ADDENDUM NO. 1
October 28, 2014

Contract B – Water Supply Pump Stations
Spirit Mountain Recreation Authority

SEH No. FOSJJ 129137

From: Short Elliott Hendrickson Inc.
416 South 6th Street, Suite 200
Brainerd, MN 56401-3540
218.855.1700

To: Document Holders

DOCUMENT HOLDERS on the above-named project are hereby notified that this document shall be appended to, take precedence over and become part of the original bidding documents dated October 2014for this work. Bids submitted for the construction of this work shall conform to this document.

This addendum consists of 1 page and attached Drawings (all drawings for Contract B).

Changes to Drawings:

1. Please replace the set of drawings with this complete set for Contract B with revision date of October 28, 2014.

Note: Receipt of this Addendum No. 1 (dated October 28, 2014 shall be acknowledged on Page 1 of the submitted City of Duluth Official Sealed Bid Form. Failure to do so may subject Bidder to disqualification.

END OF ADDENDUM

LEGEND

STREET CENTERLINE (5+00, 6+00)
SURVEY BASELINE (5, 6)
COUNTY
SECTION
QUARTER
SIXTEENTH
CORPORATE LIMITS

EXISTING

RIGHT OF WAY
PERMANENT EASEMENT
PROPERTY LINE
R.R. RIGHT OF WAY
SANITARY SEWER AND MANHOLE
FM — FORCE MAIN
CO — SANITARY SEWER SERVICE & CLEANOUT
WATER MAIN, HYDRANT AND VALVE
WATER SERVICE AND CURB STOP BOX
WATER VALVE MANHOLE
STORM SEWER, APRON, MANHOLE AND CATCH BASIN
CULVERT
BULKHEAD
FO — BURIED FIBER OPTIC CABLE
FO-DUCT, T — BURIED FIBER OPTIC DUCT OR CONDUIT
T-BUR — BURIED PHONE CABLE AND PEDESTAL
T, T-DUCT — BURIED PHONE DUCT OR CONDUIT AND MANHOLE
TV-BUR, TV — BURIED TV CABLE AND PEDESTAL
P-BUR, UE — BURIED ELECTRIC CABLE
E, P-DUCT — BURIED ELECTRIC DUCT OR CONDUIT AND MANHOLE
P-OH — OVERHEAD ELECTRIC, POLE AND DOWN GUY ANCHOR
LIGHT POLE
TRAFFIC SIGNAL STANDARD
G — GAS MAIN
G — GAS SIGN, VALVE AND VENT
PETRO — PETROLEUM PIPELINE
\# — SOIL BORING
\#1 — TRAVERSE POINT
CONCRETE CURB AND GUTTER
CONC, BIT — EXISTING PAVEMENT OR SIDEWALK
SIGN (HWY, PARK, STOP, ETC.)
STREET NAME SIGN
DITCH
RAILROAD TRACKS
X — FENCE (UNIDENTIFIED)
X — BARBED WIRE FENCE
XC — CHAIN LINK FENCE
XE — ELECTRIC WIRE FENCE
XWD — WOOD FENCE
XWW — WOVEN WIRE FENCE
PLATE BEAM GUARDRAIL
CABLE GUARDRAIL
6", 6" — DECIDUOUS AND CONIFEROUS TREE
BUSH-SHRUB
WOODED AREA
WET — WETLAND
BLDG — BUILDING

PROPOSED

NEW RIGHT OF WAY
PERMANENT EASEMENT
TEMPORARY EASEMENT
SANITARY SEWER AND MANHOLE
FM — FORCE MAIN
CO — SANITARY SEWER SERVICE & CLEANOUT
WATER MAIN, HYDRANT AND VALVE
WATER SERVICE AND CURB STOP BOX
WATER VALVE MANHOLE
STORM SEWER, MANHOLE AND CATCH BASIN
CULVERT
BULKHEAD
DRAIN PIPE
DITCH
CONCRETE CURB AND GUTTER
SILT FENCE
SILTC — FLOATATION SILT CURTAIN
BIOROLL
LIGHT POLE
TRAFFIC SIGNAL, STANDARD
SIGN (HWY, PARK, STOP, ETC.)
STREET LIGHT FEED POINT
STREET LIGHTING CABLE

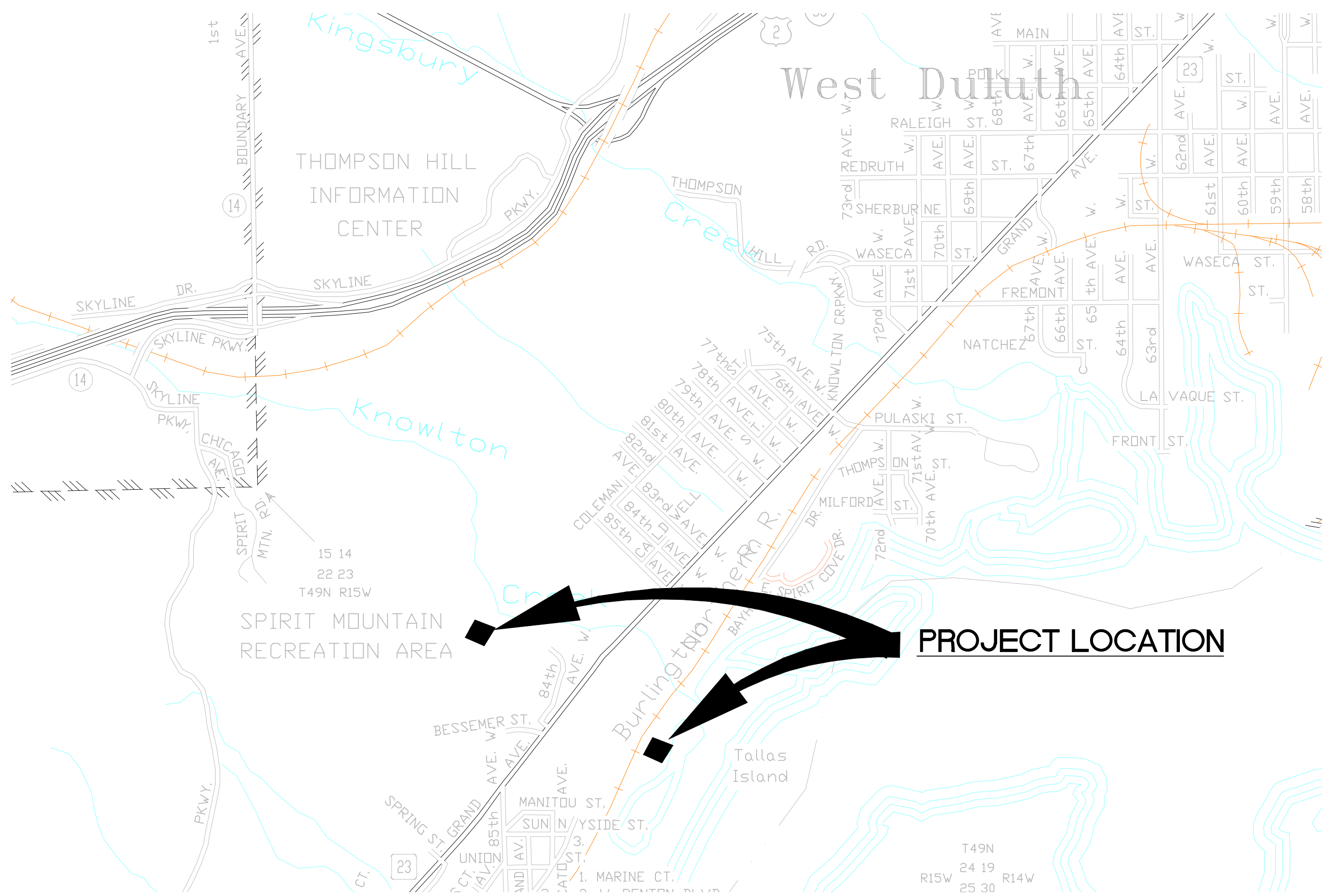
P:\FJ\J\JOCON\106141\50-Cad\contract B pump house shts\JOCON106141 TL.dwg 10/28/2014 9:07 AM rhaehn

SPIRIT MOUNTAIN
CITY OF DULUTH, MINNESOTA

CONSTRUCTION PLANS
FOR
INFRASTRUCTURE IMPROVEMENTS

CONTRACT "B"
PUMP STATIONS

CLIENT PROJECT NO. 129137



N
N.T.S.

NO.	BY	DATE	REVISIONS
1	RVH	10/28/14	ADDED ARCHITECTURAL SHEETS

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."

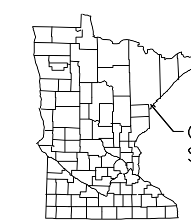
THE CONTRACTOR SHALL CALL THE GOPHER STATE ONE CALL SYSTEM AT 811 BEFORE COMMENCING EXCAVATION.

811 Know what's below. Call before you dig.

INDEX

THIS PLAN CONTAINS 55 SHEETS.

PROJECT LOCATION



CITY OF DULUTH
ST. LOUIS COUNTY

DULUTH, MINNESOTA

SEH
PHONE: 218.855.1700
416 S 6TH ST, STE 200
BRAINERD, MN 56401-3540
www.sehinc.com

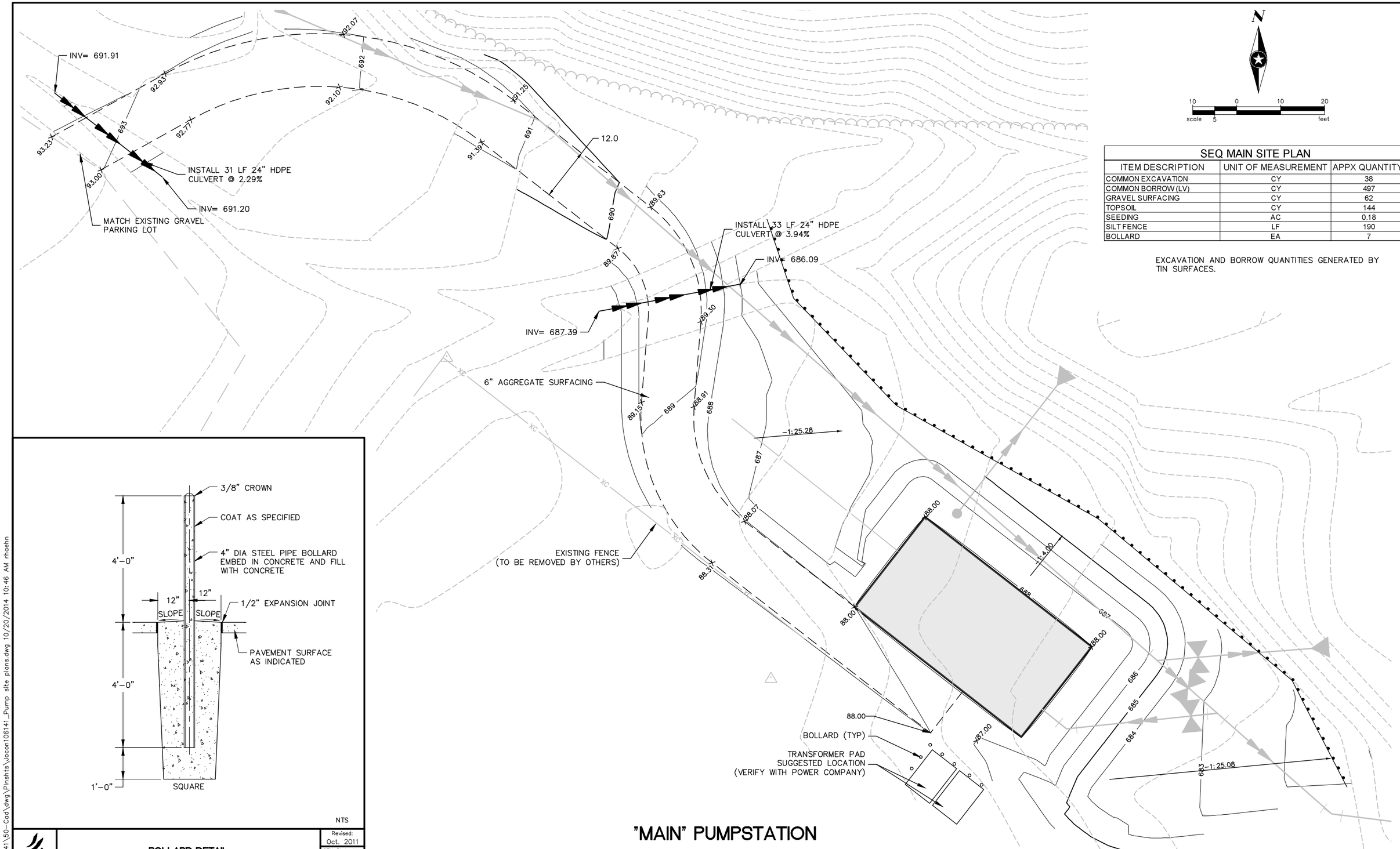
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

[illegible] JEFFERY R. LEDIN
Signature P.E.

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

FILE NO. FOSJJ129137

C1



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

BOLLARD DETAIL

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

"MAIN" PUMPSTATION

P:\FJJ\JJOCON\106141\50-Cad\dwg\Plnshts\Jocon106141_Pump site plans.dwg 10/20/2014 10:46 AM rhaehn

DRAWN BY:	RVH
DESIGNER:	RVH
CHECKED BY:	JRL
DESIGN TEAM	

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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

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www.sehinc.com

ON HILL IMPROVEMENTS
SPIRIT MOUNTAIN
DULUTH, MN

PUMP STATION
SITE / GRADING PLANS

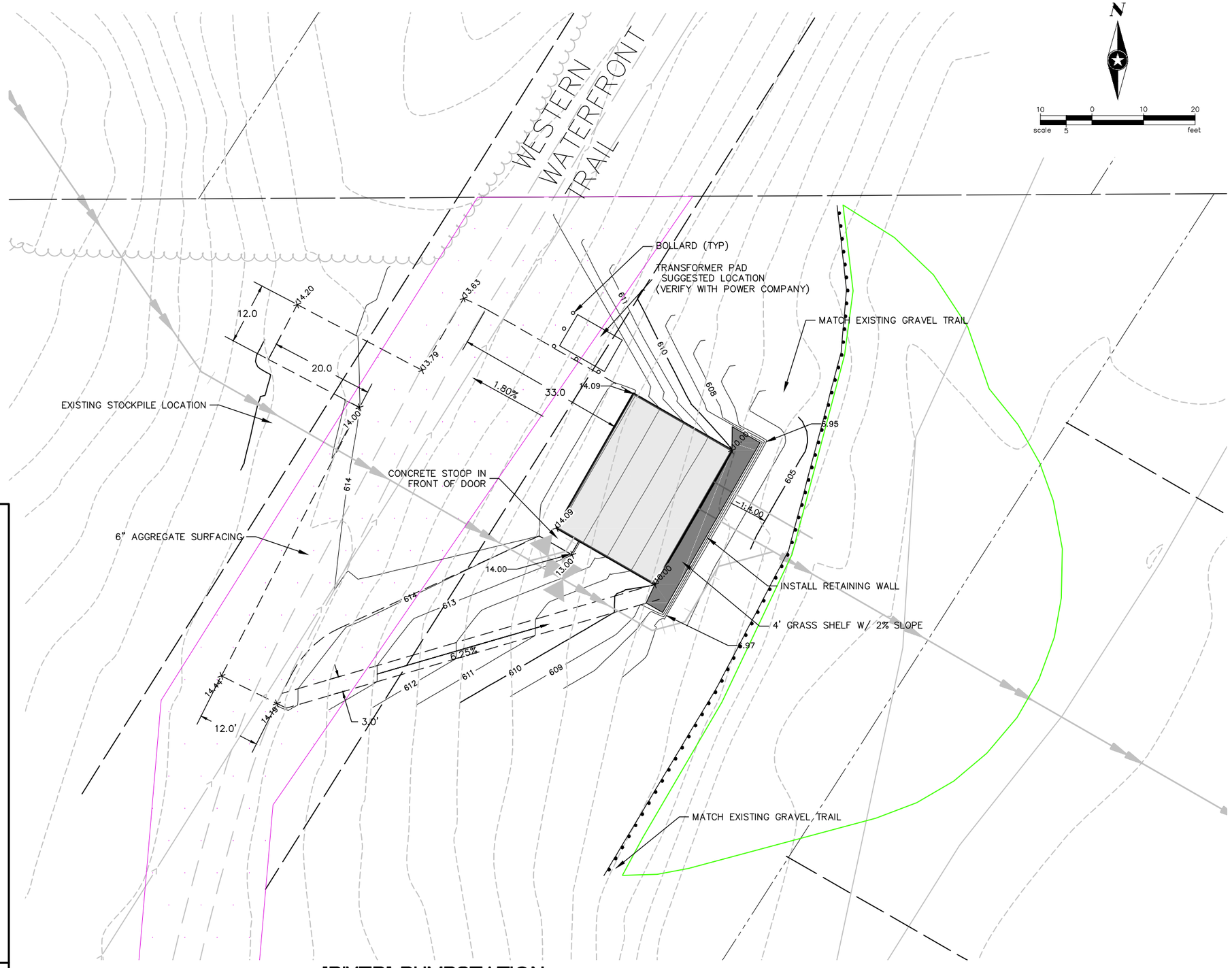
FILE NO. FOSJJ129137

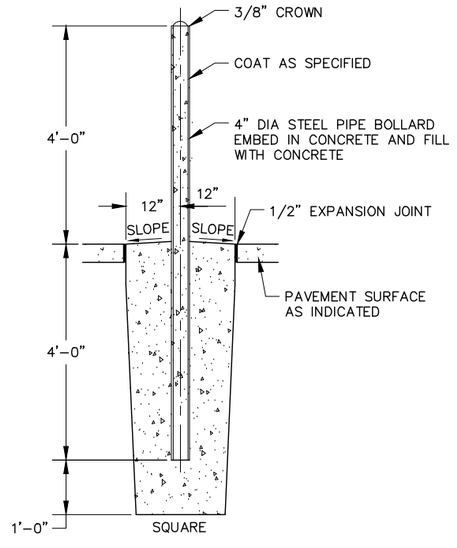
C2

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

"RIVER" PUMPSTATION

DRAWN BY: RVH
DESIGNER: RVH
CHECKED BY: JRL
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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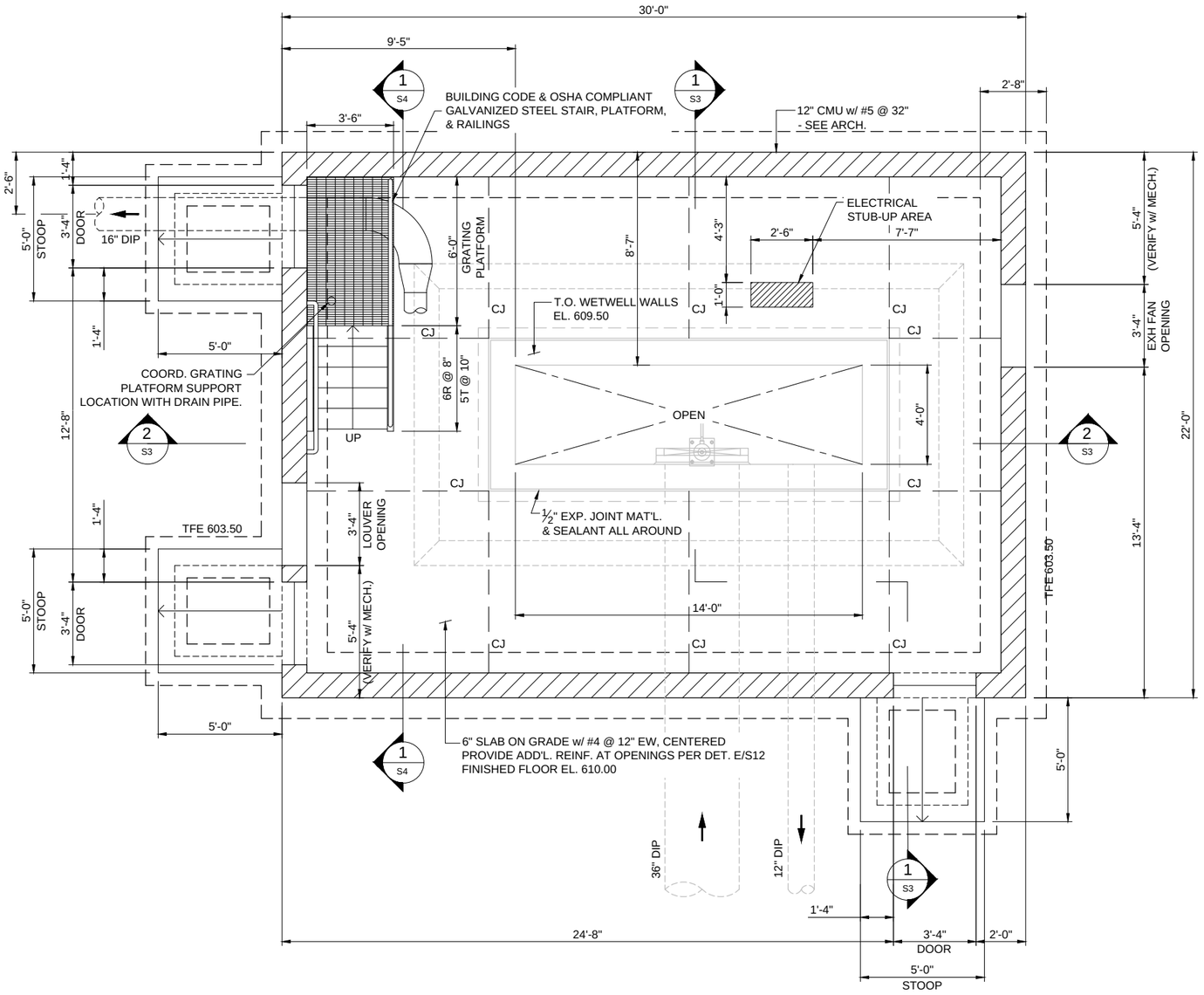
ON HILL IMPROVEMENTS
SPIRIT MOUNTAIN
DULUTH, MN

PUMP STATION
SITE / GRADING PLANS

FILE NO. FOSJJ129137

C3

P:\FJ\J\JOCON\106141\50-Cad\dwg\Plnshts\Jocon106141_Pump site plans.dwg 10/20/2014 10:46 AM rhaehn



PROJECT NORTH / TRUE NORTH

1 S1 FOUNDATION / FLOOR PLAN

0 2' 4' 6'

NOTES

1. PROVIDE ADDITIONAL REINFORCEMENT AT CMU OPENINGS PER DETAIL E/S12 U.N.O.
2. SEE SHEET C6 FOR SOIL CORRECTION DIAGRAM.
3. CJ - INDICATES SLAB CONSTRUCTION JOINT PER DETAIL A/S12.
4. SEE MECHANICAL FOR PIPE LOCATIONS.

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC.
PROFESSIONAL ENGINEERS

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Michael L. Hemstad

Date: OCTOBER 17, 2014 MICHAEL L. HEMSTAD, PE Lic. No. 19165

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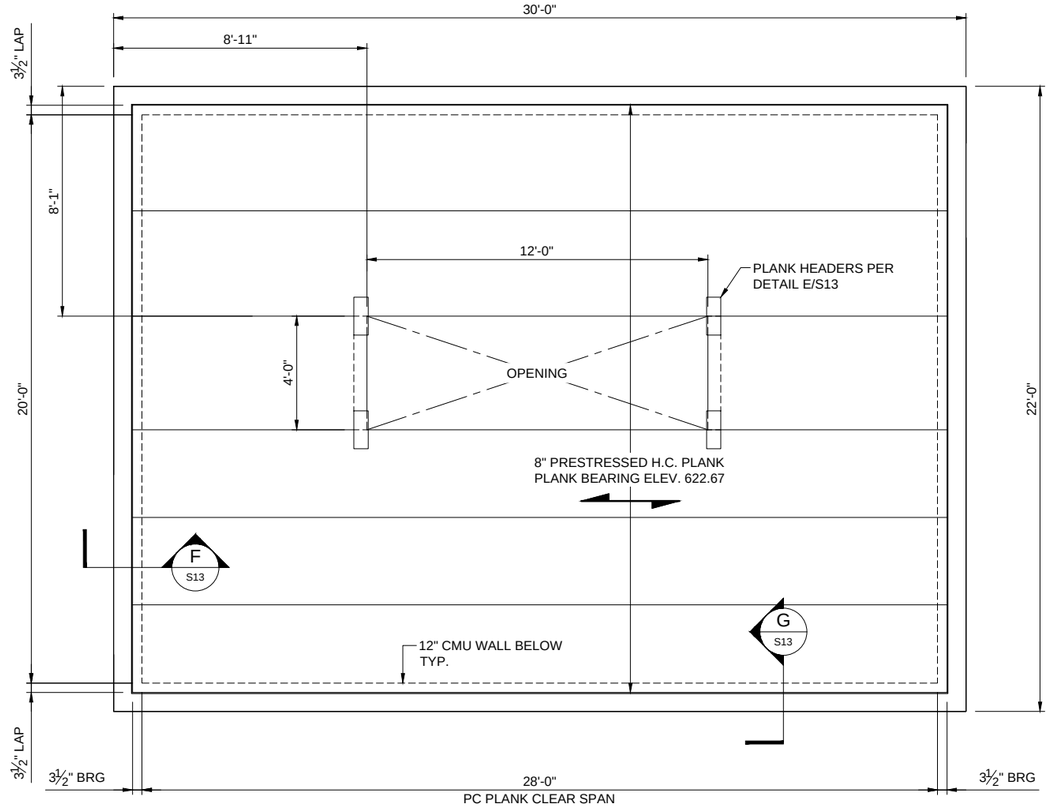
ST. CLOUD, MN 56302-1717
www.sehinc.com

PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

RIVER PUMP STATION
STRUCTURAL
FOUNDATION / FLOOR PLAN

FILE NO.
FOSJJ129137

S1

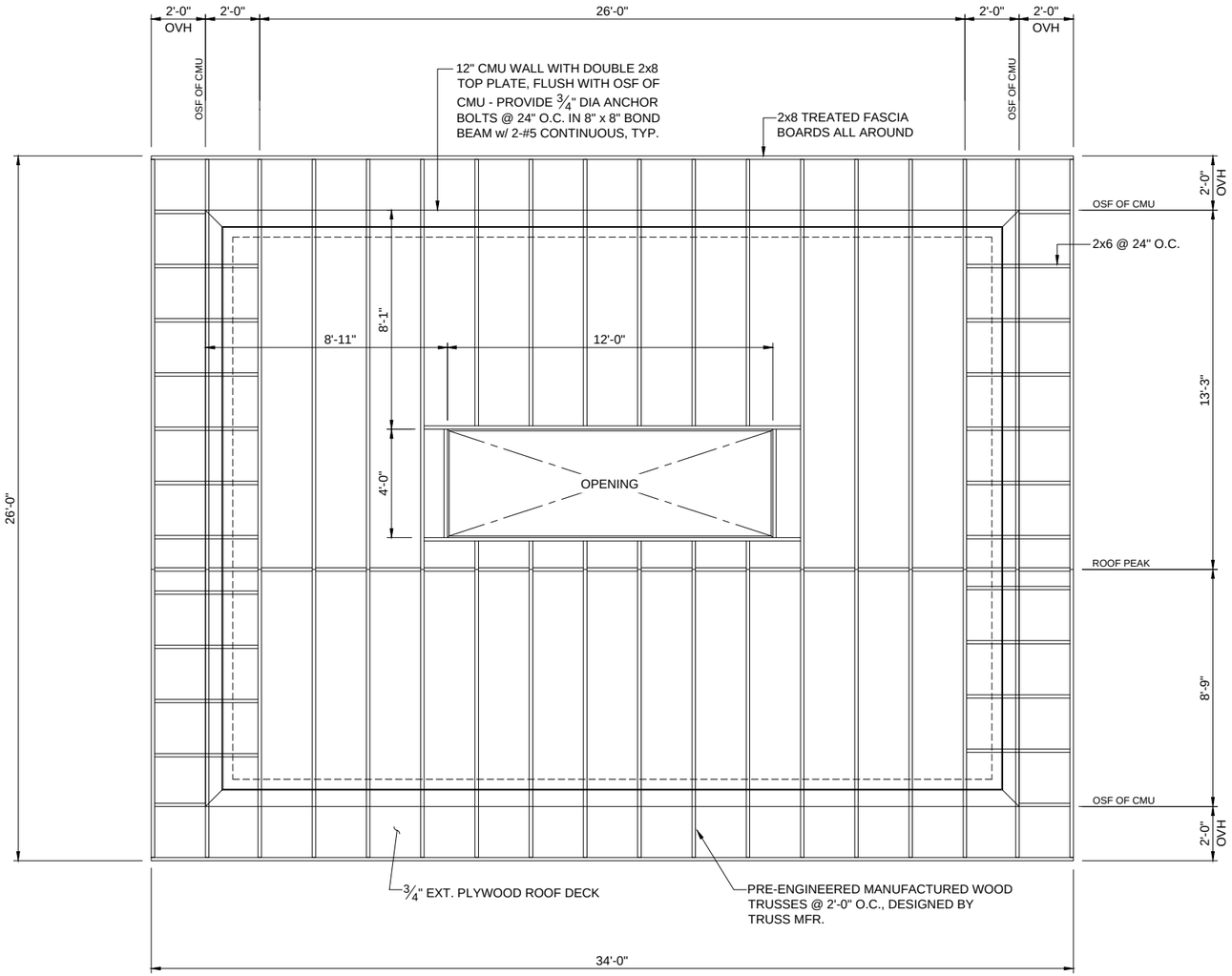


TRUE

PROJECT

1 S2 PRECAST CONCRETE COVER PLAN

0 2' 4' 6'



PROJECT TRUE

2 S2 ROOF FRAMING PLAN

0 2' 4' 6'

FRAMING NOTES

1. PLYWOOD SHALL BE INSTALLED LENGTHWISE PERPENDICULAR TO TRUSSES.
2. PROVIDE 2x4 BLOCKING AT ALL JOINTS IN PLYWOOD ROOF.
3. NAIL ¾" PLYWOOD ROOF DECK TO TRUSSES WITH 10d NAILS, 4" O.C. AT DIAPHRAGM EDGES, 6" O.C. AT OTHER EDGES, AND 12" O.C. AT INTERMEDIATE SUPPORTS.
4. TRUSS MANUFACTURER SHALL DETERMINE TRUSS CONFIGURATION TO MEET ROOF PROFILE.
5. TRUSS MANUFACTURER SHALL DETERMINE LATERAL BRACING REQUIREMENTS FOR TRUSSES.

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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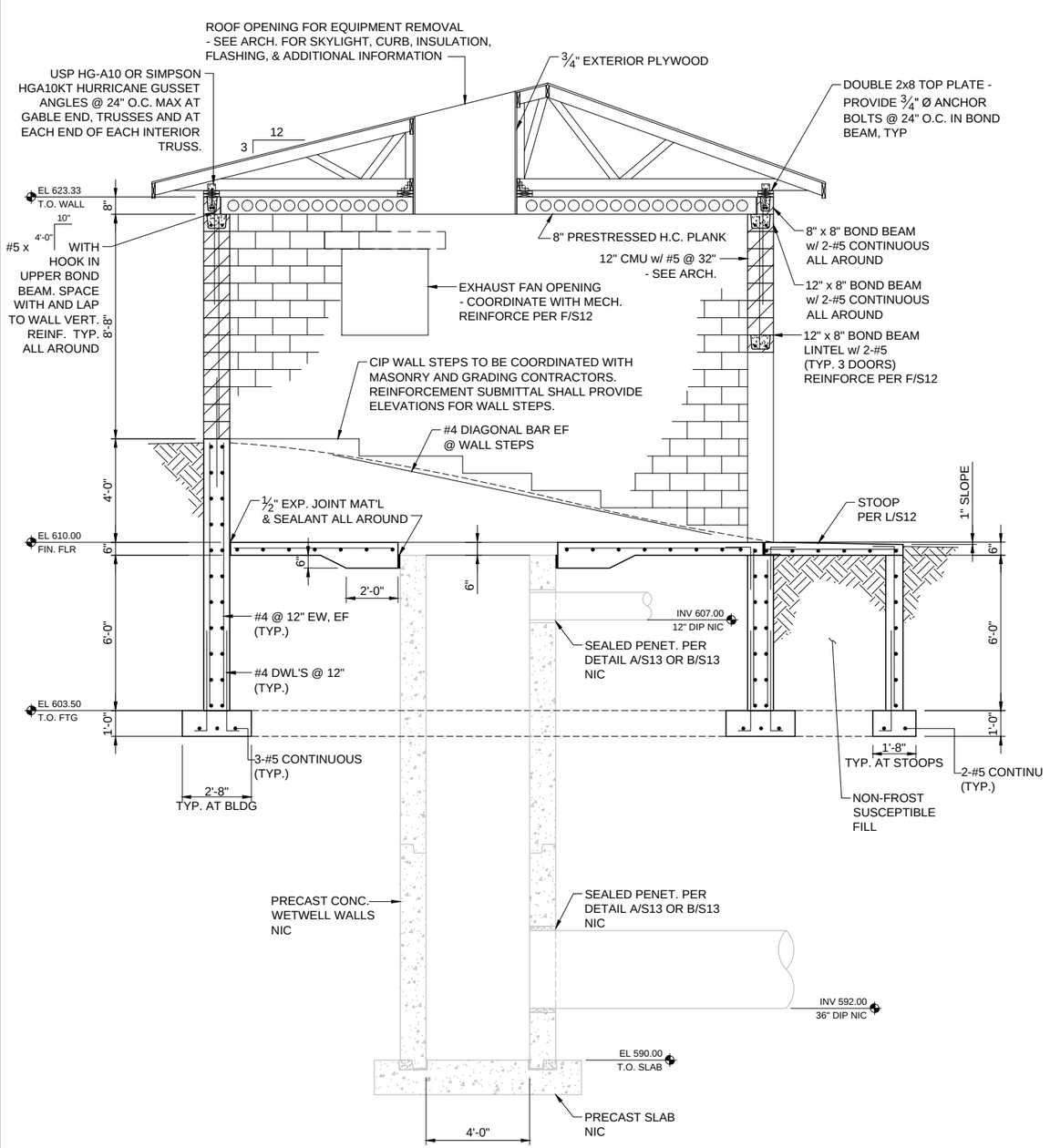
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

RIVER PUMP STATION
STRUCTURAL
PRECAST CONCRETE COVER AND ROOF PLANS

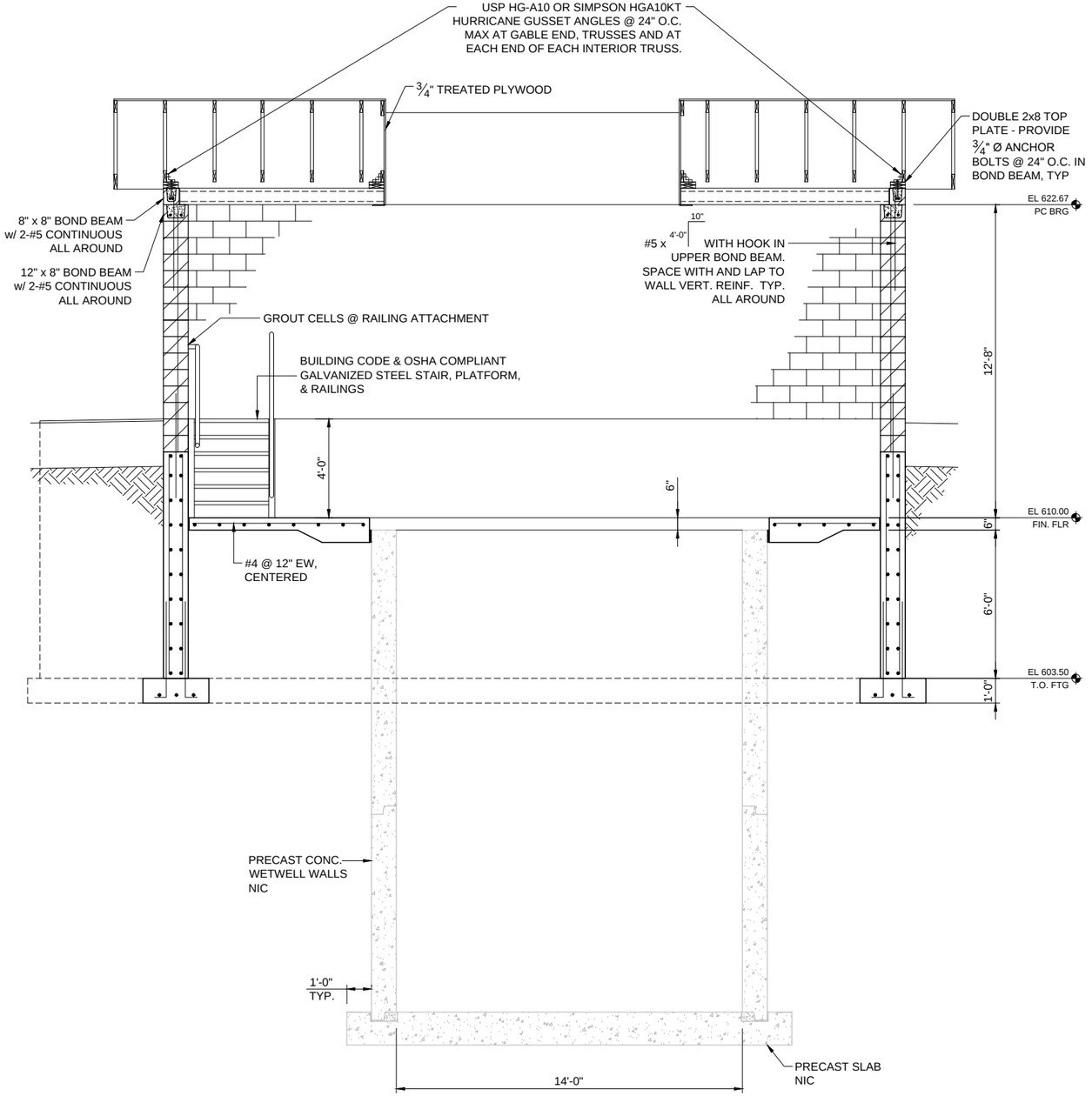
FILE NO. FOSJJ129137

S2



1 S3 BUILDING SECTION

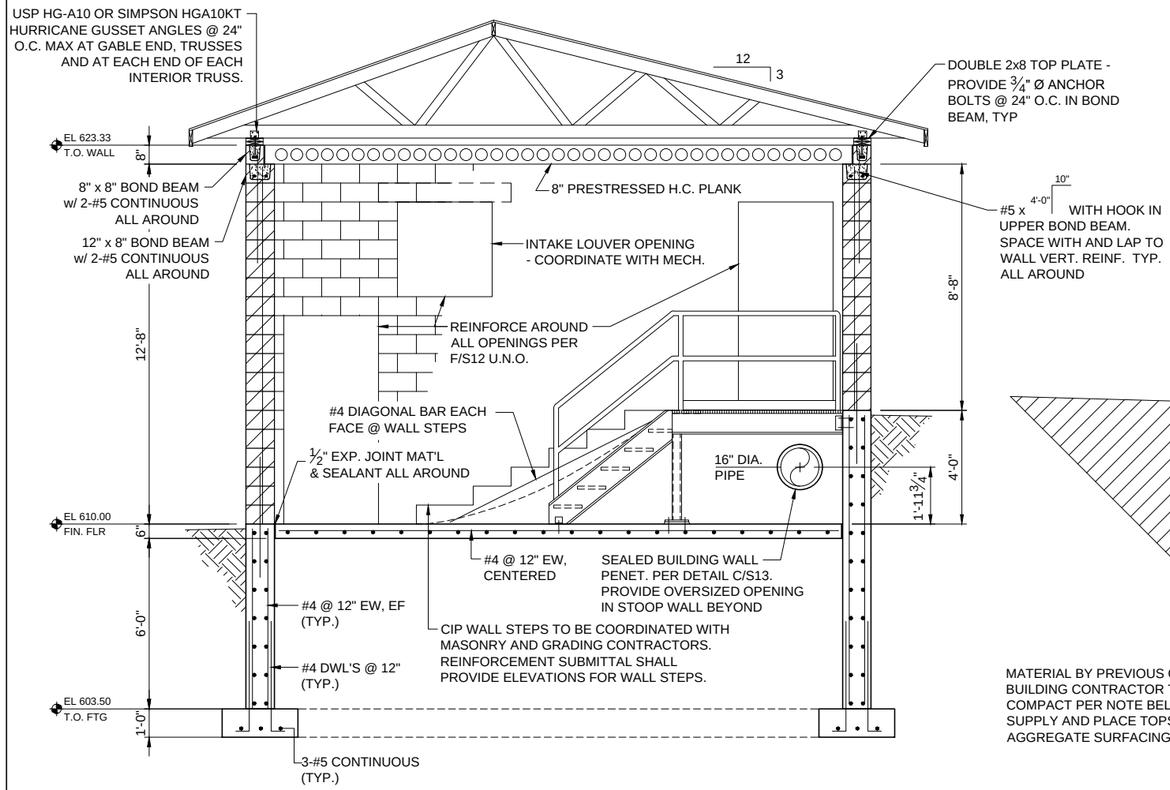
0 2' 4' 6'



