10A

NOTES

ABBREVIATIONS

E - ELECTRICAL CONTRACTOR
M - MECHANICAL CONTRACTOR
G - GENERAL CONTRACTOR

O - OTHERS
U - WITH UNIT



Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date: 10/22/14
Project No.: S-14005
Filename: s14005-E7.dwg
Drawn By: TRL
Checked By: TRL

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Terence R. Larson
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

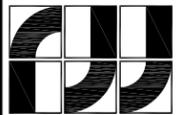
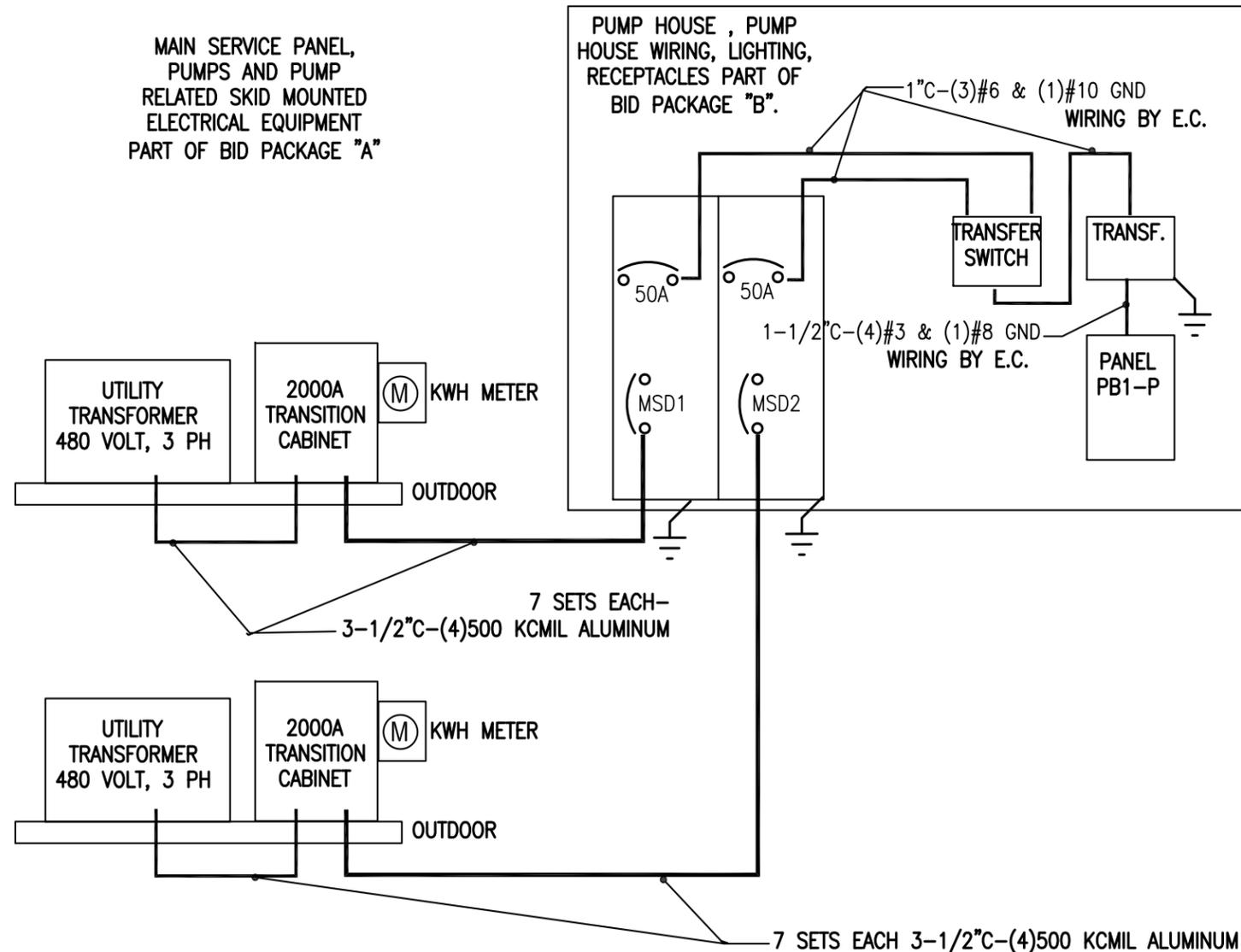
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Sheet Title:
**Primary Pump
Station
Schedules**

Sheet Number:
E7

PAD CONSTRUCTION NOTES:

1. AIR ENTRAINED CONCRETE - 4000 PSI AFTER 28 DAYS, MAX AGGREGATE 3/4"
2. STEEL FLOAT FINISH
3. REINFORCEMENT: TYPE A-305 BILLET STOCK A.S.T.M. GRADE 60
4. ALL REINFORCING TO BE #4 BAR 12" O.C. EACH WAY. WIRE TIE ALL CROSSINGS
5. IF THE ANTICIPATED FORECAST TEMPERATURE IS 35 DEGREES F OR LESS, THE PAD WILL BE INSULATED WITH EITHER BLANKETS OR POLY AND STRAW FOR A MIN. OF 3 DAYS
6. APPLY MEMBRANE CURING COMPOUND, MEETING ASTM C 309, AT MANUFACTURER'S PRESCRIBED RATE AFTER REMOVAL OF FORMS
7. EDGE TROWEL WITH CHAMFERED OUTSIDE EDGES
8. A SAFE OPERATING CLEARANCE OF A MIN 10'-0" (UNOBSTRUCTED) IS REQUIRED IN FRONT OF THE TRANSFORMER DOOR. THE DOOR(S) CAN FACE ANY DIRECTION EXCEPT TOWARD THE BUILDING UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE ENGINEER. DECISIONS SHALL BE BASED UPON SOUND ENGINEERING PRACTICES AND SITE SPECIFIC CONDITION
9. IF NECESSARY, ELECTRICAL CONTRACTOR MAY REMOVE TOP LIP OF FIBERGLASS GROUND SLEEVE IN THE LOW VOLTAGE SECTION
10. GROUND SLEEVE MAY BE PICKED UP AT MINNESOTA POWER SERVICE CENTER, MONDAY-FRIDAY, BETWEEN 8 AM-3 PM OR BY ARRANGEMENT
11. FIBERGLASS GROUND SLEEVE FURNISHED BY MINNESOTA POWER
12. A SAFE OPERATING CLEARANCE OF A MIN 4'-0" (UNOBSTRUCTED) SHALL BE REQUIRED IN FRONT OF THE CABINET ACCESS DOOR(S). THE DOOR(S) CAN FACE ANY DIRECTION EXCEPT TOWARDS A PAD MOUNT TRANSFORMER WHERE INSTALLED ON THE SAME PAD AS THE TRANSFORMER.
13. THE CABINET SHOULD BE LOCATED ON THE SAME SLAB AS THE PAD MOUNT TRANSFORMER OR NEXT TO THE RISER POLE (NO CLOSER THAN 10'-0") OF ANY OVERHEAD TRANSFORMER BANK.
14. A MIN. OF 3'-0" CLEARANCE SHALL BE REQUIRED FROM ANY EDGE OF A PAD MOUNT TRANSFORMER. THE CABINET SHALL NEVER BE PLACED IN FRONT OF THE ACCESS DOORS TO A PAD MOUNT TRANSFORMER.
15. THE CABINET SHALL BE BOLTED DOWN TO THE CONCRETE WITH ANCHOR BOLTS.
16. THE CUSTOMER SHALL PROVIDE THE CABLES TO THE CABINET FROM THE CUSTOMER PREMISES, THE CABINET, CONNECTION LUGS FOR THE CUSTOMER AND UTILITY SIDE, CONDUIT BETWEEN THE TRANSFORMER AND CABINET (SIZE TO BE SPECIFIED BY UTILITY), AND THE CONCRETE SLAB. UTILITY WILL PROVIDE THE C/T AND V/T TRANSFORMERS, THE METER SOCKET, AND THE CABLES BETWEEN THE CABINET AND TRANSFORMER (OVERHEAD OR UNDERGROUND).



**FOSTER, JACOBS,
& JOHNSON, INC.**

PROFESSIONAL ENGINEERS
345 CANAL PARK DRIVE SUITE 200 DULUTH, MN 55802 (218) 722-3060 (218) 722-1931 Email: mal@fj.com

Project Name:
**SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS**

Project Location:
**SPIRIT MOUNTAIN
Duluth, Minnesota**

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
AT FULL SIZE
(IF NOT 1" - SCALE ACCORDINGLY)

Issue Date:	10/22/14
Project No.:	S-14005
Filename:	88-E2-PLAN.dwg
Drawn By:	TRL
Checked By:	TRL

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Terence R. Larson
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

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Sheet Title:
**Primary Pump
Station
Riser and Details**

Sheet Number:
E8



SPIRIT MOUNTAIN SKI AREA

PUMP STATION INSTALLATION REFERENCE DRAWINGS

PROCESS MECHANICAL AND ELECTRICAL DESIGN DRAWINGS

OCTOBER 20, 2014

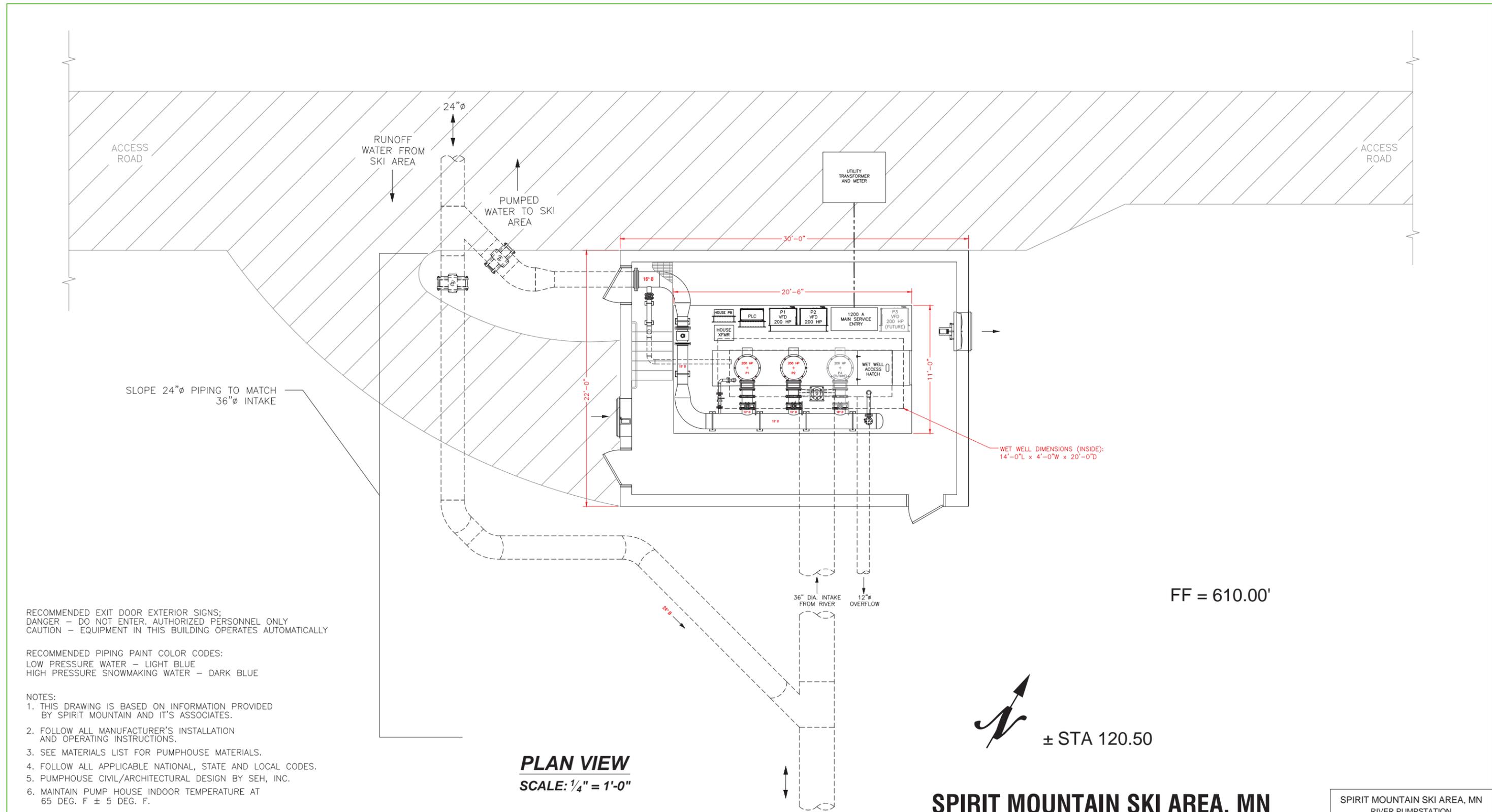
DRAWING SCHEDULE:

782013-M1 RIVER PUMP STATION GENERAL ARRANGEMENT & MECHANICAL LAYOUT
782013-E1 RIVER PUMP STATION ELECTRICAL LAYOUT
782013-M2 MAIN PUMP STATION GENERAL ARRANGEMENT & MECHANICAL LAYOUT
782013-E2 MAIN PUMP STATION ELECTRICAL LAYOUT

IN COOPERATION WITH



 **TORRENT** Engineering and Equipment
PO BOX 270 MILFORD, IN 46542 USA
Phone: (574)-658-3200 Fax: (574)-658-3229 www.torrentee.com



FF = 610.00'

± STA 120.50

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION

RECOMMENDED EXIT DOOR EXTERIOR SIGNS:
 DANGER - DO NOT ENTER, AUTHORIZED PERSONNEL ONLY
 CAUTION - EQUIPMENT IN THIS BUILDING OPERATES AUTOMATICALLY

RECOMMENDED PIPING PAINT COLOR CODES:
 LOW PRESSURE WATER - LIGHT BLUE
 HIGH PRESSURE SNOWMAKING WATER - DARK BLUE

- NOTES:
- THIS DRAWING IS BASED ON INFORMATION PROVIDED BY SPIRIT MOUNTAIN AND IT'S ASSOCIATES.
 - FOLLOW ALL MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
 - SEE MATERIALS LIST FOR PUMPHOUSE MATERIALS.
 - FOLLOW ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES.
 - PUMPHOUSE CIVIL/ARCHITECTURAL DESIGN BY SEH, INC.
 - MAINTAIN PUMP HOUSE INDOOR TEMPERATURE AT 65 DEG. F ± 5 DEG. F.