2 S3 BUILDING SECTION

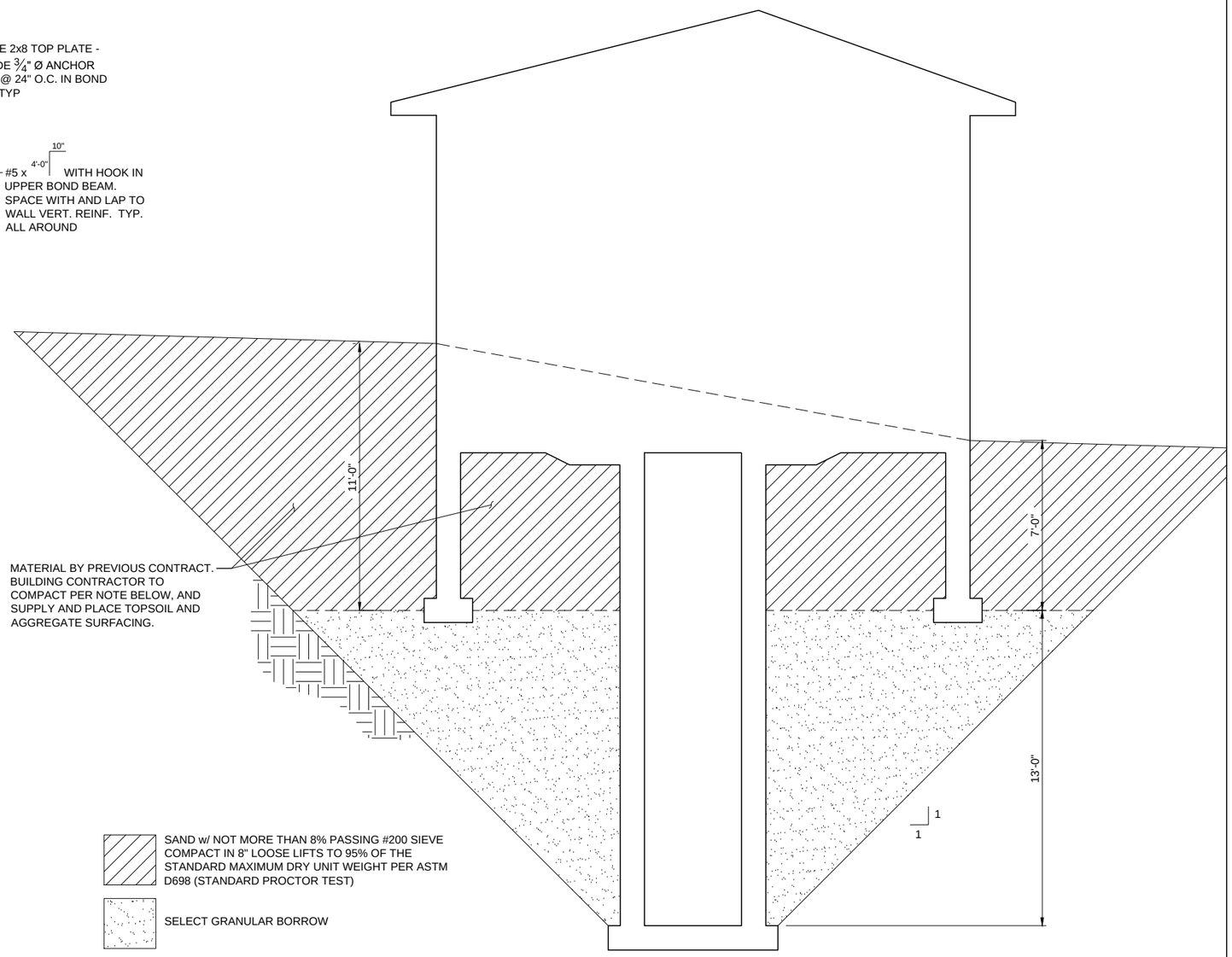
0 2' 4' 6'

DRAWN BY: RF DESIGNER: NCT CHECKED BY: MLH DESIGN TEAM	NO.	BY	DATE	REVISIONS	FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS	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. Michael L. Hemstad Date: OCTOBER 17, 2014 MICHAEL L. HEMSTAD, PE Lic. No. 19165	SEH PHONE: 320.229.4300 1200 25TH AVENUE SOUTH P.O. BOX 1717 ST. CLOUD, MN 56302-1717 www.sehinc.com	PUMP BUILDING PLANS CONTRACT 'B' SPIRIT MOUNTAIN DULUTH, MN	RIVER PUMP STATION STRUCTURAL BUILDING SECTIONS	FILE NO. FOSJJ129137	S3



1 S4 BUILDING SECTION

0 2' 4' 6'



2 S4 SOIL CORRECTION DIAGRAM

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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Michael L. Hemstad
Date: OCTOBER 17, 2014 MICHAEL L. HEMSTAD, PE Lic. No. 19165

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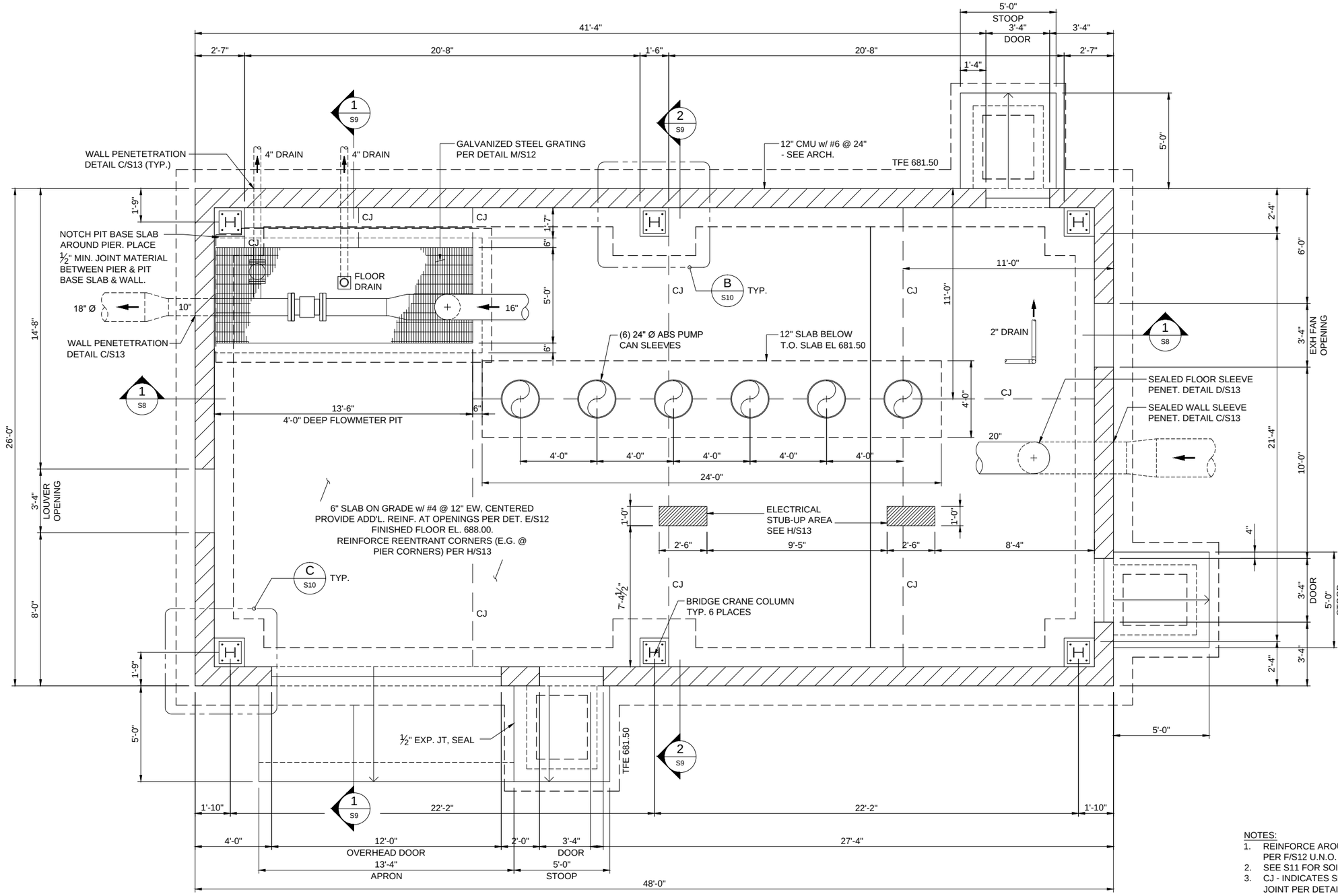
ST. CLOUD, MN 56302-1717
www.sehinc.com

PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

RIVER PUMP STATION
STRUCTURAL
BUILDING SECTION AND DETAILS

FILE NO.
FOSJJ129137

S4



NOTES:
1. REINFORCE AROUND ALL CMU OPENINGS PER F/S12 U.N.O.
2. SEE S11 FOR SOIL CORRECTION DIAGRAM
3. CJ - INDICATES SLAB CONSTRUCTION JOINT PER DETAIL A/S12.
4. SEE MECHANICAL FOR PIPE LOCATIONS.
5. PLACE PUMP SKID BEFORE PLACING ROOF PLANK.

PROJECT N TRUE N

1 S5 FOUNDATION / FLOOR PLAN

0 2' 4' 6'

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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Michael L. Hemstad
Date: OCTOBER 17, 2014 MICHAEL L. HEMSTAD, PE Lic. No. 19165

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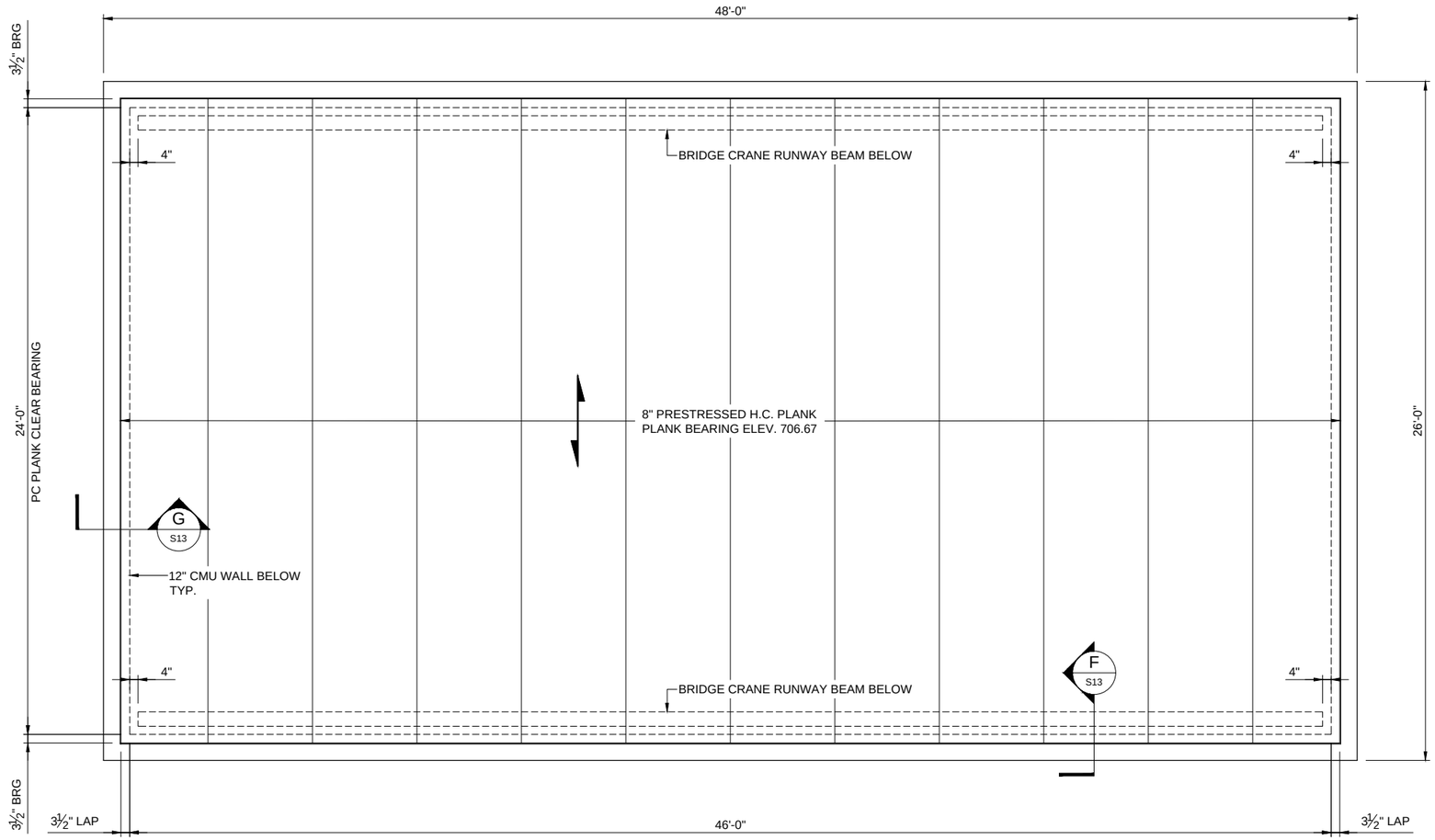
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
FOUNDATION / FLOOR PLAN

FILE NO. FOSJJ129137

S5



N PROJECT N TRUE

1 S6 PRECAST CONCRETE COVER PLAN

0 2' 4' 6'

DRAWN BY: RF DESIGNER: NCT CHECKED BY: MLH DESIGN TEAM	NO.	BY	DATE	REVISIONS	FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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Michael L. Hemstad MICHAEL L. HEMSTAD, PE

Date: OCTOBER 17, 2014 Lic. No. 19165

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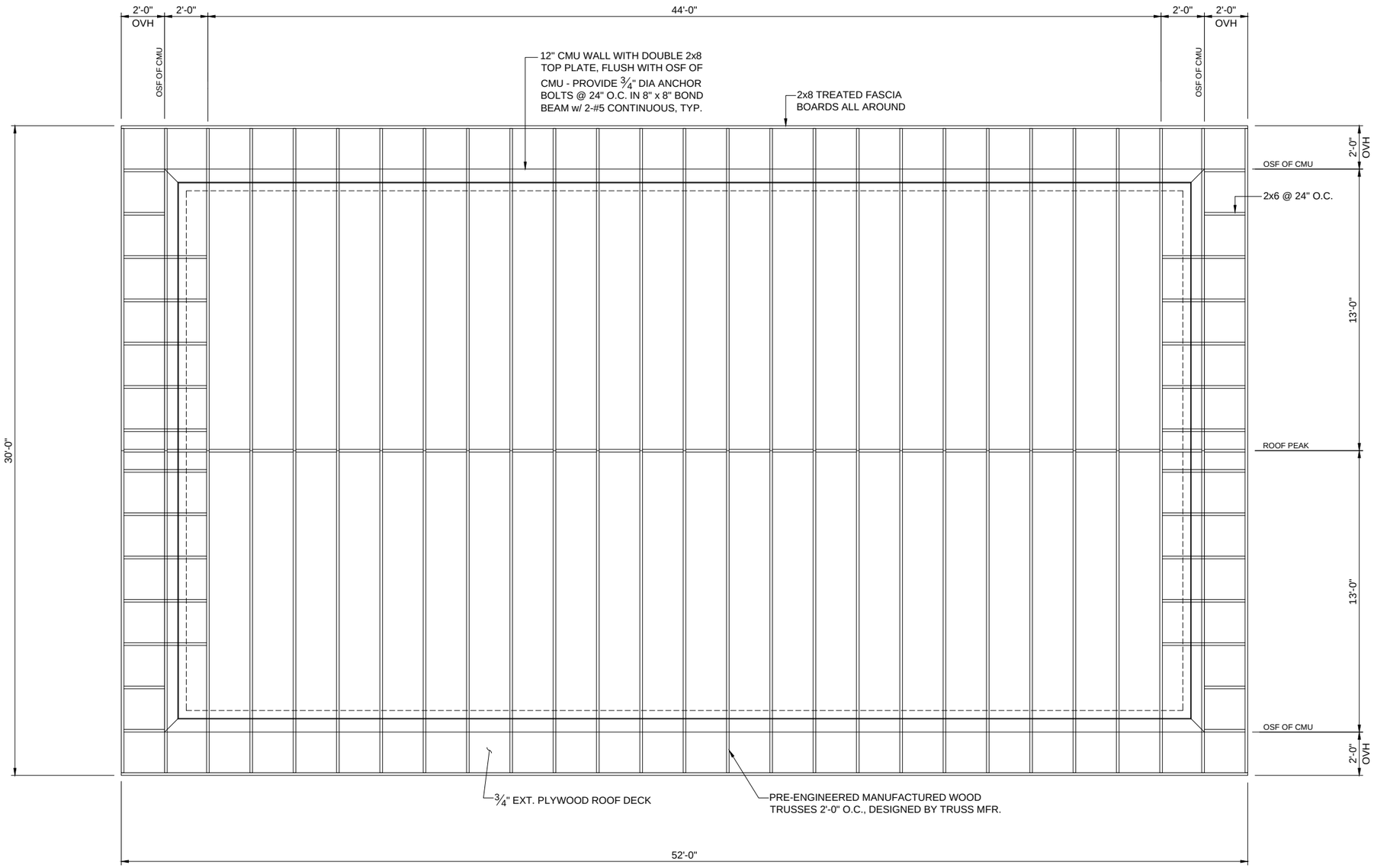
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
PRECAST CONCRETE COVER PLAN

FILE NO. FOSJJ129137

S6



PROJECT N TRUE N

1/S7 ROOF FRAMING PLAN

0 2' 4' 6'

FRAMING NOTES

1. PLYWOOD SHALL BE INSTALLED LENGTHWISE PERPENDICULAR TO TRUSSES.
2. PROVIDE 2x4 BLOCKING AT ALL JOINTS IN PLYWOOD ROOF.
3. NAIL 3/4" PLYWOOD ROOF DECK TO TRUSSES WITH 10d NAILS, 4" O.C. AT DIAPHRAGM EDGES, 6" O.C. AT OTHER EDGES, AND 12" O.C. AT INTERMEDIATE SUPPORTS.
4. TRUSS MANUFACTURER SHALL DETERMINE TRUSS CONFIGURATION TO MEET ROOF PROFILE.
5. TRUSS MANUFACTURER SHALL DETERMINE LATERAL BRACING REQUIREMENTS FOR TRUSSES.

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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MICHAEL L. HEMSTAD, PE
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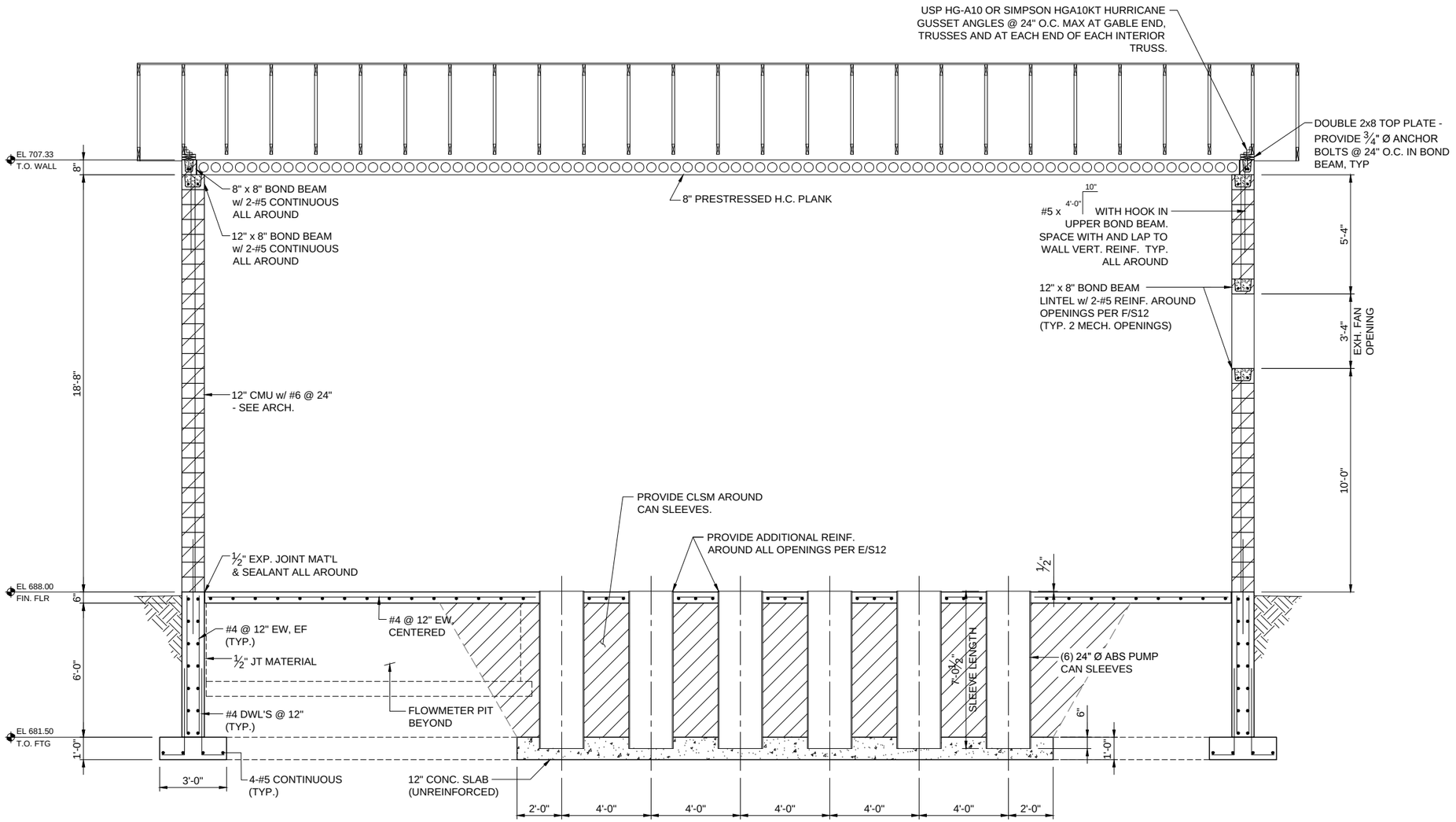
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
ROOF FRAMING PLAN

FILE NO. FOSJJ129137

S7



1 / S8 SECTION

0 2' 4' 6'

DRAWN BY: RF DESIGNER: NCT CHECKED BY: MLH DESIGN TEAM	NO.	BY	DATE	REVISIONS	FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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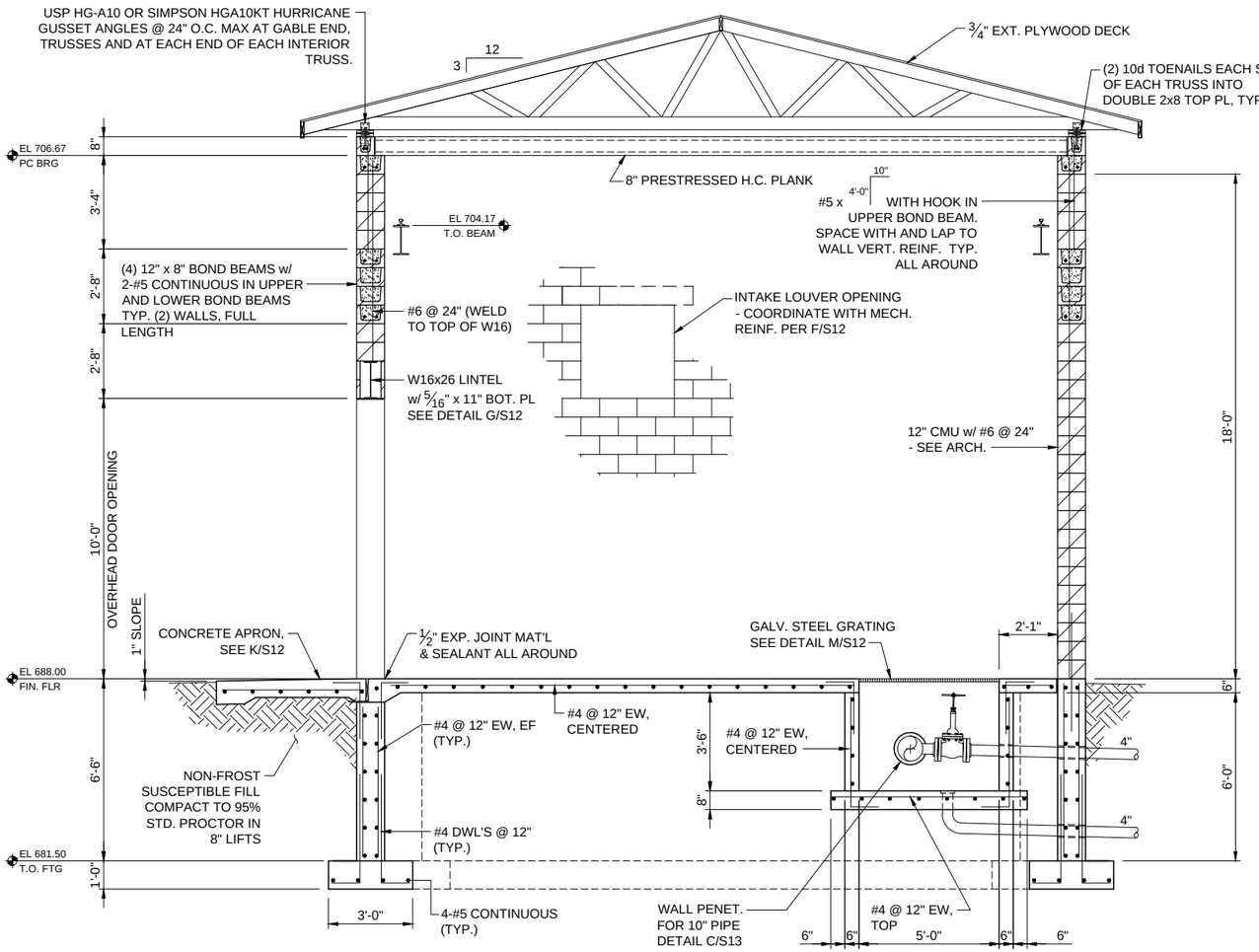
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
BUILDING SECTION

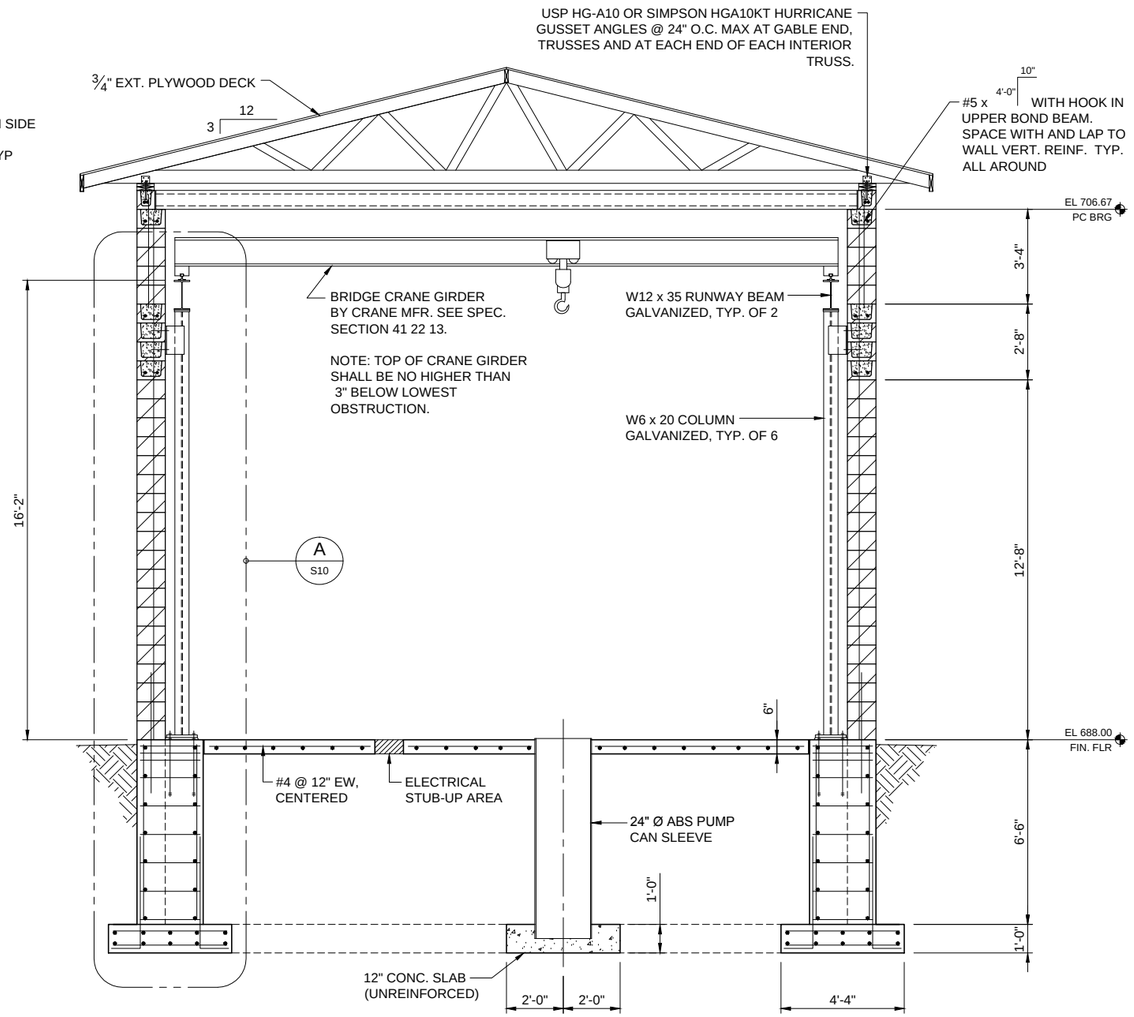
FILE NO. FOSJJ129137

S8



1 S9 SECTION

0 2' 4' 6'



2 S9 SECTION

0 2' 4' 6'

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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.
Michael L. Hemstad
Date: OCTOBER 17, 2014
MICHAEL L. HEMSTAD, PE
Lic. No. 19165

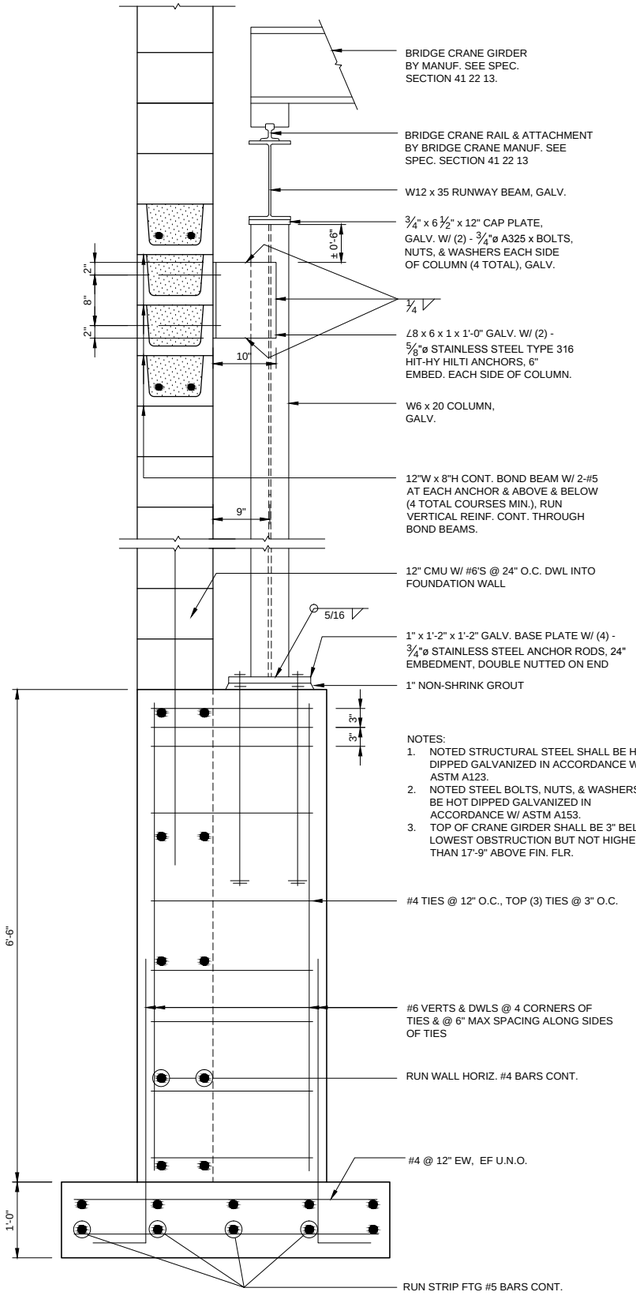
SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
BUILDING SECTIONS

FILE NO.
FOSJJ129137

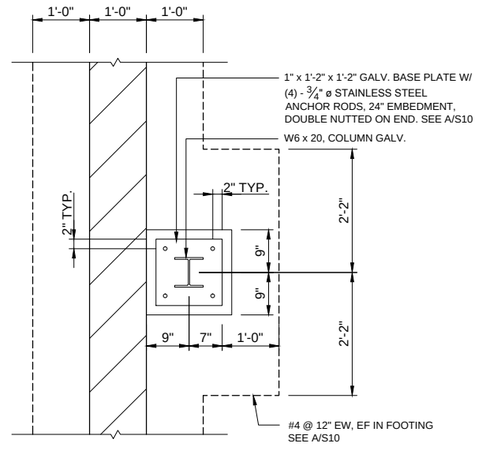
S9



NOTES:
1. NOTED STRUCTURAL STEEL SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.
2. NOTED STEEL BOLTS, NUTS, & WASHERS TO BE HOT DIPPED GALVANIZED IN ACCORDANCE W/ ASTM A153.
3. TOP OF CRANE GIRDER SHALL BE 3" BELOW LOWEST OBSTRUCTION BUT NOT HIGHER THAN 17'-9" ABOVE FIN. FLR.