PUMP RATINGS: 2000 GPM @ 230' TDH (100 PSI) TOTAL DISCHARGE PRESSURE
 200 HP, 460/3/60

PLAN VIEW
 SCALE: 1/4" = 1'-0"

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
2	09-08-14	UPDATED	JDM
3	09-29-14	UPDATED	JDM
4	10-08-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD

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Date: --/--/-- Name, P.E. Lic. No. --

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 416 SOUTH 6th ST, SUITE 200
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SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA

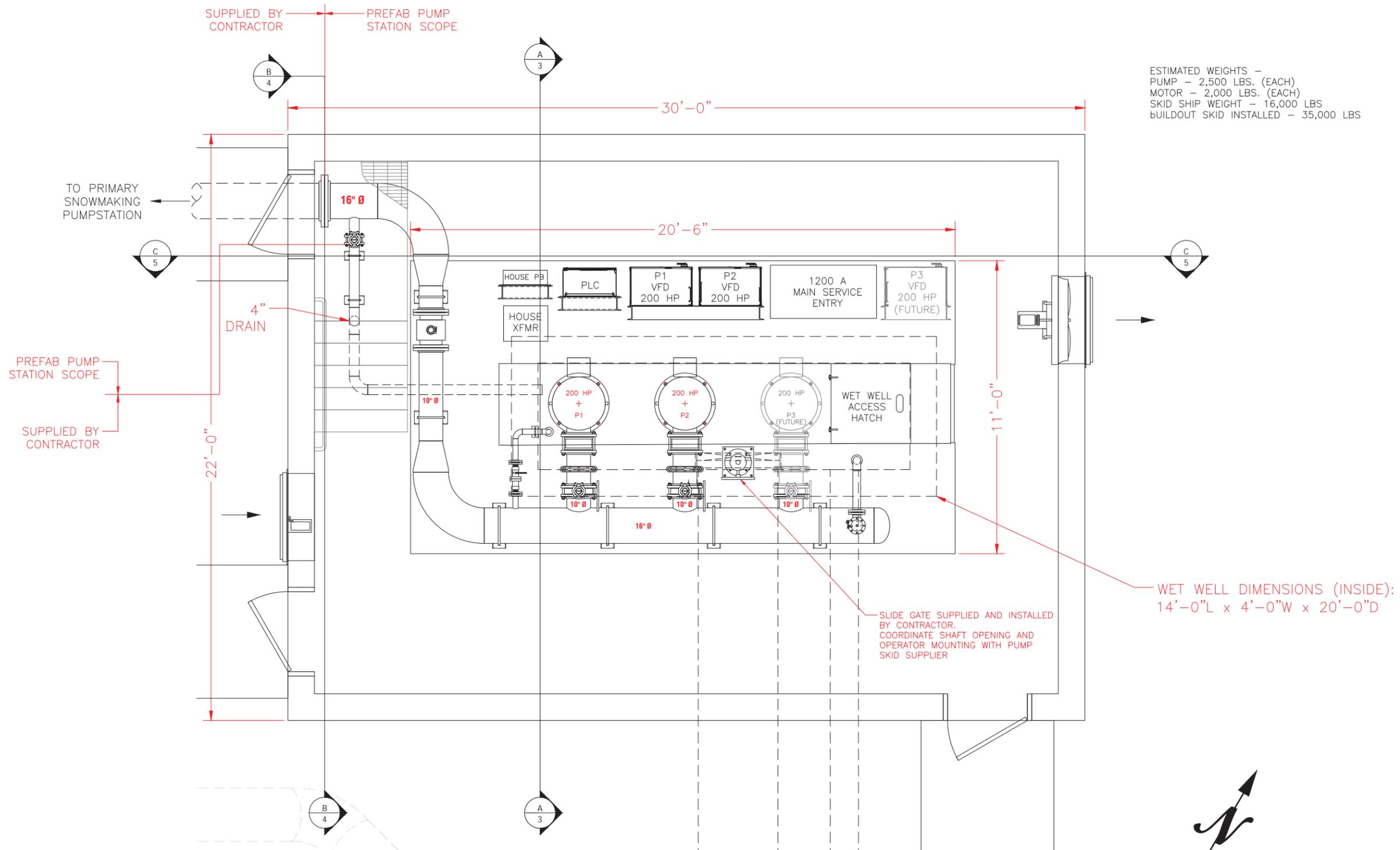
RIVER SNOW MAKING PUMPHOUSE
 PLAN VIEW

FILE NO. M1
 DATE 10-16-2014

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION PLAN VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 1 OF 7

DESIGN TEAM	NO.	BY	DATE	REVISIONS

ESTIMATED WEIGHTS -
 PUMP - 2,500 LBS. (EACH)
 MOTOR - 2,000 LBS. (EACH)
 SKID SHIP WEIGHT - 16,000 LBS
 BUILDOUT SKID INSTALLED - 35,000 LBS



PLAN VIEW
 SCALE: 1/2" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
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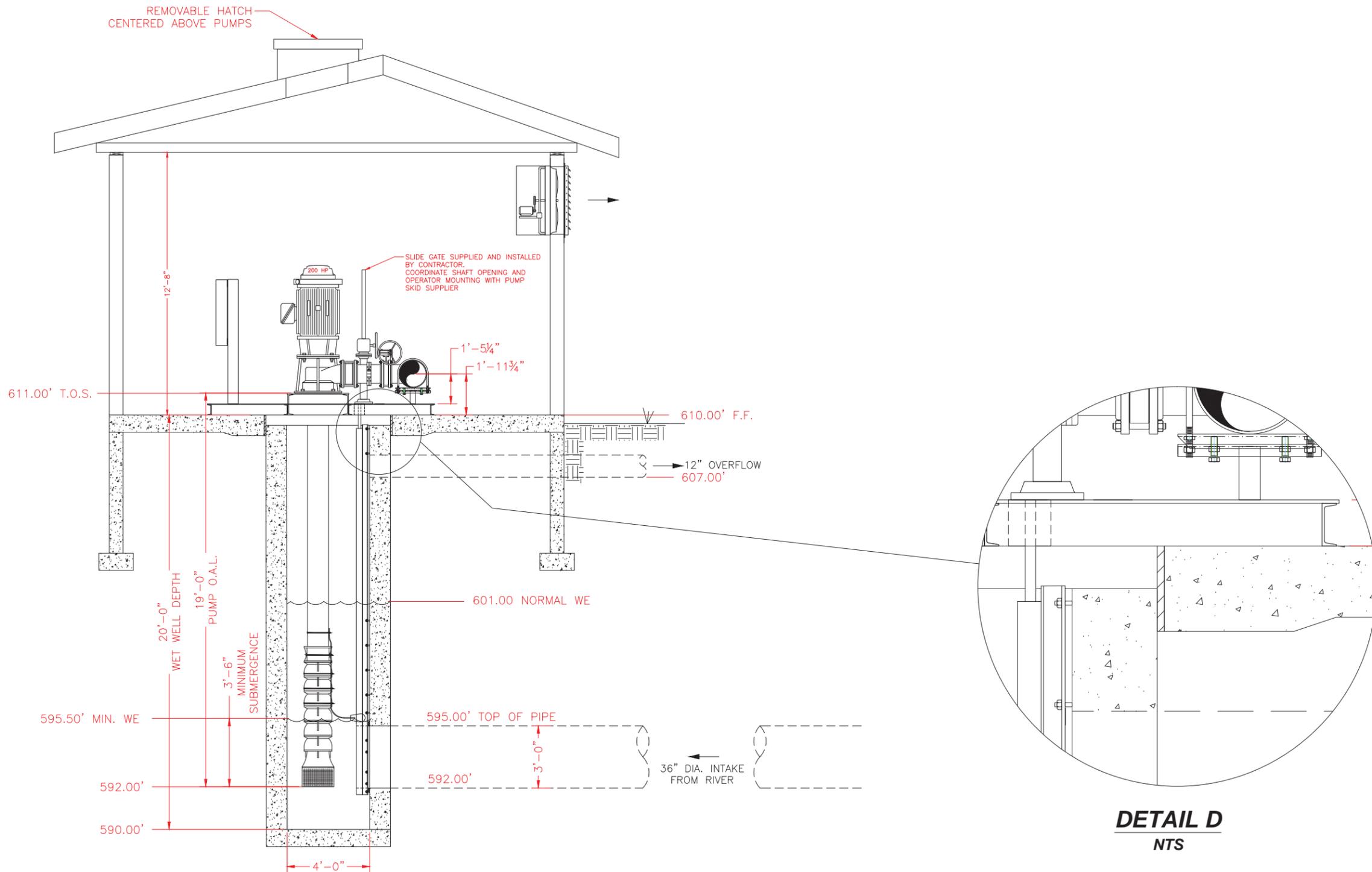
**SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
 PLAN VIEW

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION PLAN VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 2 OF 7

FILE NO.	M1
DATE 10-16-2014	

DESIGN TEAM	NO.	BY	DATE	REVISIONS
DRAWN BY: --				
DESIGNER: --				
CHECKED BY: --				



SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION

NO.	DATE	REVISION	BY
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SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION SECTION VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 3 OF 7

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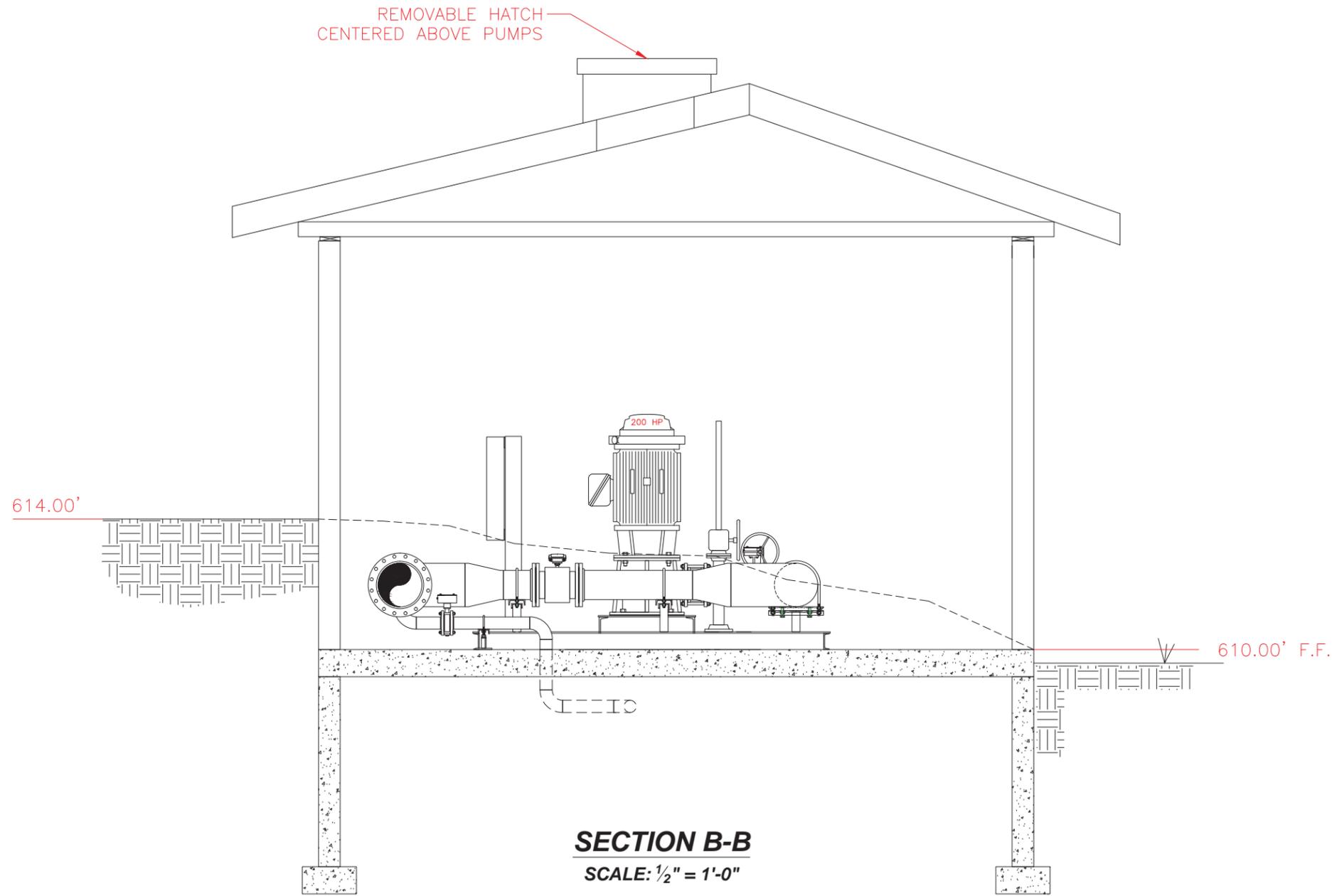
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**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
DATE
10-16-2014
M1



SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION

SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION
SECTION VIEW

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
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DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER : 782013-M1	
REV : 5	SHEET : 4 OF 7

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DESIGNER: _____				
CHECKED BY: _____				
DESIGN TEAM				

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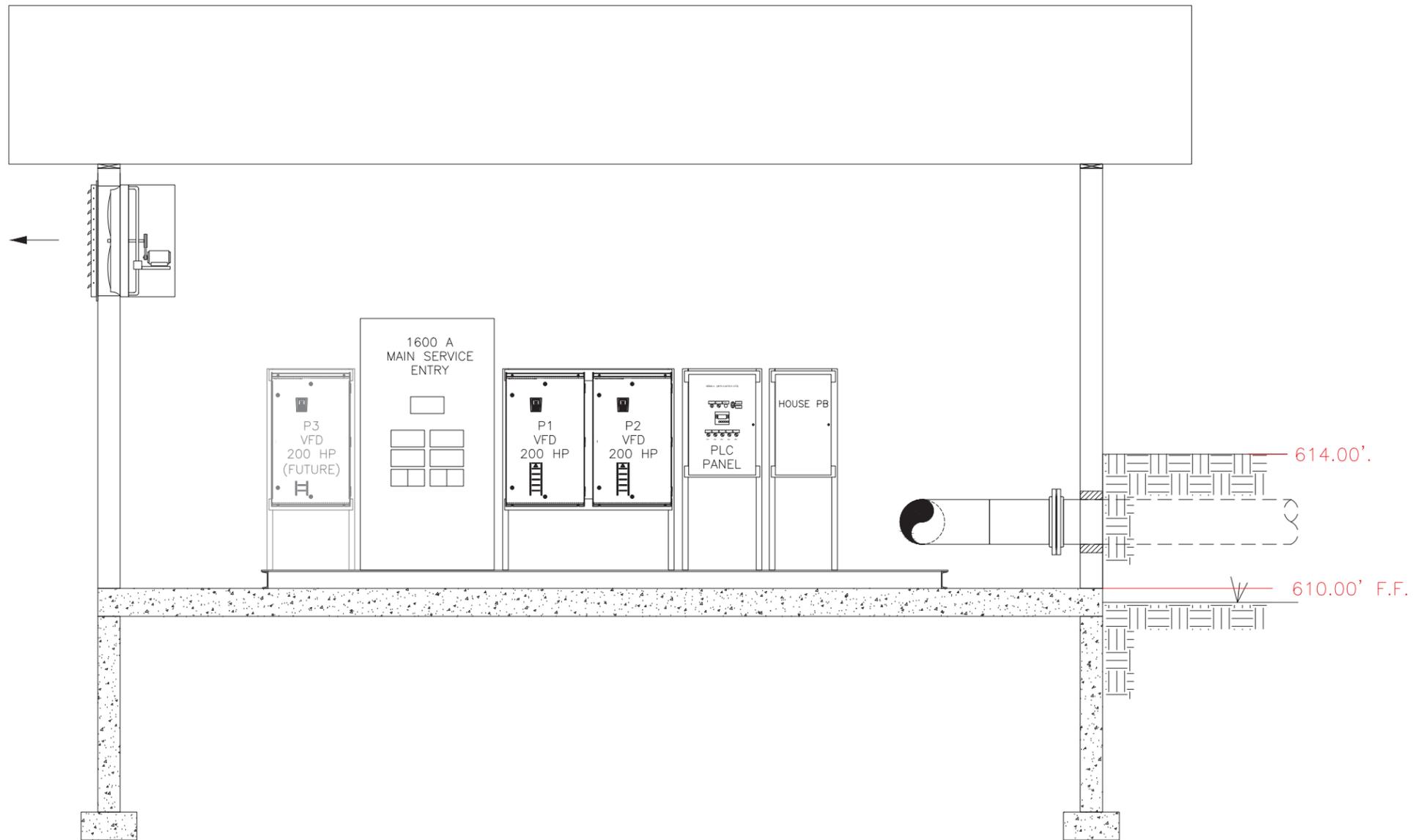
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**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO. M1
 DATE 10-16-2014



SECTION C-C
SCALE: 1/2" = 1'-0"

**SPIRIT MOUNTAIN SKI AREA, MN
 RIVER PUMPSTATION**

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION SECTION VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 5 OF 7

NO.	DATE	REVISION	BY
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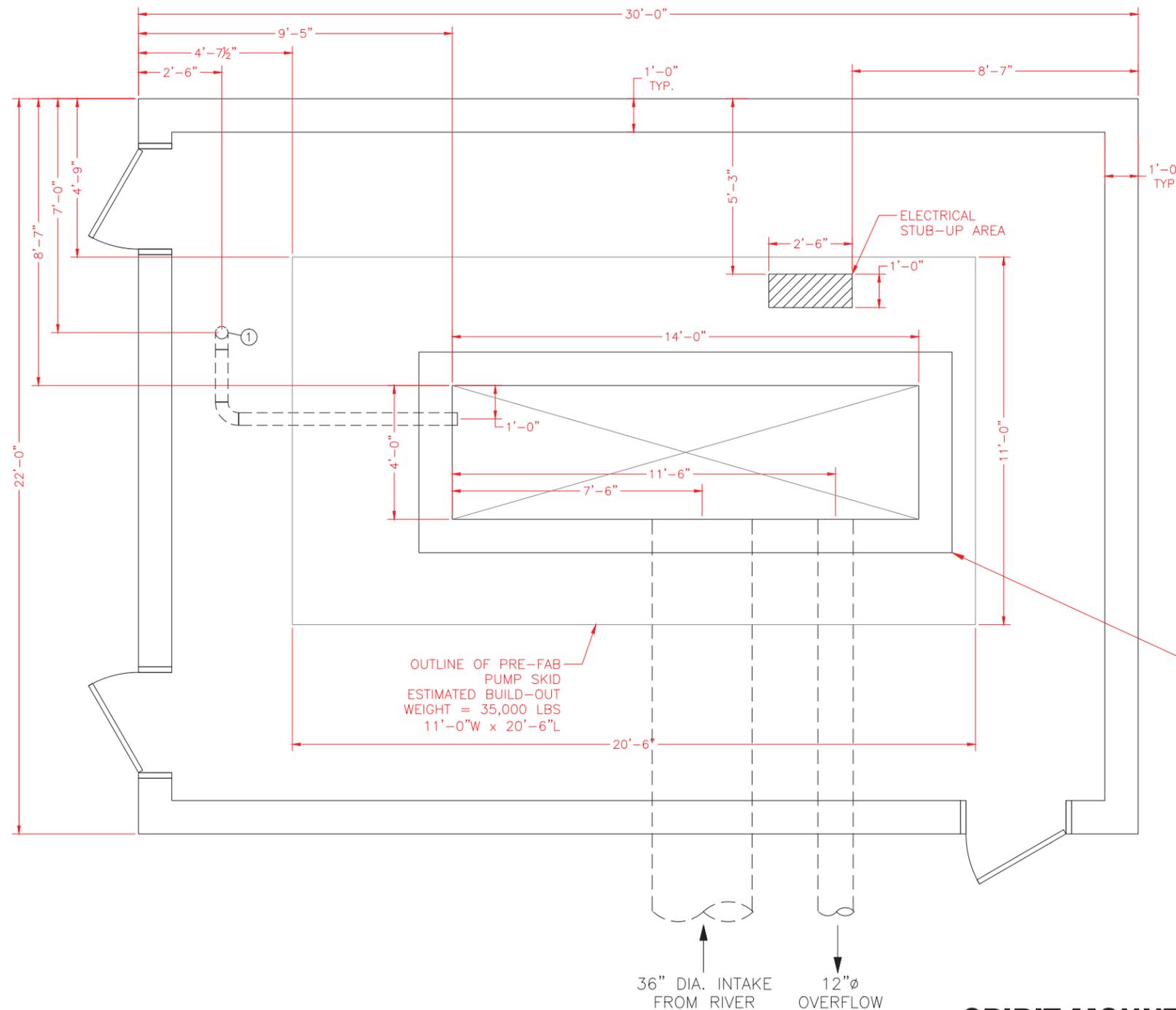


**SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA**

**RIVER SNOW MAKING PUMPHOUSE
 SECTION VIEW**

FILE NO.	M1
DATE 10-16-2014	

① - 4"Ø STUB-UP @ 3'-0" ABOVE SLAB
 CUT & FIELD WELD
 BY CONTRACTOR



OUTLINE OF PRE-FAB
 PUMP SKID
 ESTIMATED BUILD-OUT
 WEIGHT = 35,000 LBS
 11'-0"W x 20'-6"L

WET WELL DIMENSIONS (INSIDE):
 14'-0"L x 4'-0"W x 20'-0"D

36" DIA. INTAKE
 FROM RIVER

12"Ø
 OVERFLOW

SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION

SLAB PLAN
 SCALE: 1/2" = 1'-0"

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
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3	09-29-14	UPDATED	JDM
4	10-08-14	UPDATED	JDM
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SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION SLAB PLAN	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 6 OF 7

DRAWN BY: _____	NO.	BY	DATE	REVISIONS
DESIGNER: _____				
CHECKED BY: _____				
DESIGN TEAM				

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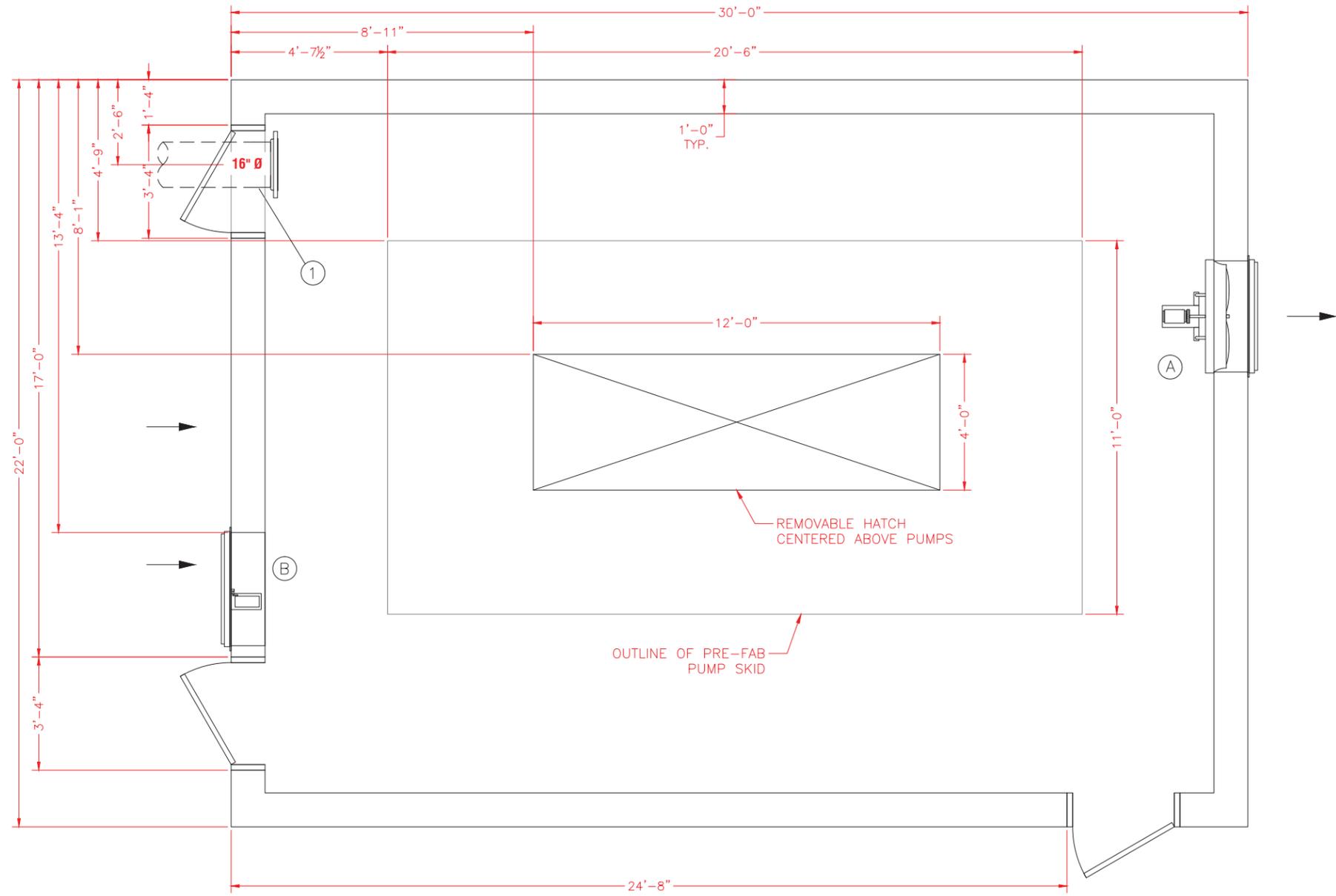
SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
 SLAB PLAN

FILE NO.	M1
DATE	10-16-2014

- (A)** RECOMMENDED VENTILATION;
 (1) 4215 CFM EACH @ 0.38" SP (STATIC PRESSURE), 36"Ø, WALL MOUNT EXHAUST FAN, 115/230 V/1/60, 3/4 HP, TEFC MOTOR, WITH ALUMINUM SPRING LOADED BACKDRAFT SHUTTER AND GAIRD. GRAINGER #1HLB6 OR EQUAL.
- (B)** (1) 36" MOTORIZED INLET AIR DAMPER, ALUMINUM FRAME, POWER TO OPEN, SPRING RETURN TO CLOSE, 120/240 V/1/60 POWERED. GRAINGER #3C729 OR EQUAL.
- (1) SINGLE SPEED THERMOSTAT WITH ONE SPDT, 16 AMP, 120/240 V/1/60 RATED CONTACT, GRAINGER #4LZ94 OR EQUAL. CONNECT ONE EACH FAN AND INTAKE TO A COMMON THERMOSTAT.
- (C)** RECOMMENDED HEATING;
 (2) 10 KW EACH ELECTRIC UNIT HEATER, 480 V/3/60 POWERED, CEILING MOUNT WITH BRACKET KIT. GRAINGER #25D240 W/ THERMOSTAT (#25D246) AND BRACKET (#25D242) OR EQUAL.

① - 16"Ø STUB THRU WALL
 W/ 16"-150# FLANGE
 BY CONTRACTOR



BUILDING PLAN
 SCALE: 1/2" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
2	09-08-14	UPDATED	JDM
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SPIRIT MOUNTAIN SKI AREA, MN RIVER PUMPSTATION BUILDING PLAN	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-16-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M1	
REV: 5	SHEET: 7 OF 7

DRAWN BY: _____	DESIGNER: _____	CHECKED BY: _____	
DESIGN TEAM			
NO.	BY	DATE	REVISIONS

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
BUILDING PLAN

FILE NO. _____
 DATE 10-16-2014
M1

MAIN SWITCHBOARD

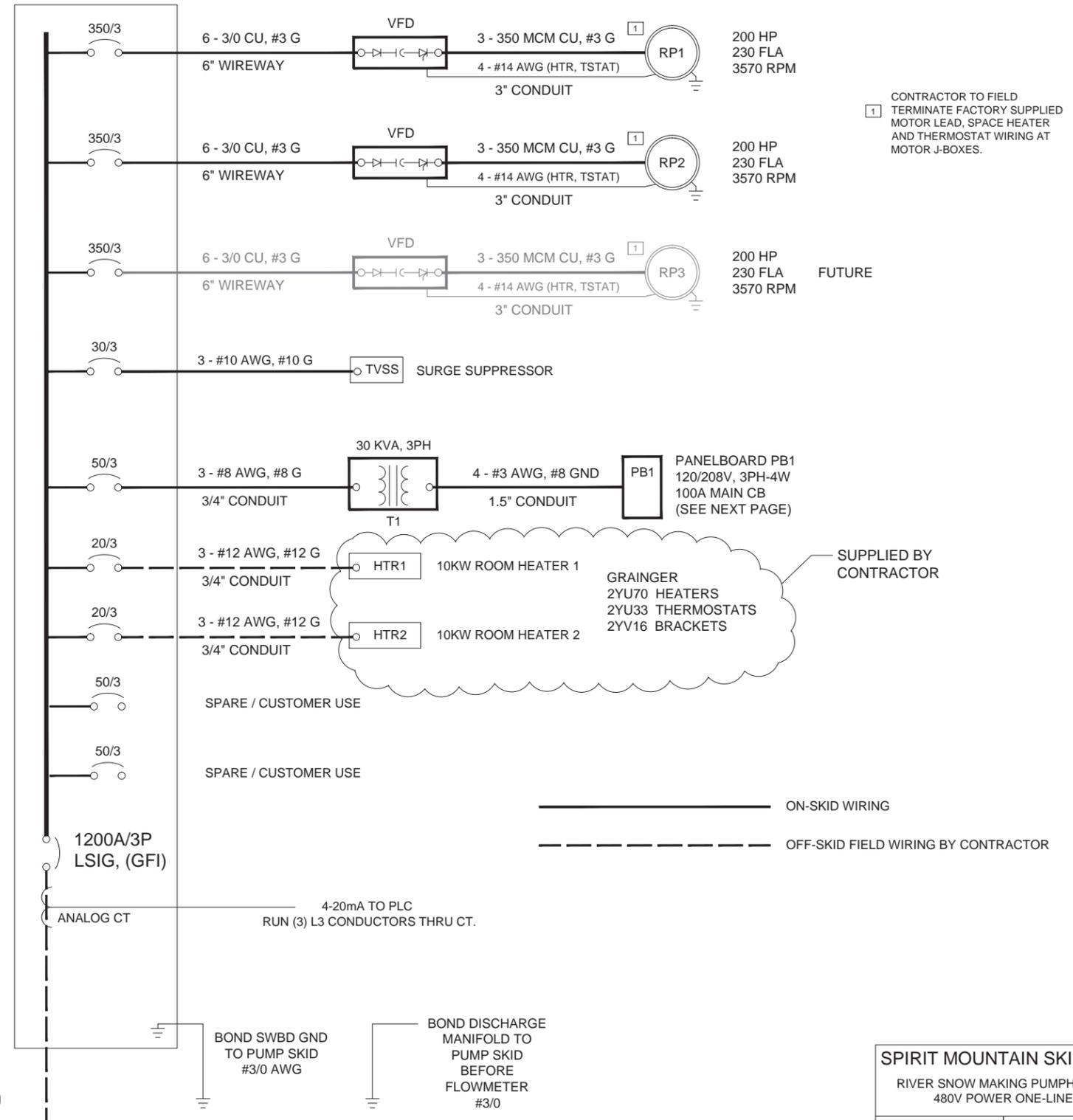
LOAD SUMMARY

LOAD	DESCRIPTION	HP	AMPS	SWBD CB (AMPS)
RP1	RIVER PUMP #1 - VFD	200	230	350
RP2	RIVER PUMP #2 - VFD	200	230	350
RP3	FUTURE RIVER PUMP #3 - VFD	200	230	350
TVSS	SURGE SUPPRESSOR		0	30
T1	30 KVA TRANSFORMER		36	50
HTR1	10 KW HEATER 1		13	20
HTR2	10 KW HEATER 2		13	20
CU1	CUSTOMER USE / SPARE		40	50
CU2	CUSTOMER USE / SPARE		40	50
TOTAL CONNECTED LOAD (AMPS)			832 AMPS	
TOTAL CONNECTED LOAD (kVA)			692 KVA	

MINIMUM SIZE TRANSFORMER RECOMMENDED = 750 KVA

1200A MCB, 80%,
LSIG (GFI)
480Y/277V
3PH-4W-60Hz
35K AIC

INDOOR
SWITCHBOARD

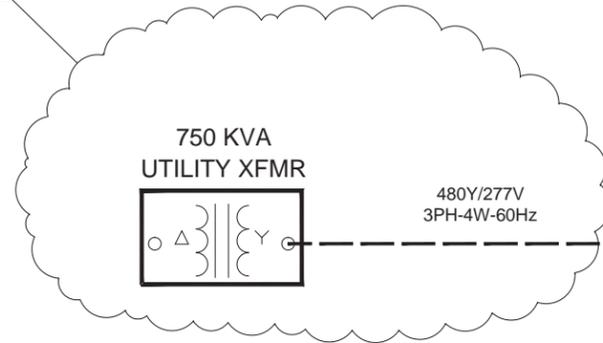


1 CONTRACTOR TO FIELD TERMINATE FACTORY SUPPLIED MOTOR LEAD, SPACE HEATER AND THERMOSTAT WIRING AT MOTOR J-BOXES.

SUPPLIED BY CONTRACTOR

ON-SKID WIRING
OFF-SKID FIELD WIRING BY CONTRACTOR

BY UTILITY



NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: _____
DESIGNER: _____
CHECKED BY: _____
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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Name, P.E. _____
Date: --/--/-- Lic. No. _____



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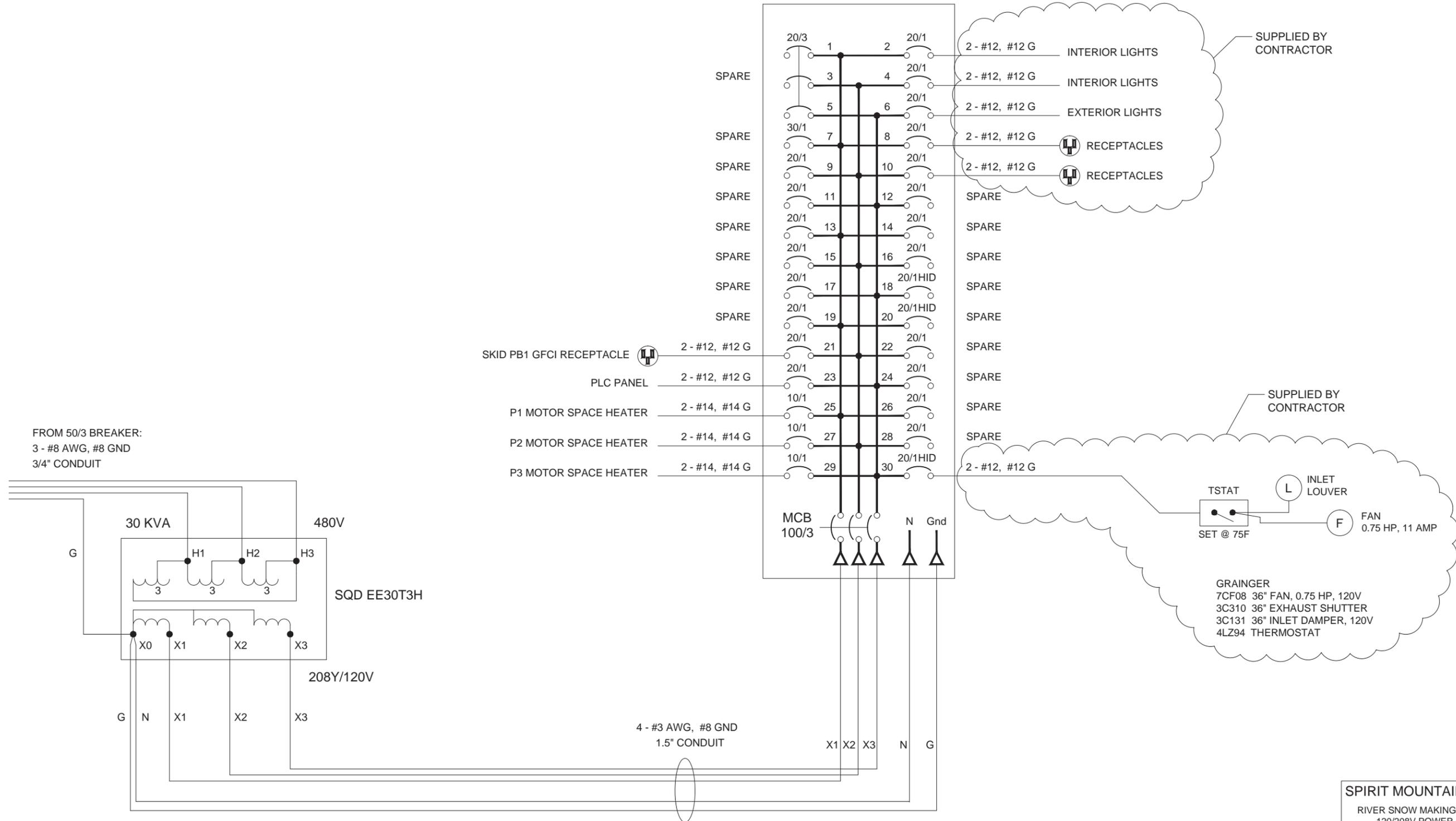
**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

SPIRIT MOUNTAIN SKI AREA RIVER SNOW MAKING PUMPHOUSE 480V POWER ONE-LINE	
DRAWN BY: RTR	CHECKED: RTR
DATE: 10-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER: 782013-E1	
REV: 1	SHEET: 1 OF 3

FILE NO. _____
DATE 10-20-2014
E1

PANELBOARD PB1
208Y/120V-3PH4W-60Hz



FROM 50/3 BREAKER:
3 - #8 AWG, #8 GND
3/4" CONDUIT

4 - #3 AWG, #8 GND
1.5" CONDUIT

SUPPLIED BY CONTRACTOR

SUPPLIED BY CONTRACTOR

GRAINGER
7CF08 36" FAN, 0.75 HP, 120V
3C310 36" EXHAUST SHUTTER
3C131 36" INLET DAMPER, 120V
4LZ94 THERMOSTAT

NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: _____	_____	_____	_____
DESIGNER: _____	_____	_____	_____
CHECKED BY: _____	_____	_____	_____
DESIGN TEAM	NO.	BY	DATE