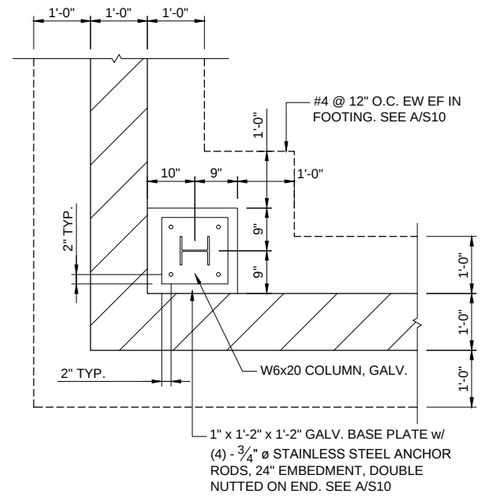
A S10 — BRIDGE CRANE COLUMN & PIER DETAIL

SCALE: 1" = 1'-0"



B S10 — TYPICAL MID-WALL COLUMN PLAN

SCALE: 3/4" = 1'-0"



C S10 — TYPICAL CORNER COLUMN PLAN

SCALE: 3/4" = 1'-0"

DRAWN BY: RF				FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS	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.
DESIGNER: NCT					Michael L. Hemstad MICHAEL L. HEMSTAD, PE
CHECKED BY: MLH					Date: OCTOBER 17, 2014 Lic. No. 19165
DESIGN TEAM	NO.	BY	DATE	REVISIONS	

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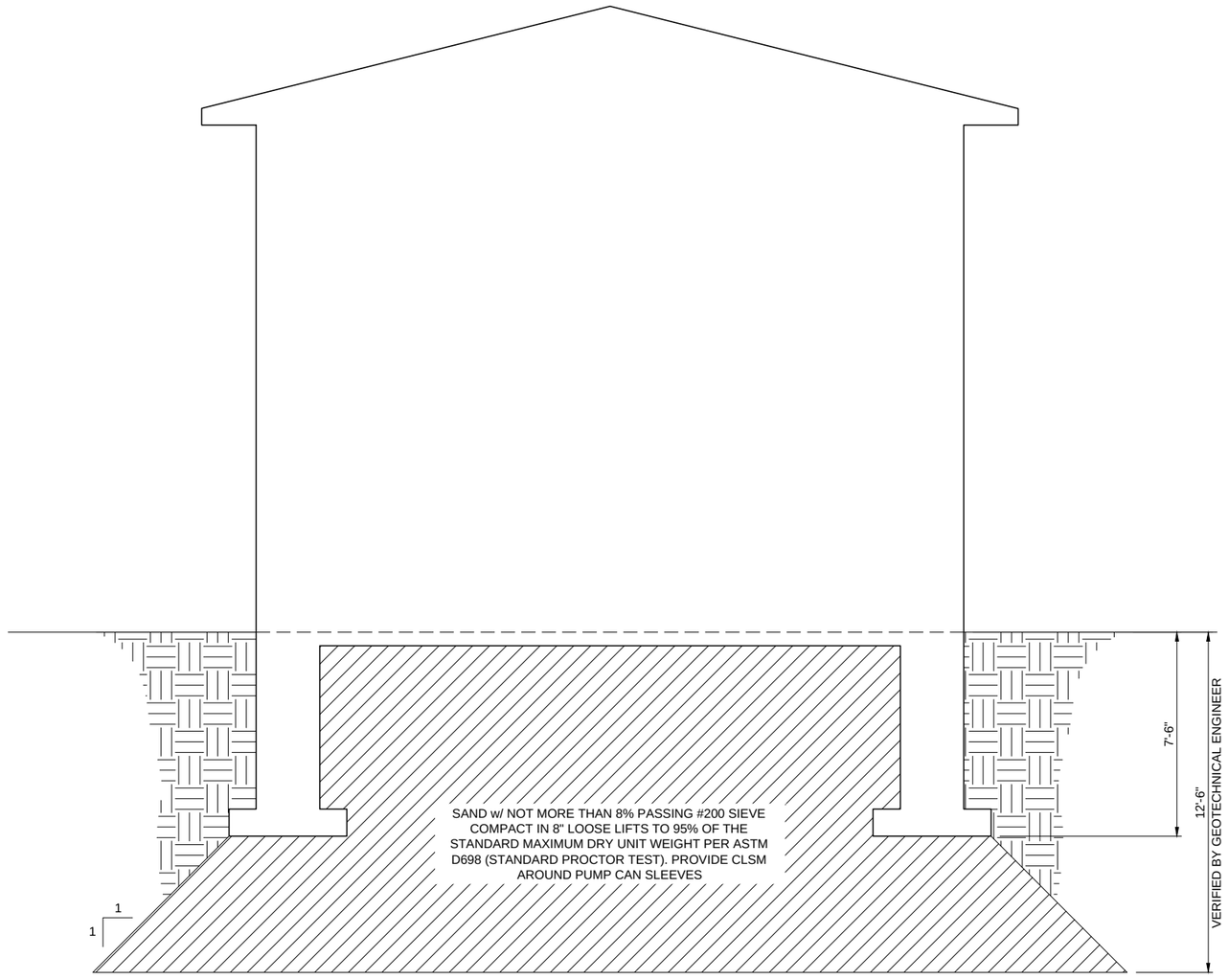
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
CRANE SUPPORT DETAILS

FILE NO.
FOSJJ129137

S10



1 / S11 SOIL CORRECTION DIAGRAM

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC.
PROFESSIONAL ENGINEERS

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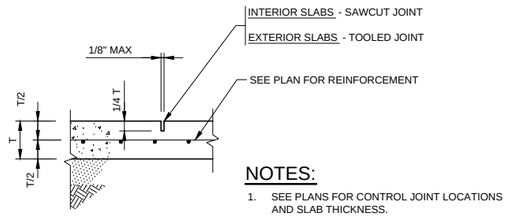
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
STRUCTURAL
SOIL CORRECTION DIAGRAM

FILE NO.
FOSJJ129137

S11

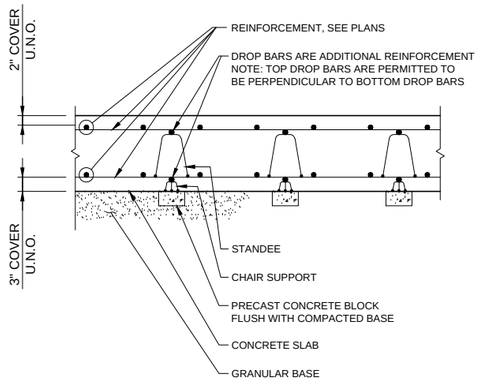


NOTES:

1. SEE PLANS FOR CONTROL JOINT LOCATIONS AND SLAB THICKNESS.
2. MAKE SAWCUTS AS SOON AS CUTTING CAN BE DONE WITHOUT RAVELING THE CONCRETE.
3. FILL JOINTS WITH JOINT SEALER (UNO).

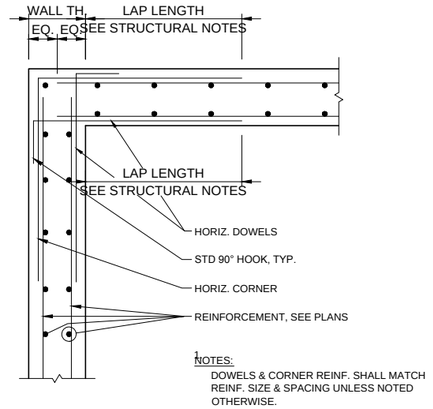
A S12 SLAB ON GRADE CONTROL JOINT

NOT TO SCALE



B S12 SLAB REINFORCEMENT SUPPORT DETAIL

NOT TO SCALE

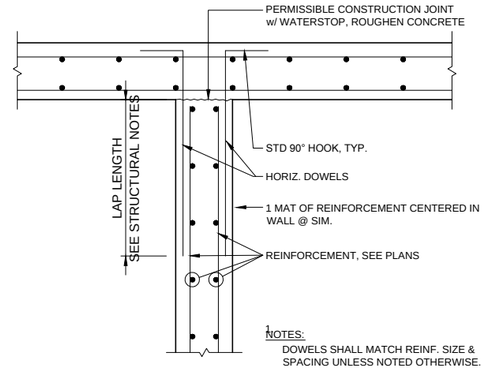


NOTES:

1 DOWELS & CORNER REINF. SHALL MATCH REINF. SIZE & SPACING UNLESS NOTED OTHERWISE.

C S12 WALL CORNER REINFORCEMENT DETAIL

NOT TO SCALE

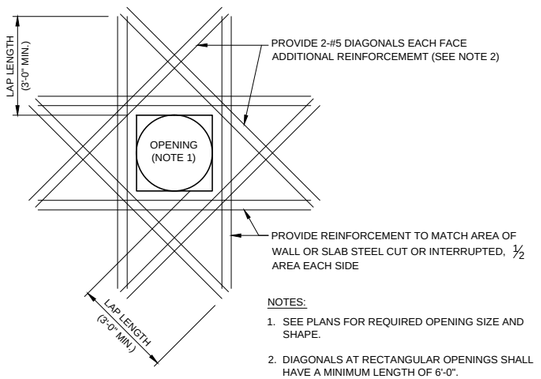


NOTES:

1 DOWELS SHALL MATCH REINF. SIZE & SPACING UNLESS NOTED OTHERWISE.

D S12 WALL INTERSECTION REINFORCEMENT DETAIL

NOT TO SCALE

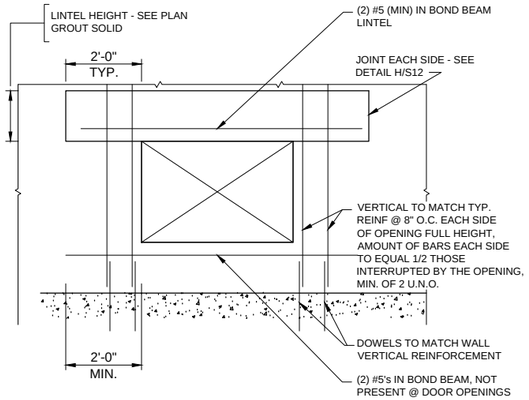


NOTES:

1. SEE PLANS FOR REQUIRED OPENING SIZE AND SHAPE.
2. DIAGONALS AT RECTANGULAR OPENINGS SHALL HAVE A MINIMUM LENGTH OF 6'-0".

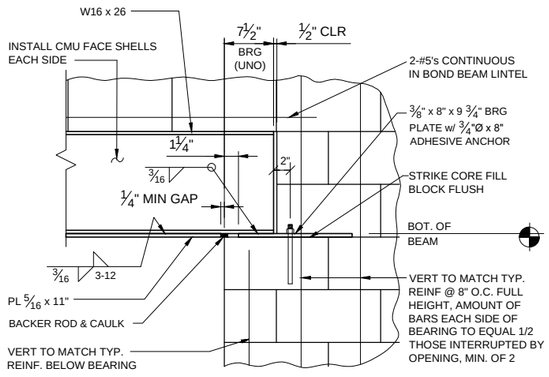
E S12 OPENING REINFORCEMENT DETAIL

NOT TO SCALE



F S12 TYPICAL MASONRY OPENING DETAIL

NOT TO SCALE

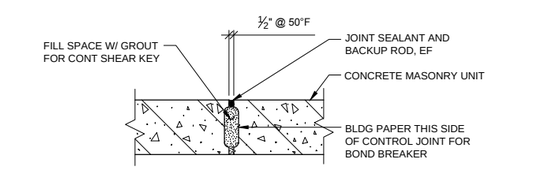


NOTE:

STEEL BEAM & PLATES TO BE HOT DIP GALVANIZED IN ACCORDANCE W/ ASTM A123.

G S12 STEEL LINTEL WITH BOTTOM PLATE

NOT TO SCALE

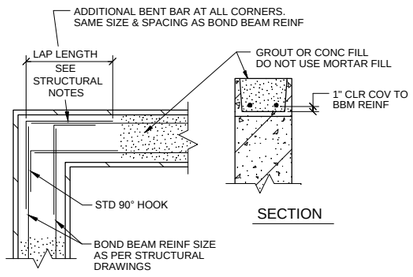


NOTE:

- DISCONTINUE HORIZ JOINT REINF AT CONTROL JOINT
- BOND BEAM REINF CONT AT CONTROL JOINT, WITH DUMMY JT IN MORTAR
- SEE STRUCTURAL AND/OR ARCHITECTURAL DRAWINGS FOR CONTROL JOINT LOCATIONS

H S12 MASONRY CONTROL JOINT DETAIL

NOT TO SCALE

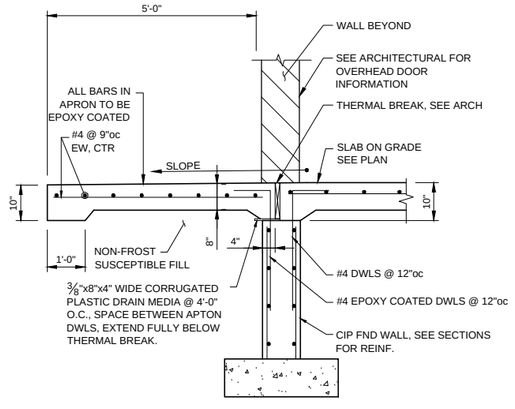


NOTE:

AT CONTROL JOINTS - CONSTRUCT DUMMY JOINTS, W/ JOINT SEALANT AND BACKER ROD, IN BOND BEAM EXPOSED FACES AND CONTINUE REINF. AND GROUT THRU JOINT.

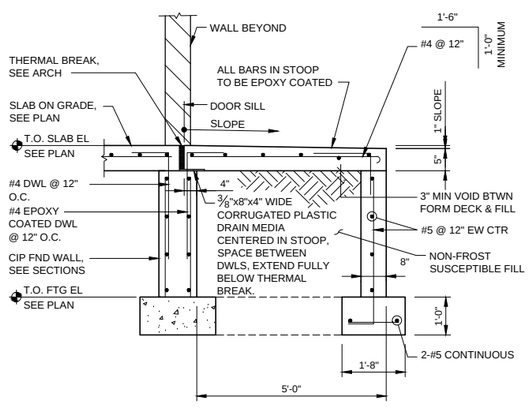
J S12 BOND BEAM CORNER REINF. DETAIL

NOT TO SCALE



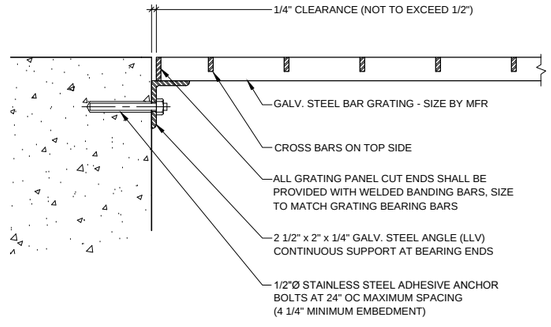
K S12 CONCRETE APRON DETAIL

NOT TO SCALE



L S12 CONCRETE STOOP DETAIL

NOT TO SCALE



M S12 GALVANIZED STEEL GRATING AND SUPPORT

NOT TO SCALE

DRAWN BY:	RF
DESIGNER:	NCT
CHECKED BY:	MLH
DESIGN TEAM	

NO.	BY	DATE	REVISIONS

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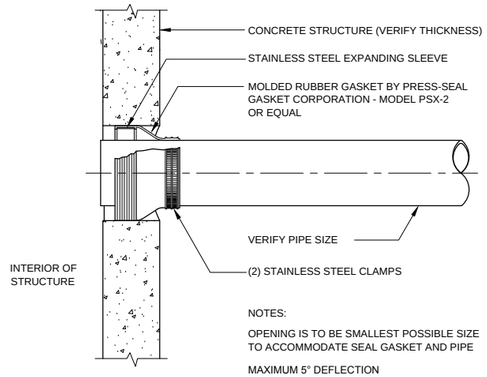
FILE NO.
FOSJJ129137

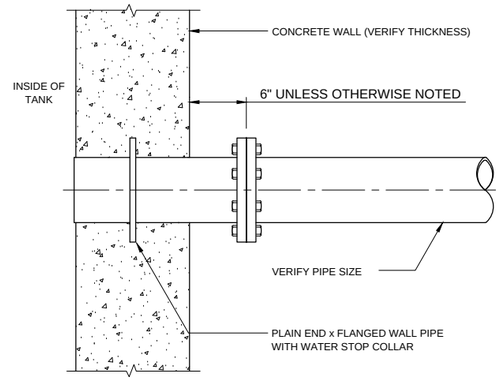
S12



A S13 PIPE SEAL GASKET DETAIL

SCALE: NONE

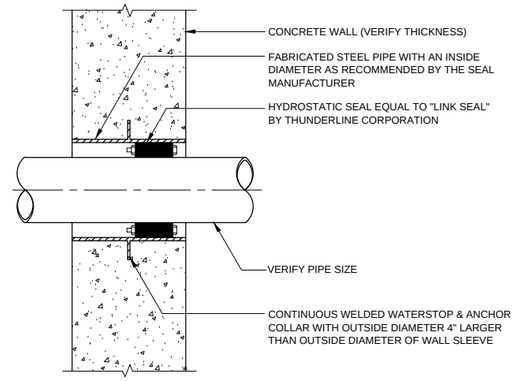
PPIPE012



B S13 PE x FL WALL PIPE DETAIL

SCALE: NONE

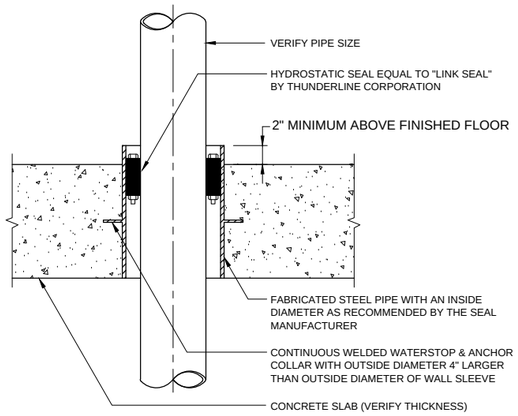
PPIPE015



C S13 SEALED WALL SLEEVE DETAIL

SCALE: NONE

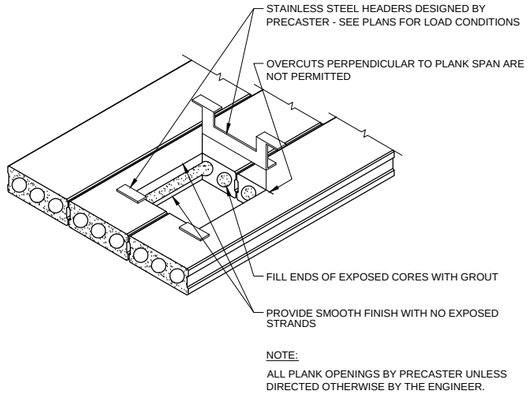
PPIPE005



D S13 SEALED FLOOR SLEEVE DETAIL

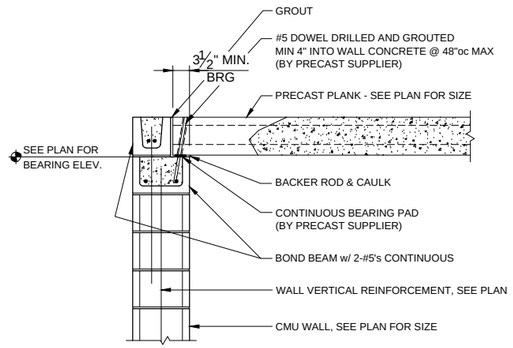
SCALE: NONE

PPIPE008



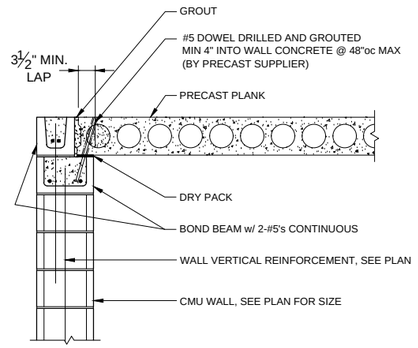
E S13 PLANK OPENING WITH HEADERS

NOT TO SCALE



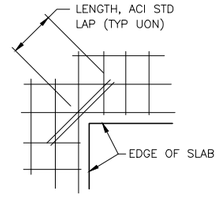
F S13 PRECAST PLANK BEARING ON CMU WALL

NOT TO SCALE



G S13 SIDE LAP CONNECTION DETAIL

NOT TO SCALE



WALL/SLAB REINF BARS *	ADDITIONAL CORNER BARS
WWF	2–#4
#4	2–#4
#5	2–#5
#6	2–#6
#7	3–#5
#8	3–#6

* USE LARGEST DIAMETER BAR IN EITHER DIRECTION FOR DETERMINING CORNER BARS

NOTES:

- PROVIDE 2" CLR COVER OVER ALL BARS AT OPENINGS
- ADDITIONAL CORNER BARS:

  WHEN SLAB CONTAINS BOTTOM REINF LAYER ONLY, PLACE DIAG BARS AT MIDSPAN

  WHEN SLAB CONTAINS TOP REINF LAYER ONLY, PLACE DIAG BARS W/ TOP REINF

  WHEN CONTAINS TOP & BOTTOM REINF LAYERS, PLACE DIAG BARS W/ TOP & BOTTOM REINF

H S13 SLAB REENTRANT CORNER DETAIL

NOT TO SCALE

DRAWN BY: RF
DESIGNER: NCT
CHECKED BY: MLH
DESIGN TEAM

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MAIN PUMP STATION
STRUCTURAL
STANDARD DETAILS

FILE NO. FOSJJ129137

S13

GENERAL STRUCTURAL NOTES

THESE NOTES DO NOT REPLACE THE SPECIFICATIONS BUT ARE TO BE READ IN CONJUNCTION WITH THEM. ANY DISCREPANCIES OR CONFLICTS BETWEEN THE TWO SHALL BE BROUGHT TO THE ATTENTION OF THE SER FOR RESOLUTION.

THESE DRAWINGS ARE FOR THE SPIRIT MOUNTAIN PUMPHOUSE BUILDINGS (CONTRACT B) AND NO OTHER USE IS AUTHORIZED. CONTACT SER, MIKE HEMSTAD AT SEH 651-490-2005.

GOVERNING BUILDING CODE:

1. 2007 MINNESOTA STATE BUILDING CODE.
2. 2006 INTERNATIONAL BUILDING CODE AS ADOPTED AND AMENDED BY THE STATE BUILDING CODE
3. ACI - 318
4. AISC - 360, 303

DESIGN LOADS

1. LIVE LOAD:
   - FLOOR SLABS — 150 PSF U.N.O.
   - STAIRS, LANDINGS — 100 PSF
2. SNOW LOADS:
   - GROUND SNOW LOAD — 60 PSF
   - ROOF SNOW LOAD — 42 PSF + DRIFTING & UNBALANCED PER IBC
   - SNOW ON OVERHANG — 84 PSF + DRIFTING & UNBALANCED PER IBC
   - SNOW EXPOSURE FACTOR — 1.0
   - IMPORTANCE FACTOR — 1.0 (BASED ON OCC CAT II)
   - THERMAL FACTOR 1.20 BLDG WILL BE UNHEATED AT TIMES DURING WINTER
   - RAIN LOADS — N/A
3. WIND LOADS: (ASCE 7-05)
   - WIND SPEED (3 SEC GUST) — 90.00 MPH
   - WIND IMPORTANCE FACTOR — 1.0 (BASED ON OCC CAT II)
   - WIND EXPOSURE — C
   - INTERNAL PRESS COEF — +/-0.18
4. SEISMIC LOADS: NOT APPLICABLE
5. SOIL CRITERIA:
   - ALLOWABLE SOIL BEARING PRESSURE — 2,000 PSF ON COMPACTED FILL
   - Q100 WATER ELEVATION — 602.0
   - DEWATER AS REQUIRED TO KEEP EXCAVATIONS DRY
   - FROST DEPTH — 84 INCHES

   COMPACT FILL BENEATH FOOTINGS AND FLOORS TO 98% STANDARD PROCTOR
6. PRECAST PLANK LOADING, WHERE NOT NOTED ON DRAWINGS:
   - APPLIED DEAD LOAD — 20 PSF
   - LIVE LOAD — 50 PSF (SNOW)

DESIGN / CONSTRUCTION CRITERIA

1. THE CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS BEFORE CONSTRUCTION, COORDINATING WITH DRAWINGS BY OTHER DISCIPLINES, AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES, INCONSISTENCIES, OR DIFFICULTIES AFFECTING THE WORK BEFORE PROCEEDING.
2. ALL. MATERIAL, WORKMANSHIP, AND DETAILS SHALL BE IN ACCORDANCE WITH TYPICAL COMPETENT CONSTRUCTION PRACTICES, CURRENT MANUFACTURERS RECOMMENDATIONS, AND ALL APPLICABLE CODES AND GOVERNMENT REGULATIONS. SPECIAL STRUCTURAL INSPECTION IS REQUIRED AS SCHEDULED AND PER IBC CHAPTER 17. CONTRACTOR SHALL COORDINATE WITH OWNER'S TESTING AGENCY.
3. THE CONTRACTOR SHALL COORDINATE ALL DISCIPLINES, VERIFYING SIZE AND LOCATION OF ALL OPENINGS, WHETHER SHOWN ON STRUCTURAL DRAWINGS OR NOT, AS CALLED FOR ON ARCHITECTURAL, MECHANICAL, OR ELECTRICAL DRAWINGS. ALL CONFLICTS, INCONSISTENCIES, OR OTHER DIFFICULTIES AFFECTING STRUCTURAL WORK SHALL BE CALLED TO THE ARCHITECT AND ENGINEER'S ATTENTION FOR DIRECTION BEFORE PROCEEDING.
4. THE CONTRACTOR SHALL SUPPLY ALL NECESSARY TEMPORARY BRACING, SHORING, GUYING, OR OTHER MEANS TO AVOID EXCESSIVE STRESSES AND TO HOLD STRUCTURAL ELEMENTS IN PLACE DURING CONSTRUCTION.
5. JOB SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE GENERAL CONTRACTOR & THEIR SUBCONTRACTORS.
6. THE ENGINEER IS NOT RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES OR PRACTICES. WHERE DRAWINGS AND DETAILS IMPLY THIS, THEY ARE PROVIDED TO SHOW FINAL CONSTRUCTION. IF CONTRACTOR DESIRES TO USE DIFFERENT MEANS AND METHODS THAN IMPLIED BY THESE DRAWINGS, SUBMIT SIMILAR DETAILS FOR REVIEW.
7. STANDARD OR TYPICAL STRUCTURAL DETAILS ARE INTENDED TO ILLUSTRATE DESIGN CONCEPTS AND TO SPECIFY MATERIAL AND REQUIRED PHYSICAL DIMENSIONS MATCHING OR SIMILAR TO THE REFERENCED LOCATIONS IN THE DRAWINGS SET.
8. THERE IS NO PROVISION FOR FUTURE VERTICAL EXPANSION IN THE DESIGN.

FOUNDATIONS

1. CAUTION: EXISTING UNDERGROUND UTILITIES MAY EXIST ANYWHERE ON THE SITE. NOTIFY GOPHER ONE-CALL (800) 252-1166 PRIOR TO DISTURBING ANY GRADE OR EXCAVATION.
2. STRUCTURAL FOUNDATIONS CONSIST OF WALL AND SPREAD FOOTINGS ESTABLISHED ON MATERIAL CAPABLE OF SAFELY SUPPORTING 2.0 KSF AS RECOMMENDED BY AET IN REPORT 01-06238 DATED 9/17/14. THE STRUCTURAL ENGINEER IS NOT RESPONSIBLE FOR THE ACCURACY OR CONTENT OF THE SUBSURFACE SOIL CONDITIONS DESCRIBED IN THE SPECIFICATIONS, TEST BORINGS, OR GEOTECHNICAL REPORT. THE OWNER SHALL EMPLOY A CERTIFIED GEOTECHNICAL ENGINEER DURING CONSTRUCTION TO TEST, INSPECT AND VERIFY ALL ASSUMED SOIL CONDITIONS.
3. WALLS ARE DESIGNED FOR A LATERAL LOAD OF 70 PCF EQUIVALENT FLUID PRESSURE, AT-REST. WALLS ARE NOT DESIGNED TO RESIST LATERAL LOAD UNTIL THE WALL CONCRETE HAS ACHIEVED ITS FULL DESIGN STRENGTH AND THE BASE SLAB AND GROUND FLOOR SLAB ARE IN PLACE AND HAVE ACHIEVED 75 PERCENT OF THEIR DESIGN STRENGTH. SUBMIT CONCRETE TESTING VERIFYING THIS BEFORE BACKFILLING AND COMPACTING.
4. FOUNDATION WALLS SHALL BE ADEQUATELY BRACED DURING BACKFILLING AND COMPACTION TO PREVENT MOVEMENT OR STRUCTURAL DAMAGE. BRACING SHALL REMAIN IN PLACE UNTIL PERMANENT BRACING IS IN PLACE AND UNTIL CONCRETE ACHIEVES SUFFICIENT STRENGTH TO RESIST IMPOSED LOADS. LIMIT COMPACTION TO HAND OPERATED POWER EQUIPMENT WITHIN 8 FEET OF WALL.
5. WHEN PLACING COMPACTED FILL ADJACENT TO FOUNDATION WALLS AND PIERS, PLACE BACKFILL AT EQUAL RATES ON BOTH SIDES TO PREVENT OVERTURNING OR STRUCTURAL DAMAGE.
6. CONTRACTOR SHALL PROVIDE FOR DEWATERING AT EXCAVATIONS FROM EITHER SURFACE WATER OR SEEPAGE.
7. MOISTURE CONTENT IN SOILS BENEATH BUILDING LOCATIONS SHOULD NOT BE ALLOWED TO CHANGE AFTER FOOTING EXCAVATIONS AND AFTER GRADING FOR SLABS ON GRADE ARE COMPLETED. IF SUBGRADE MATERIALS BECOME DESICCATED OR SOFTENED BY WATER OR OTHER CONDITIONS, REMOVE AND REPLACE WITH ENGINEERED FILL AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER. DO NOT PLACE CONCRETE ON FROZEN GROUND, NOR ALLOW GROUND BENEATH FOUNDATIONS TO FREEZE. ALL FOUNDATION WORK SHALL BE PLACED ON SUBSTRATE APPROVED AND TESTED BY GEOTECHNICAL ENGINEER OF RECORD.
8. DO NOT PLACE BACKFILL ON FROZEN SUBGRADE. DO NOT PLACE FROZEN BACKFILL.
9. SLABS ON GRADE SHALL BE CONSTRUCTED ON A SUBGRADE OF CLEAN GRANULAR FILL COMPACTED TO AT LEAST 96 PERCENT OF ITS MAXIMUM DRY DENSITY (STANDARD PROCTOR) AND 6 INCHES OF MnDOT CLASS 5 BASE BELOW THE SLAB.
10. GRADING: WHERE NOT SPECIFICALLY SHOWN ON THE PLANS, IT IS INTENDED THAT ALL EXCAVATED AND BACKFILLED AREAS SHALL BE GRADED TO SLOPE AWAY FROM BUILDINGS AND OTHER STRUCTURES.

CONCRETE

1. CONCRETE AND ITS PLACEMENT SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE FOLLOWING:
   - ACI 350 ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES
   - ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
   - ACI 301 SPECIFICATIONS FOR STRUCTURAL CONCRETE
   - ACI MCP MANUAL OF CONCRETE PRACTICE
2. AN INDEPENDENT TESTING AGENCY SHALL CAST 4 TEST CYLINDERS FOR EACH 50 CUBIC YARDS OF EACH CONCRETE MIX PLACED OR FOR EACH DAY'S OPERATION, WHICH EVER IS THE LESSER AMOUNT. THE TESTING AGENCY SHALL CAST, CURE, AND TEST THE SPECIMENS IN ACCORDANCE WITH ASTM C31 AND ASTM C39. AIR AND SLUMP SHALL BE TESTED FOR EACH TRUCKLOAD AT THE FINAL LOCATION (TEST AFTER PUMP, NOT AT TRUCK).
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF FORM WORK TO COMPLY WITH THE DIMENSIONS INDICATED ON THE PLANS, MAINTAINING PROPER ALIGNMENT DURING CONCRETE POURING OPERATIONS. SPECIAL CARE SHALL BE TAKEN WITH FORMWORK FOR SELF-CONSOLIDATING CONCRETE.
4. ALL CONCRETE EXCEPT EXTERIOR FLAT WORK SHALL DEVELOP MINIMUM ULTIMATE COMPRESSIVE DESIGN STRENGTH OF 4000 PSI IN 28 DAYS. CONCRETE USED IN WALLS AND FOOTINGS SHALL HAVE A MAXIMUM W/C (WATER/ CEMENT + POZZOLAN) RATIO OF 0.45, AND A MAXIMUM OF 4 INCHES OF SLUMP BEFORE ADDITION OF ADMIXTURES. CONCRETE USED IN SLAB ON GRADE STRUCTURAL SLABS SHALL HAVE A MAXIMUM W/C RATIO OF 0.45, WITH 6% +/- 1% AIR ENTRAINMENT AND A MAXIMUM OF 4 INCHES OF SLUMP BEFORE ADDITION OF ADMIXTURES. DO NOT TROWEL FINISH.
5. CONCRETE FOR EXTERIOR FLATWORK AND STOOP SLABS SHALL HAVE A MINIMUM DESIGN COMPRESSIVE STRENGTH OF 4500 PSI IN 28 DAYS, A MAXIMUM W/C RATIO OF .45, WITH 6% +/- 1% AIR ENTRAINMENT, AND A MAXIMUM OF 4 INCHES OF SLUMP BEFORE ADDITION OF WATER REDUCING ADMIXTURE.
6. CLSM (CONTROLLED LOW STRENGTH MATERIAL) SHALL HAVE A MIN. STRENGTH OF 50 PSI, MAXIMUM 200 PSI
7. THE PRECEEDING MINIMUM MIX REQUIREMENTS MAY HAVE WATER-REDUCING ADMIXTURES CONFORMING TO ASTM C494 ADDED TO THE MIX AT MANUFACTURER'S DOSAGE RATES FOR IMPROVED WORKABILITY. NO CHLORIDE CONTAINING ADMIXTURES WILL BE ALLOWED. DO NOT ADD WATER TO CONCRETE AT THE JOBSITE WITHOUT WRITTEN APPROVAL OF THE S.E.R.
8. CONCRETE USED IN AREAS SUBJECT TO DE-ICING SALTS (STOOPS, APRONS, AND SIDEWALKS) SHALL HAVE CORTEC MCI ADDED TO THE MIX AT MANUFACTURER'S DOSAGE RATES.
9. ALL CONCRETE IS NORMAL WEIGHT UNLESS SPECIFICALLY NOTED OTHERWISE. CEMENT SHALL BE PORTLAND CEMENT TYPE 1 CONFORMING TO ASTM C150. UP TO 25% CEMENT CAN BE REPLACED WITH CLASS "C" FLYASH. AND UP TO 40% WITH GGBFS (50% COMBINED MAX.). AGGREGATE FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33. WATER IS TO BE POTABLE.
10. MEASURED FROM THE TIME WATER AND CEMENT ARE BATCHED TOGETHER, NO MORE THAN 90 MINUTES SHALL ELAPSE UNTIL CONCRETE IS PLACED. THIS TIME SHALL BE REDUCED BY TWO MINUTES FOR EVERY DEGREE THAT CONCRETE TEMPERATURE AT PLACEMENT EXCEEDS 75 DEGREES FAHRENHEIT.
11. PROTECT CONCRETE IN ACCORDANCE WITH ACI 305 AND ACI 306 FOR HOT WEATHER CONCRETING AND COLD WEATHER CONCRETING RESPECTIVELY. WHEN HEAT IS REQUIRED, CONCRETE SHALL NOT BE EXPOSED TO COMBUSTION PRODUCTS (USE DUCTED HEATER OR GROUND THAW). KEEP PROTECTION IN PLACE MINIMUM 24 HOURS AFTER CESSATION OF HEATING TO PROVIDE GRADUAL COOL-DOWN. CONCRETE BEING PLACED SHALL BE PROTECTED FROM RAIN. IF RAIN FALLS ON CONCRETE BEFORE IT HAS SET, OR WITHIN 3 HOURS OF PLACEMENT IN ANY EVENT, CONTRACTOR SHALL BEAR COST OF TESTING TO PROVE CONCRETE IS UNAFFECTED, AND SHALL REMOVE AND REPLACE AFFECTED CONCRETE TO THE SATISFACTION OF THE ENGINEER.
12. CEMENTITIOUS GROUT SHALL BE NON-SHRINK AND NON-METALLIC GROUT. PLACE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND TRIM NEATLY WHERE VISIBLE.
13. COORDINATE WITH OTHER TRADES FOR SLEEVES, CONDUIT, ELECTRICAL GROUNDING WIRES, INSERTS, UNDERGROUND UTILITIES, AND OTHER ITEMS TO BE EMBEDDED INTO CONCRETE AND VERIFY THAT THEY ARE PROPERLY INSTALLED AND SUPPORTED BEFORE CASTING CONCRETE. DIAMETER OF CONDUIT AND PIPE RUNNING WITHIN SLAB OR WALL SHALL NOT EXCEED 1/6 THE SLAB OR WALL THICKNESS AND SHALL BE PLACED IN THE CENTER OF THE MEMBER. PLACEMENT OF SUCH ITEMS SHALL BE COORDINATED WITH REINFORCING PLACEMENT WHERE THEY WOULD OTHERWISE DISPLACE EACH OTHER. FOR INSTANCE, IN AREAS WITH A SINGLE MAT OF REINFORCING, EAST-WEST CONDUIT SHOULD BE PLACED WITH EAST-WEST REINFORCING, THEN NORTH-SOUTH CONDUIT IS PLACED WITH NORTH-SOUTH REINFORCING.
14. NO UNCOATED ALUMINUM ITEMS SHALL BE EMBEDDED IN ANY CONCRETE. ALL ALUMINUM SURFACES IN DIRECT CONTACT WITH CONCRETE SHALL RECEIVE ONE 8-12 MIL DRY FILM THICKNESS BITUMASTIC.
15. UNLESS SHOWN ON DRAWINGS, CONCRETE SHALL BE PLACED WITHOUT CONSTRUCTION JOINTS EXCEPT WHERE SPECIFICALLY SHOWN ON SHOP DRAWINGS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING ADDITIONAL OR ALTERNATE CONSTRUCTION JOINT LOCATIONS TO THE ENGINEER FOR APPROVAL.
16. BEVEL ALL EXPOSED CORNERS OF CONCRETE 3/4"X3/4".
17. VERIFY SIZE AND LOCATION OF ALL EQUIPMENT BASES / HOUSEKEEPING PADS
18. CONCRETE FLOORS: ALL CAST-IN-PLACE CONCRETE FLOORS SHALL BE PROVIDED WITH A MIN. 1/8" PER FT SLOPE TO FLOOR DRAINS UNLESS NOTED OTHERWISE. IF CONCRETE CONTAINS MORE THAN 2 PERCENT ENTRAINED AIR, DELAY START OF FINISHING TO PRECLUDE WEAKENED AIR-RICH PLANE JUST BELOW SURFACE.