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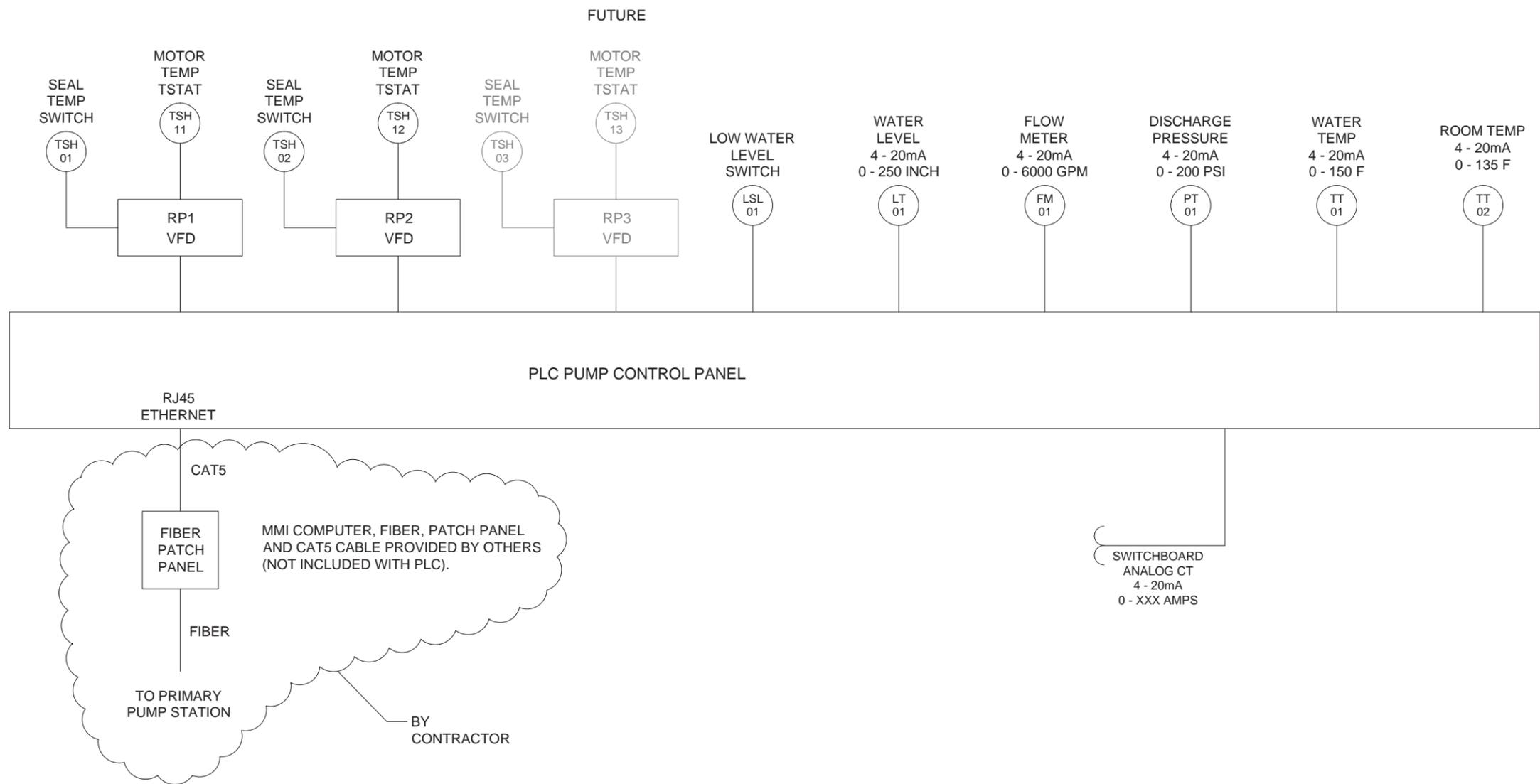
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**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
120/208V POWER ONE-LINE

SPIRIT MOUNTAIN SKI AREA RIVER SNOW MAKING PUMPHOUSE 120/208V POWER ONE-LINE	
DRAWN BY: RTR	CHECKED: RTR
DATE: 10-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER: 782013-E1	
REV: 1	SHEET: 2 OF 3

FILE NO.	E1
DATE 10-20-2014	



NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: _____	_____	_____	_____
DESIGNER: _____	_____	_____	_____
CHECKED BY: _____	_____	_____	_____
DESIGN TEAM	NO.	BY	DATE

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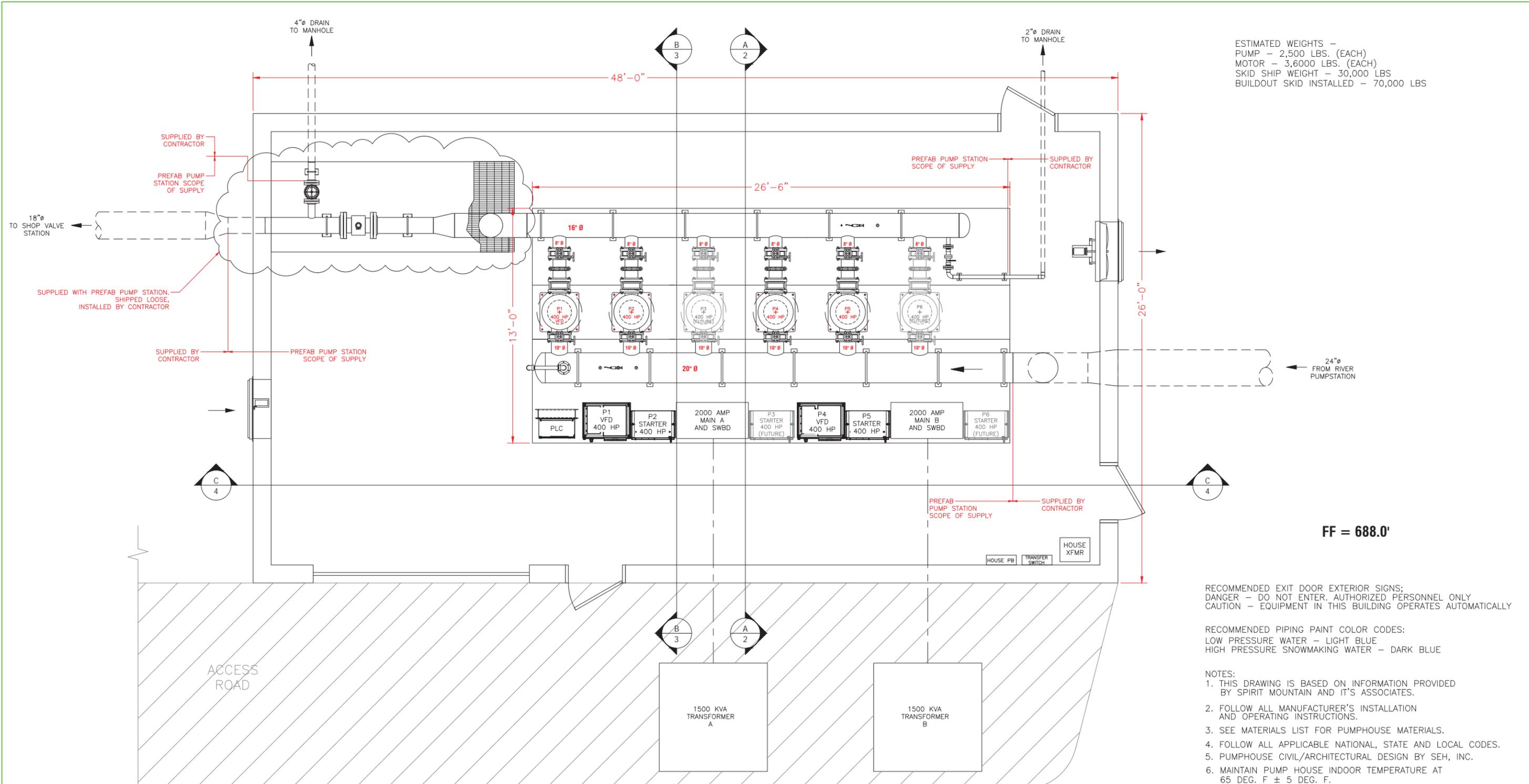
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**SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA**

RIVER SNOW MAKING PUMPHOUSE
 CONTROL BLOCK DIAGRAM

SPIRIT MOUNTAIN SKI AREA	
RIVER SNOW MAKING PUMPHOUSE CONTROL BLOCK DIAGRAM	
DRAWN BY: RTR	CHECKED: RTR
DATE: 10-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER: 782013-E1	
REV: 1	SHEET: 3 OF 3

FILE NO.	E1
DATE 10-20-2014	



ESTIMATED WEIGHTS -
 PUMP - 2,500 LBS. (EACH)
 MOTOR - 3,600 LBS. (EACH)
 SKID SHIP WEIGHT - 30,000 LBS
 BUILDOUT SKID INSTALLED - 70,000 LBS

FF = 688.0'

RECOMMENDED EXIT DOOR EXTERIOR SIGNS:
 DANGER - DO NOT ENTER. AUTHORIZED PERSONNEL ONLY
 CAUTION - EQUIPMENT IN THIS BUILDING OPERATES AUTOMATICALLY

RECOMMENDED PIPING PAINT COLOR CODES:
 LOW PRESSURE WATER - LIGHT BLUE
 HIGH PRESSURE SNOWMAKING WATER - DARK BLUE

- NOTES:
- THIS DRAWING IS BASED ON INFORMATION PROVIDED BY SPIRIT MOUNTAIN AND IT'S ASSOCIATES.
 - FOLLOW ALL MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
 - SEE MATERIALS LIST FOR PUMPHOUSE MATERIALS.
 - FOLLOW ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES.
 - PUMPHOUSE CIVIL/ARCHITECTURAL DESIGN BY SEH, INC.
 - MAINTAIN PUMP HOUSE INDOOR TEMPERATURE AT 65 DEG. F ± 5 DEG. F.

PLAN VIEW
 SCALE: 3/8" = 1'-0"



PUMP RATING: 1,000 GPM @ 1,215' TDH + 125' SUCTION = 1,340' (580 PSI) TOTAL DISCHARGE

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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 Name, P.E. _____
 Lic. No. _____
 Date: --/--/--

SEH
 PHONE: 218-855-1700
 418 SOUTH 6TH ST, SUITE 200
 BRAINERD, MN 56401-3540
 www.sehinc.com

Spirit Mountain

**SPIRIT MOUNTAIN SKI AREA, MN
 SNOWMAKING PRIMARY PUMPSTATION LAYOUT**

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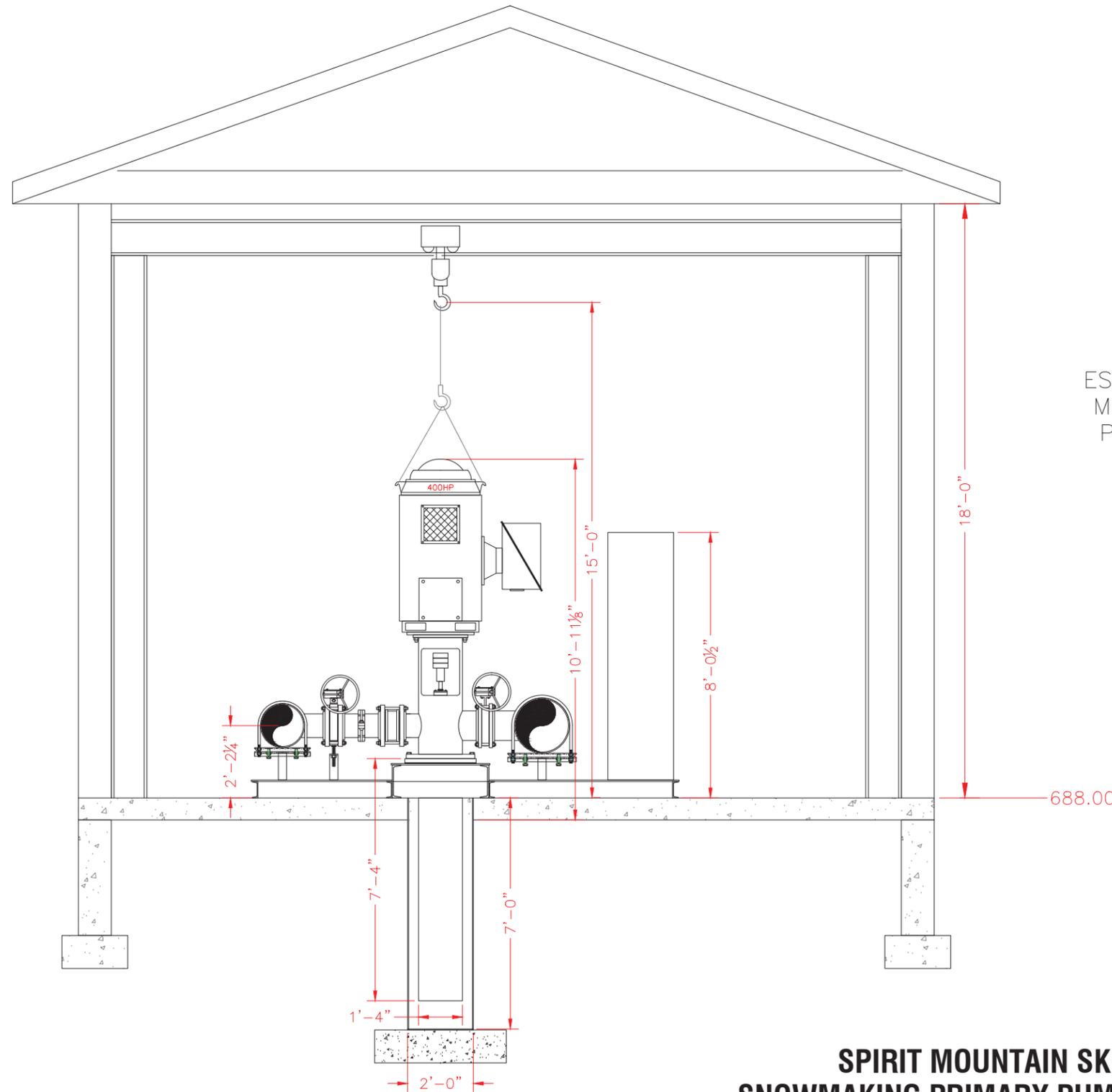
SPIRIT MOUNTAIN SKI AREA, MN SNOWMAKING PRIMARY PUMPSTATION LAYOUT PLAN VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M2	
REV: 6	SHEET: 1 OF 6

DRAWN BY: _____	NO.	BY	DATE	REVISIONS
DESIGNER: _____				
CHECKED BY: _____				
DESIGN TEAM				

**SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA**

**PRIMARY SNOW MAKING PUMPHOUSE
 PLAN VIEW**

FILE NO. _____
 DATE 10-20-2014
M2



3 TON MIN.
BRIDGE CRANE
ESTIMATED WEIGHTS –
MOTOR = 3600 LBS
PUMP = 2500 LBS

SECTION A-A
SCALE: 1/2" = 1'-0"

**SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT**

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT
SECTION VIEW

DRAWN BY: JDM	CHECKED: MRM
DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M2	
REV: 6	SHEET: 2 OF 6

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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DESIGN TEAM	NO.	BY
	DATE	REVISIONS

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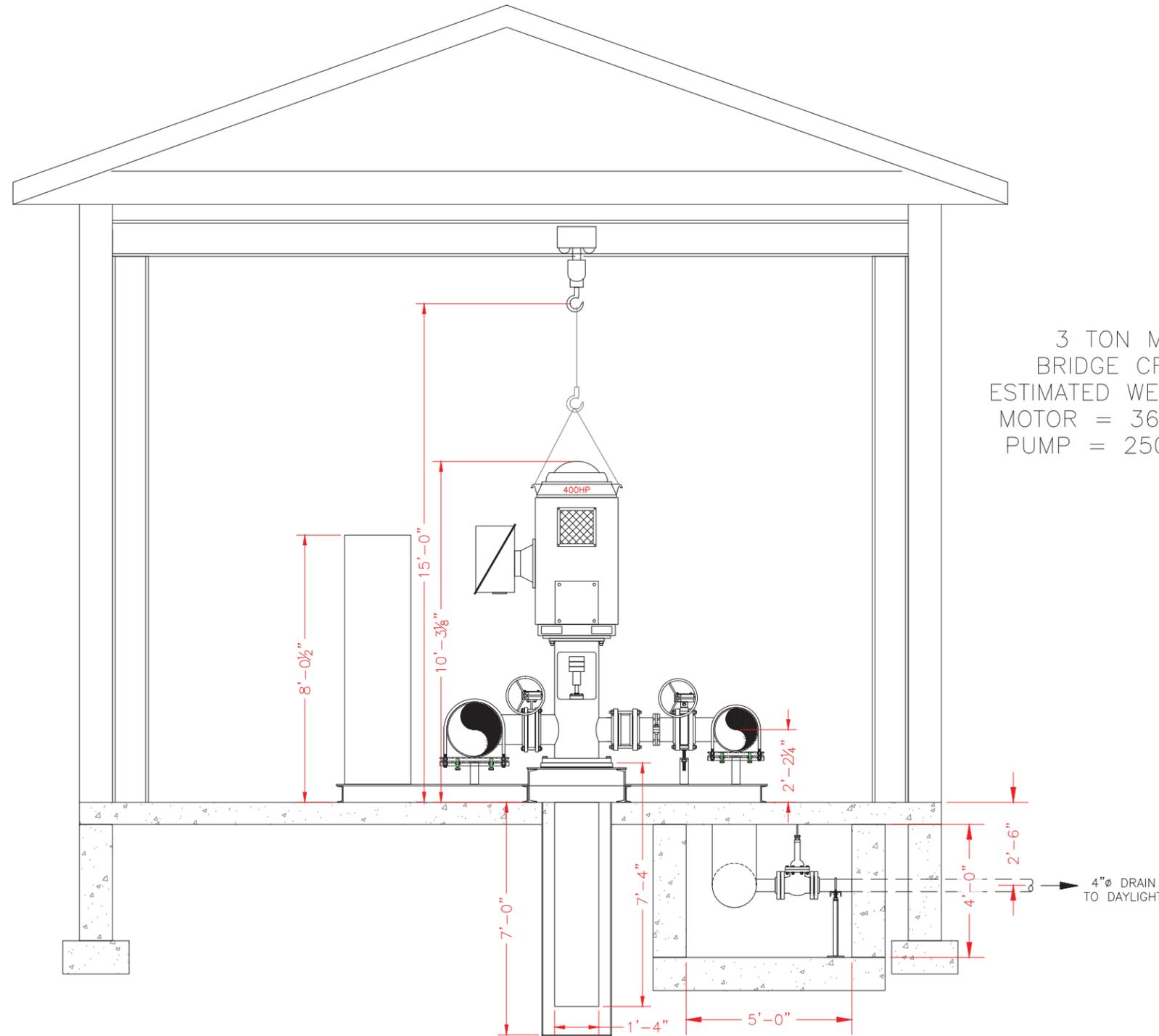
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**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
DATE
10-20-2014
M2



3 TON MIN.
BRIDGE CRANE
ESTIMATED WEIGHTS –
MOTOR = 3600 LBS
PUMP = 2500 LBS

SECTION B-B
SCALE: 1/2" = 1'-0"

**SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT**

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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SPIRIT MOUNTAIN SKI AREA, MN SNOWMAKING PRIMARY PUMPSTATION LAYOUT SECTION VIEW	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M2	
REV: 6	SHEET: 3 OF 6

DRAWN BY: _____	DESIGNER: _____	CHECKED BY: _____
DESIGN TEAM	NO.	BY
	DATE	REVISIONS

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 Date: ____/____/____

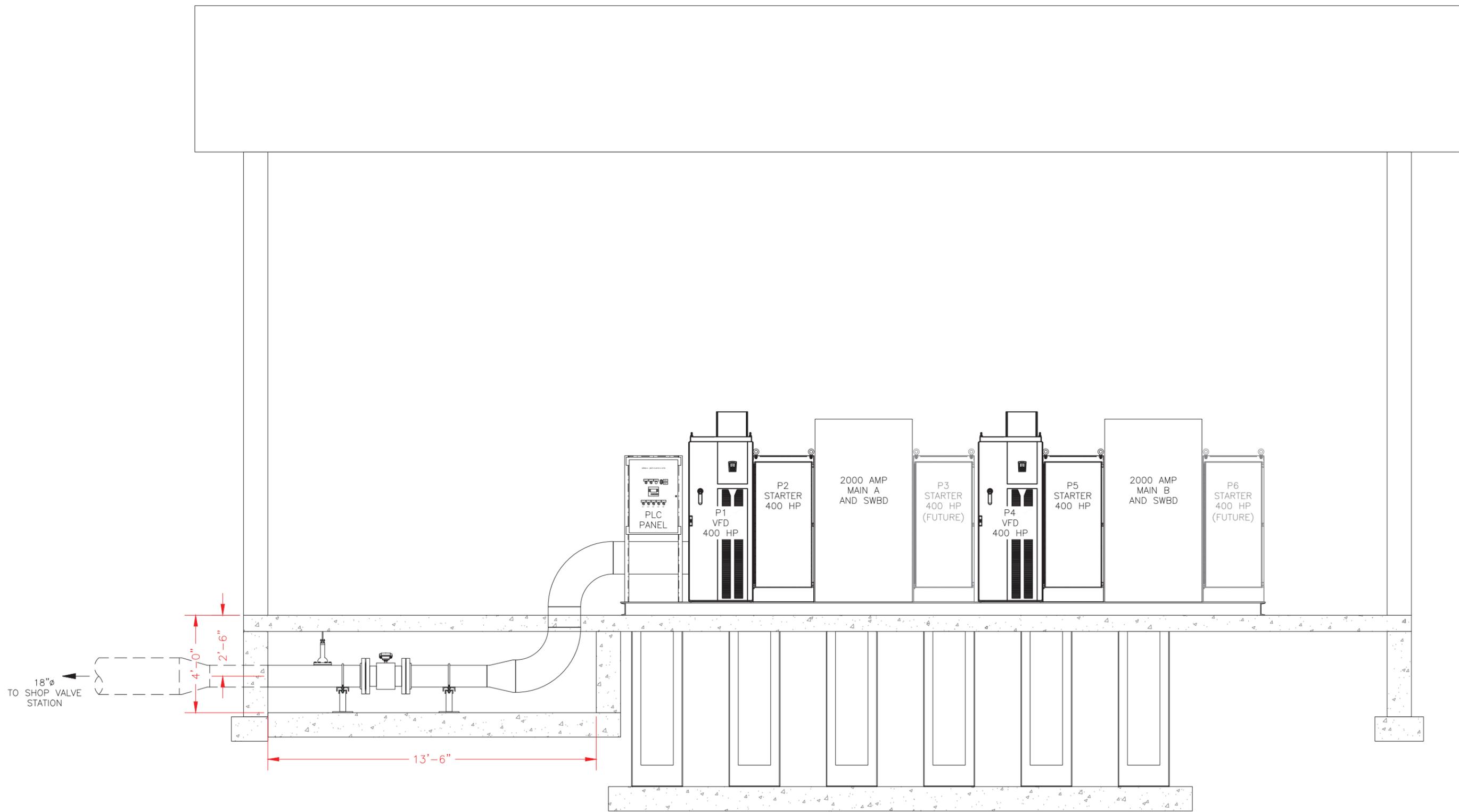
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 BRAINERD, MN 56401-3540
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**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

**PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW**

FILE NO.
DATE
10-20-2014
M2



SECTION C-C
SCALE: 1/2" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT
SECTION VIEW

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER : 782013-M2	
REV : 6	SHEET : 4 OF 6

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NO.	BY	DATE	REVISIONS

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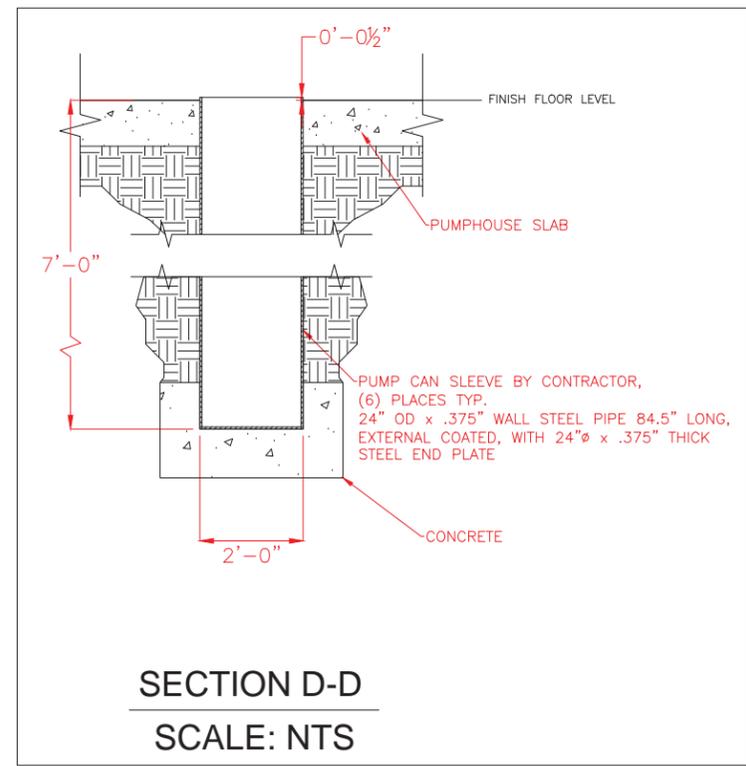
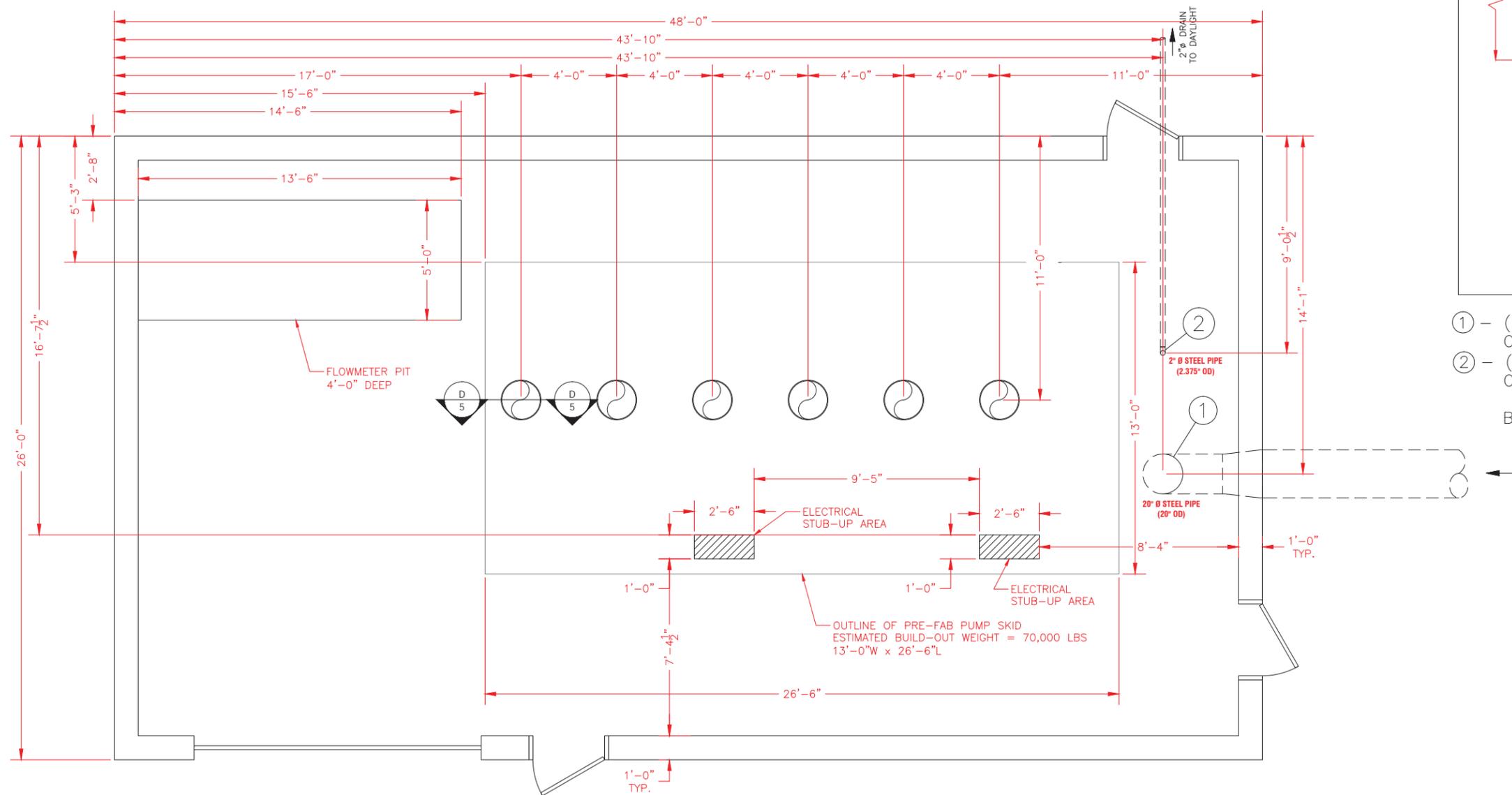
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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.	M2
DATE	10-20-2014