PRECAST CONCRETE

1. PRE-ENGINEERED PRECAST UNITS SHALL BE IN COMPLIANCE AND DESIGNED IN ACCORDANCE WITH THE FOLLOWING AGENCIES REQUIREMENTS AND RECOMMENDATIONS:
   - ACI 318- LATEST EDITION "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE,
   - PCI MNL 120- LATEST EDITION "PCI DESIGN HANDBOOK- PRECAST AND PRESTRESSED CONCRETE"
   - PCI MNL 123- LATEST EDITON "DESIGN AND TYPICAL DETAILS OF CONNECTIONS PRECAST AND PRESTRESSED CONCRETE"
2. PRIOR TO INSTALLATION, THE PRECAST CONCRETE MANUFACTURER SHALL SUBMIT STRUCTURAL CALCULATIONS AND PLANS TO THE ARCHITECT/ENGINEER FOR REVIEW. THE STRUCTURAL CALCULATIONS SHALL. CONTAIN AN ORIGINAL PROFESSIONAL ENGINEER'S SEAL AND SIGNATURE BY THE DESIGN ENGINEER REGISTERED IN THE STATE WHERE THE PROJECT IS LOCATED.
3. PRECAST CONCRETE UNITS SHALL BE DESIGNED FOR ALL POTENTIAL LOADING CONDITIONS INCLUDING INITIAL HANDLING AND ERECTION STRESSES, ALL SUPERIMPOSED DEAD AND LIVE LOADS SHOWN ON THE CONTRACT DRAWINGS, AND ALL CONCENTRATED LOADS FROM MECHANICAL EQUIPMENT AND LIFTING POINTS. GENERAL CONTRACTOR SHALL VERIFY MECHANICAL LOADS WITH THE MECHANICAL CONTRACTOR AND PROVIDE TO PRECAST DESIGNER AND S.E.R. BEFORE DESIGN.
4. THE PRECAST CONCRETE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL PRECAST CONNECTION HARDWARE INCLUDING HANGERS, EMBED PLATES, ANCHORS, CLIP ANGLES, ETC. THAT ARE CAST INTO THE PRECAST UNITS.
5. ALL ROOF OPENING DIMENSIONS AND LOCATIONS SHOWN ON THE PLANS SHALL BE VERIFIED BY THE CONTRACTOR AND ROOF MANUFACTURER.

REINFORCING STEEL

1. ALL REINFORCING STEEL SHALL BE DETAILED, FABRICATED, AND INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CODES: ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCING" ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" MSP2 "CRSI MANUAL OF STANDARD PRACTICE" AWS D1.4 "STRUCTURAL WELDING CODE- REINFORCING STEEL" WRI "WELDED WIRE FABRIC MANUAL OF STANDARD PRACTICE"
2. ALL CONCRETE IS REINFORCED CONCRETE UNLESS SPECIFICALLY CALLED OUT AS UNREINFORCED. REINFORCE ALL CONCRETE NOT OTHERWISE SHOWN WITH SAME STEEL AS IN SIMILAR SECTIONS OR AREAS. ANY DETAILS NOT SHOWN SHALL BE DETAILED PER ACI 315 AND MEET REQUIREMENTS OF ACI 318, CURRENT EDITIONS.
3. ALL REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 OR A706 GRADE 60 STEEL. REINFORCING TO BE WELDED SHALL ONLY BE WELDED TO STRUCTURAL STEEL, NOT OTHER REINFORCING, UNLESS SPECIFICALLY NOTED ON THE DRAWINGS. WELDED PLAIN WIRE FABRIC SHALL BE SUPPLIED IN SHEETS, NOT ROLLS, AND CONFORM TO THE REQUIREMENTS OF ASTM A185.
4. CLEAR MINIMUM COVERAGE OF CONCRETE OVER REINFORCING STEEL SHALL BE AS FOLLOWS UNLESS SPECIFICALLY NOTED OTHERWISE:
   - CONCRETE PLACED AGAINST EARTH 3"
   - ALL OTHER CONCRETE 2"
5. ALL FOOTING DOWELS SHALL BE ACCURATELY POSITIONED AND WIRED IN PLACE BEFORE CASTING FOOTING CONCRETE. WHERE NOT NOTED, PROVIDE AND INSTALL DOWELS OF SAME SIZE AND SPACING AS VERTICAL REINFORCEMENT IN ALL COLUMNS AND WALLS. POSITION ALL ANCHOR BOLTS WITH TEMPLATES.
6. BAR LAP LENGTHS IN CONCRETE AND 90 DEGREE END HOOKS SHALL BE IN ACCORDANCE WITH THE TABLE BELOW UNLESS NOTED OTHERWISE. THIS TABLE LISTS CLASS 'B' LAPS. INCREASE LAP LENGTH BY 50% FOR EPOXY COATED REINFORCING STEEL WITH C-C BAR SPACING < 6Db AND COVER TO CENTER OF BAR <3Db, OTHERWISE INCREASE BY 20%. FOR MASONRY REINFORCING, USE "WALL TOP BAR" VALUES.

REINF.	WALL, COLUMN OR SLAB		BEAMS		90 DEGREE
BAR SIZE	BAR LAP	* TOP BAR	BAR LAP	* TOP BAR	END HOOK
#3	19 IN	24 IN	28 IN	36 IN	6 IN
#4	25 IN	32 IN	37 IN	48 IN	8 IN
#5	31 IN	40 IN	46 IN	60 IN	10 IN
#6	37 IN	48 IN	56 IN	72 IN	12 IN
#7	54 IN	70 IN	81 IN	105 IN	14 IN
#8	62 IN	80 IN	93 IN	120 IN	16 IN
#9	70 IN	90 IN	104 IN	135 IN	18 IN
#10	78 IN	102 IN	117 IN	152 IN	20 IN
#11	86 IN	113 IN	130 IN	169 IN	22 IN

7. BARS MARKED CONTINUOUS, CORNER BARS, AND ALL VERTICAL STEEL SHALL BE LAPPED IN ACCORDANCE WITH TABLE ABOVE AT SPLICES AND EMBEDMENTS.
8. BAR SUPPORT ACCESSORIES SHALL BE AS SPECIFIED IN LATEST EDITION OF THE ACI DETAILING HANDBOOK AND THE CONCRETE REINFORCING STEEL INSTITUTE DESIGN HANDBOOK. MAXIMUM ACCESSORY SPACING SHALL BE 4'-0" ON CENTER, AND ALL ACCESSORIES ON EXPOSED SURFACES SHALL HAVE PLASTIC COATED ENDS.

CONCRETE REPAIR (FOR DAMAGED OR HONEYCOMBED CONCRETE)

1. LOCATE AND REMOVE AREAS OF LOOSE, DELAMINATED, OR DAMAGED CONCRETE. SAWCUT OUTSIDE PERIMETER OF DAMAGED AREAS TO A MINIMUM DEPTH OF APPROXIMATELY 3/4 INCH; DO NOT CUT REINFORCING. SANDBLAST AREA TO BE PATCHED AND BLOW CLEAN. PROTECT SURROUNDINGS AND WORKERS FROM DUST AND HAZARDS ASSOCIATED WITH THIS WORK.
2. WHERE HALF OR MORE OF THE PERIMETER OF REINFORCING BAR IS EXPOSED, BOND BETWEEN REINFORCING BAR AND SURROUNDING CONCRETE IS BROKEN, OR REINFORCING BAR IS CORRODED, REMOVE CONCRETE FROM ENTIRE PERIMETER OF BAR TO PROVIDE MINIMUM 3/4 INCH CLEARANCE BEHIND BAR. CLEAN AND COAT EXPOSED SUFACE OF BAR WITH BONDING AGENT (SIKA ARMATEC 110, SONOPREP, OR EUCLID CORR-BOND).
3. DAMPEN PATCH AREA AND APPLY MORTAR SCRUB COAT, KEEPING MOIST UNTIL PATCH IS APPLIED.
4. PATCH WITH POLYMER-MODIFIED CEMENTITIOUS PATCHING MORTAR (DAYTON SUPERIOR HD-50, EUCLID VERTI-COAT, MASTER BUILDERS EMACO R320, SIKATOP 121, OR SONOPATCH 100). CURE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

CONCRETE BLOCK MASONRY

1. REINFORCED CONCRETE MASONRY MATERIALS AND CONSTRUCTION SHALL COMPLY WITH THE FOLLOWING CODES AND SPECIFICATIONS: ACI 530.1- LATEST EDITION, TMS 602- "SPECIFICATIONS FOR MASONRY STRUCTURES"- LATEST EDITION, ACI 530/ASCE 5/ TMS 402- "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES"- LATEST EDITION.
2. CONCRETE BLOCK USED IN EXTERIOR WALLS OR LOAD BEARING WALLS SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS:
   - MASONRY ASSEMBLY Fm'= 2000 PSI
   - CONCRETE MASONRY UNITS: ASTM C90-11a
   - MORTAR, ASTM C-270-10 TYPE M BELOW GRADE
     TYPE S ABOVE GRADE
   - GROUT, ASTM C-476-10 f'g= 3000 PSI
3. THE CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY BRACING FOR ALL MASONRY WALLS DURING CONSTRUCTION.
4. CONCRETE BLOCK SHALL BE LAID IN RUNNING BOND PATTERN TYPICAL UNLESS NOTED OTHERWISE. NO VERTICAL (HEAD) JOINT SHALL BE CONTINUOUS FOR MORE THAN ONE BLOCK HEIGHT. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities WHICH are to be reinforced or to be filled with concrete or grout.
5. ALL JOINTS SHALL BE CONCAVE TOOLED JOINTS ABOVE AND BELOW GRADE.
6. MASONRY WALLS SHALL BE REINFORCED WITH HOT DIPPED GALVANIZED TRUSS HORIZONTAL REINFORCING (PER ASTM A153) WITH 9 GAGE SIDE AND CROSS RODS. REINFORCING SHALL BE CONTINUOUS IN HORIZONTAL JOINTS EVERY OTHER BLOCK COURSE (16° 0.C.) IN WALLS EVERY COURSE (8" O.C.) IN PARAPETS, WITH PREFABRICATED CORNER AND TEE SECTIONS.
7. UNLESS NOTED OTHERWISE, CONCRETE BLOCK SHALL BE REINFORCED AS FOLLOWS IN 6", 8", 10", AND 12" WALLS:
   - VERTICAL REINFORCING SHALL BE A MINIMUM OF 2 - #6 BARS IN 12" WALLS AT AT EACH DOOR AND WINDOW JAMB, EACH SIDE OF CONTROL JOINTS AND IN THE END VOID OF EACH LENGTH OF WALL. SEE DRAWINGS FOR (SINGLE CENTERED) REINFORCING REQUIRED IN GENERAL. LAP SPLICES FOR MASONRY VERTICAL REINFORCING SHALL BE ACCORDING TO THE TABLE ABOVE, FOR "WALL TOP BAR."
   - STACK BOND CMU SHALL HAVE CONTINOUS HORIZONTAL BOND BEAMS AT 48"0.C. REINFORCED WITH 2#4 CONTINUOUS.
   - CONTINUOUS HORIZONTAL BARS SHALL BE INCLUDED PER SECTION OR DETAIL IN BOND BEAM OR OPTIONAL RUNNING BOND BEAM WHERE NOTED. WHERE NOT DETAILED, USE 2-#5 CONTINUOUS. WHERE BOND BEAMS ARE CONTINUOUS AT CORNERS OF WALLS, SUPPLY CORNER BARS MATCHING SIZE OF HORIZONTAL BARS. ALL BOND BEAM REINFORCING SHALL HAVE STANDARD LAPS OR HOOKED DEVELOPMENT REINFORCING BARS AT WALL CORNERS AND INTERSECTIONS. TOP OF WALL SHALL BE A BOND BEAM.
9. GROUTING AND REINFORCING: ALL MASONRY, GROUTING, AND REINFORCING WORK SHALL BE PERFORMED BY MASON CRAFTWORKERS WHO HAVE SUCCESSFULLY COMPLETED THE INTERNATIONAL MASONRY INSTITUTE (1-800-IMI -0988) TRAINING COURSE FOR GROUTING AND REINFORCED MASONRY CONSTRUCTION, OR EQUAL
10. MASONRY BLOCK CELLS WITH VERTICAL REINFORCING AND BOND BEAMS WITH HORIZONTAL REINFORCING SHALL BE GROUTED SOLID WITH A CEMENT GROUT MIX, Fg' = 3000 PSI. MORTAR IS NOT ACCEPTABLE. PROVIDE A CLEANOUT HOLE AT THE BASE OF ALL GROUTED CELLS. ACCOUNT FOR FLY ASH IN GROUT DURING WINTER CONSTRUCTION BY PROTECTING AND HEATING AS REQUIRED TO ASSURE SET AND STRENGTH GAIN.
11. UNLESS OTHERWISE COVERED ON ARCHITECTURAL PLANS OR SPECIFICATIONS, VERTICAL CONTROL JOINTS IN MASONRY CONSTRUCTION SHALL BE 3/8" WIDE, FULL HEIGHT OF WALL. JOINTS SHALL BE SPACED AT A MAXIMUM OF 16' -0" ON CENTER AND COORDINATED WITH THE ARCHITECT/ENGINEER. INSTALL CONTROL JOINTS IN LOCATIONS AS REQUIRED AND AS DIRECTED BY ENGINEER/ARCHITECT.
12. ALL HORIZONTAL JOINT REINFORCING SHALL BE DISCONTINUOUS AT CONTROL JOINTS IN MASONRY. ALL BOND BEAM HORIZONTAL REINFORCING SHALL BE CONTINUOUS THROUGH CONTROL JOINTS.
13. LINTELS OVER ALL OPENINGS IN WALLS NOT OTHERWISE NOTED SHALL BE AN 8 INCH DEEP BOND BEAM WITH TWO #5 BARS.
14. PROVIDE ADDITIONAL VERTICAL REINFORCEMENT (2 - #6 BARS IN ONE CORE, ONE EACH SIDE OF BLOCK) AT ENDS OF WALLS, CORNERS, AND OPENINGS. WALLS SHALL BE ANCHORED AT BOTTOM BY DOWELS MATCHING WALL VERTICAL REINFORCING (UNLESS NOTED OTHERWISE). WALLS SHOULD BE ANCHORED AT TOP BY BRACING ANGLES PER DETAILS ON DRAWINGS.
15. BOND BEAM LINTELS SHALL BE STANDARD HORSECOLLAR TYPE (U SHAPED) BLOCK. CONTINUITY BONDBEAMS MAY BE FLOWTHROUGH BLOCK.

POST INSTALLED ANCHOR RODS AND DOWELS

1. UNLESS NOTED OTHERWISE, ANCHORS AND REINFORCING DOWELS INSTALLED IN CONCRETE OR CONCRETE MASONRY SHALL BE AS NOTED BELOW. ANCHORS NOT SHOWN OR NOTED ON THE DRAWINGS, THOSE REQUIRED BY THE CONTRACTOR SOLELY FOR HIS MEANS AND METHODS, OR THOSE REQUIRED BY MECHANICAL/ELECTRICAL AND CARRYING LESS THAN 100 POUNDS, DO NOT REQUIRE SPECIAL INSPECTION.
2. APPROVED MANUFACTURERS ARE: HILTI, ITW/REDHEAD, SIMPSON, AND POWERS/RAWL. SUBMIT PRODUCT DATA AND CURRENT ICC ES REPORT OR IAPMO REPORT SHOWING PRODUCT IS COMPLIANT WITH PROJECT CODE REQUIREMENTS FOR REVIEW. CONTRACTOR SHALL ARRANGE FOR MANUFACTURER'S REP TO TRAIN ALL INSTALLERS ON THE COMPLETE INSTALLATION PROCESS. A LETTER OF PROCEDURE STATING METHOD OF DRILLING, THE PRODUCT FOR USE, THE COMPLETE INSTALLATION PROCEDURE, MANUFACTURER TRAINING DATE AND A LIST OF THE PERSONNEL TRAINED ON ANCHOR INSTALLATION SHALL BE SUBMITTED TO THE ENGINEER.
3. PERMANENT ANCHORS EXPOSED TO EARTH, WEATHER, OR CORROSIVE ENVIRONMENTS SHALL BE STAINLESS STEEL TYPE 304 OR 316; ANCHORS IN CONTACT WITH CHLORIDE DE-ICER RUNOFF SHALL BE TYPE 316. OTHERWISE, ANCHORS SHALL BE ZINC PLATED, MINIMUM ASTM A36 MATERIAL UNLESS ASTM A193 GRADE B7 IS NOTED IN THE DRAWINGS, AND SHALL BE ACCORDING TO ASTM F1554. REINFORCING DOWELS SHALL BE OF THE SAME MATERIAL AND COATING (IF ANY) AS THE CONTINUING REINFORCING.
4. WHERE EXPANSION ANCHORS ARE CALLED FOR, CONTRACTOR MAY SUBSTITUTE SCREW TYPE ANCHORS WITH SELF-TAPPING THREADS OR ADHESIVE ANCHORS OF THE SAME SIZE AND EMBEDMENT, SUBJECT TO REVIEW OF CAPACITY BY THE ENGINEER FOR THE PRODUCT SUBSTITUTED. WHERE ADHESIVE ANCHORS ARE CALLED FOR, OTHER TYPES SHALL NOT BE SUBSTITUTED.
5. ADHESIVE SHALL HAVE A CURRENT ICC ES REPORT. USE HIGH VISCOSITY ADHESIVE AND PLACEMENT DEVICES IN CONSULTATION WITH THE MANUFACTURER FOR OVERHEAD WORK. OVERHEAD INSTALLATION SHALL BE SUBJECT TO CONTINUOUS SPECIAL INSPECTION DURING INSTALLATION AND SHALL ONLY BE DONE BY CERTIFIED ADHESIVE ANCHOR INSTALLERS. USE LOW TEMPERATURE FORMULATIONS FOR COLD WEATHER WORK. DO NOT APPLY SIGNIFICANT LOAD TO ANCHORS IN COLD WEATHER UNTIL THEIR CAPACITY HAS BEEN ASSURED.
6. ANCHORS INSTALLED IN CONCRETE MASONRY AND PRECAST HOLLOWCORE CONCRETE SHALL BE INSTALLED IN CORES GROUTED SOLID. MINIMUM GROUT STRENGTH Fg' = 3000 PSI. MINIMUM 12 INCHES OF GROUT EACH WAY ALONG HORIZONTAL PRECAST CORES FROM ANCHOR. VERTICAL CORES SHALL BE GROUTED FULL HEIGHT. ANCHORS INSTALLED IN MASONRY SHALL NOT BE INSTALLED WITHIN 1 1/2 INCHES OF ANY HEAD JOINT UNLESS BLOCK ARE SQUARE END AND MORTARED ACROSS FULL WIDTH OF HEAD JOINT, OR FILLED BOND BEAM.
7. HOLES SHALL BE DRILLED, CLEANED, AND MAINTAINED UNTIL INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS USING STANDARD ROTARY-IMPACT BITS AND OIL-FREE COMPRESSED AIR; DIAMOND CORE BITS SHALL NOT BE USED UNLESS SPECIFICALLY APPROVED BY THE MANUFACTURER. LOCATE AND AVOID REINFORCING BARS. MAINTAIN SPACING (MINIMUM 8 INCHES) AND EDGE/CORNER DISTANCES (MINIMUM 4 INCHES) AS RECOMMENDED BY MANUFACTURER UNLESS SPECIFICALLY NOTED OTHERWISE IN THE DRAWINGS.
8. UNLESS NOTED OTHERWISE, ANCHORS SHALL BE INSTALLED TO THE FOLLOWING EMBEDMENTS:

	DIAMETER	CIP CONCRETE	GROUTED CMU
EXPANSION/SCREW:	1/2 INCH	3 1/2 INCHES	4 1/2 INCHES
	5/8 INCH	4 INCHES	5 INCHES
	3/4 INCH	5 INCHES	6 INCHES
ADHESIVE:	1/2 INCH	4 1/2 INCHES	5 1/2 INCHES
	5/8 INCH	5 INCHES	6 INCHES
	3/4 INCH	6 INCHES	7 INCHES (6" IN 8" CMU)

9. EXCEPT AS NOTED, ALL ANCHORS SHALL HAVE INTERMITTENT SPECIAL STRUCTURAL INSPECTION BY ONE OF THE FOLLOWING. LOAD TESTS SHALL BE TO 150 PERCENT OF SERVICE CAPACITY OR 50 PERCENT OF ULTIMATE STRENGTH, WITH NO APPRECIABLE SLIP OR PERMANENT DEFORMATION. ANCHORS WHICH FAIL THIS TEST SHALL BE REPLACED AT NO COST TO THE PROJECT. TWO FAILURES IN A GIVEN INSTALLATION SHALL RESULT IN MANDATORY LOAD TESTING AT DOUBLE THE RATE NOTED BELOW.

   EXPANSION AND SCREW ANCHORS:
   - WITNESS INSTALLATION WITH TORQUE WRENCH ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS OF ICC REPORT
   - TEST WITH TORQUE WRENCH AFTER INSTALLATION (INCLUDING LOAD TEST OF 5 PERCENT OF INSTALLED ANCHORS)
   - LOAD TEST OF 10 PERCENT OF INSTALLED ANCHORS BY SUPPLIER OR THIRD PARTY INSPECTOR

   ALL ADHESIVE ANCHOR RODS AND DOWELS SHALL HAVE SPECIAL STRUCTURAL INSPECTION (INTERMITTENT EXCEPT AS NOTED FOR OVERHEAD INSTALLATION) BY ONE OF THE FOLLOWING:
   - WITNESS INSTALLATION ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS OF ICC REPORT
   - LOAD TEST OF 10 PERCENT OF INSTALLED ANCHORS BY SUPPLIER OR THIRD PARTY INSPECTOR

STRUCTURAL METALS / FRP

1. ALL STRUCTURAL STEEL WIDEFLANGE BEAMS AND COLUMNS SHALL BE ASTM A992, GRADE 50 STEEL AND ALL MISCELLANEOUS STEEL SHALL BE ASTM A992 OR A36 STEEL (MIN. Fy = 36 KSI). RECTANGULAR STEEL TUBES (HSS) SHALL BE ASTM A500, GRADE B STEEL (Fy = 46 KSI). PIPE SHALL BE ASTM A53 (Fy = 35 KSI) OR A500 GRADE B (42 KSI). OTHER SHAPES SHALL BE ASTM A36 (36 KSI). SPLICING OR MODIFICATION OF MEMBERS IN THE FIELD IS PROHIBITED WITHOUT PRIOR WRITTEN APPROVAL OF THE S.E.R.
2. FABRICATION AND ERECTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AISC MANUAL OF STEEL CONSTRUCTION, EXCEPT AS FOLLOWS:
   - TO PARAGRAPH 3.1, ADD 'THE PROJECT ARCHITECTURAL DRAWINGS ARE A PART OF THE STRUCTURAL STEEL DESIGN DRAWINGS BY REFERENCE AND MUST BE USED CONCURRENTLY WITH THE STRUCTURAL STEEL DESIGN DRAWINGS FOR ANY INFORMATION NOT SHOWN ON THE STRUCTURAL STEEL DESIGN DRAWINGS."
   - DELETE PARAGRAPH 3.2 AND INSERT THE FOLLOWING: "ARCHITECTURAL, PROCESS, ELECTRICAL AND MECHANICAL PLANS SHALL BE USED AS A SUPPLEMENT TO THE STRUCTURAL STEEL DESIGN DRAWINGS TO DEFINE DETAIL CONFIGURATIONS AND CONSTRUCTION INFORMATION."
   - PARAGRAPH 3.3 MODIFY THE LAST SENTENCE TO READ, "IN CASE OF DISCREPANCIES BETWEEN THE STRUCTURAL STEEL PLANS AND PLANS OF OTHER DISCIPLINES, SUCH DISCREPANCIES SHALL BE CALLED TO THE ARCHITECT / ENGINEER'S ATTENTION FOR RESOLUTION."
3. ALL STEEL SHALL RECEIVE A PRIMER COAT UNLESS GALVANIZED.
4. ALL WELDING SHALL BE PERFORMED BY A CERTIFIED WELDER USING E70 ELECTRODES IN ACCORDANCE WITH THE REQUIREMENTS OF THE AWS D1.1 AND D1.2 "STRUCTURAL WELDING CODE" AND VISUALLY INSPECTED. FULL-PEN WELDS SHALL ALSO BE INSPECTED BY NDT METHODS SUCH AS ULTRASONIC, MAG PARTICLE, OR DYE PEN.
5. ALL FIELD WELDED CONNECTIONS SHALL BE CHIPPED, GROUND WHERE REQUIRED, WIRE BRUSH CLEANED AND PAINTED TO MATCH THE PAINT SYSTEM.
6. ALL BOLTS NOT OTHERWISE SPECIFIED SHALL BE 3/4" DIAMETER HIGH STRENGTH (ASTM A325-N). ALL BOLTS SHALL BE FULLY PRETENSIONED. ANY NON-TWISTOFF BOLTS SHALL HAVE 10 PERCENT CHECKED WITH A TORQUE WRENCH BY THE SPECIAL INSPECTOR. ALL BEAM CONNECTIONS SHALL BE DESIGNED PER THE AISC MANUAL OF STEEL CONSTRUCTION "FRAMED BEAM CONNECTIONS" FOR THE INDICATED REACTIONS OR AT LEAST 0.60 x BEAM TOTAL SHEAR CAPACITY SHOWN IN THE ALLOWABLE UNIFORM LOAD TABLES, WHICHEVER IS GREATER. ALL CONNECTIONS MUST BE TWO BOLT MINIMUM. ALL COPES SHALL BE MADE WITH A 1 INCH MINIMUM RADIUS.
7. ALL ANCHOR RODS SHALL BE 3/4" DIAMETER STAINLESS STEEL TYPE 304 UNLESS NOTED OTHERWISE. WHERE HEADED RODS ARE NOTED OR SPECIFIED, BENT RODS SHALL NOT BE FURNISHED.
8. METAL/FRP STAIRWAYS, PLATFORMS AND GRATES SHALL BE PROVIDED/ CONSTRUCTED WITH ADEQUATE DESIGN CHARACTERISTICS (100 PSF LIVE LOAD CAPACITY U.N.O.) AND STRUCTURAL CONFIGURATIONS IN ACCORDANCE WITH THE FABRICATOR'S SHOP DRAWINGS AS APPROVED BY THE ENGINEER. ALL STAIRWAYS, PLATFORMS AND GRATES SHALL SATISFY ALL REQUIREMENTS OF THE PROJECT SPECIFICATIONS. ALL STAIR RUNS LONGER THAN 10 FEET SHALL HAVE DIAGONAL BRACING FASTENED TO THE BOTTOM FLANGES OF THE STRINGERS U.N.O.
9. ALL EXPOSED STEEL SHALL BE GALVANIZED. DAMAGED GALVANIZING SHALL BE REPAIRED BY APPLICATION OF COLD GALVANIZING COMPOUND SUCH AS ZRC (MINIMUM 3 COATS). PAINT FINISH PER ARCHITECTURAL.

WOOD TRUSSES

1. PRE-ENGINEERED WOOD TRUSSES SHALL BE DESIGNED IN ACCORDANCE WITH THE TRUSS PLATE INSTITUTE'S NATIONAL DESIGN STANDARD FOR METAL-PLATE CONNECTED WOOD TRUSS CONSTRUCTION (ANSI/TP-1 LATEST EDITION). TRUSSES SHALL BE DESIGNED BY AN AUTHORIZED MEMBER OF THE WOOD TRUSS COUNCIL OF AMERICA (WTCA). TRUSS DESIGN SHALL CONFORM TO SPECIFIED CODES, ALLOWABLE STRESS INCREASES, DEFLECTION LIMITATIONS, AND OTHER APPLICABLE CRITERIA OF THE GOVERNING CODE, INCLUDING EAVE LOADING PER SECTION 7.4.5 OF ASCE 7 ASSUMING POORLY INSULATED WARM ROOF.
2. PRIOR TO INSTALLATION, THE TRUSS MANUFACTURER SHALL SUBMIT STRUCTURAL CALCULATIONS AND PLANS TO THE ARCHITECT/ENGINEER FOR REVIEW. THE STRUCTURAL CALCULATIONS SHALL CONTAIN AN ORIGINAL PROFESSIONAL ENGINEER'S SEAL AND SIGNATURE BY THE DESIGN ENGINEER REGISTERED IN THE STATE WHERE THE PROJECT IS LOCATED.
3. ALL TRUSSES SHALL BE SECURELY BRACED BOTH DURING ERECTION AND PERMANENTLY, AS INDICATED ON THE APPROVED TRUSS DESIGN DRAWINGS ALL IN ACCORDANCE WITH TPI'S COMMENTARY AND RECOMMENDATIONS FOR HANDLING, INSTALLING AND BRACING METAL-PLATE CONNECTED WOOD TRUSSES (HIB-91, BOOKLET) AND THE LATEST EDITION OF ANSI/TP-1.
4. THE TRUSS MANUFACTURER SHALL SUPPLY ALL HARDWARE AND FASTENERS FOR JOINING TRUSS MEMBERS TOGETHER AND FASTENING TRUSS MEMBERS TO THEIR SUPPORTS. METAL CONNECTOR PLATES SHALL BE MANUFACTURED BY A MEMBER OF THE WOOD TRUSS COUNCIL OF AMERICA (WTCA) AND SHALL BE 20 GAUGE MINIMUM. CONNECTOR PLATES SHALL MEET OR EXCEED ASTM A653, GRADE 33, WITH ASTM A924 GALVANIZED COATING DESIGNATION G90.
5. SHIPMENT, HANDLING, AND ERECTION OF TRUSSES SHALL BE BY EXPERIENCED, QUALIFIED PERSONS AND SHALL BE PERFORMED IN A MANNER SO AS NOT TO ENDANGER LIFE OR PROPERTY. APPARENT TRUSS DAMAGE SHALL BE REPORTED TO THE TRUSS MANUFACTURER FOR EVALUATION PRIOR TO ERECTION. CUTTING OR ALTERATION OF TRUSSES IS NOT PERMITEED.
6. ALL ROOF OPENING DIMENSIONS AND LOCATIONS SHOWN ON THE PLANS SHALL BE VERIFIED BY THE CONTRACTOR AND ROOF MANUFACTURER.

BRIDGE CRANES

1. CRANES SHALL COMPLY WITH CMAA SPECIFICATION 74.
2. BRIDGE CRANES SHALL HAVE SPAN AND MINIMUM HOOK HEIGHT AS SHOWN ON DRAWINGS. SERVICE CLASSIFICATION 'B', 3 TON CAPACITY.
3. BRIDGE, TROLLEY AND HOIST ARE MANUALLY OPERATED.
4. CRANE SUPPLIER SHALL SUPPLY CRANE RAILS AND MOUNTING SYSTEM. RAIL SPLICES SHALL BE TIGHT FIT, BOLTED.
5. CRANE RUNWAY BEAMS ARE DESIGNED FOR MAXIMUM VERTICAL DEFLECTION OF L/1000 AND MAXIMUM LATERAL DEFLECTION OF L/400 (BASED ON TOP FLANGE ONLY). BRIDGE SHALL BE DESIGNED FOR A MAXIMUM VERTICAL DEFLECTION OF SPAN/600. IMPACT IS NOT CONSIDERED IN DEFLECTION CALCULATIONS.
6. RUNWAY BEAMS SHALL BE SIMPLE SPAN AND SHALL NOT BE SPLICED EXCEPT AT COLUMNS. NO WELDING OR DRILLING IS PERMITTED ON THE BOTTOM (TENSION) FLANGE OR THE BOTTOM 6 INCHES OF THE WEB, EXCEPT AT THE END BEARING. PROVIDE END STOPS AT EACH END OF EACH RUNWAY BEAM.

SHOP DRAWING REVIEW

1. SHORT ELLIOTT HENDRICKSON INC. (SEH) WILL REVIEW THE GENERAL CONTRACTOR'S (GC) SHOP DRAWINGS AND RELATED SUBMITTALS (AS INDICATED BELOW) WITH RESPECT TO THE ABILITY OF THE DETAILED WORK, WHEN COMPLETE, TO BE A PROPERLY FUNCTIONING INTEGRAL ELEMENT OF THE OVERALL STRUCTURAL SYSTEM DESIGNED BY SEH. IN GENERAL, SUBMITTALS WILL NOT BE REVIEWED FOR CORRECT QUANTITIES OR CONSTRUCTION CONSIDERATIONS.
2. PRIOR TO SUBMITTAL OF A SHOP DRAWING OR ANY RELATED MATERIAL TO SEH, THE GC SHALL:
   - REVIEW EACH SUBMISSION FOR CONFORMANCE WITH THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND OPERATIONS OF CONSTRUCTION AND SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL THERETO, ALL OF

DRAWN BY:	JMB	NO.	BY	DATE	REVISIONS
DESIGNER:	JMB				
CHECKED BY:	MLH				
DESIGN TEAM					

FOSTER, JACOBS, & JOHNSON, INC.
PROFESSIONAL ENGINEERS

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.
MICHAEL L. HEMSTAD, PE
Date: OCTOBER 17, 2014 Lic. No. 19165

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PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

GENERAL STRUCTURAL NOTES

FILE NO. F0SJJ129137

S14

WHICH ARE THE SOLE RESPONSIBILITY OF THE GC.

- REVIEW AND APPROVE EACH SUBMISSION.
- STAMP EACH SUBMISSION AS APPROVED.

3. SEH SHALL ASSUME THAT NO SUBMISSION COMPRISES A VARIATION FROM THE CONTRACT DOCUMENTS UNLESS THE GC ADVISES SEH WITH WRITTEN DOCUMENTATION. SHOP DRAWINGS AND RELATED MATERIAL (IF ANY) REQUIRED ARE INDICATED BELOW. SHOULD SEH REQUIRE MORE THAN TEN (10) WORKING DAYS TO PERFORM THE REVIEW, SEH SHALL SO NOTIFY THE GC. SUBMITTALS SHALL INCLUDE:
   - CONCRETE MIX DESIGNS AND MATERIAL CERTIFICATES INCLUDING ADMIXTURES AND COMPOUNDS APPLIED TO THE CONCRETE AFTER PLACEMENT.
   - AGGREGATE TESTS AND CONCRETE TEST HISTORY FOR EACH MIX DESIGN, WITH THE SUBMISSION OF CONCRETE MIX DESIGNS.
   - REINFORCING STEEL SHOP DRAWINGS INCLUDING ERECTION DRAWINGS AND BENDING DETAILS. BAR LIST WILL NOT BE REVIEWED FOR CORRECT QUANTITIES.
   - ELEVATIONS OF ALL REINFORCED CONCRETE MASONRY WALLS AND ALL CONCRETE WALLS WITH FOOTING STEPS OR OTHER ELEVATION CHANGES, AT A SCALE NO SMALLER THAN 1/8" = 1'-0" SHOWING ALL REQUIRED REINFORCING. SPECIFICALLY, DETAILER SHALL DRAW STEPPED WALLS AT RIVER PUMP STATION TO FIT MASONRY COURSING AND GRADES.
   - GROUT MIX DESIGNS (FOR CMU).
   - STRUCTURAL STEEL SHOP DRAWINGS INCLUDING ERECTION DRAWINGS AND PIECE DETAILS. INCLUDE CONNECTOR SUBMITTALS. INCLUDE MISCELLANEOUS FRAMING SPECIFIED ON DRAWINGS.
   - PRECAST SHOP DRAWINGS INCLUDING REINFORCING, BEARING DETAILS.
   - PRECAST DESIGN CALCULATIONS SIGNED AND SEALED BY AN ENGINEER REGISTERED IN STATE OF PROJECT
   - PRE-MANUFACTURED WOOD TRUSS SHOP DRAWINGS
   - PRE-MANUFACTURED WOOD TRUSS DESIGN CALCULATIONS SIGNED AND SEALED BY ENGINEER REGISTERED IN STATE OF PROJECT
   - SEH SHALL REVIEW SHOP DRAWINGS AND RELATED MATERIALS WITH COMMENTS PROVIDED THAT EACH SUBMISSION HAS MET THE ABOVE REQUIREMENTS. SEH SHALL RETURN WITHOUT COMMENT UNREQUIRED MATERIAL OR SUBMISSIONS WITHOUT GC APPROVAL STAMP.