- ① - (1) 20" STUB UP @ 3'-0" ABOVE SLAB CUT & FIELD WELD
 - ② - (1) 2" STUB UP @ 3'-0" ABOVE SLAB CUT AND FIELD WELD
- BY CONTRACTOR

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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Name, P.E. _____
Lic. No. _____



SPIRIT MOUNTAIN SKI AREA, MN SNOWMAKING PRIMARY PUMPSTATION LAYOUT

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SPIRIT MOUNTAIN SKI AREA, MN SNOWMAKING PRIMARY PUMPSTATION LAYOUT SLAB PLAN	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M2	
REV: 6	SHEET: 5 OF 6

DRAWN BY: _____	DESIGNER: _____	CHECKED BY: _____
NO.	BY	DATE
REVISIONS		

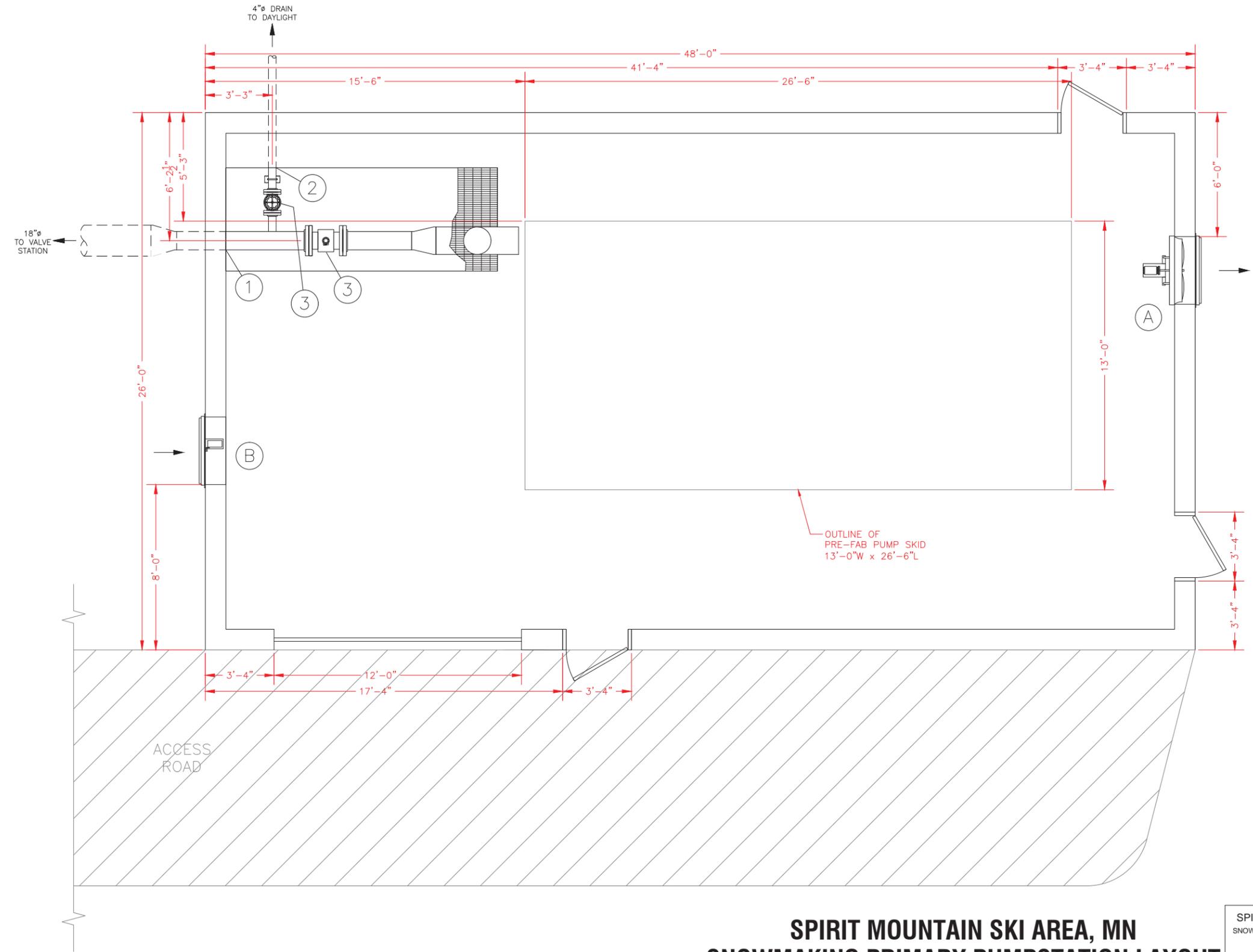
**SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA**

PRIMARY SNOW MAKING PUMPHOUSE
SLAB PLAN

FILE NO. _____
DATE 10-20-2014
M2

- (A)** RECOMMENDED VENTILATION;
 (1) 4215 CFM EACH @ 0.38" SP (STATIC PRESSURE), 36"Ø, WALL MOUNT EXHAUST FAN, 115/230 V/1/60, 3/4 HP, TEFC MOTOR, WITH ALUMINUM SPRING LOADED BACKDRAFT SHUTTER AND GAIRD. GRAINGER #1HLB6 OR EQUAL.
- (B)** (1) 36" MOTORIZED INLET AIR DAMPER, ALUMINUM FRAME, POWER TO OPEN, SPRING RETURN TO CLOSE, 120/240 V/1/60 POWERED. GRAINGER #3C729 OR EQUAL.
- (1) SINGLE SPEED THERMOSTAT WITH ONE SPDT, 16 AMP, 120/240 V/1/60 RATED CONTACT, GRAINGER #4LZ94 OR EQUAL. CONNECT ONE EACH FAN AND INTAKE TO A COMMON THERMOSTAT.
- (C)** RECOMMENDED HEATING;
 (2) 10 KW EACH ELECTRIC UNIT HEATER, 480 V/3/60 POWERED, CEILING MOUNT WITH BRACKET KIT. GRAINGER #25D240 W/ THERMOSTAT (#25D246) AND BRACKET (#25D242) OR EQUAL.

- 1** 10"Ø STUB THRU WALL - 2'-6" Ø BELOW FF. CUT & FIELD WELD
- 2** 4"Ø STUB THRU WALL - 2'-6" Ø BELOW FF. CUT & FIELD WELD
- 3** SUPPLIED WITH PUMP STATION SHIPPED LOOSE INSTALLED BY CONTRACTOR ALL ABOVE BY CONTRACTOR



BUILDING PLAN
 SCALE: 3/8" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT

NO.	DATE	REVISION	BY
3	10-08-14	UPDATED	JDM
4	10-09-14	UPDATED	JDM
5	10-16-14	UPDATED	CAD
6	10-20-14	UPDATED	CAD

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SPIRIT MOUNTAIN SKI AREA, MN SNOWMAKING PRIMARY PUMPSTATION LAYOUT BUILDING PLAN	
DRAWN BY: JDM	CHECKED: MRM
DATE: 10-20-2014	APPROVED: JDC
SCALE: AS NOTED	D - SIZE DRAWING
DRAWING NUMBER: 782013-M2	
REV: 6	SHEET: 6 OF 6

DRAWN BY: _____	NO.	BY	DATE	REVISIONS
DESIGNER: _____				
CHECKED BY: _____				
DESIGN TEAM				

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Date: ___/___/___ Name, P.E. _____ Lic. No. _____

SEH
 PHONE: 218-855-1700
 418 SOUTH 6TH ST, SUITE 200
 BRAINERD, MN 56401-3540
 www.sehinc.com



SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
 BUILDING PLAN

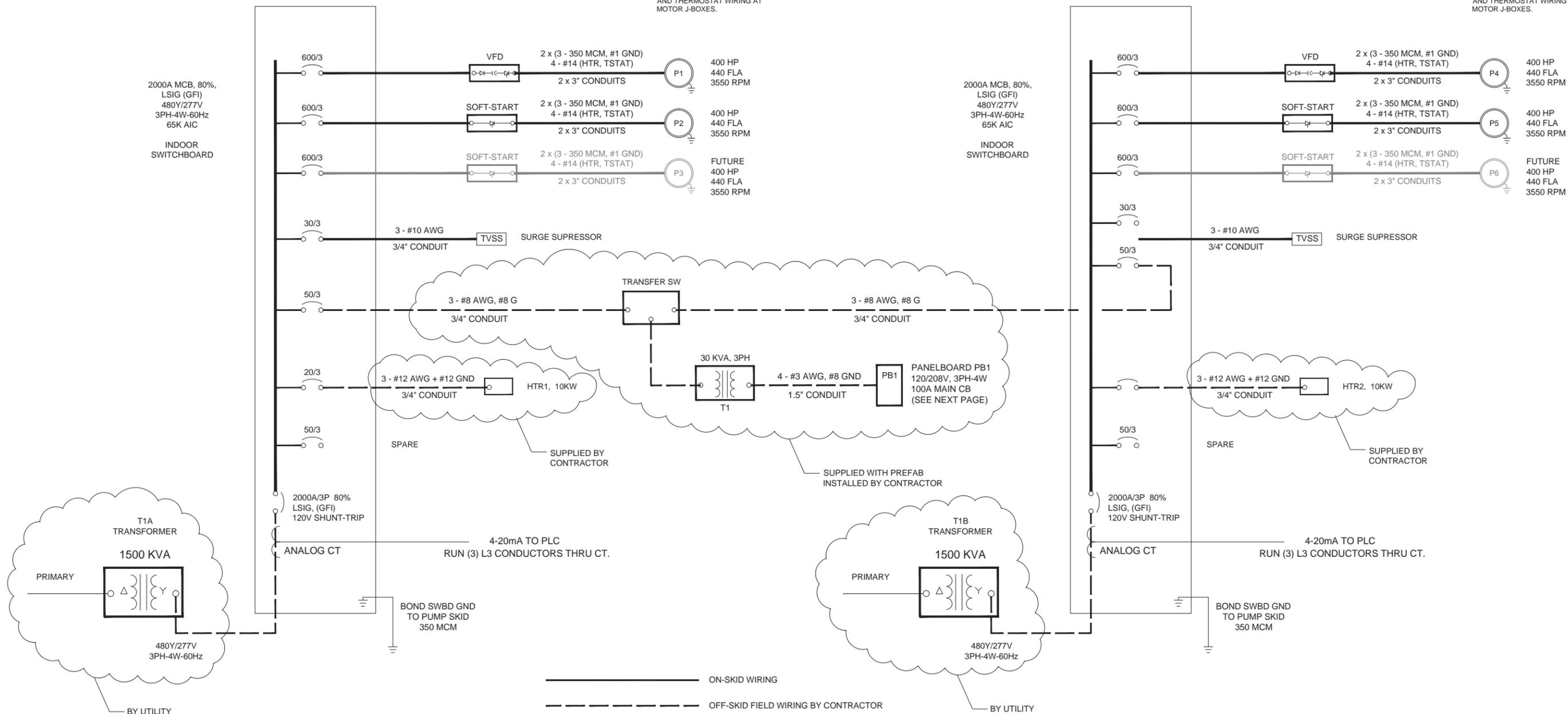
FILE NO.	M2
DATE 10-20-2014	

PRIMARY- MAIN A

PRIMARY- MAIN B

1 CONTRACTOR TO FIELD TERMINATE FACTORY SUPPLIED MOTOR LEAD, SPACE HEATER AND THERMOSTAT WIRING AT MOTOR J-BOXES.

1 CONTRACTOR TO FIELD TERMINATE FACTORY SUPPLIED MOTOR LEAD, SPACE HEATER AND THERMOSTAT WIRING AT MOTOR J-BOXES.



NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: _____	_____	_____	_____
DESIGNER: _____	_____	_____	_____
CHECKED BY: _____	_____	_____	_____
DESIGN TEAM	NO.	BY	DATE