SPECIAL INSPECTION

DESCRIPTION	TESTING		INSPECTING		NA
	YES	NO	YES	NO	
1 METAL CONSTRUCTION					
WELDING		●	●		
DETAILS: BRACING, LOCATIONS, ETC.		●	●		
BOLTING		●	●		
2 CONCRETE CONSTRUCTION					
CONCRETE	●		●		
PRECAST/PRESTRESSED CONCRETE	●		●		
REINFORCEMENT: SIZE AND SPACING		●	●		
BOLTS INSTALLED IN CONCRETE		●	●		
3 MASONRY CONSTRUCTION					
REINFORCEMENT: SIZE AND SPACING		●	●		
PRISMS	●		●		
DETAILS: GROUTING, LINTELS, ETC.		●	●		
4 WOOD CONSTRUCTION					●
5 GRADING, EXCAVATION AND FILLING	●		●		
6 PILING, PIERS AND CAISSONS	●		●		

A. SPECIAL INSPECTIONS IN ACCORDANCE WITH IBC CHAPTER 17 SHALL BE PERFORMED.

ABBREVIATIONS

ADDL	ADDITIONAL
ADH	ADHESIVE
ADJ	ADJUSTABLE
AL	ALUMINUM
APPROX.	APPROXIMATELY
B/	BOTTOM OF
BLDG	BUILDING
BOT	BOTTOM
BRG	BEARING
BTWN	BETWEEN
C.J	CONTROL JOINT
CL	CENTERLINE
CLR	CLEAR COVER
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC.	CONCRETE
CONSTR.	CONSTRUCTION
CONT.	CONTINUOUS
CTR	CENTERED
DEG.	DEGREE
DIA.	DIAMETER
DWG	DRAWING
DWL	DOWEL
E	EAST
EF	EACH FACE
EL.	ELEVATION
ENCL.	ENCLOSURE
EQ. SP.	EQUALLY SPACED
EQUIP.	EQUIPMENT
EW	EACH WAY
EX.	EXISTING
EXP.	EXPANSION
F.F.	FRONT FACE
FFE	FINISHED FLOOR ELEVATION
F.D.	FLOOR DRAIN
FRP	FIBERGLASS-REINFORCED PLASTIC
FT	FOOT, FEET
FTG	FOOTING
GALV.	GALVANIZED
GND	GROUND
H.C.	HOLLOW CORE
HGT	HEIGHT
HORIZ.	HORIZONTAL
H.P.	HIGH POINT
I.D.	INSIDE DIAMETER

ABBREVIATIONS

INV. EL.	INVERT ELEVATION
ISF	INSIDE FACE
LB	POUND, POUNDS
L.P.	LOW POINT
LVL	LEVEL
LVR	LOUVER
MATL	MATERIAL
MAX.	MAXIMUM
MECH.	MECHANICAL
MIN.	MINIMUM
N	NORTH
N/A	NOT APPLICABLE
N.T.S.	NOT TO SCALE
O.C.	ON CENTERS
O.D.	OUTSIDE DIAMETER
OPNG	OPENING
OSF	OUTSIDE FACE
PL	PLATE
PSF	POUNDS PER SQUARE FOOT
REINF.	REINFORCEMENT
S	SOUTH
SER	STRUCTURAL ENGINEER OF RECORD
SIM.	SIMILAR
SPEC.	SPECIFICATION
SQ	SQUARE
S.S.	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURAL
T&B	TOP AND BOTTOM
T.O.	TOP OF
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
VERT.	VERTICAL
W	WEST
W/	WITH
W/O	WITHOUT
WS	WATERSTOP

S:\EF\FJ\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\20-Struct\Contract B S14.dwg 10/15/2014 3:04 PM jburns

DRAWN BY: JMB
DESIGNER: JMB
CHECKED BY: MLH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC.
PROFESSIONAL ENGINEERS

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Michael L. Hemstad
Date: OCTOBER 17, 2014 MICHAEL L. HEMSTAD, PE Lic. No. 19165

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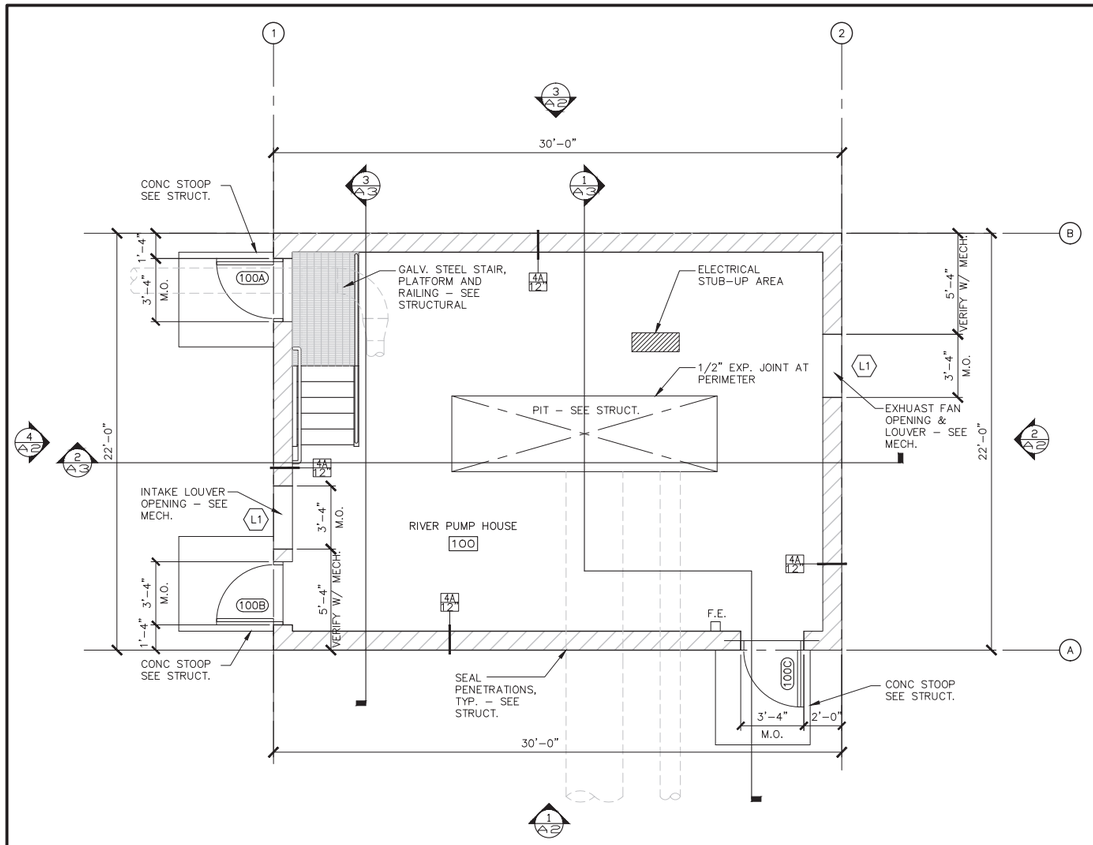
PUMP BUILDING PLANS
CONTRACT 'B'
SPIRIT MOUNTAIN
DULUTH, MN

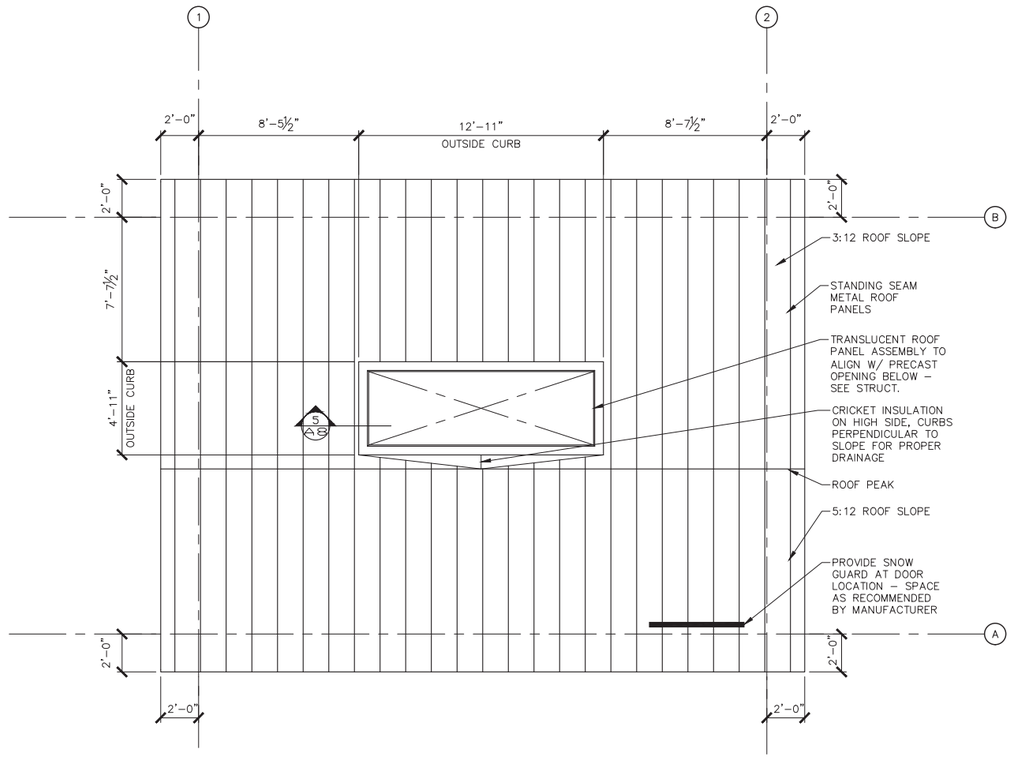
GENERAL STRUCTURAL NOTES

FILE NO. FOSJJ129137

S15



1 FLOOR PLAN – RIVER
1/4" = 1'-0"



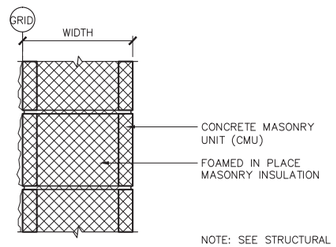
2 ROOF PLAN – RIVER
1/4" = 1'-0"

OPENING SCHEDULE

OPEN NO.	OPENING SIZE WD	OPENING SIZE HGT	OPENING SIZE THK	FRAME TYPE	FRAME MAT'L	DETAILS TYPE	DETAILS MAT'L	DETAILS HEAD	DETAILS JAMB	HDWR GROUP	REMARKS
100A	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–
100B	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–
100C	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–

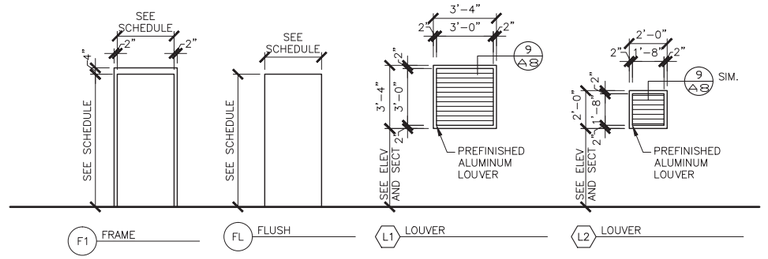
ROOM FINISH SCHEDULE

NO.	ROOM NAME	FLOOR MAT'L	FLOOR FINISH	BASE	WALL FINISH NORTH	WALL FINISH EAST	WALL FINISH SOUTH	WALL FINISH WEST	CEILINGS MAT'L	CEILINGS FINISH	CEILINGS HEIGHT	REMARKS
100	PUMP HOUSE	CONC	SEALED	–	PAINT	PAINT	PAINT	PAINT	PRECAST	PAINT	EXPOSED	–



4A WIDTH MASONRY – SINGLE WYTHE

3 WALL TYPES
1-1/2" = 1'-0"



4 DOOR, FRAME & LOUVER TYPES

DRAWING NAME: S:\FJ\F\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - River Pump\RP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A1 PLOTTED: Oct 13, 2014 - 1:42pm

DRAWN BY: BF
DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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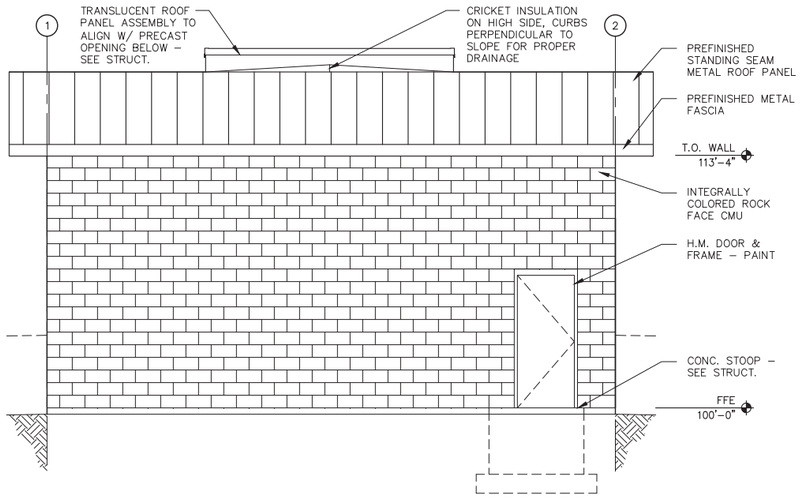
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

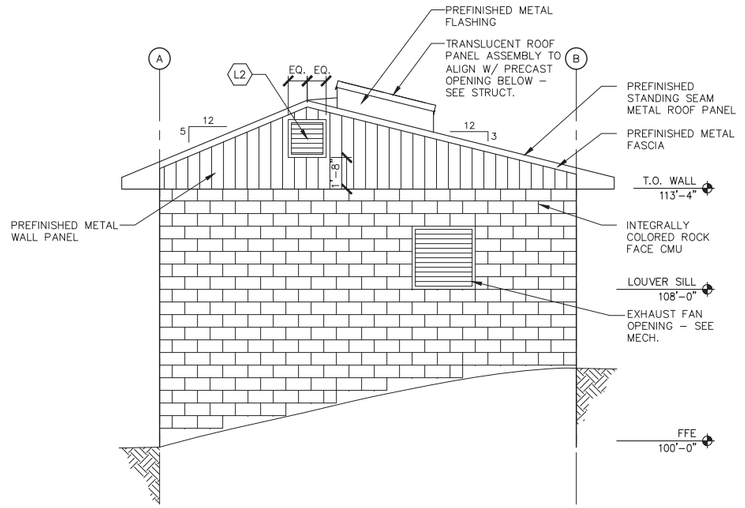
RIVER PUMP STATION
ARCHITECTURAL
FLOOR PLAN, ROOF PLAN, SCHEDULES, WALL ASSEMBLY KEY

FILE NO.
FOSJJ129137

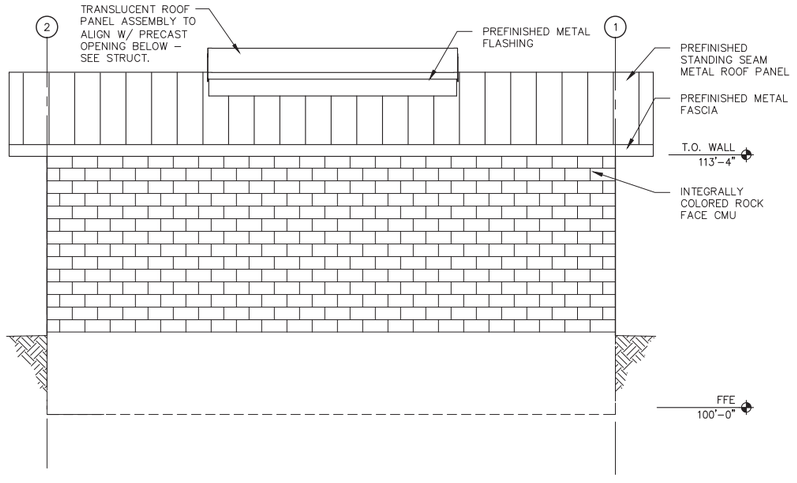
A1



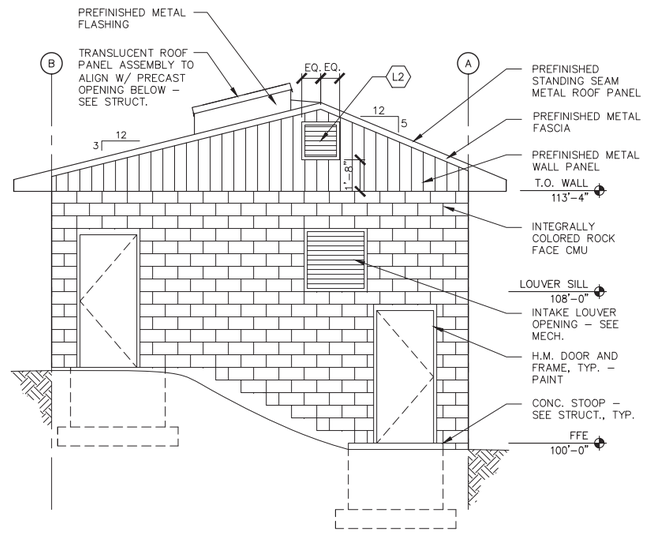
1 EXTERIOR ELEVATION 1
1/4" = 1'-0"



2 EXTERIOR ELEVATION 2
1/4" = 1'-0"



3 EXTERIOR ELEVATION 3
1/4" = 1'-0"



4 EXTERIOR ELEVATION 4
1/4" = 1'-0"

DRAWING NAME: S:\F\J\F\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - River Pump\RP_Exterior Elevations.dwg LAYOUT TAB: A2 PLOTTED: Oct 13, 2014 - 1:42pm

DRAWN BY: BF DESIGNER: BB CHECKED BY: JM DESIGN TEAM	NO.	BY	DATE	REVISIONS	FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SCOTT BLANK, AIA
Date: 10/17/2014 Lic. No. 51092

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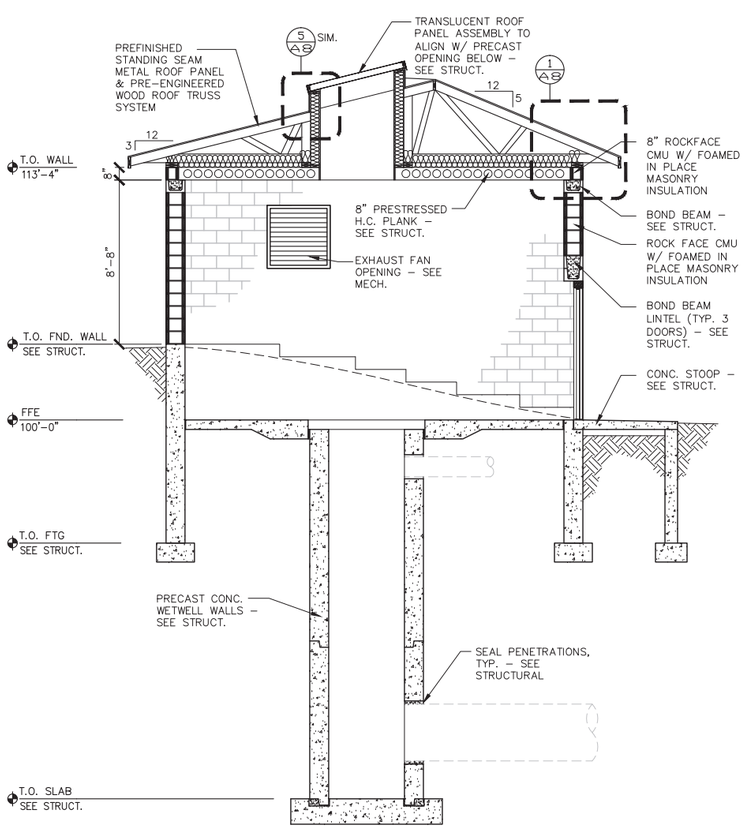
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

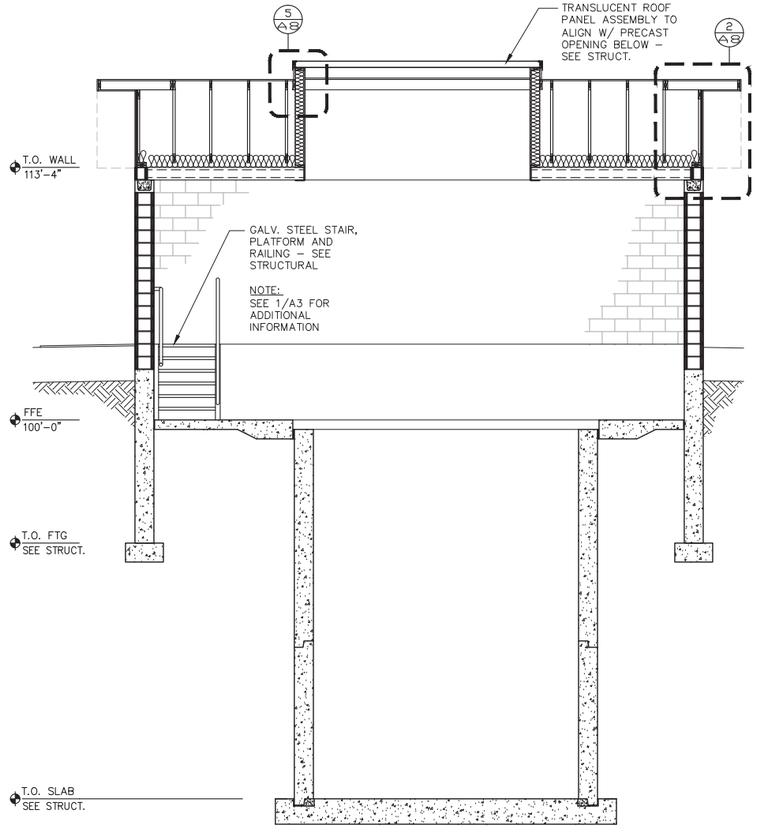
MAIN PUMP STATION
ARCHITECTURAL
EXTERIOR ELEVATIONS

FILE NO. FOSJJ129137

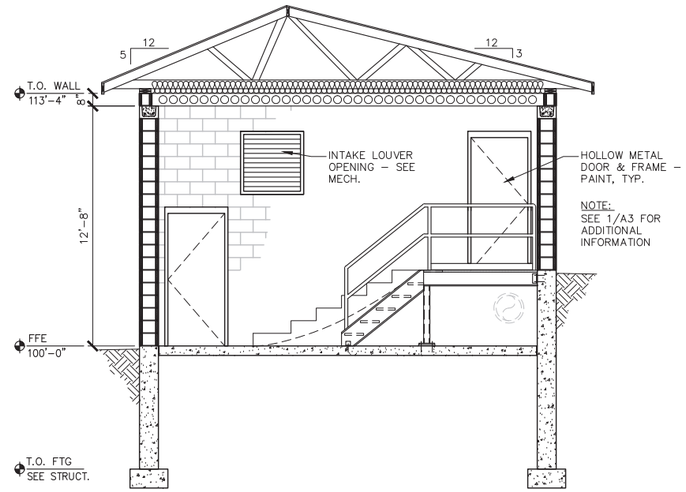
A2



1 BUILDING SECTION 1
1/4" = 1'-0"



2 BUILDING SECTION 2
1/4" = 1'-0"



3 BUILDING SECTION 3
1/4" = 1'-0"

DRAWING NAME: S:\FJ\F\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - River Pump\RP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A3 PLOTTED: Oct 13, 2014 - 1:42pm

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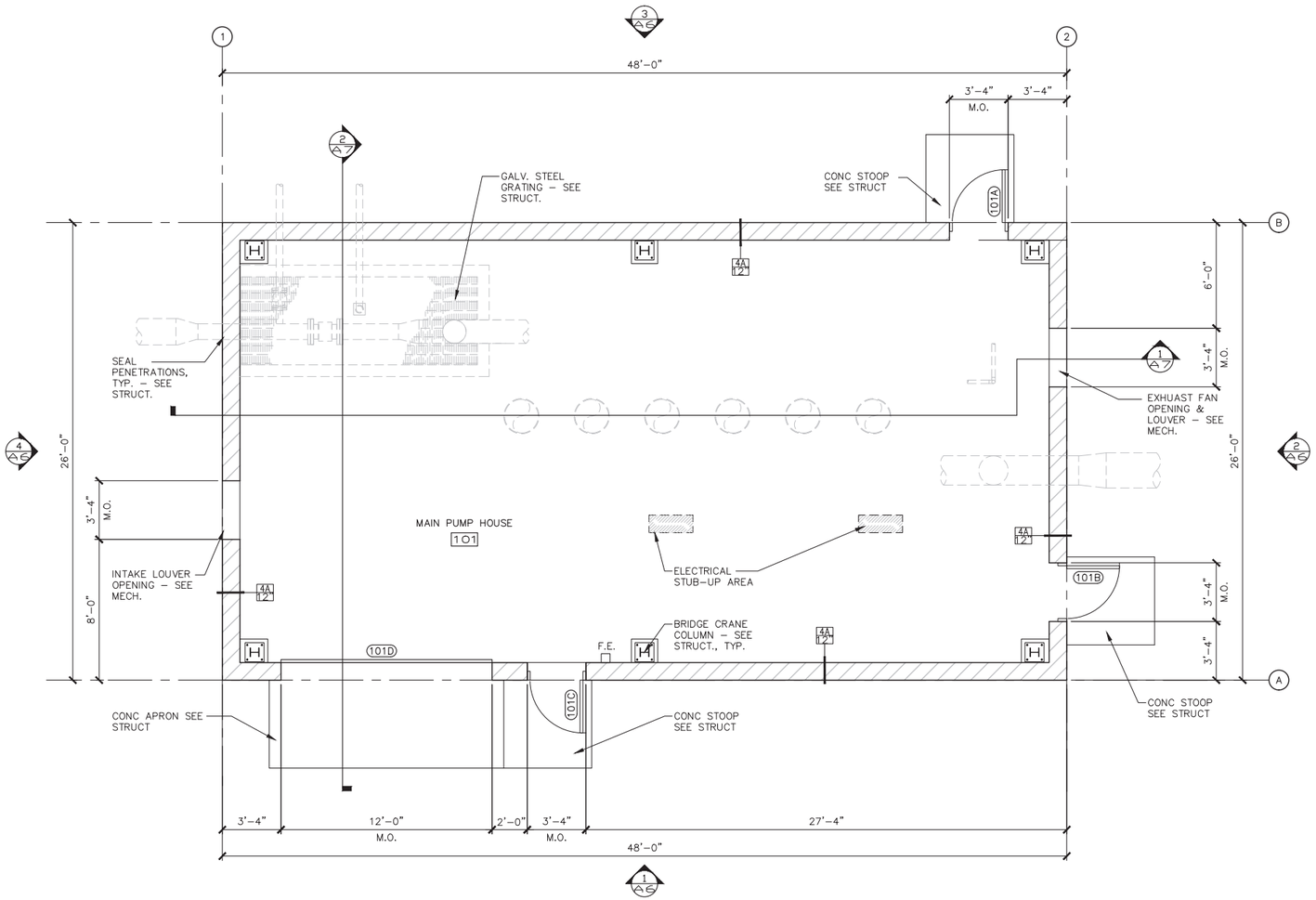
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

RIVER PUMP STATION
ARCHITECTURAL
BUILDING SECTIONS

FILE NO.
FOSJJ129137

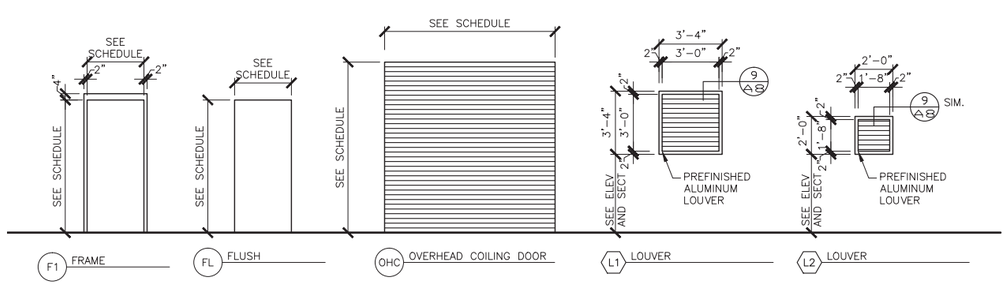
A3



1 FLOOR PLAN – MAIN

1/4" = 1'-0"

North



2 DOOR, FRAME & LOUVER TYPES

OPENING SCHEDULE

OPEN NO.	OPENING SIZE WD	HGT	THK	FRAME TYPE	MAT'L	TYPE	MAT'L	DETAILS HEAD	JAMB	HDWR GROUP	REMARKS
101A	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–
101B	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–
101C	3'–0"	7'–0"	1–3/4"	FL	HM	F1	HM	3/A8	7/A8	1	–
101D	12'–0"	10'–0"	–	–	–	–	OHC	4/A8	8/A8	–	–

ROOM FINISH SCHEDULE

NO.	ROOM NAME	FLOOR MAT'L	FINISH	BASE	WALL FINISH NORTH	EAST	SOUTH	WEST	CEILINGS MAT'L	FINISH	HEIGHT	REMARKS
101	PUMP HOUSE	CONC	SEALED	–	PAINT	PAINT	PAINT	PAINT	PRECAST	PAINT	EXPOSED	–

DRAWING NAME: S:\F\V\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - Main Pump Station\MP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A4 PLOTTED: Oct 13, 2014 - 1:42pm

DRAWN BY: BF
DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

FOSTER, JACOBS, & JOHNSON, INC. PROFESSIONAL ENGINEERS

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Date: 10/17/2014 Lic. No. 51092

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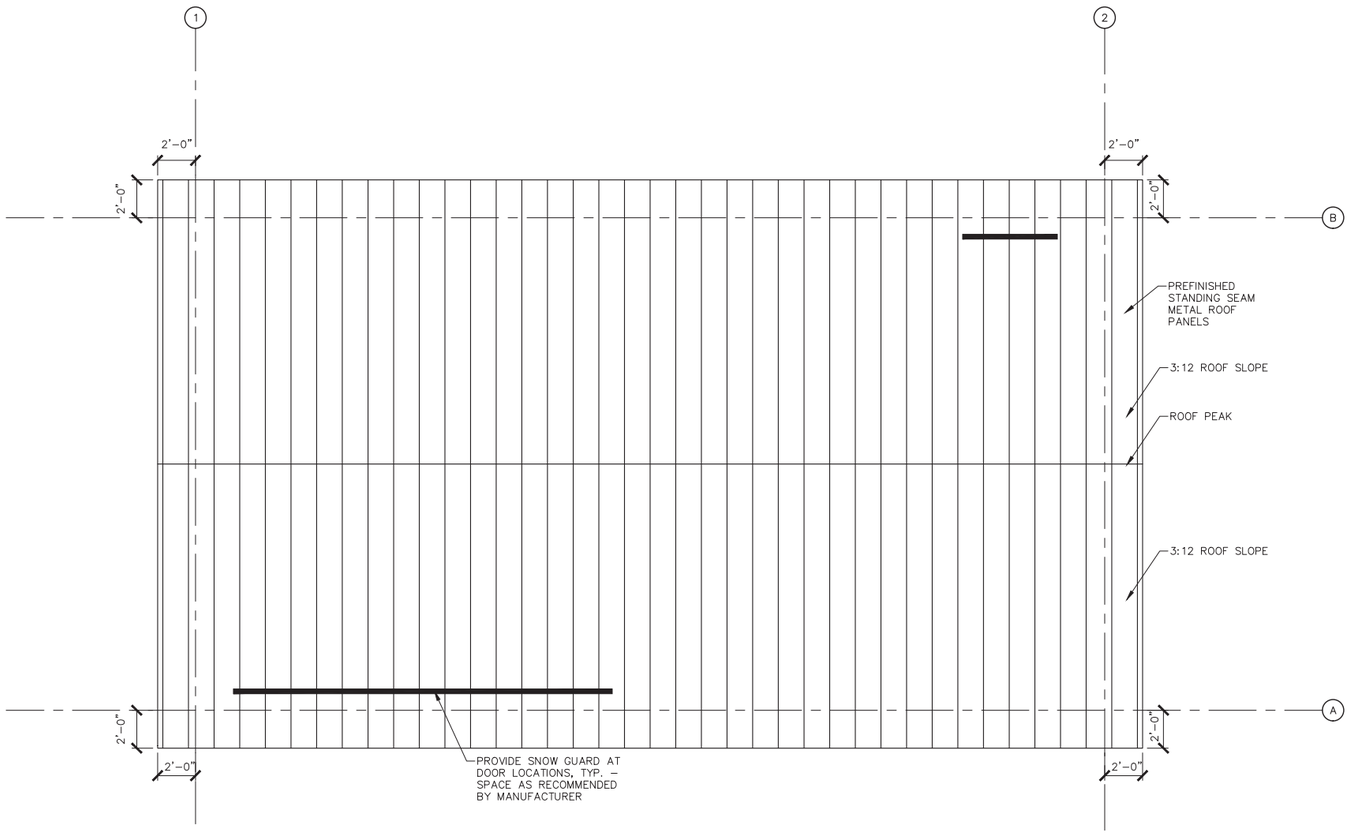
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
ARCHITECTURAL
FLOOR PLAN, SCHEDULES

FILE NO.
FOSJJ129137

A4



1 ROOF PLAN – MAIN
1/4" = 1'-0"

North

DRAWING NAME: S:\F\V\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - Main Pump Station\MP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A5 PLOTTED: Oct 13, 2014 - 1:43pm

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DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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PROFESSIONAL ENGINEERS

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SCOTT BLANK, AIA
Date: 10/17/2014 Lic. No. 51092

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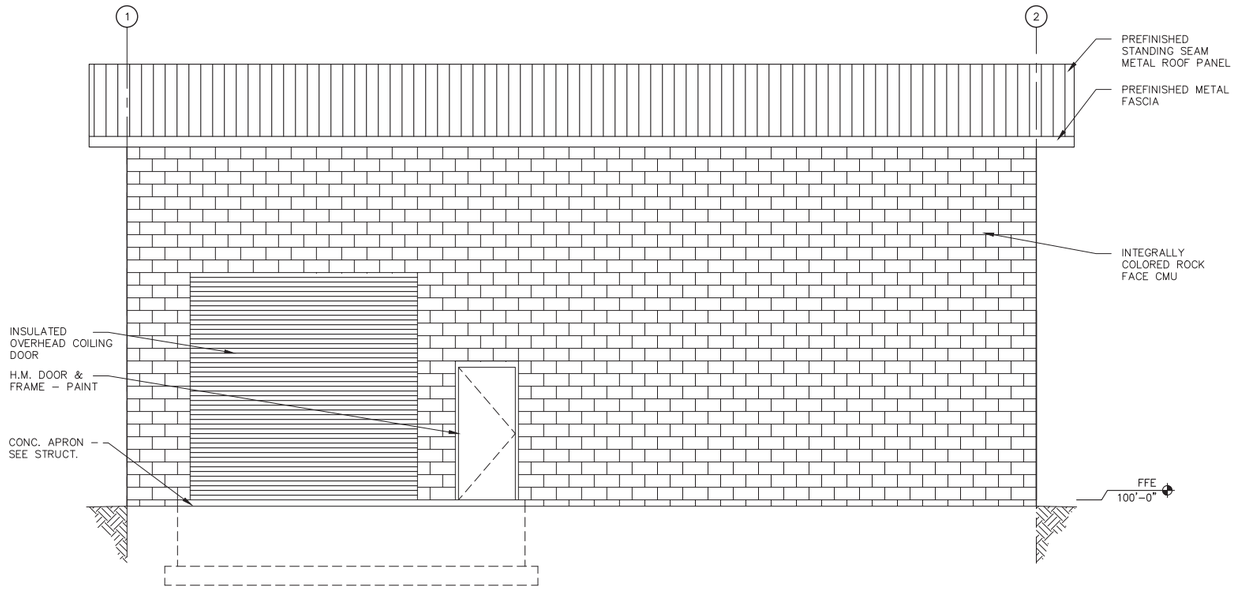
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

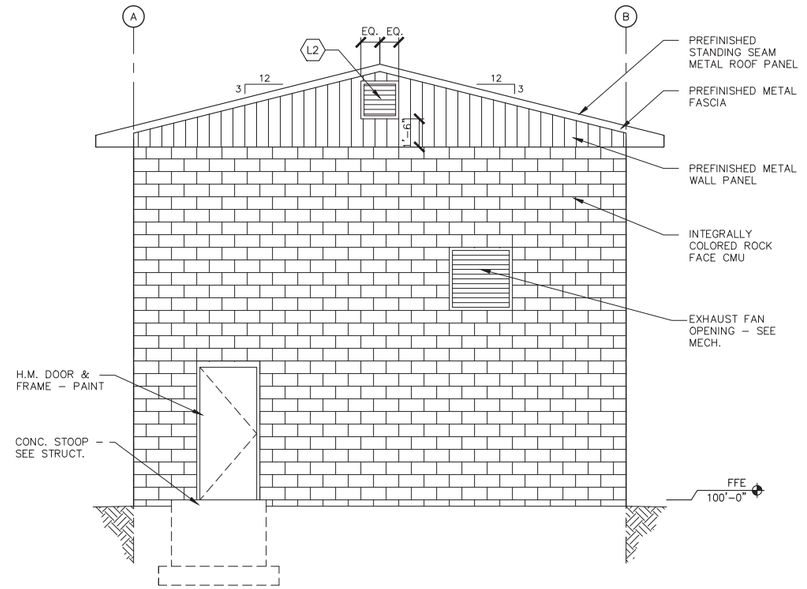
MAIN PUMP STATION
ARCHITECTURAL
ROOF PLAN

FILE NO.
FOSJJ129137

A5



1 EXTERIOR ELEVATION 1
1/4" = 1'-0"



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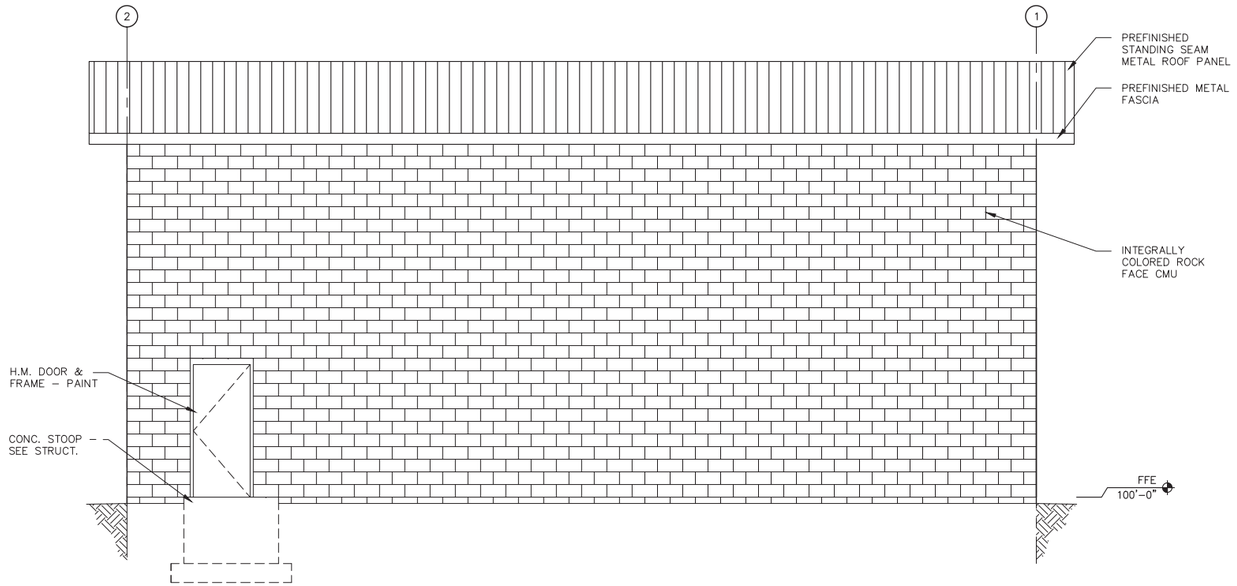

3 EXTERIOR ELEVATION 3
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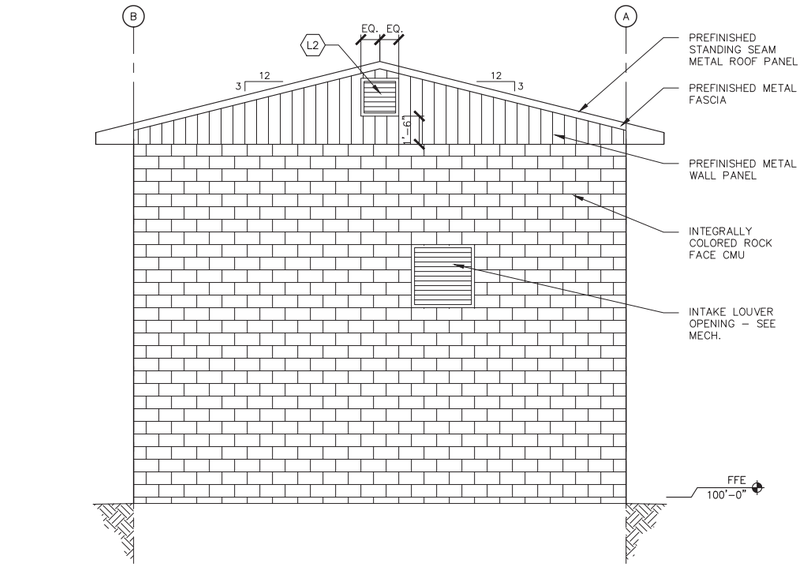

4 EXTERIOR ELEVATION 4
1/4" = 1'-0"

DRAWN BY: BF
DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

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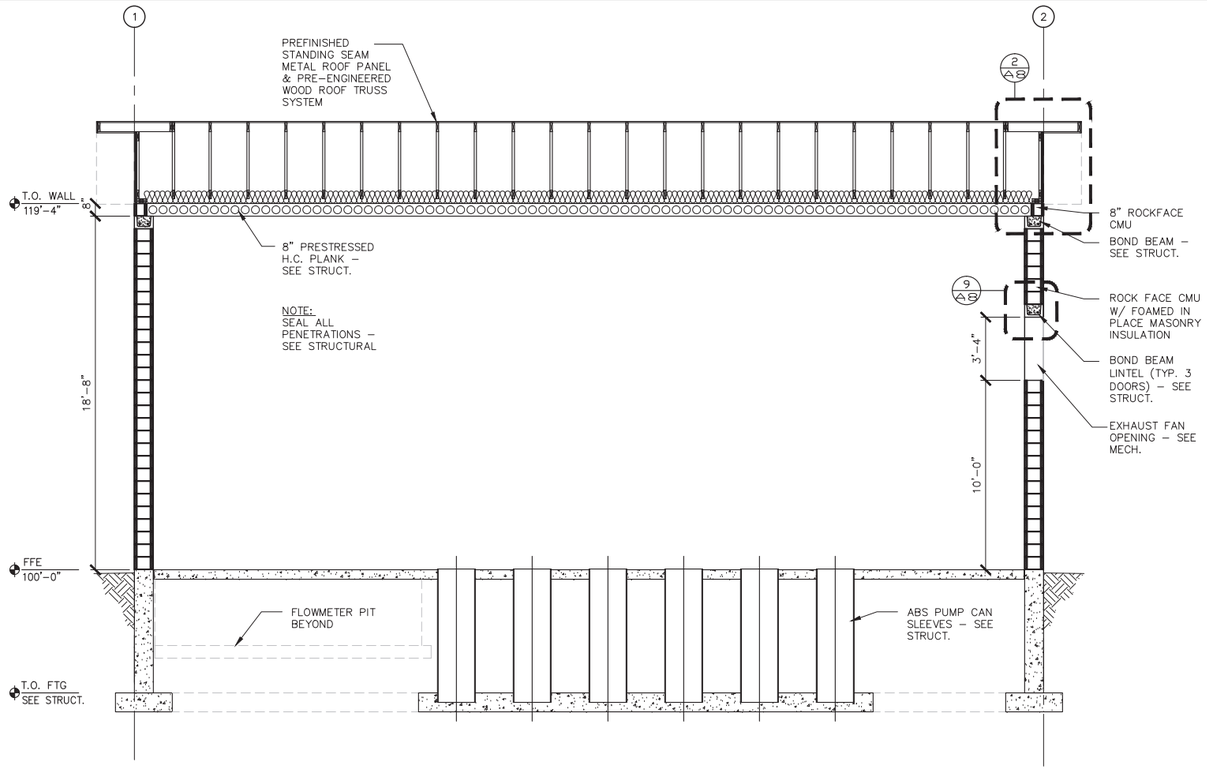
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

MAIN PUMP STATION
ARCHITECTURAL
EXTERIOR ELEVATIONS

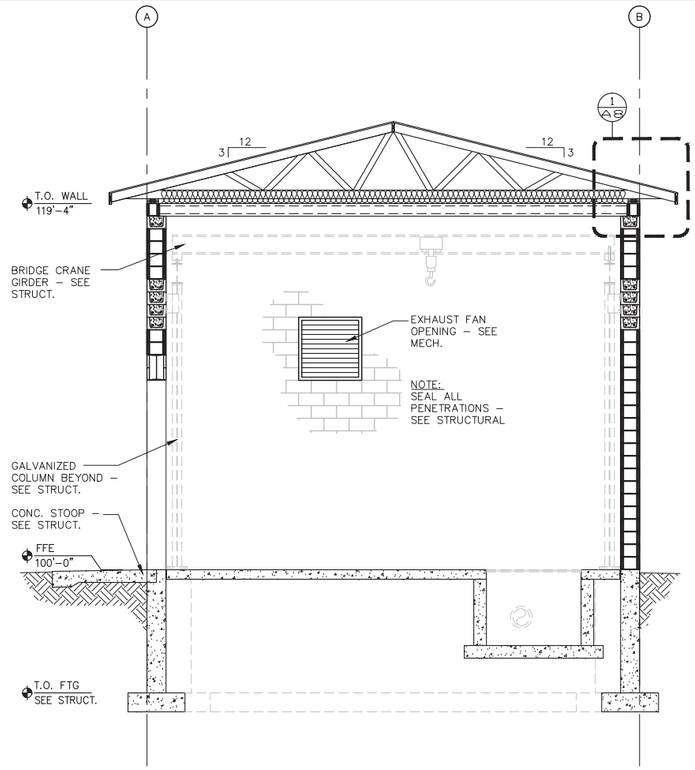
FILE NO. FOSJJ129137

A6

DRAWING NAME: S:\F\F\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - Main Pump Station\MP_Exterior Elevations.dwg LAYOUT TAB: A6 PLOTTED: Oct 13, 2014 - 1:43pm



1 BUILDING SECTION 1
1/4" = 1'-0"



2 BUILDING SECTION 2
1/4" = 1'-0"

DRAWING NAME: S:\FJ\FJ\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - Main Pump Station\MP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A7 PLOTTED: Oct 13, 2014 - 1:43pm

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DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

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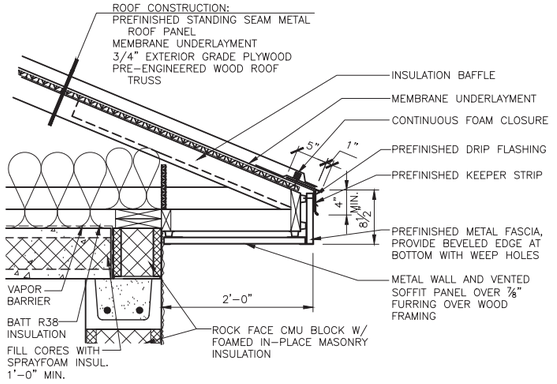
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

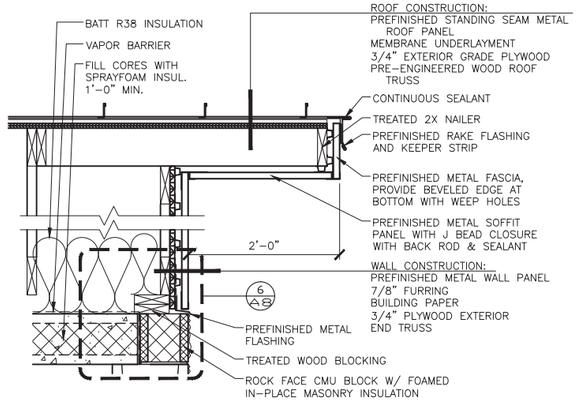
MAIN PUMP STATION
ARCHITECTURAL
BUILDING SECTIONS

FILE NO. FOSJJ129137

A7



1 METAL ROOF EAVE DETAIL
1" = 1'-0"



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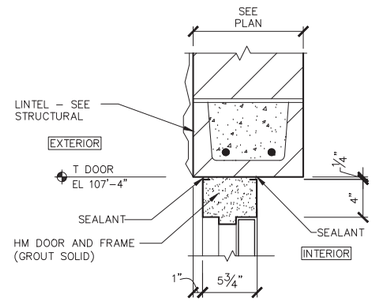
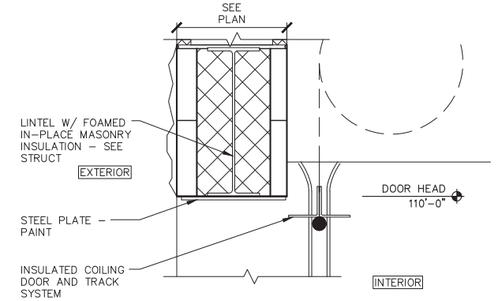
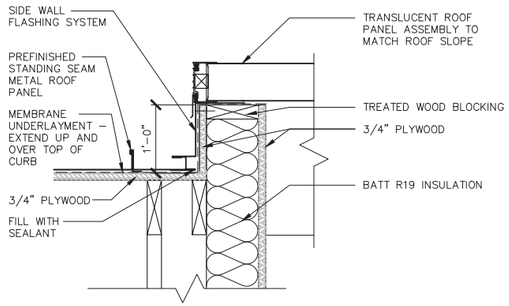


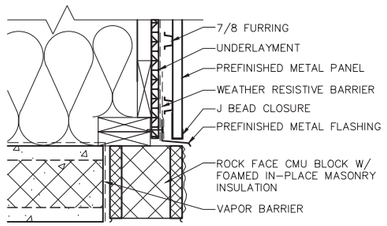
3 HM DOOR FRAME HEAD DETAIL
1-1/2" = 1'-0"



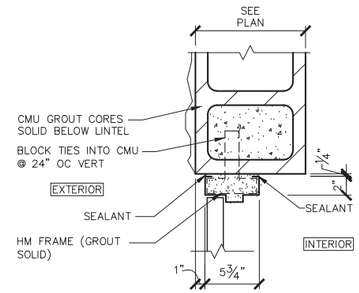
4 OVERHEAD DOOR HEAD DETAIL
1-1/2" = 1'-0"



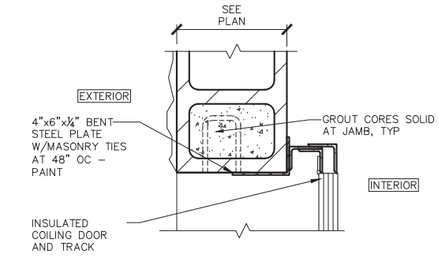
5 SKYLIGHT DETAIL
1-1/2" = 1'-0"



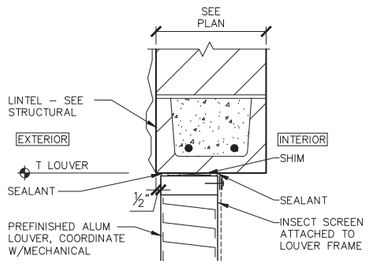
6 SKYLIGHT DETAIL
1-1/2" = 1'-0"



7 HM DOOR FRAME JAMB DETAIL
1-1/2" = 1'-0"



8 OVERHEAD DOOR JAMB DETAIL
1-1/2" = 1'-0"



9 LOUVER HEAD DETAIL
1-1/2" = 1'-0"

DRAWING NAME: S:\FJV\FOSJJ\129137\5-final-dsgn\51-const-dwgs-CAD\15-Arch\Sheets - River Pump\RP_Floor Plan_Sections_Details.dwg LAYOUT TAB: A8 PLOTTED: Oct 13, 2014 - 1:42pm

DRAWN BY: BF
DESIGNER: BB
CHECKED BY: JM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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SCOTT BLANK, AIA
Date: 10/17/2014 Lic. No. 51092

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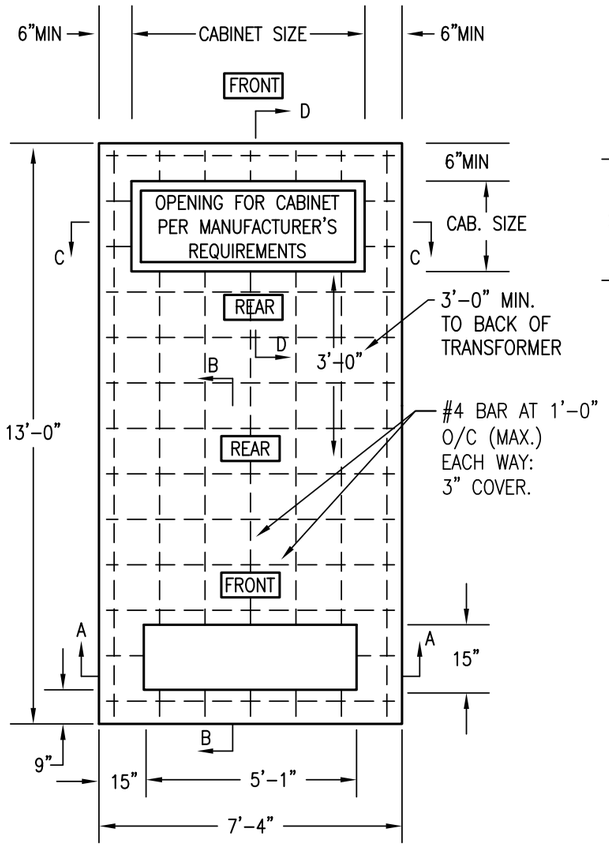
PUMP BUILDING PLANS
SPIRIT MOUNTAIN
DULUTH, MN

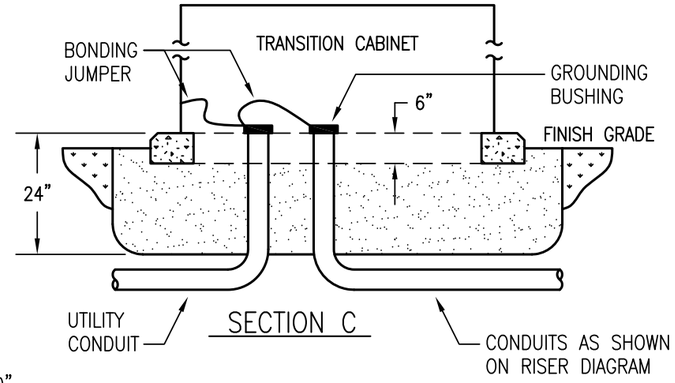
RIVER PUMP STATION
ARCHITECTURAL
DETAILS

FILE NO.
FOSJJ129137

A8



PLAN VIEW



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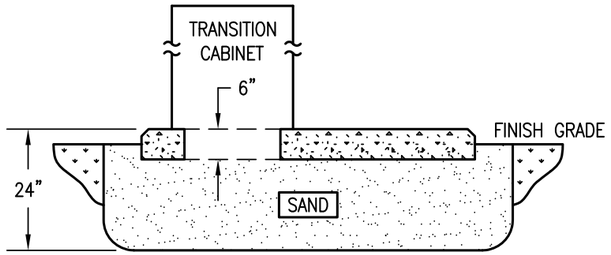

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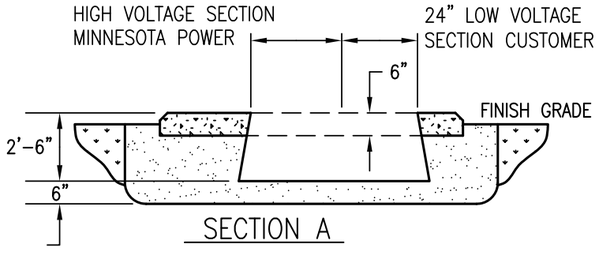

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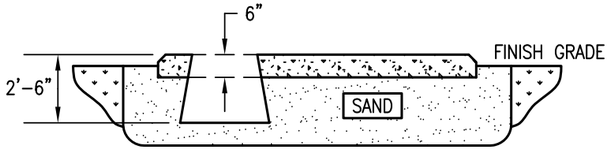

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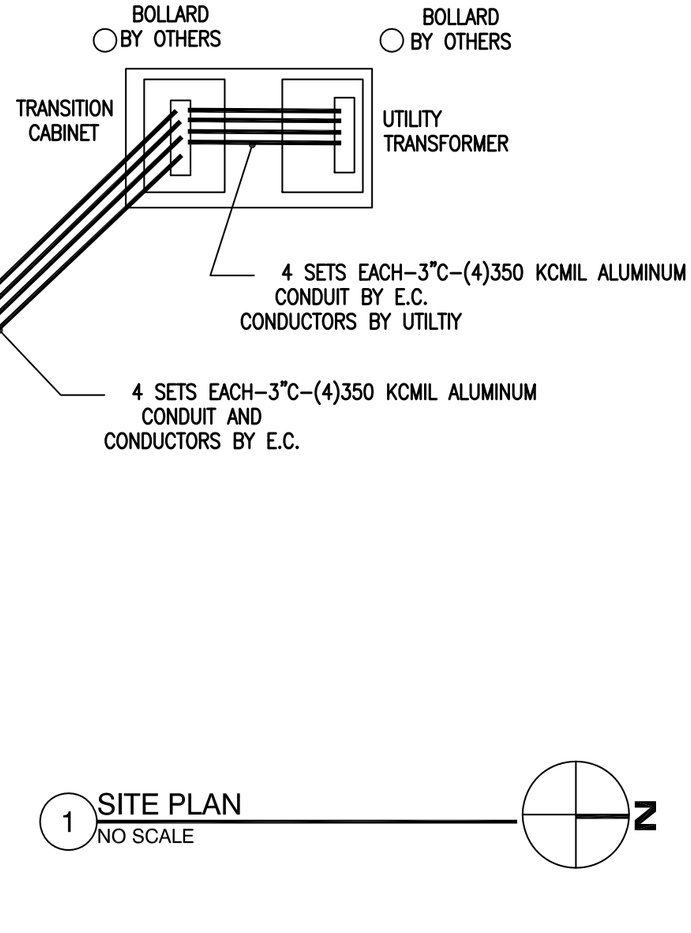

1 SITE PLAN
NO SCALE

N

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DULUTH, MN 55802
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Email: mail@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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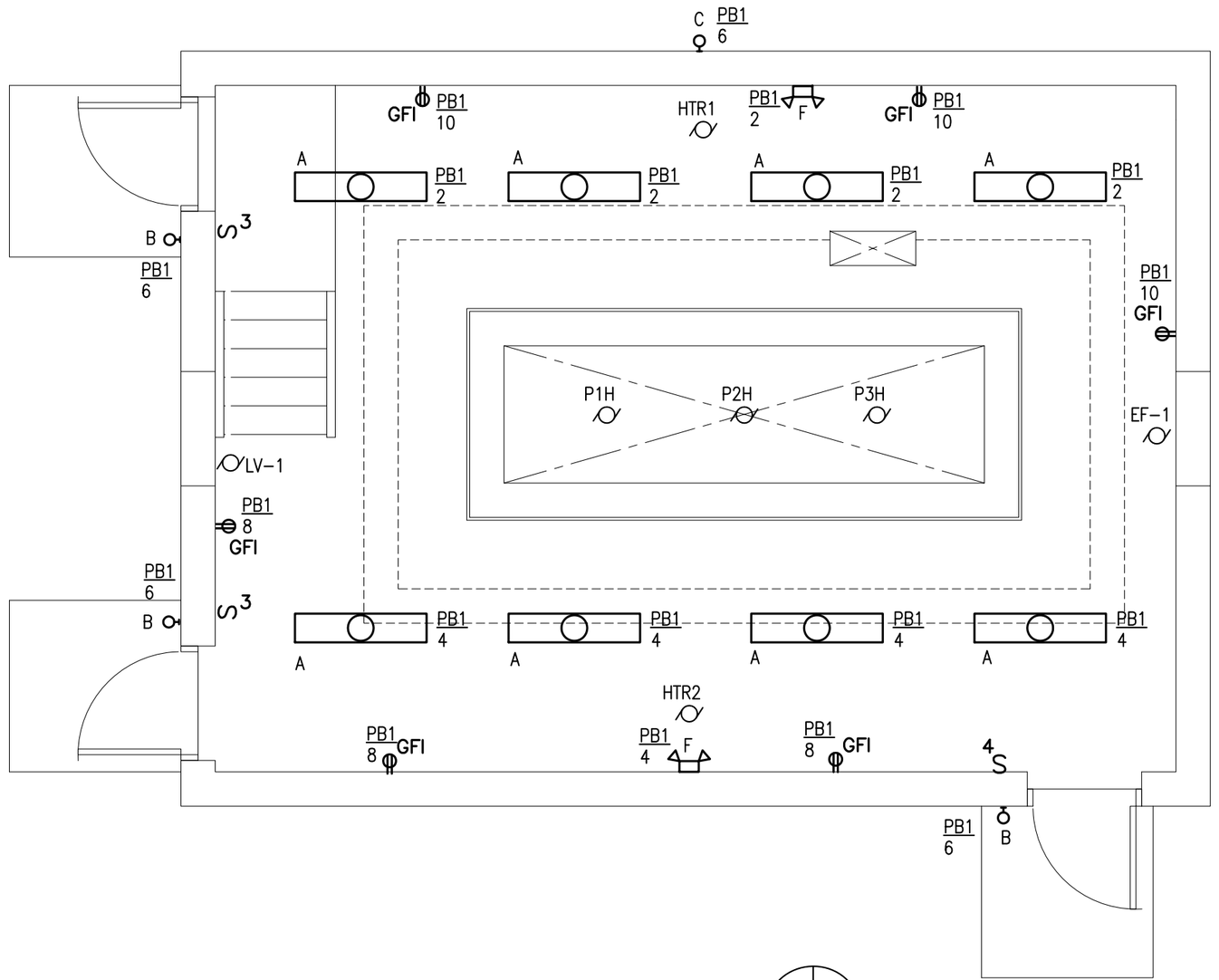
Terence R. Larson

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

Sheet Title:
River Pump Station Site Plan

Sheet Number:
E1



1 ELECTRICAL PLAN
NO SCALE

N

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Email: mail@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
Reg. No. 17136
Date: October 22, 2014

Sheet Title:
River Pump Station Electrical Plan

Sheet Number:
E2

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.	BUS A	BUS B	BUS 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

								STARTER				CONTROL						DISCONNECT								
IDENTITY	LOCATION	DESCRIPTION	MOTOR BY	VOLTAGE	PHASE	LOAD	UNITS	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	WIRE SIZE	PANEL	CIRCUIT	MOP	NOTES
HTR1	RIVER PUMP STATION	HEATER 1	O	480	3	10	KW				U	X						O		X			U	#12	SWBD		20A	
HTR2	RIVER PUMP STATION	HEATER 2	O	480	3	10	KW				U	X						O		X			U	#12	SWBD		20A	
EF-1	RIVER PUMP STATION	EXHAUST FAN 1	O	120	1	3/4	HP	X			O	X						O		X			O	#12	PB1	30	20A	
LV-1	RIVER PUMP STATION	LOUVRE 1	O	120	1	FRAC	HP	X			O	X						O		X			O	#12	PB1	30	20A	
P1H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1						O	X						O		X			O	#14	PB1	25	10A	
P2H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1						O	X						O		X			O	#14	PB1	27	10A	
P3H	RIVER PUMP STATION	PUMP 1 MOTOR HEATER	O	120	1						O	X						O		X			O	#14	PB1	29	10A	

NOTES

ABBREVIATIONS

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

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DULUTH, MN 55802 Email: mail@fjj.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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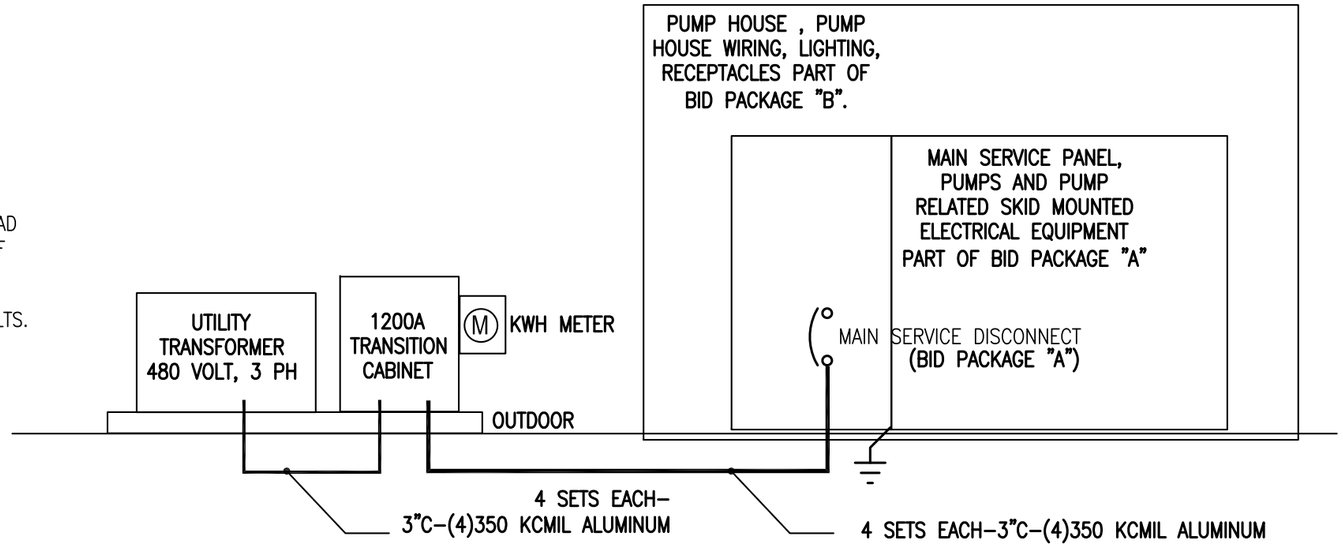
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

Sheet Title:
River Pump Station Schedules

Sheet Number:
E3

PAD CONSTUCTION 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).



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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-E4.dwg
Drawn By:	TRL
Checked By:	TRL

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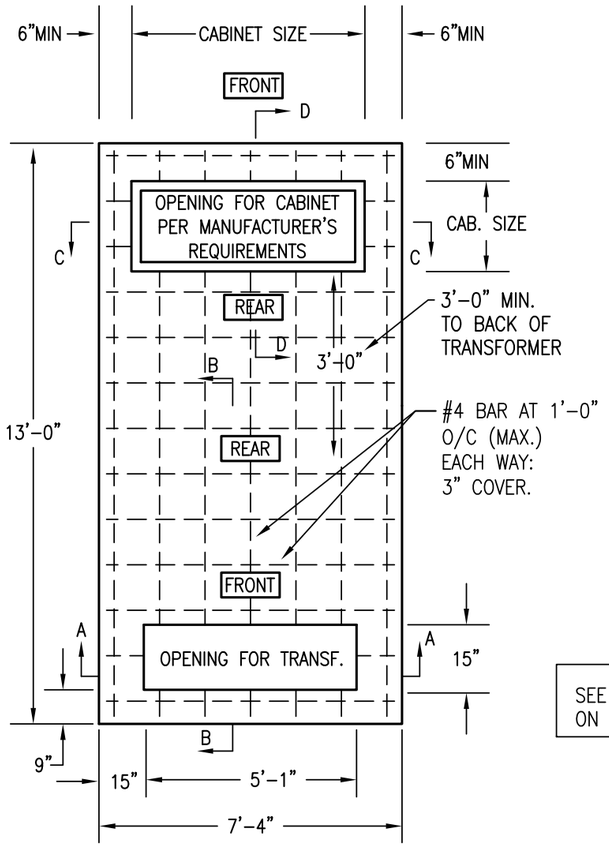
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

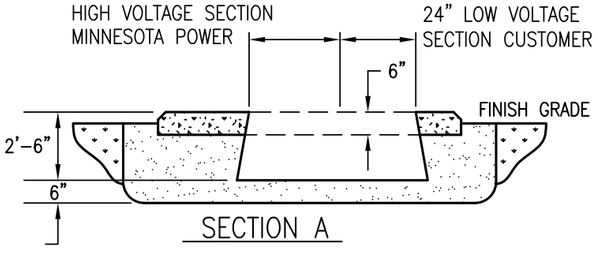
Sheet Title:
River Pump Station
Riser and Details

Sheet Number:
E4

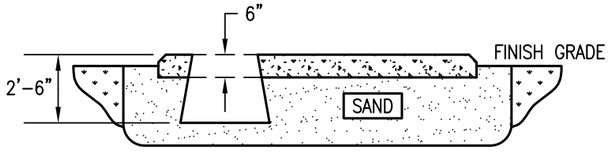


PLAN VIEW

SEE PAD CONSTRUCTION NOTES ON DRAWING E6.



SECTION A



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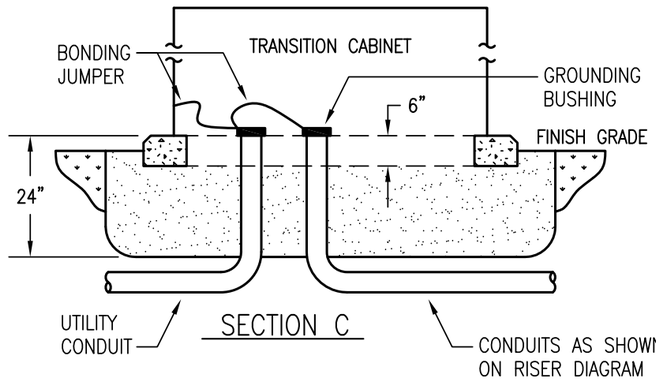

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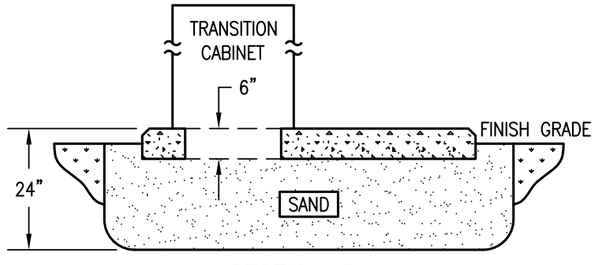

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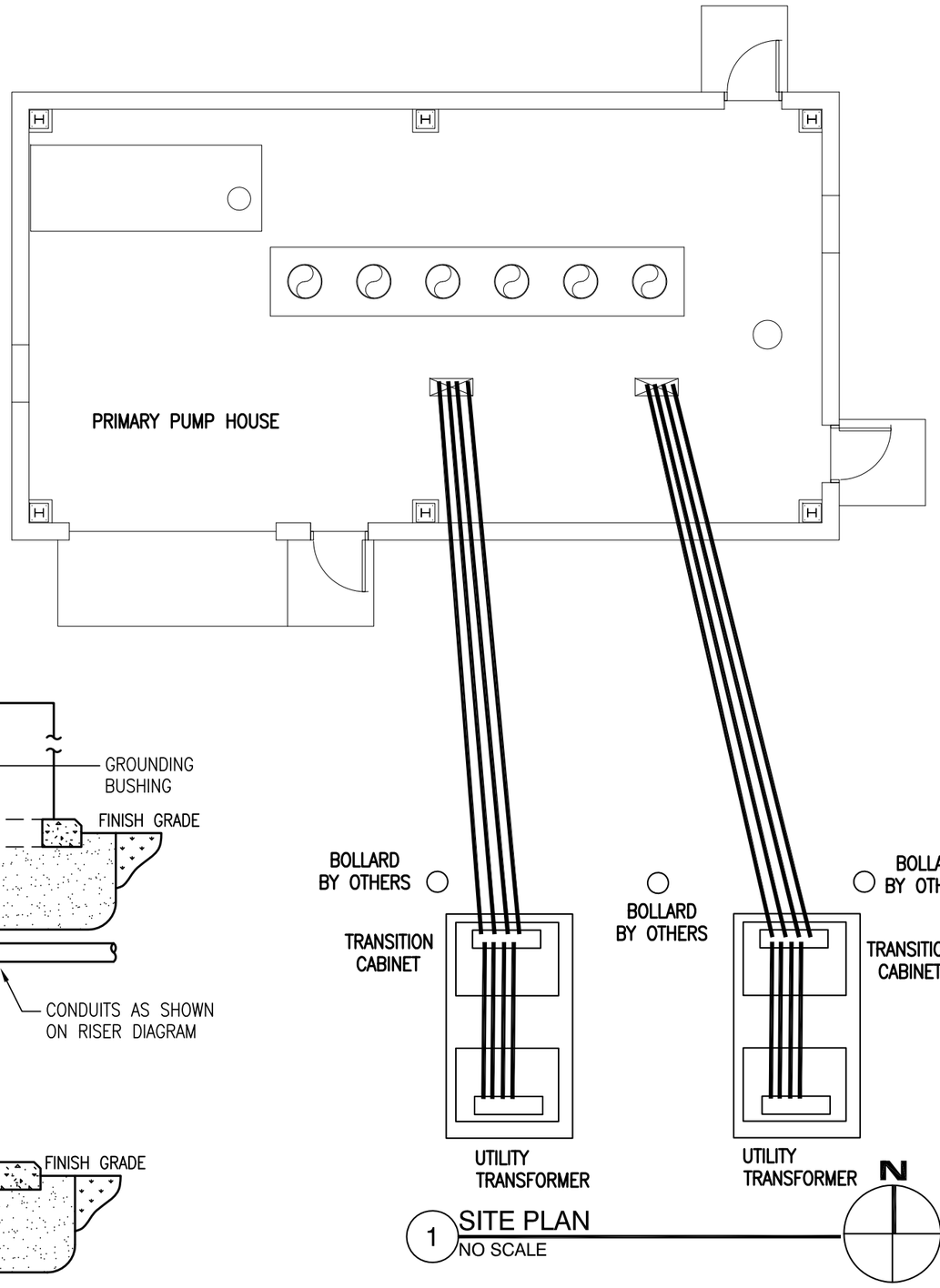

1 SITE PLAN
NO SCALE

FOSTER, JACOBS, & JOHNSON, INC.
PROFESSIONAL ENGINEERS
345 CANAL PARK DRIVE
SUITE 200
DULUTH, MN 55802
(218) 722-3060
FAX (218) 722-1931
Email: mail@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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Terence R. Larson

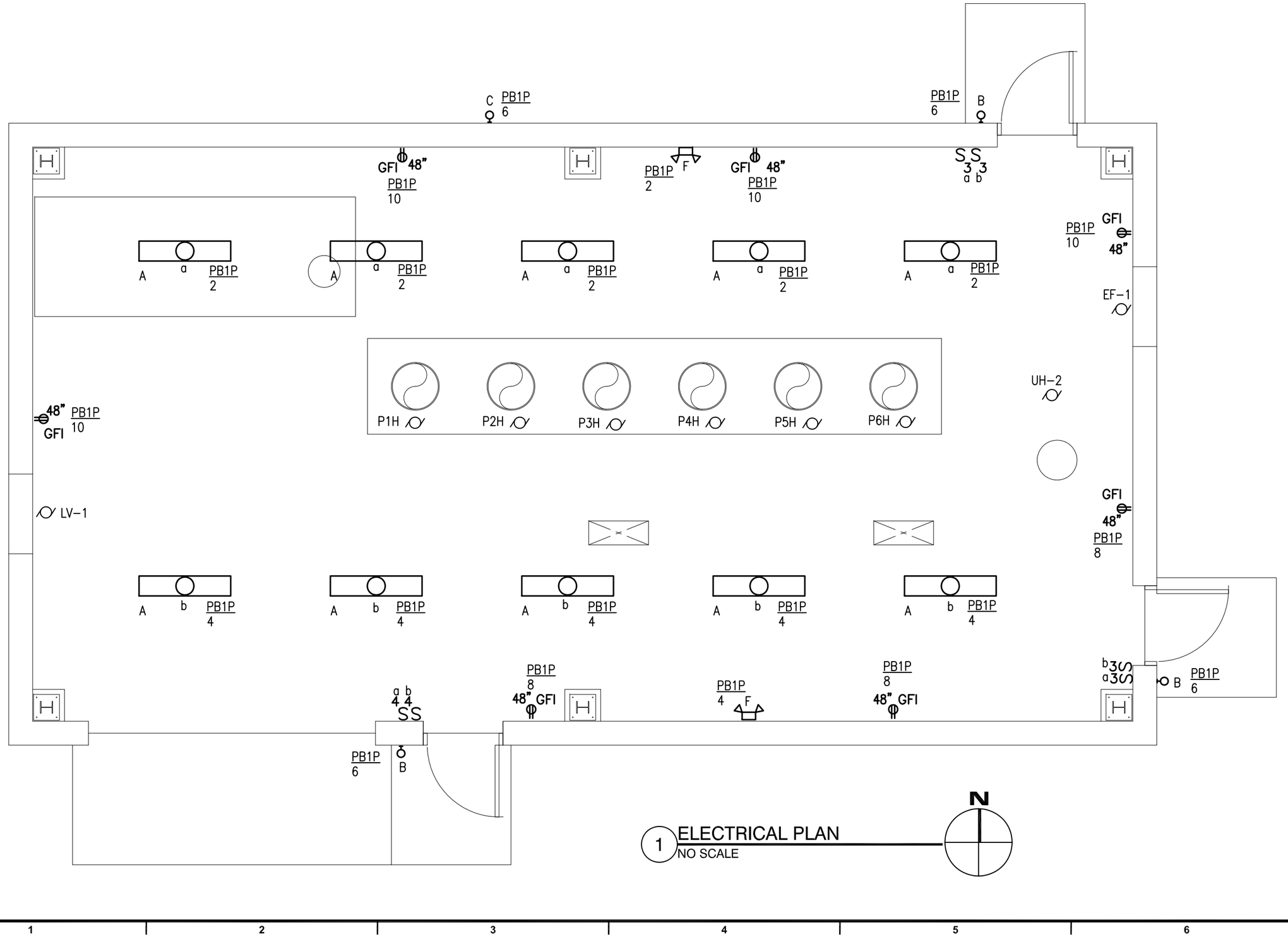
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

Sheet Title:

Primary Pump Station Site Plan

Sheet Number:

E5



1 ELECTRICAL PLAN
NO SCALE

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SUITE 200
DULUTH, MN 55802
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Project Name:
SPIRIT MOUNTAIN
CONTRACT "B"
PUMP STATIONS

Project Location:
SPIRIT MOUNTAIN
Duluth, Minnesota

Phase:
BIDDING

MARK	DATE	DESCRIPTION

LINE IS ONE INCH
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Issue Date:	10/22/14
Project No.:	S-14005
Filename:	s14005-E6.dwg
Drawn By:	TRL
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Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

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

NOTES

ABBREVIATIONS

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

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Email: mail@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-E7.dwg
Drawn By: TRL
Checked By: TRL

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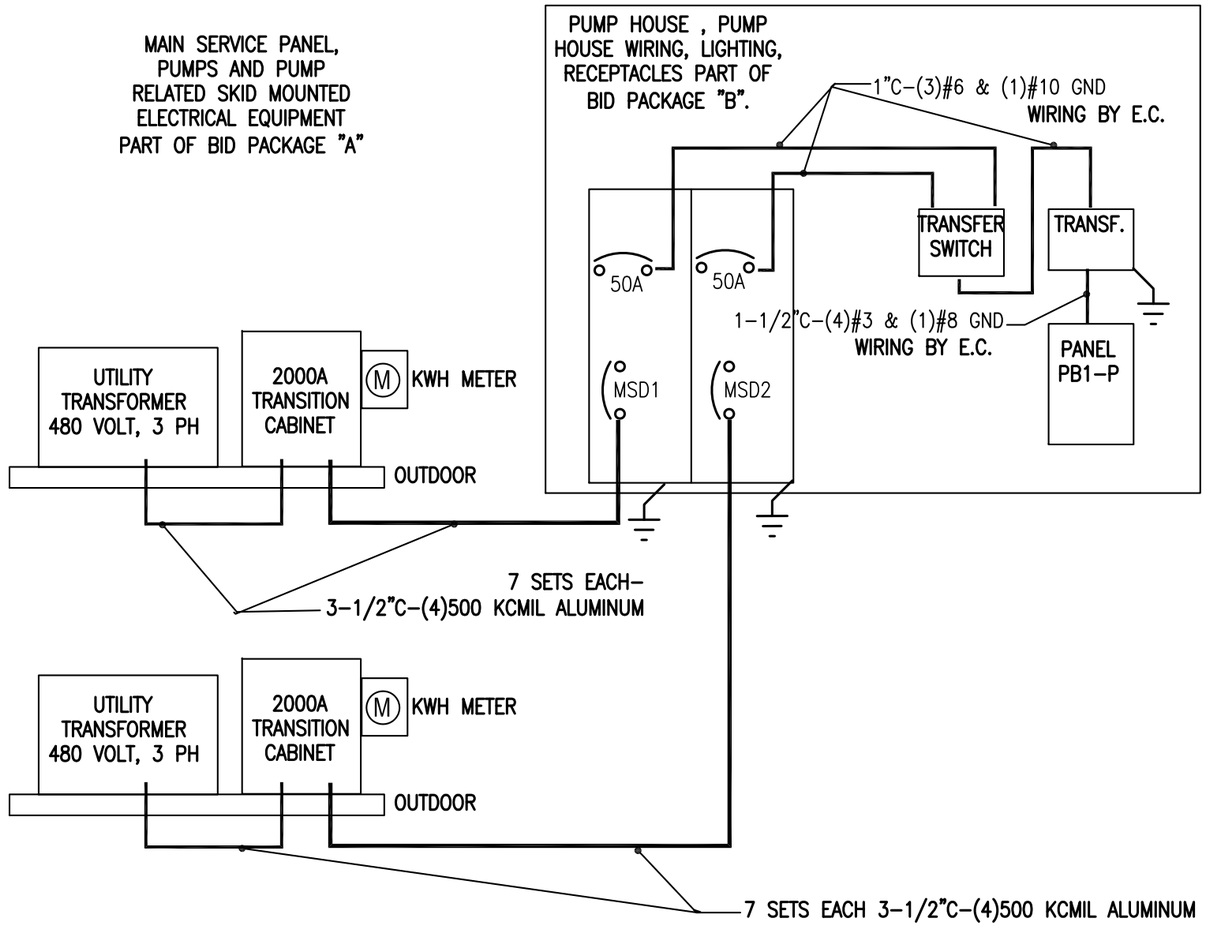
Terence R. Larson
Reg. No. 17136
Date: October 22, 2014

Sheet Title:
Primary Pump Station Schedules

Sheet Number:
E7

PAD CONSTUCTION 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).