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Name, P.E. _____
 Date: --/--/-- Lic. No. _____



SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

FILE NO. _____
 DATE 10-20-2014

E2

SPIRIT MOUNTAIN SKI AREA
PRIMARY SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

DRAWN BY: RTR	CHECKED: RTR
DATE: 19-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER:	
782013-E2	
REV: 1	SHEET: 1 OF 4

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LOAD SUMMARY

LOAD	DESCRIPTION	HP	MAIN A		MAIN B	
			AMPS	AMPS	AMPS	SWBD CB (AMPS)
P1	PRIMARY PUMP #1 - VFD	400	440			600/3
P2	PRIMARY PUMP #2 - SOFT STARTER	400	440			600/3
P3	FUTURE PRIMARY PUMP #3 - SOFT STARTER	400	440			600/3
P4	PRIMARY PUMP #4 - VFD	400		440		600/3
P5	PRIMARY PUMP #5 - SOFT STARTER	400		440		600/3
P6	FUTURE PRIMARY PUMP #6 - SOFT STARTER	400		440		600/3
TVSS	SURGE SUPPRESSOR		0	0		30
T1	30 KVA TRANSFORMER		36	36		50
HTR1	10 KW HEATER 1		13			20
HTR2	10 KW HEATER 2			13		20
CU1	CUSTOMER USE / SPARE		40			50
CU2	CUSTOMER USE / SPARE			40		50
			TOTAL CONNECTED LOAD (AMPS)		1409 AMPS	1409 AMPS
			TOTAL CONNECTED LOAD (kVA)		1171 KVA	1171 KVA

MINIMUM SIZE TRANSFORMER RECOMMENDED = 2 x 1500 KVA (TRANSFORMERS A AND B)

NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: _____
 DESIGNER: _____
 CHECKED BY: _____
 DESIGN TEAM

NO.	BY	DATE	REVISIONS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 Name, P.E. _____
 Date: --/--/-- Lic. No. _____



**SPIRIT MOUNTAIN SKI AREA
 DULUTH, MINNESOTA**

PRIMARY SNOW MAKING PUMPHOUSE
 480V POWER ONE-LINE

FILE NO.
 DATE
 10-20-2014

E2

SPIRIT MOUNTAIN SKI AREA
 PRIMARY SNOW MAKING PUMPHOUSE
 480V POWER ONE-LINE

DRAWN BY: RTR CHECKED: RTR
 DATE: 10-20-2014 APPROVED: MRM

SCALE: NONE

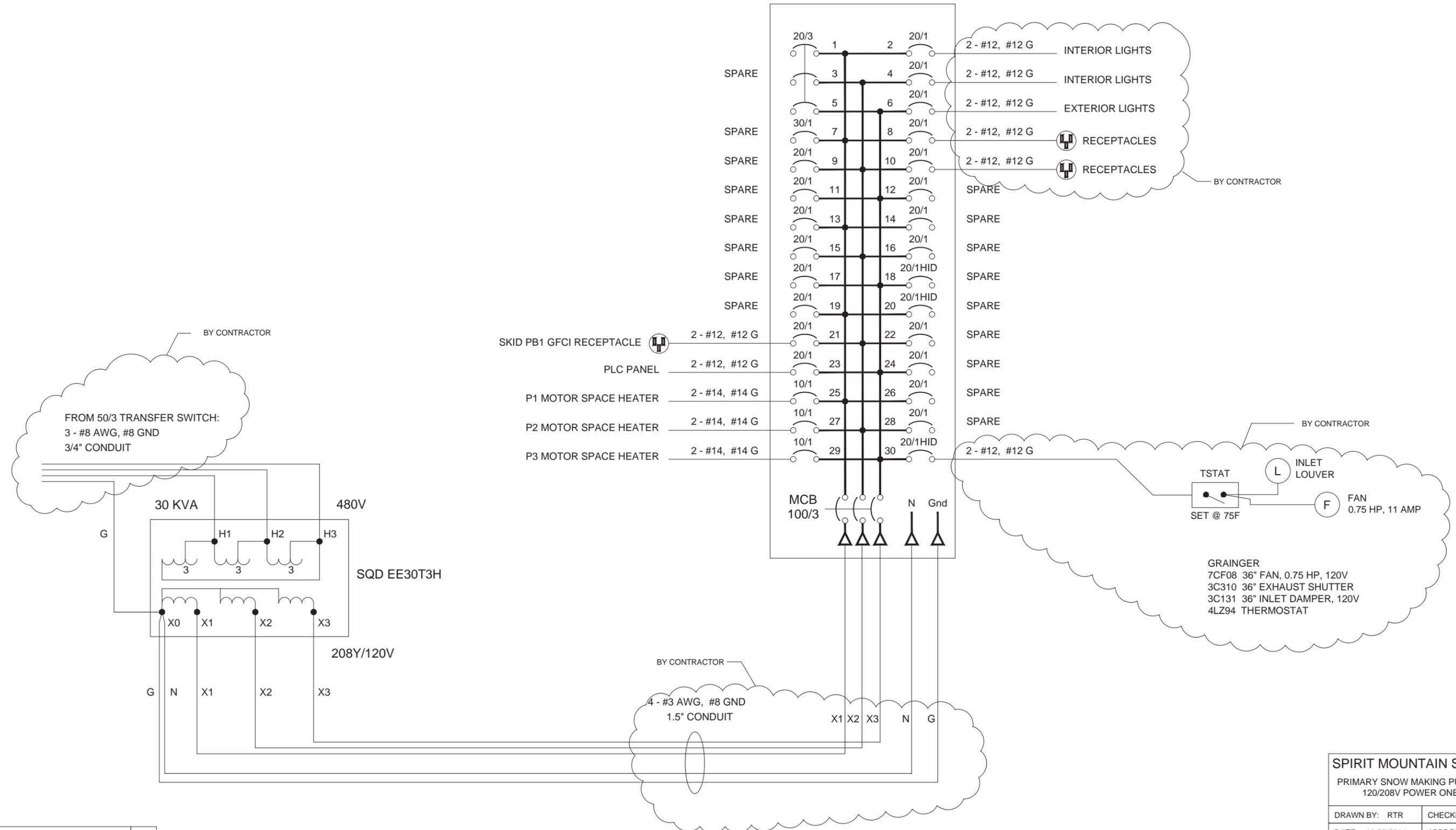
DRAWING NUMBER :
 782013-E2

REV: 1 SHEET: 2 OF 4

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TORRENT Engineering and Equipment
 P.O. BOX 270 MILFORD, IN 46542 USA
 Phone: (574)-658-3200 Fax: (574)-658-3229 www.torrentee.com

PANELBOARD PB1
208Y/120V-3PH4W-60Hz



BY CONTRACTOR

FROM 50/3 TRANSFER SWITCH:
3 - #8 AWG, #8 GND
3/4" CONDUIT

2 - #12, #12 G INTERIOR LIGHTS
2 - #12, #12 G INTERIOR LIGHTS
2 - #12, #12 G EXTERIOR LIGHTS
2 - #12, #12 G RECEPTACLES
2 - #12, #12 G RECEPTACLES

BY CONTRACTOR

BY CONTRACTOR

TSTAT
SET @ 75F

L INLET LOUVER
F FAN 0.75 HP, 11 AMP

GRAINGER
7CF08 36" FAN, 0.75 HP, 120V
3C310 36" EXHAUST SHUTTER
3C131 36" INLET DAMPER, 120V
4LZ94 THERMOSTAT

BY CONTRACTOR

4 - #3 AWG, #8 GND
1.5" CONDUIT

X1 X2 X3 N G

NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY: -			
DESIGNER: -			
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DESIGN TEAM	NO.	BY	DATE

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Name, P.E. _____
Date: --/--/-- Lic. No. -



SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
120/208V POWER ONE-LINE

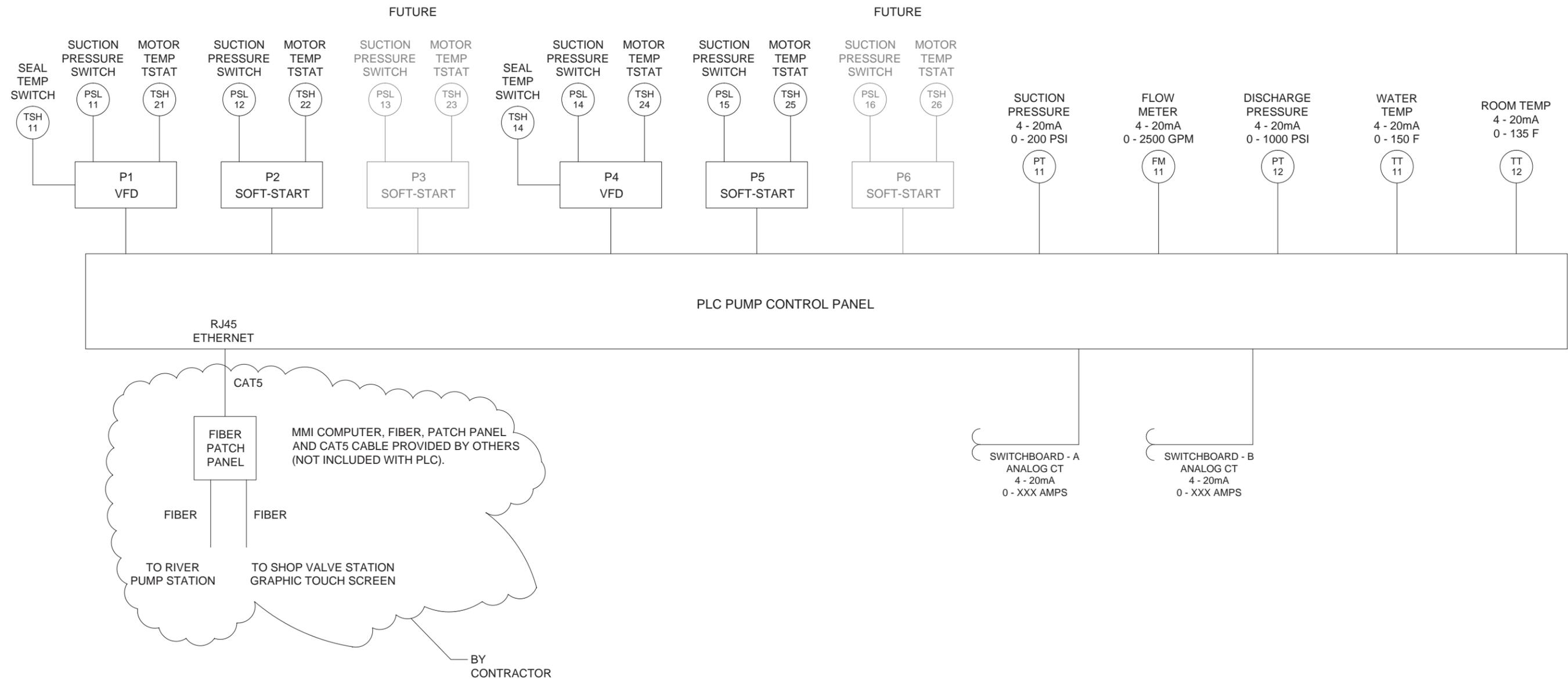
FILE NO. _____
DATE 10-20-2014
E2

SPIRIT MOUNTAIN SKI AREA PRIMARY SNOW MAKING PUMPHOUSE 120/208V POWER ONE-LINE	
DRAWN BY: RTR	CHECKED: RTR
DATE: 10-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER: 782013-E2	
REV: 1	SHEET: 3 OF 4

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NO.	DATE	REVISION	BY
1	10-20-2014	UPDATED	CAD
0	09-08-2014	INITIAL DRAWING RELEASE	CAD

DRAWN BY:	-			
DESIGNER:	-			
CHECKED BY:	-			
DESIGN TEAM	NO.	BY	DATE	

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Name, P.E. _____
Date: --/--/-- Lic. No. --



SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
CONTROL BLOCK DIAGRAM

FILE NO.
DATE
10-20-2014

E2

SPIRIT MOUNTAIN SKI AREA	
PRIMARY SNOW MAKING PUMPHOUSE CONTROL BLOCK DIAGRAM	
DRAWN BY: RTR	CHECKED: RTR
DATE: 10-20-2014	APPROVED: MRM
SCALE: NONE	
DRAWING NUMBER: 782013-E2	
REV: 1	SHEET: 4 OF 4

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