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Email: mail@fjj.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

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Terence R. Larson

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

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

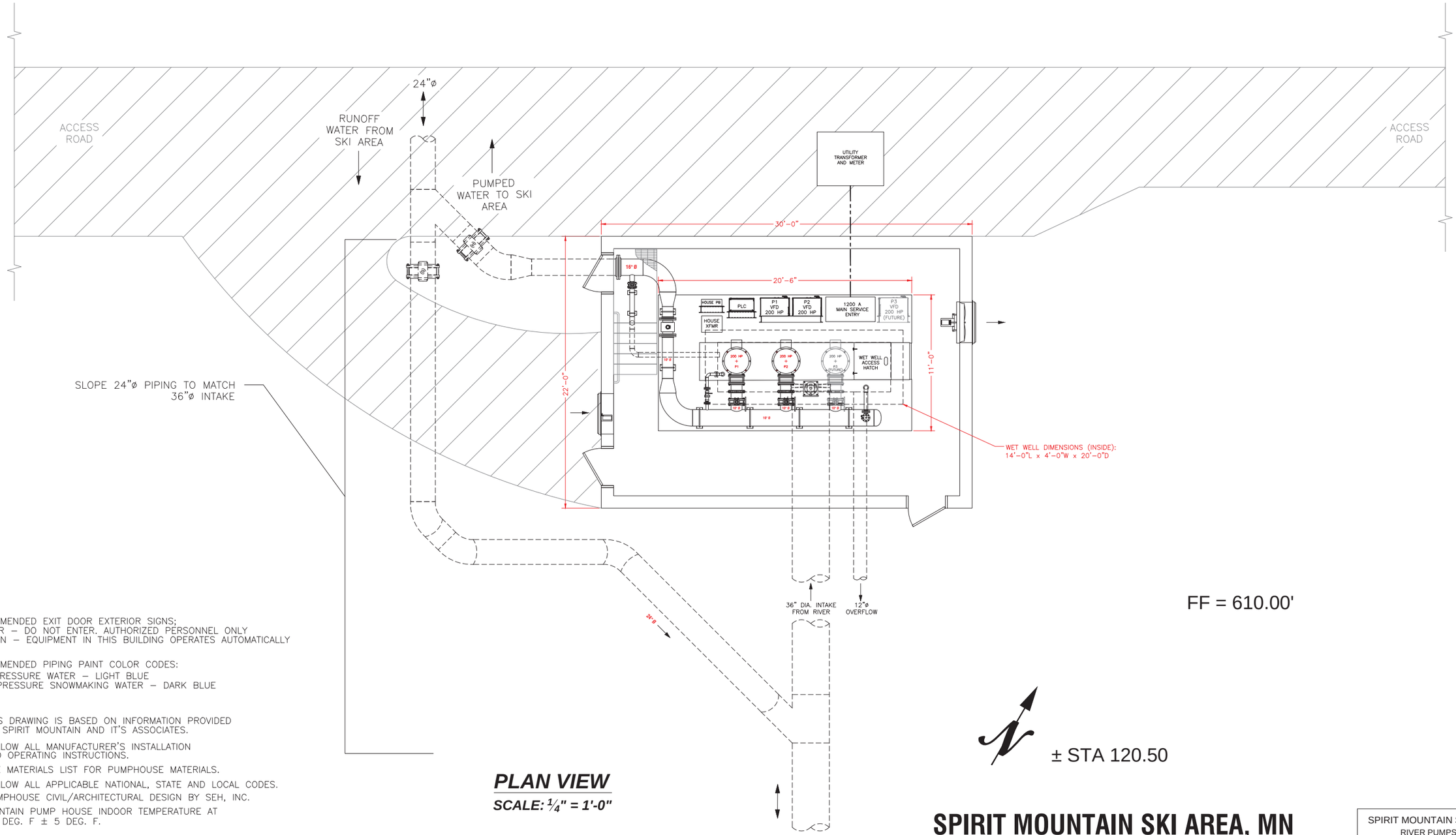
DRAWING SCHEDULE:

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

SEH
PHONE: 218-855-1700
416 SOUTH 6th St, SUITE 200
BRAINERD, MN 56401-3540
www.sehinc.com

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



PLAN VIEW
SCALE: 1/4" = 1'-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:
1. THIS DRAWING IS BASED ON INFORMATION PROVIDED BY SPIRIT MOUNTAIN AND IT'S ASSOCIATES.
2. FOLLOW ALL MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
3. SEE MATERIALS LIST FOR PUMPHOUSE MATERIALS.
4. FOLLOW ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES.
5. PUMPHOUSE CIVIL/ARCHITECTURAL DESIGN BY SEH, INC.
6. 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

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

ALL TORRENT DRAWINGS ARE PROVIDED FOR PROCESS EQUIPMENT DESIGN AND INSTALLATION. SITE PLAN AND BUILDING DETAILS ARE REPRESENTATIVE AND SHOWN FOR CLARITY ONLY. SEE CIVIL SITE PLAN OR BUILDING DESIGN DRAWINGS FOR ALL SITE AND BUILDING CONSTRUCTION INFORMATION AND DIMENSIONS

SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION

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

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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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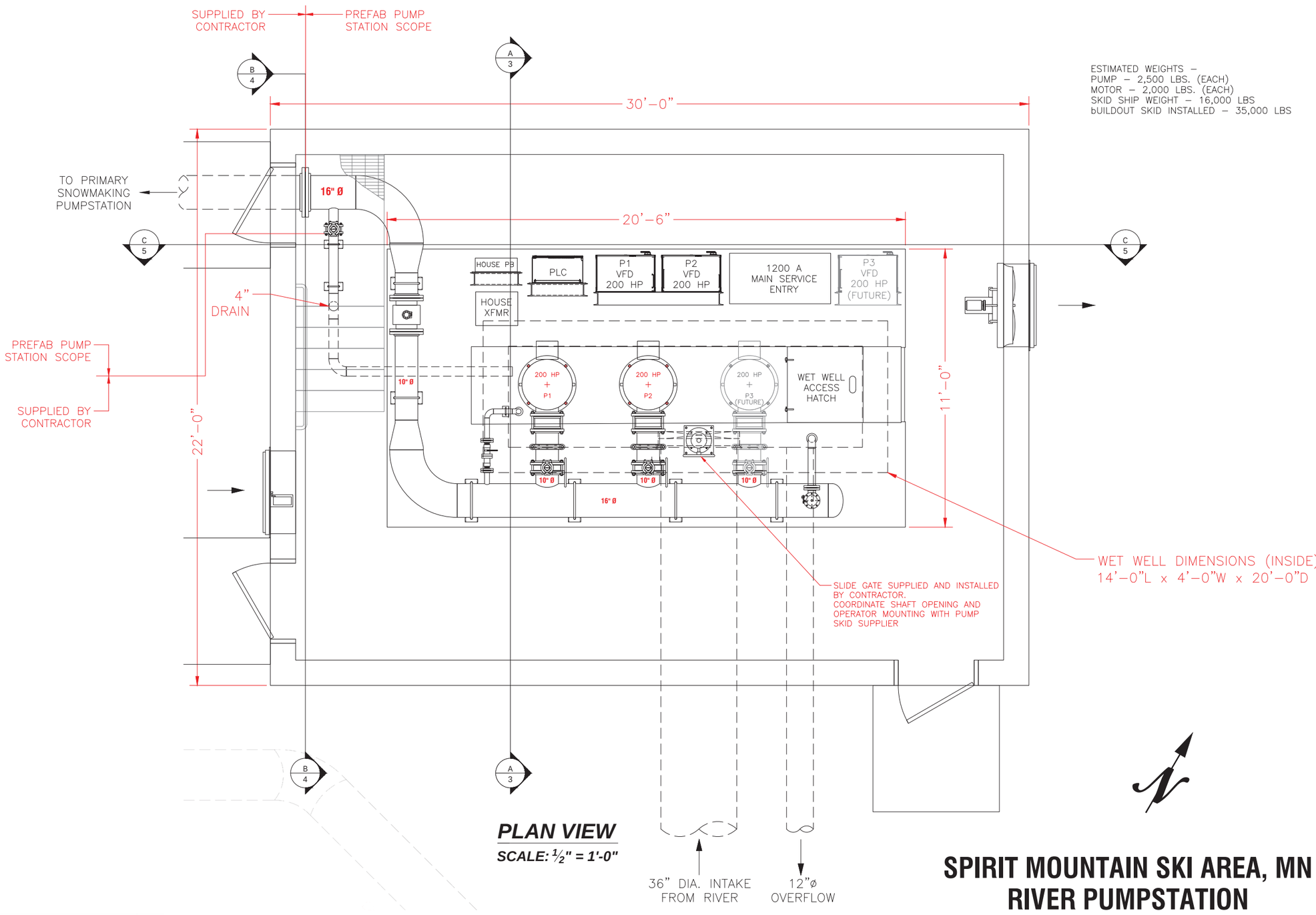
BRAINERD, MN 56401-3540
www.sehinc.com

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
PLAN VIEW

FILE NO.
DATE 10-16-2014

M1



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: ½" = 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
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

DRAWN BY: –
DESIGNER: –
CHECKED BY: –
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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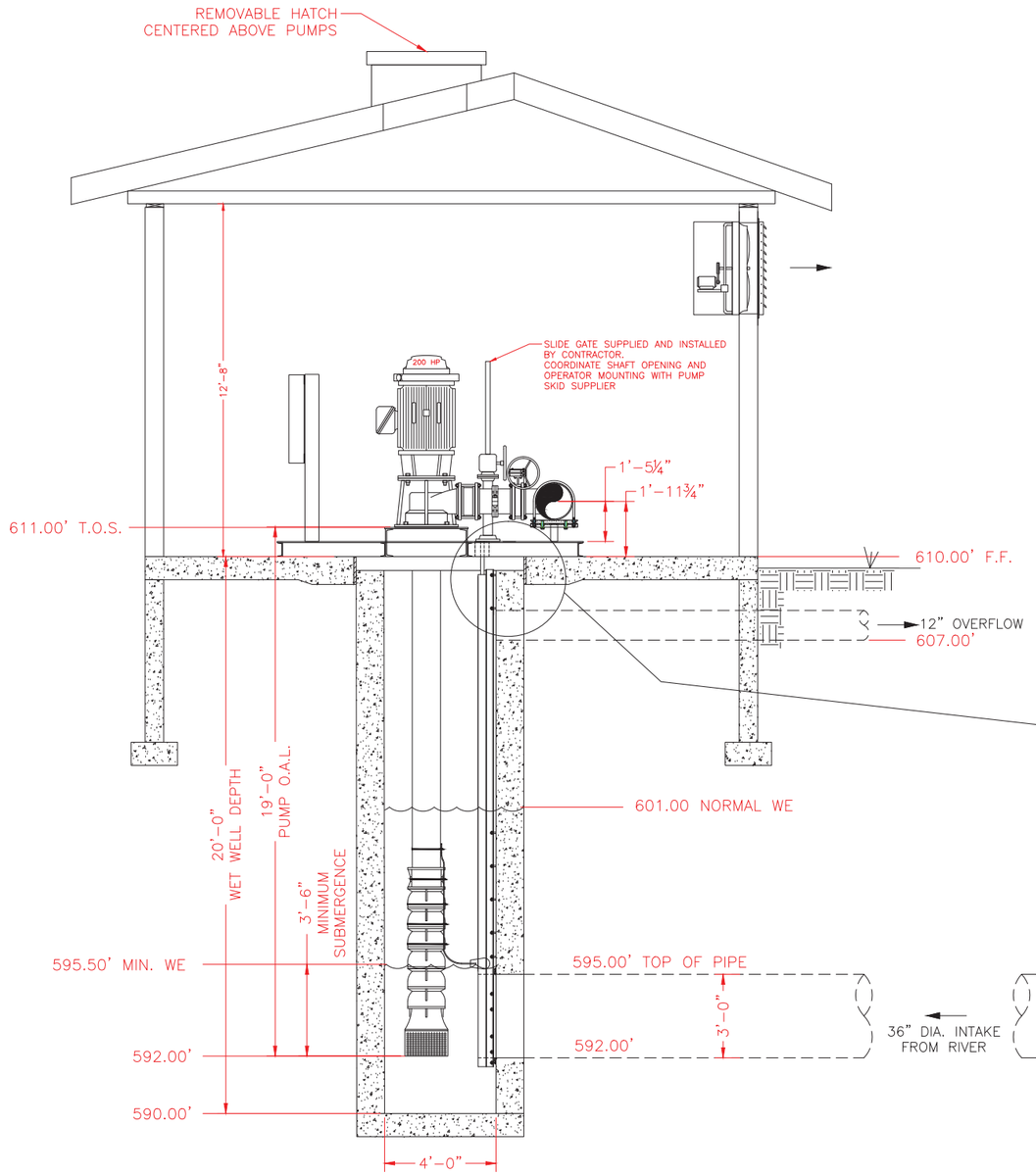
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

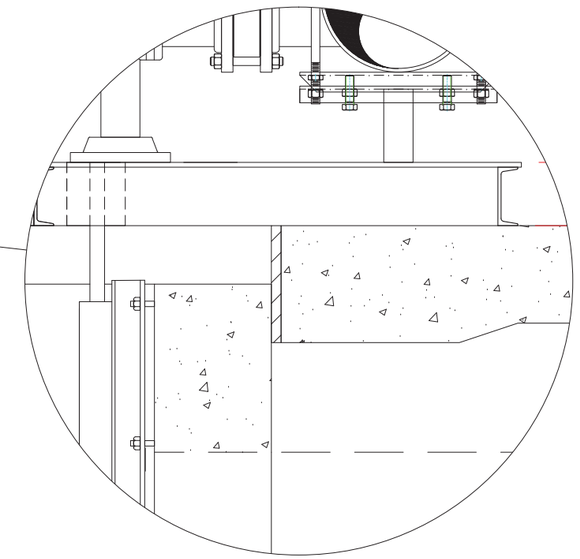
RIVER SNOW MAKING PUMPHOUSE
PLAN VIEW

FILE NO.
DATE 10–16–2014
M1



SECTION A-A

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



DETAIL D

NTS

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
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

DRAWN BY: –
DESIGNER: –
CHECKED BY: –
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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Name, P.E.
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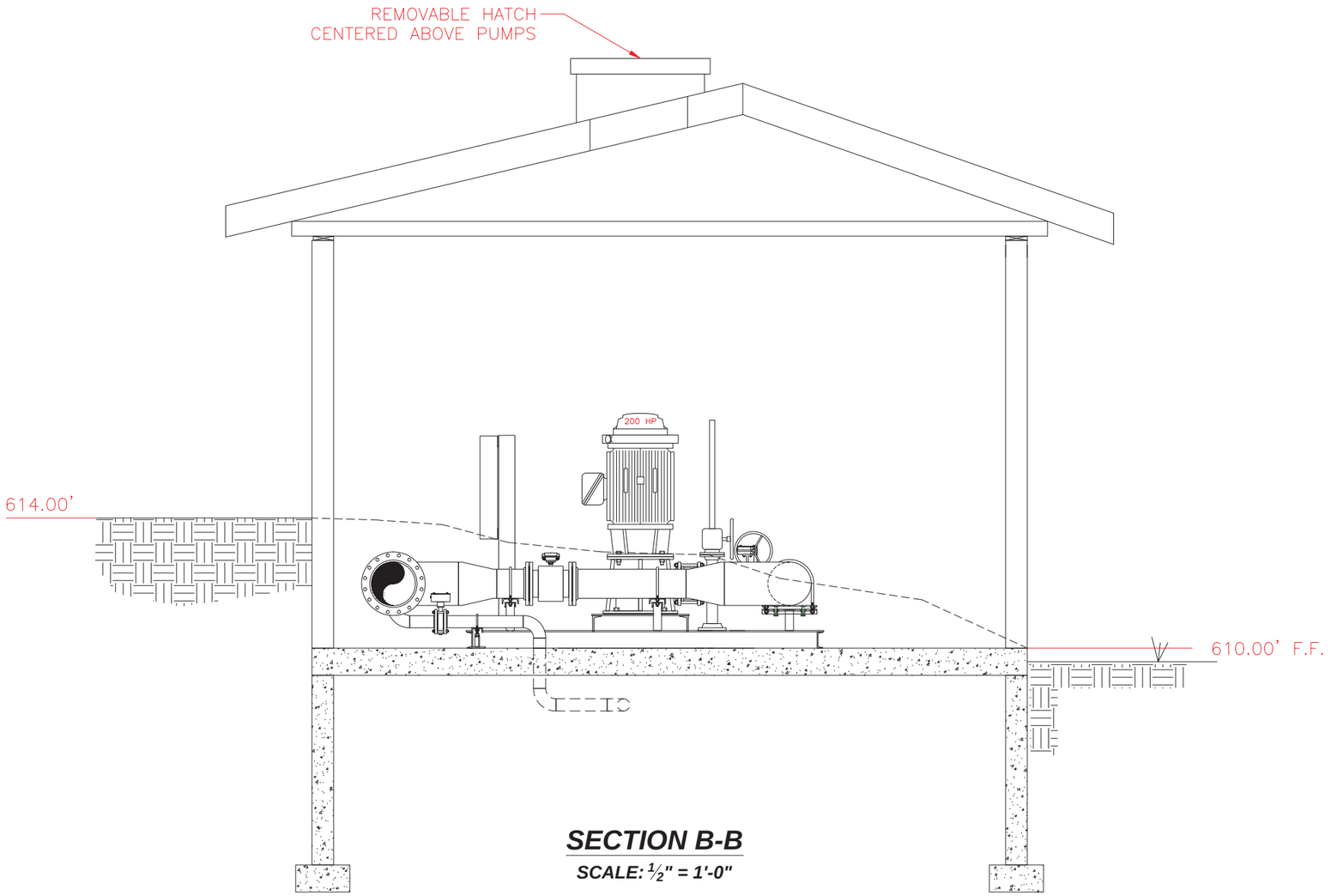
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
DATE 10-16-2014
M1



SECTION B-B

SCALE: ½" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION

NO.	DATE	REVISION	BY
1	03-21-13	UPDATED	JDM
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4	10-08-14	UPDATED	JDM
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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 : 4 OF 7

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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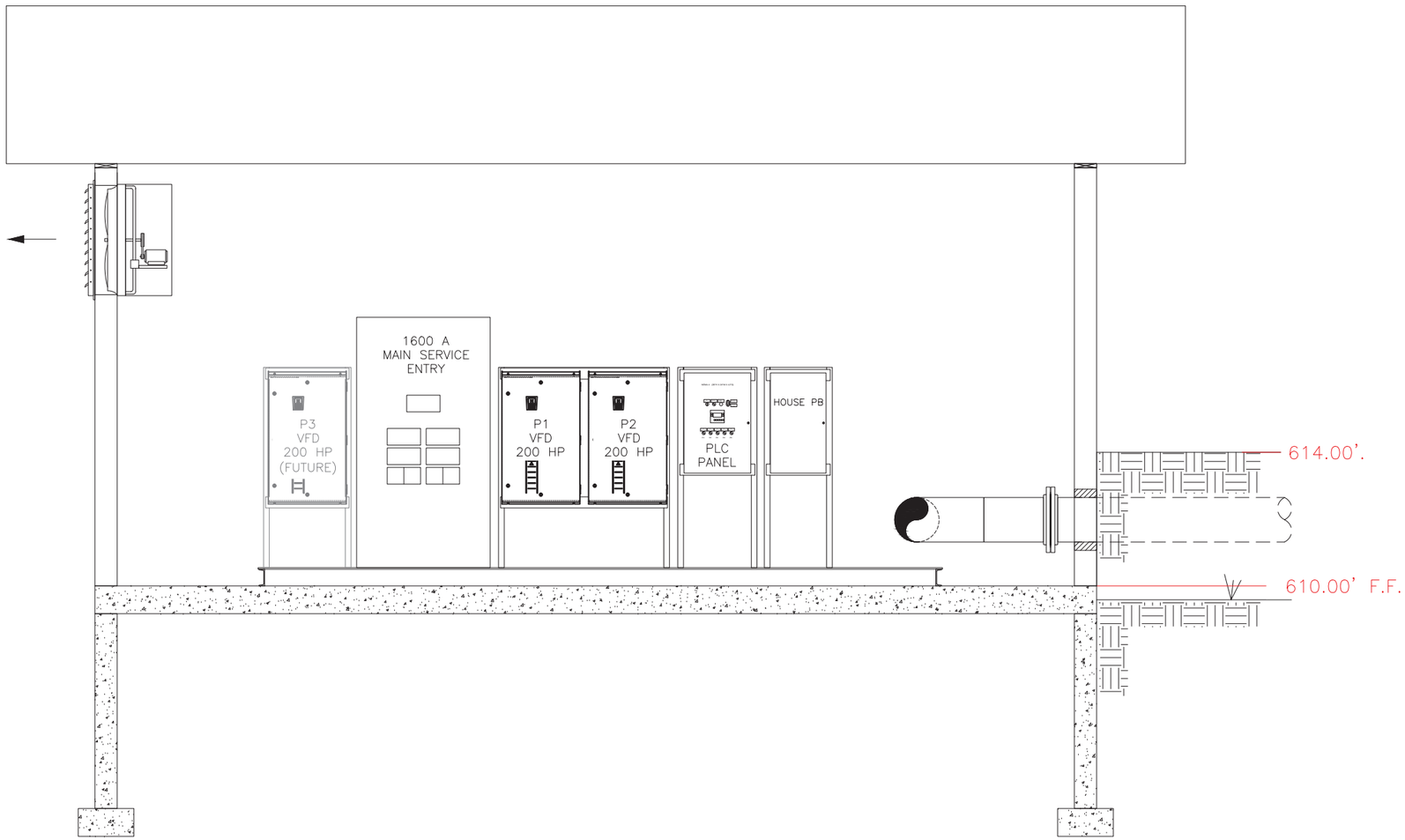
www.sehinc.com

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
DATE 10-16-2014
M1



SECTION C-C

SCALE: ½" = 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
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SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION

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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 : 5 OF 7

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DESIGNER: –
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DESIGN TEAM

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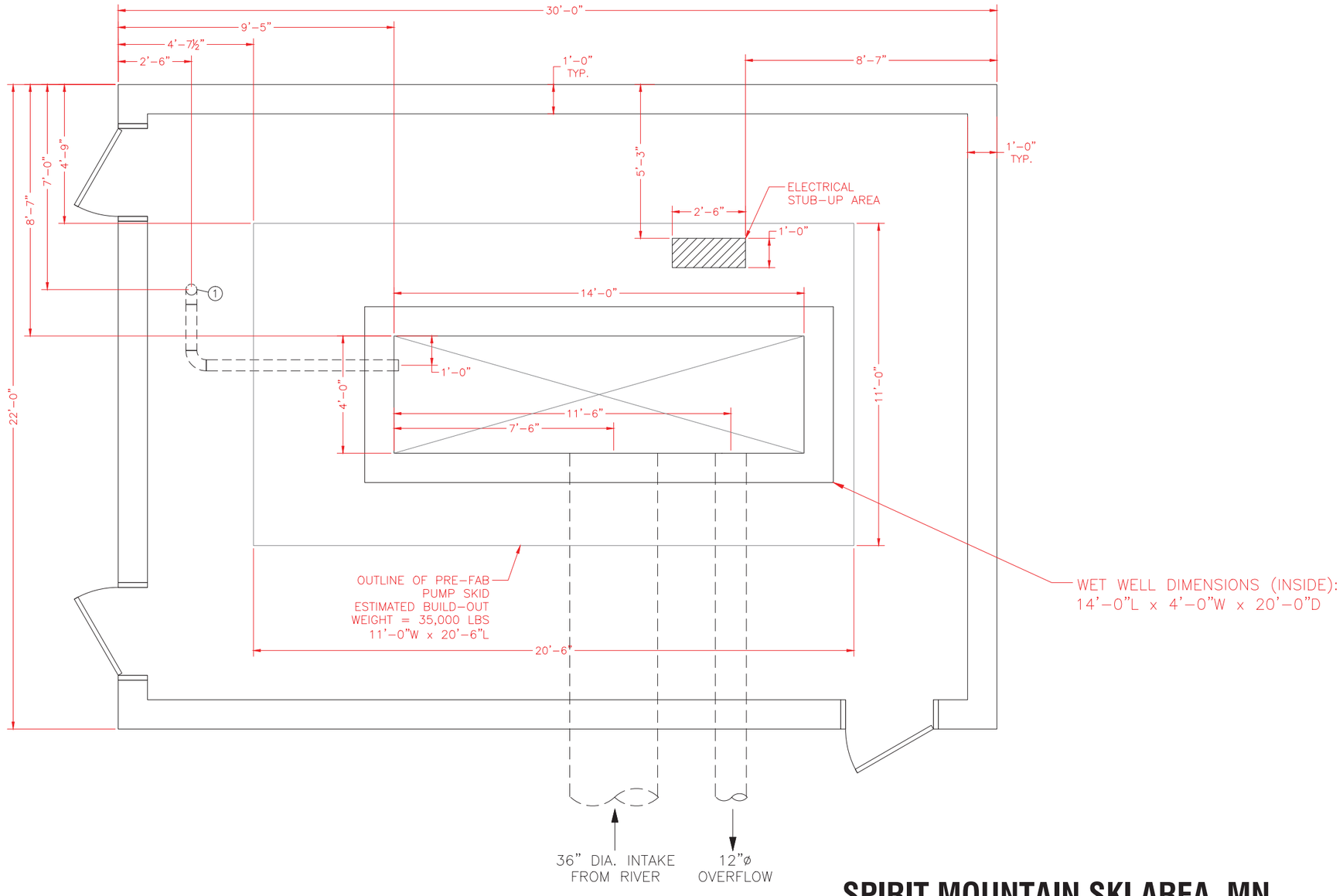
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
DATE 10-16-2014
M1

(1) – 4"ø STUB–UP @ 3'–0" ABOVE SLAB
CUT & FIELD WELD
BY CONTRACTOR



SLAB PLAN

SCALE: ½" = 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, 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

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
SLAB PLAN

FILE NO.
DATE 10–16–2014
M1

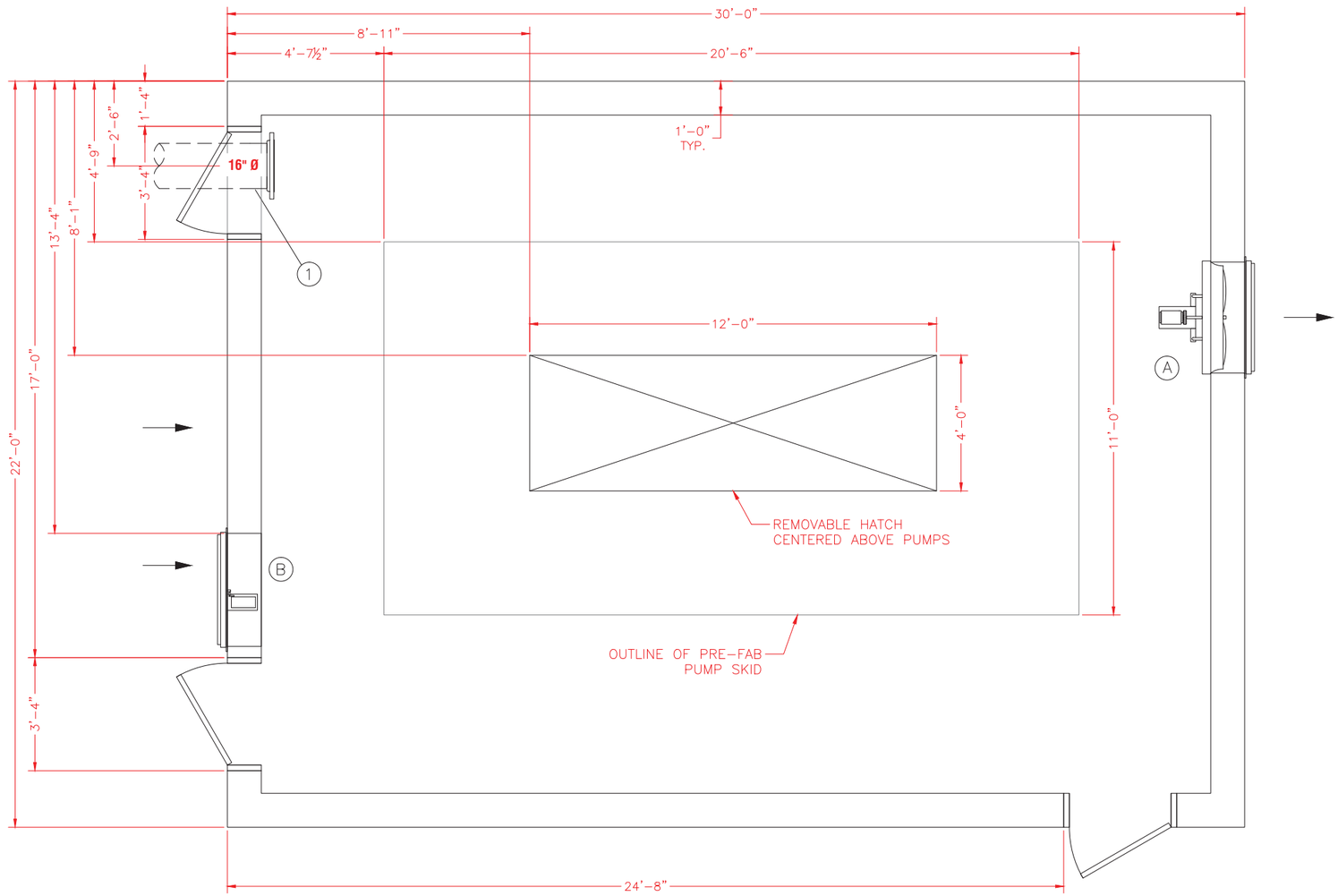
(A) RECOMMENDED VENTILATION;
(1) 4215 CFM EACH @ 0.38" SP (STATIC PRESSURE), 36"ø, WALL MOUNT EXHAUST FAN, 115/230 V/1/60, 3/4 HP, TEFC MOTOR, WITH ALUMINUM SPRING LOADED BACKDRAFT SHUTTER AND GAURD. GRAINGER #1HLB6 OR EQUAL.

(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: ½" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
RIVER PUMPSTATION

NO.	DATE	REVISION	BY
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3	09-29-14	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: –
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DESIGN TEAM

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
BUILDING PLAN

FILE NO.
DATE 10–16–2014
M1

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

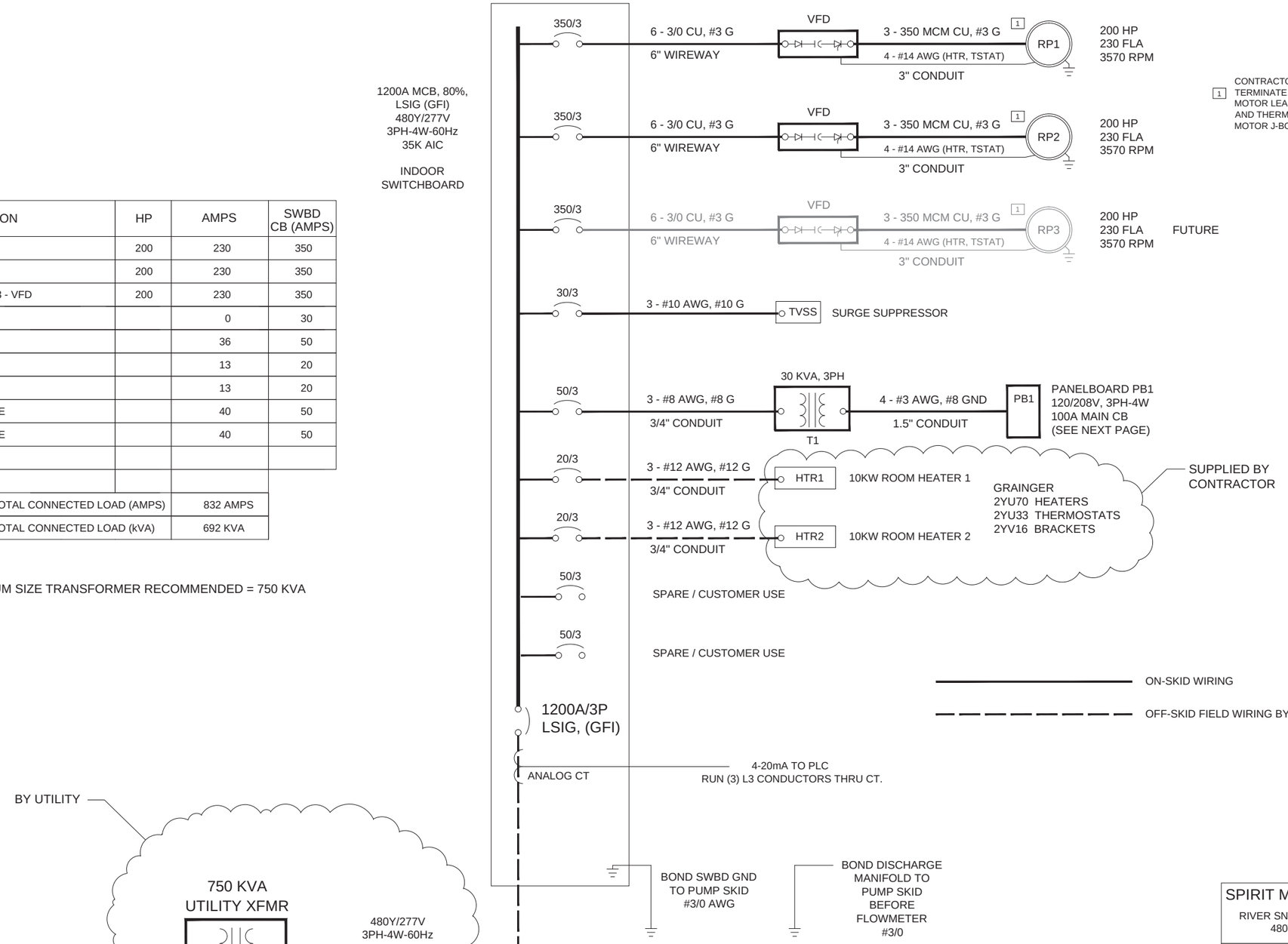
TOTAL CONNECTED LOAD (AMPS)	832 AMPS
TOTAL CONNECTED LOAD (kVA)	692 KVA

MINIMUM SIZE TRANSFORMER RECOMMENDED = 750 KVA

MAIN SWITCHBOARD

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.

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0	09-08-2014	INITIAL DRAWING RELEASE	CAD

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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

DRAWN BY: –
DESIGNER: –
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DESIGN TEAM

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

FILE NO.
DATE 10-20-2014
E1

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

	20/3	1	2	20/1	2 - #12, #12 G — INTERIOR LIGHTS
SPARE		3	4	20/1	2 - #12, #12 G — INTERIOR LIGHTS
		5	6	20/1	2 - #12, #12 G — EXTERIOR LIGHTS
SPARE	30/1	7	8	20/1	2 - #12, #12 G — RECEPTACLES
SPARE	20/1	9	10	20/1	2 - #12, #12 G — RECEPTACLES
SPARE	20/1	11	12	20/1	SPARE
SPARE	20/1	13	14	20/1	SPARE
SPARE	20/1	15	16	20/1	SPARE
SPARE	20/1	17	18	20/1HID	SPARE
SPARE	20/1	19	20	20/1HID	SPARE
SKID PB1 GFCI RECEPTACLE — 2 - #12, #12 G	20/1	21	22	20/1	SPARE
PLC PANEL — 2 - #12, #12 G	20/1	23	24	20/1	SPARE
P1 MOTOR SPACE HEATER — 2 - #14, #14 G	10/1	25	26	20/1	SPARE
P2 MOTOR SPACE HEATER — 2 - #14, #14 G	10/1	27	28	20/1	SPARE
P3 MOTOR SPACE HEATER — 2 - #14, #14 G	10/1	29	30	20/1HID	2 - #12, #12 G

MCB 100/3 — N — Gnd

SUPPLIED BY CONTRACTOR

SUPPLIED 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

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

30 KVA — 480V

G — H1 — H2 — H3

3 — 3 — 3

SQD EE30T3H

X0 — X1 — X2 — X3

208Y/120V

G — N — X1 — X2 — X3

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

X1 — X2 — X3 — N — G

NO.	DATE	REVISION	BY
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SpiritMountain

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

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

FILE NO.
DATE 10-20-2014
E1

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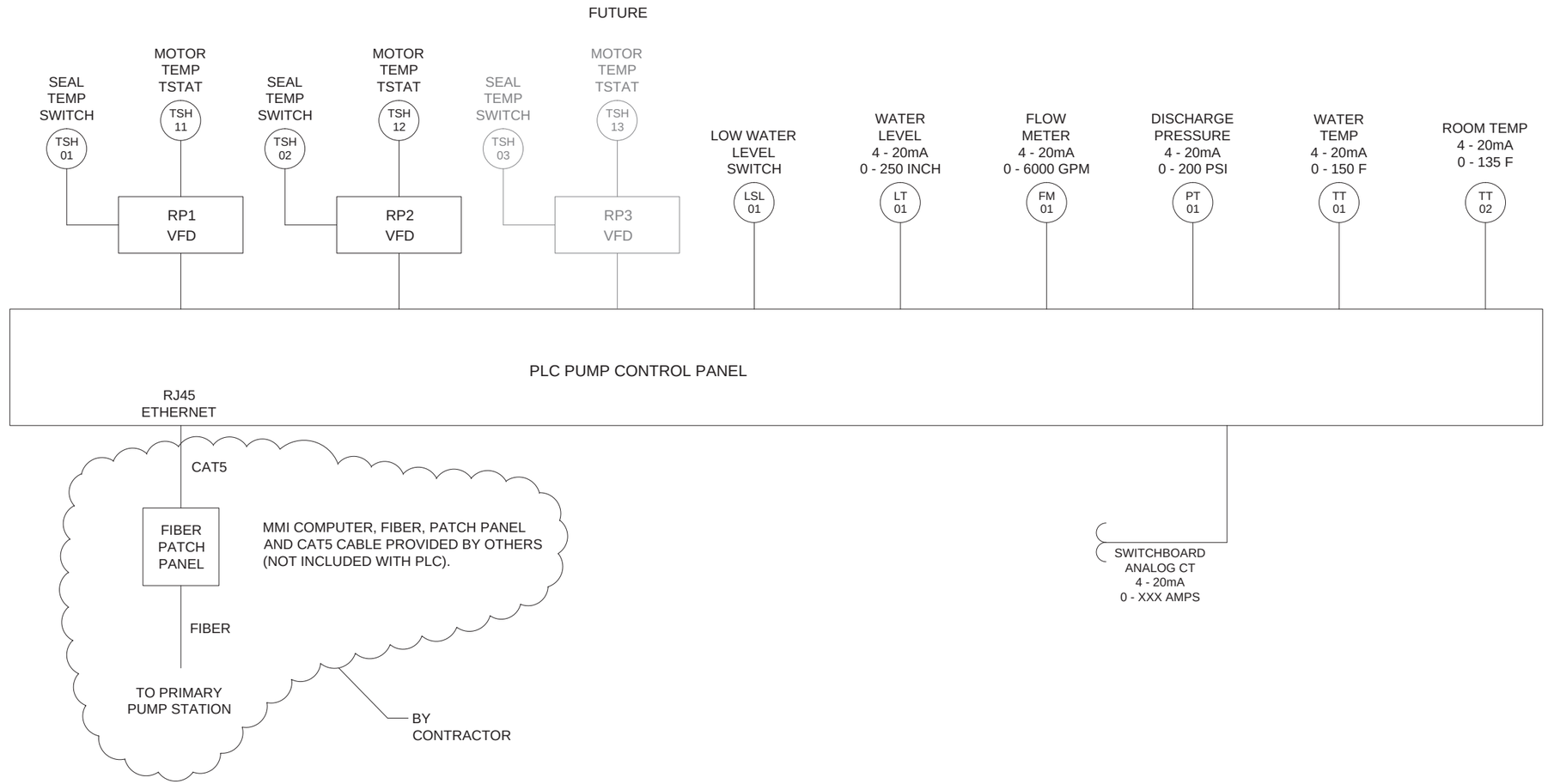
SPIRIT MOUNTAIN SKI AREA
RIVER SNOW MAKING PUMPHOUSE
120/208V POWER ONE-LINE

DRAWN BY: RTR	CHECKED : RTR
DATE: 10-20-2014	APPROVED : MRM
SCALE: NONE	
DRAWING NUMBER : 782013-E1	
REV : 1	SHEET : 2 OF 3



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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

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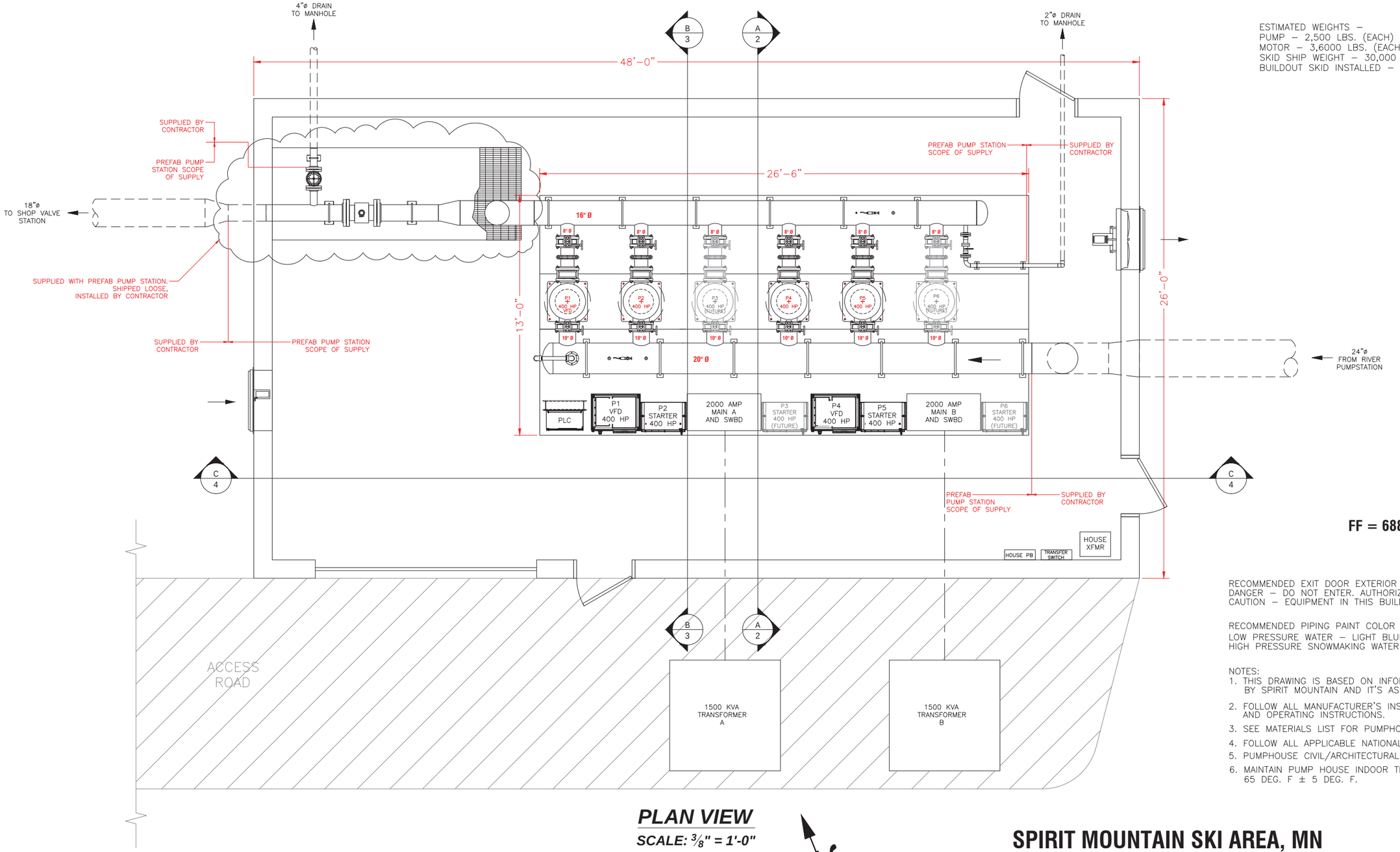
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

RIVER SNOW MAKING PUMPHOUSE
CONTROL BLOCK DIAGRAM

FILE NO.
DATE 10–20–2014
E1



ESTIMATED WEIGHTS –
PUMP – 2,500 LBS. (EACH)
MOTOR – 3,6000 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:
1. THIS DRAWING IS BASED ON INFORMATION PROVIDED BY SPIRIT MOUNTAIN AND IT'S ASSOCIATES.
2. FOLLOW ALL MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
3. SEE MATERIALS LIST FOR PUMPHOUSE MATERIALS.
4. FOLLOW ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES.
5. PUMPHOUSE CIVIL/ARCHITECTURAL DESIGN BY SEH, INC.
6. 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
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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

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DESIGNER: –
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DESIGN TEAM

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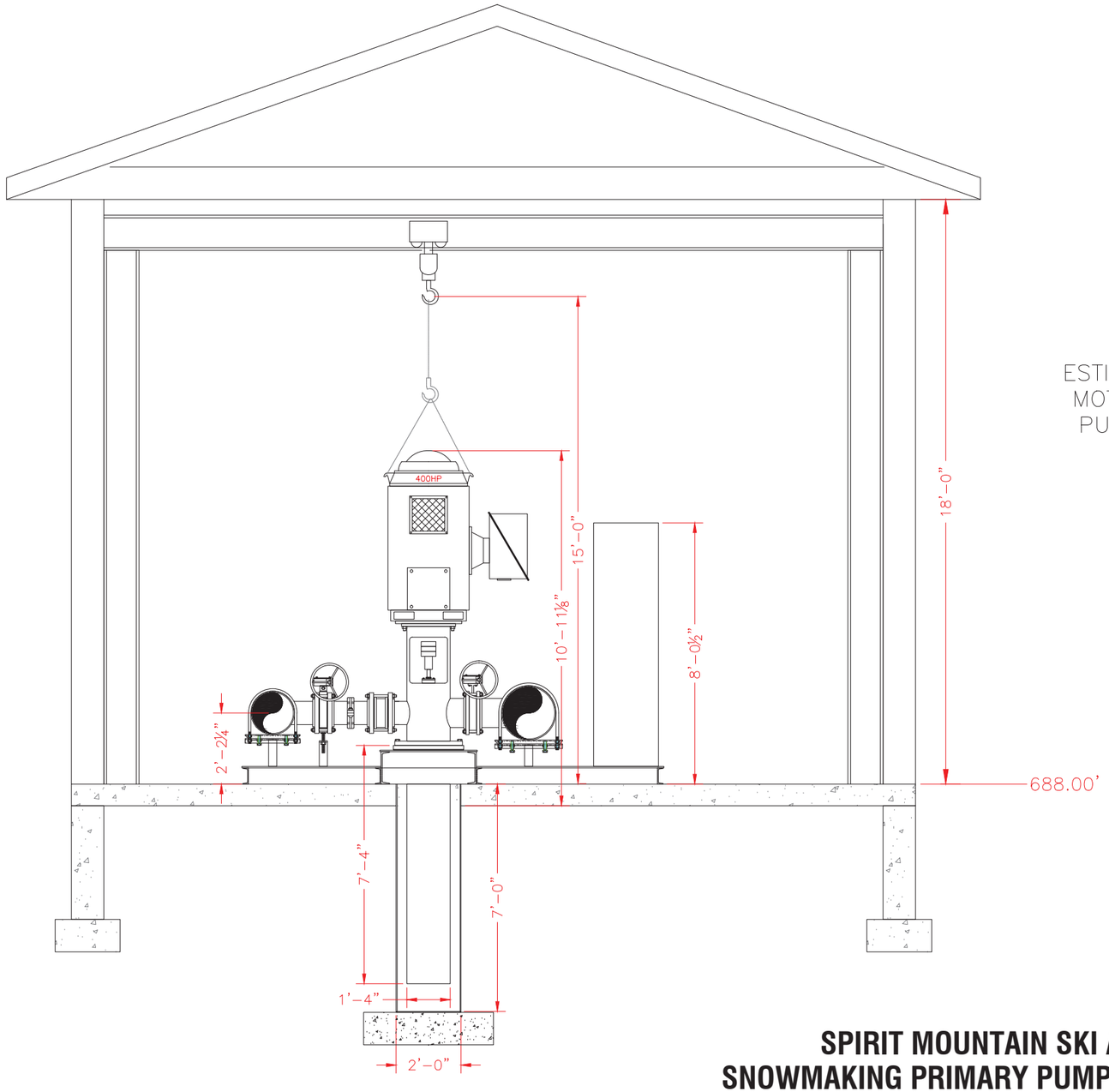
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

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: ½" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT

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

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DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.
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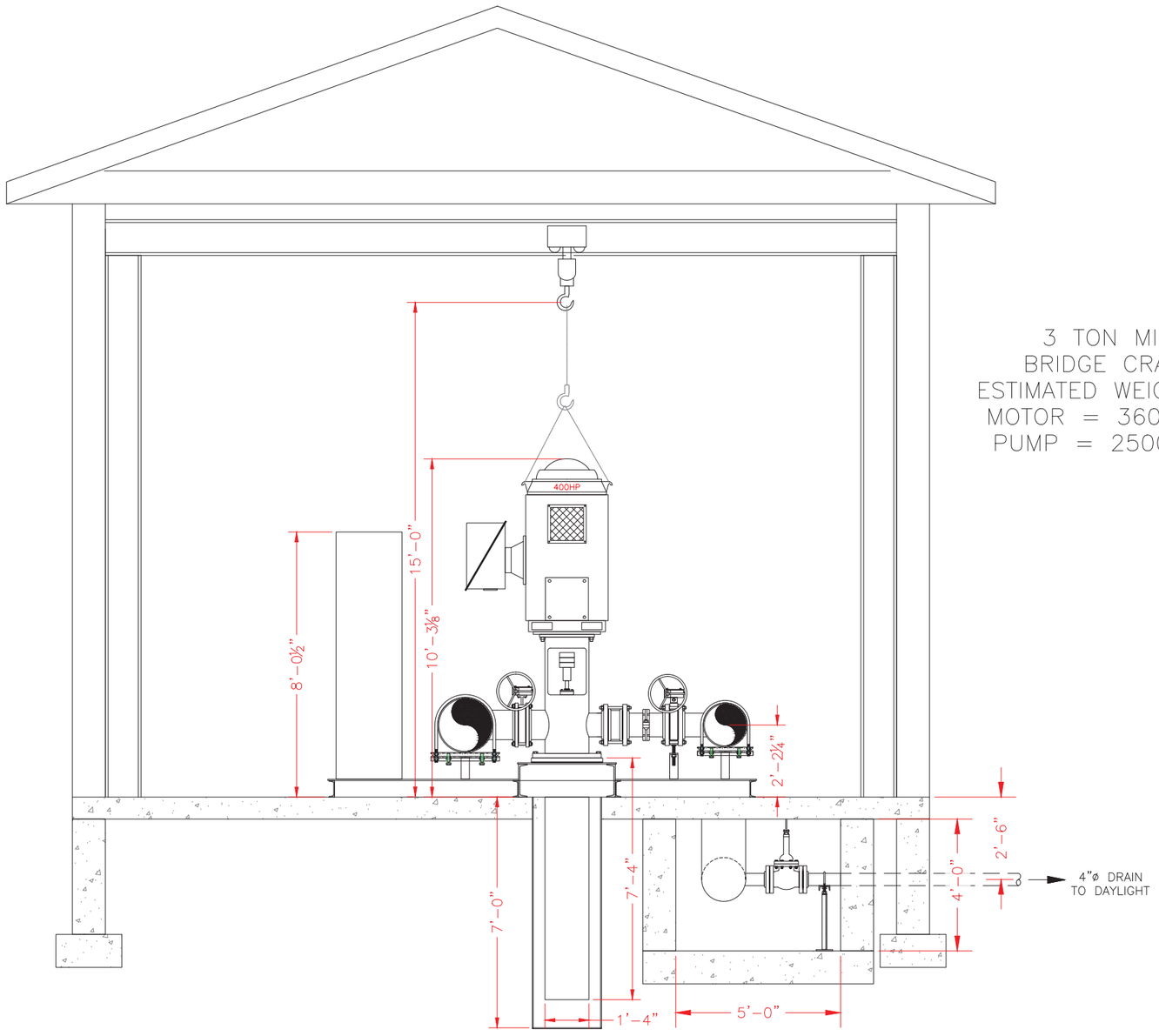

3 TON MIN.
BRIDGE CRANE
ESTIMATED WEIGHTS –
MOTOR = 3600 LBS
PUMP = 2500 LBS

SECTION B-B

SCALE: ½" = 1'-0"

SPIRIT MOUNTAIN SKI AREA, MN
SNOWMAKING PRIMARY PUMPSTATION LAYOUT

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SECTION VIEW

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REV : 6	SHEET : 3 OF 6

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DESIGN TEAM

NO.	BY	DATE	REVISIONS

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Name, P.E.
Date: --/--/-- Lic. No. –

SEH
PHONE: 218-855-1700
416 SOUTH 6th St, SUITE 200
BRAINERD, MN 56401-3540
www.sehinc.com

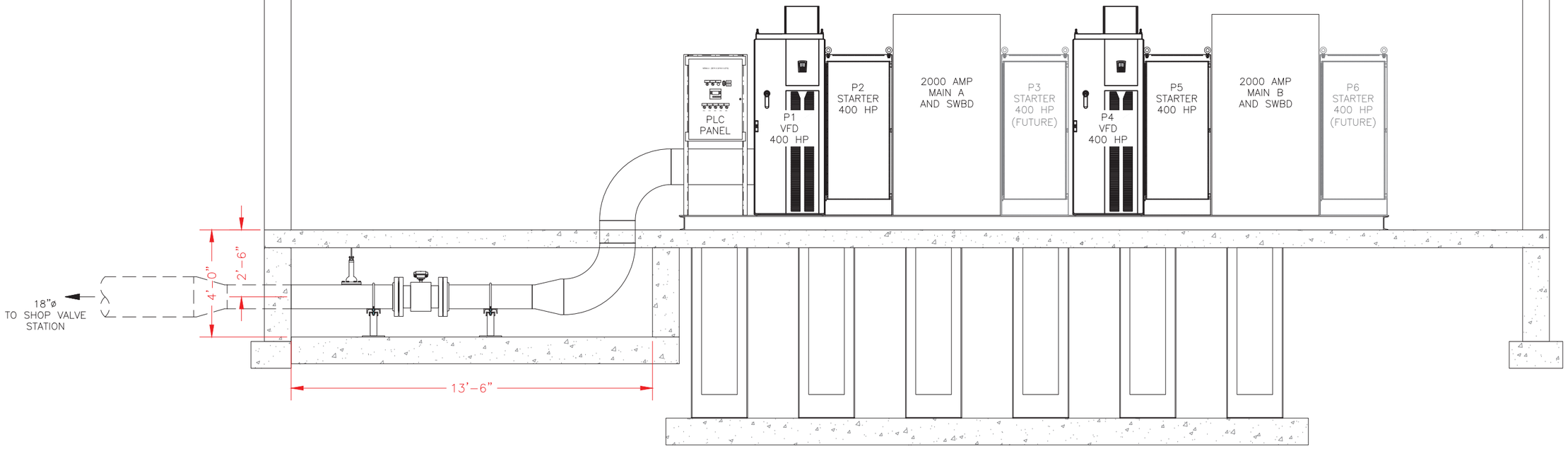
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.

DATE
10-20-2014

M2



SECTION C-C

SCALE: ½" = 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: 4 OF 6

DRAWN BY: —
DESIGNER: —
CHECKED BY: —
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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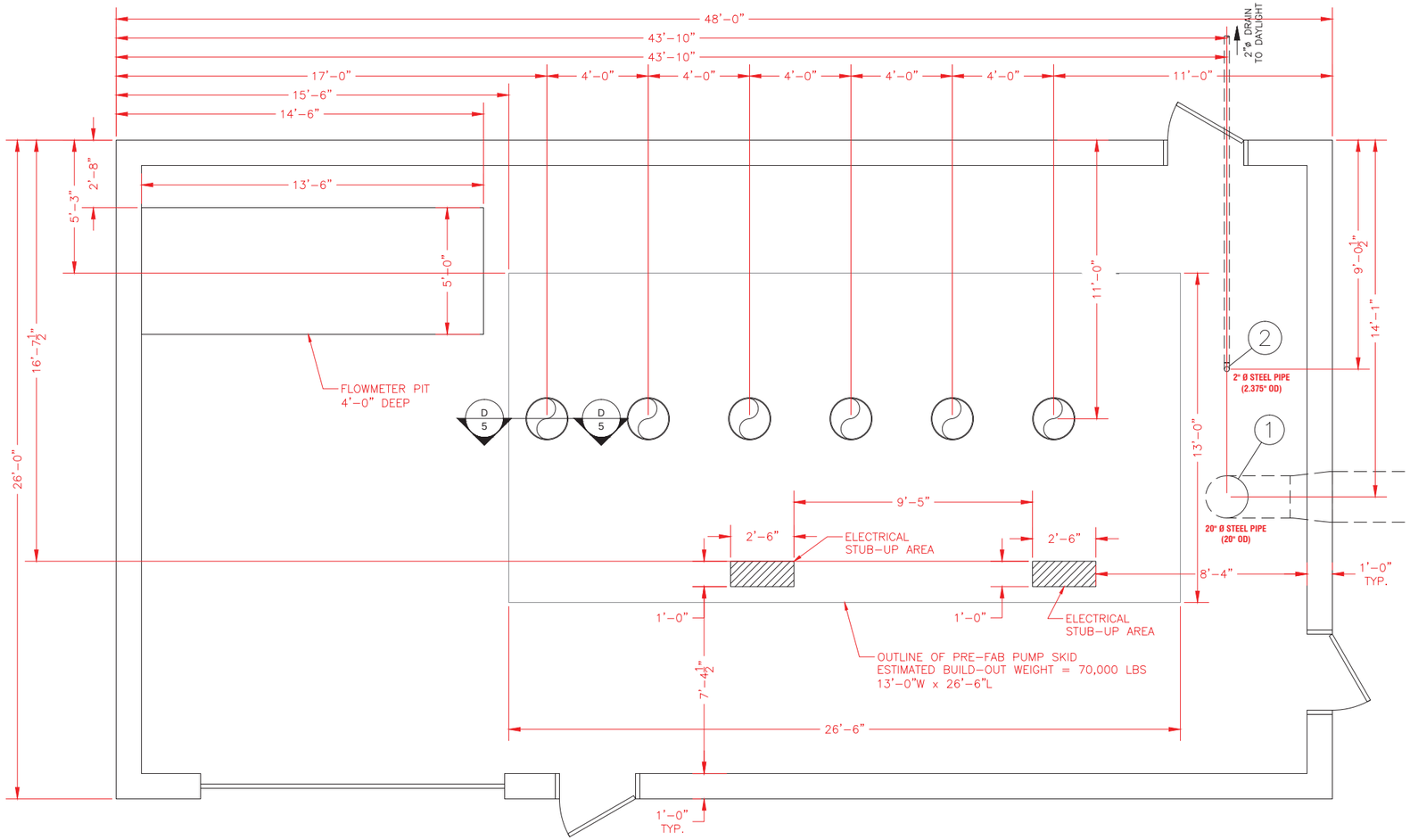
SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
SECTION VIEW

FILE NO.

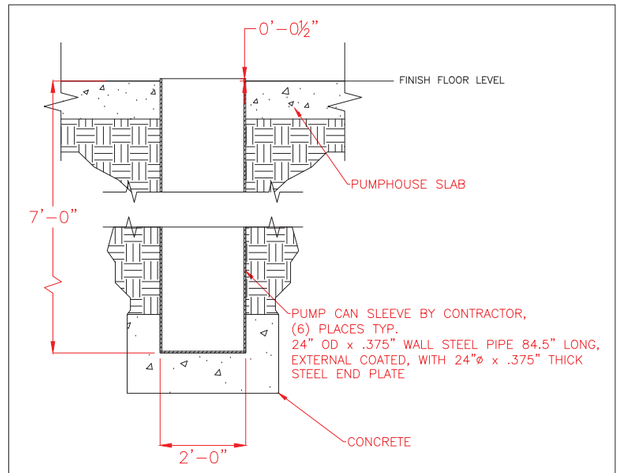
DATE
10-20-2014

M2



SLAB PLAN

SCALE: ⅜" = 1'-0"



SECTION D-D

SCALE: NTS

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
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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

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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: –
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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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 GAURD. 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.

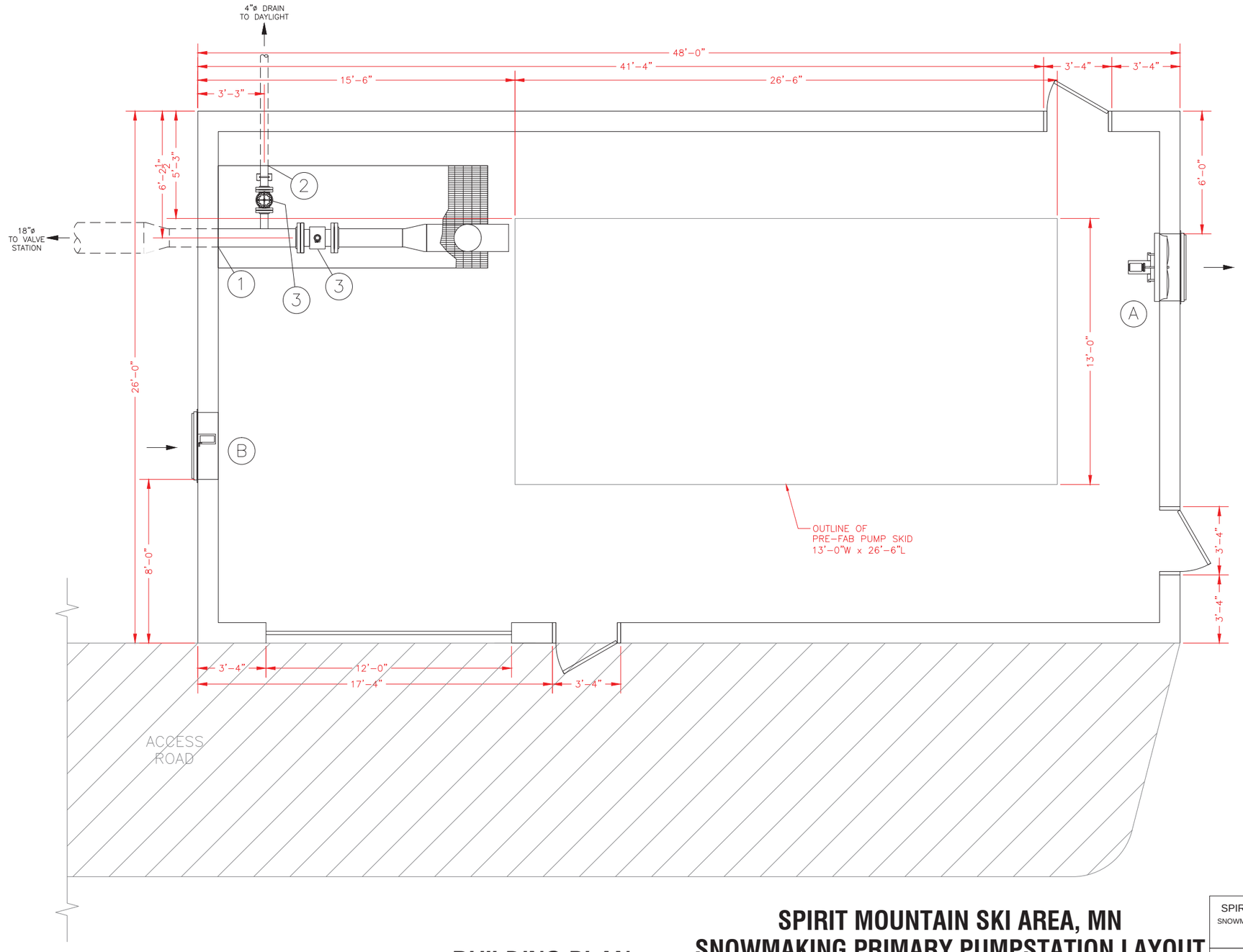
(C) RECOMMENDED HEATING;
(2) 10 KW EACH ELECTRIC UNIT HEATER, 480 V/3/60 POWERED, CEILING MOUNT WITH BRACKET KIT. GRAINGER #25D240 W/ THERMOSTAT (#25D246) AND BRACKET (#25D242) OR EQUAL.

(1) — 10"ø STUB THRU WALL – 2'–6" ℄ BELOW FF. CUT & FIELD WELD

(2) — 4"ø STUB THRU WALL – 2'–6" ℄ 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: –
DESIGNER: –
CHECKED BY: –
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
BUILDING PLAN

FILE NO.
DATE 10–20–2014
M2

PRIMARY- MAIN A

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

2000A MCB, 80%, LSIG (GFI) 480Y/277V 3PH-4W-60Hz 65K AIC

INDOOR SWITCHBOARD

600/3 — VFD — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P1 — 400 HP 440 FLA 3550 RPM

600/3 — SOFT-START — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P2 — 400 HP 440 FLA 3550 RPM

600/3 — SOFT-START — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P3 — FUTURE 400 HP 440 FLA 3550 RPM

30/3 — 3 - #10 AWG 3/4" CONDUIT — TVSS — SURGE SUPRESSOR

50/3 — TRANSFER SW — 3 - #8 AWG, #8 G 3/4" CONDUIT — 3 - #8 AWG, #8 G 3/4" CONDUIT

20/3 — 3 - #12 AWG + #12 GND 3/4" CONDUIT — HTR1, 10KW

30 KVA, 3PH — T1 — 4 - #3 AWG, #8 GND 1.5" CONDUIT — PB1 — PANELBOARD PB1 120/208V, 3PH-4W 100A MAIN CB (SEE NEXT PAGE)

50/3 — SPARE — SUPPLIED BY CONTRACTOR

SUPPLIED WITH PREFAB INSTALLED BY CONTRACTOR

2000A/3P 80% LSIG, (GFI) 120V SHUNT-TRIP

ANALOG CT — 4-20mA TO PLC RUN (3) L3 CONDUCTORS THRU CT.

BOND SWBD GND TO PUMP SKID 350 MCM

T1A TRANSFORMER 1500 KVA — PRIMARY — 480Y/277V 3PH-4W-60Hz — BY UTILITY

PRIMARY- MAIN B

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

2000A MCB, 80%, LSIG (GFI) 480Y/277V 3PH-4W-60Hz 65K AIC

INDOOR SWITCHBOARD

600/3 — VFD — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P4 — 400 HP 440 FLA 3550 RPM

600/3 — SOFT-START — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P5 — 400 HP 440 FLA 3550 RPM

600/3 — SOFT-START — 2 x (3 - 350 MCM, #1 GND) 4 - #14 (HTR, TSTAT) — 2 x 3" CONDUITS — P6 — FUTURE 400 HP 440 FLA 3550 RPM

30/3 — 3 - #10 AWG 3/4" CONDUIT — TVSS — SURGE SUPRESSOR

50/3

20/3 — 3 - #12 AWG + #12 GND 3/4" CONDUIT — HTR2, 10KW

50/3 — SPARE — SUPPLIED BY CONTRACTOR

2000A/3P 80% LSIG, (GFI) 120V SHUNT-TRIP

ANALOG CT — 4-20mA TO PLC RUN (3) L3 CONDUCTORS THRU CT.

BOND SWBD GND TO PUMP SKID 350 MCM

T1B TRANSFORMER 1500 KVA — PRIMARY — 480Y/277V 3PH-4W-60Hz — BY UTILITY

ON-SKID WIRING

OFF-SKID FIELD WIRING BY CONTRACTOR

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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SpiritMountain

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

FILE NO. E2

DATE 10-20-2014

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

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

LOAD SUMMARY

LOAD	DESCRIPTION	HP	MAIN A AMPS	MAIN B 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

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SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

FILE NO.
DATE 10–20–2014
E2

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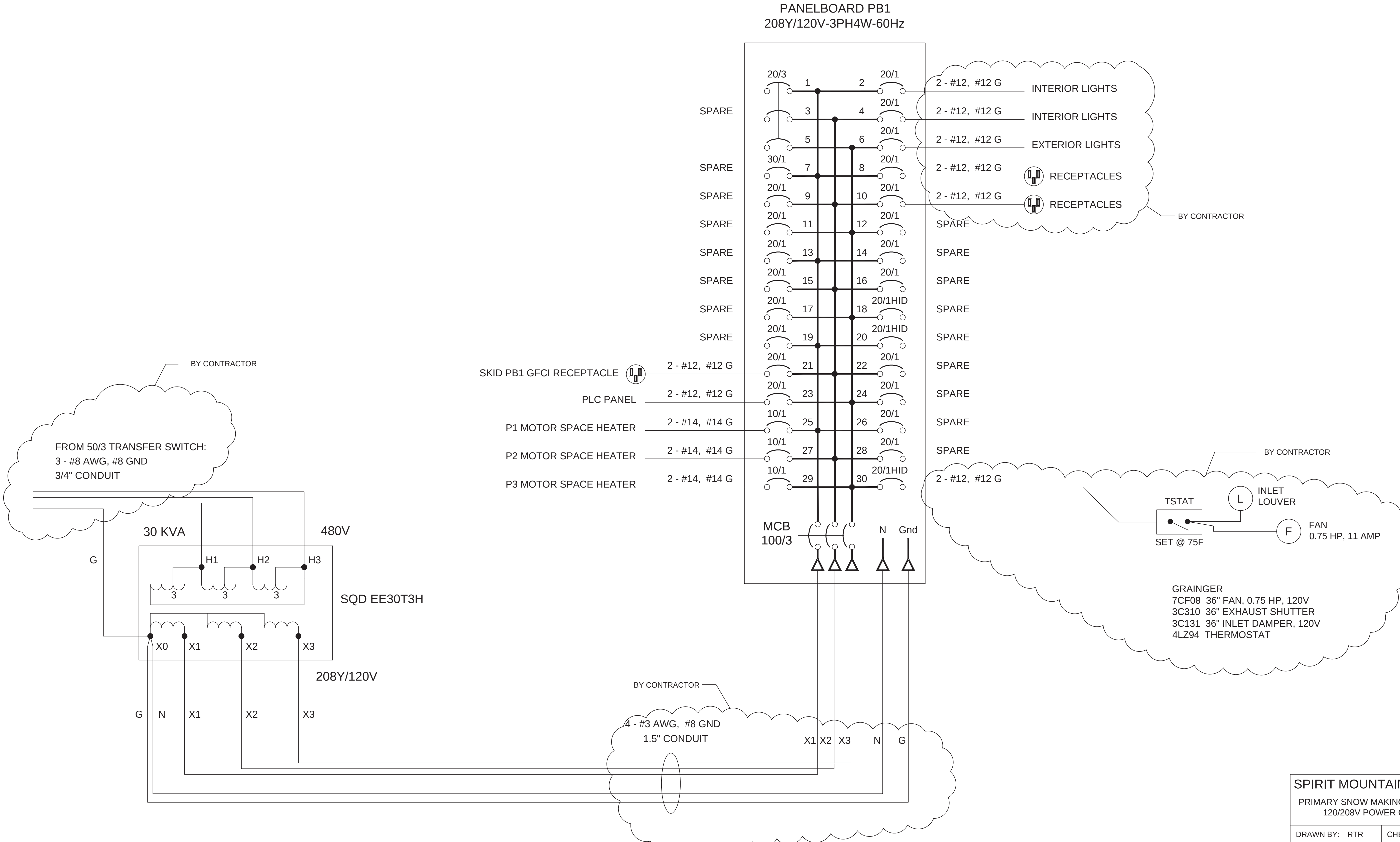
PRIMARY SNOW MAKING PUMPHOUSE
480V POWER ONE-LINE

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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0	09-08-2014	INITIAL DRAWING RELEASE	CAD

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DESIGNER: -
CHECKED BY: -
DESIGN TEAM

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SPIRIT MOUNTAIN SKI AREA

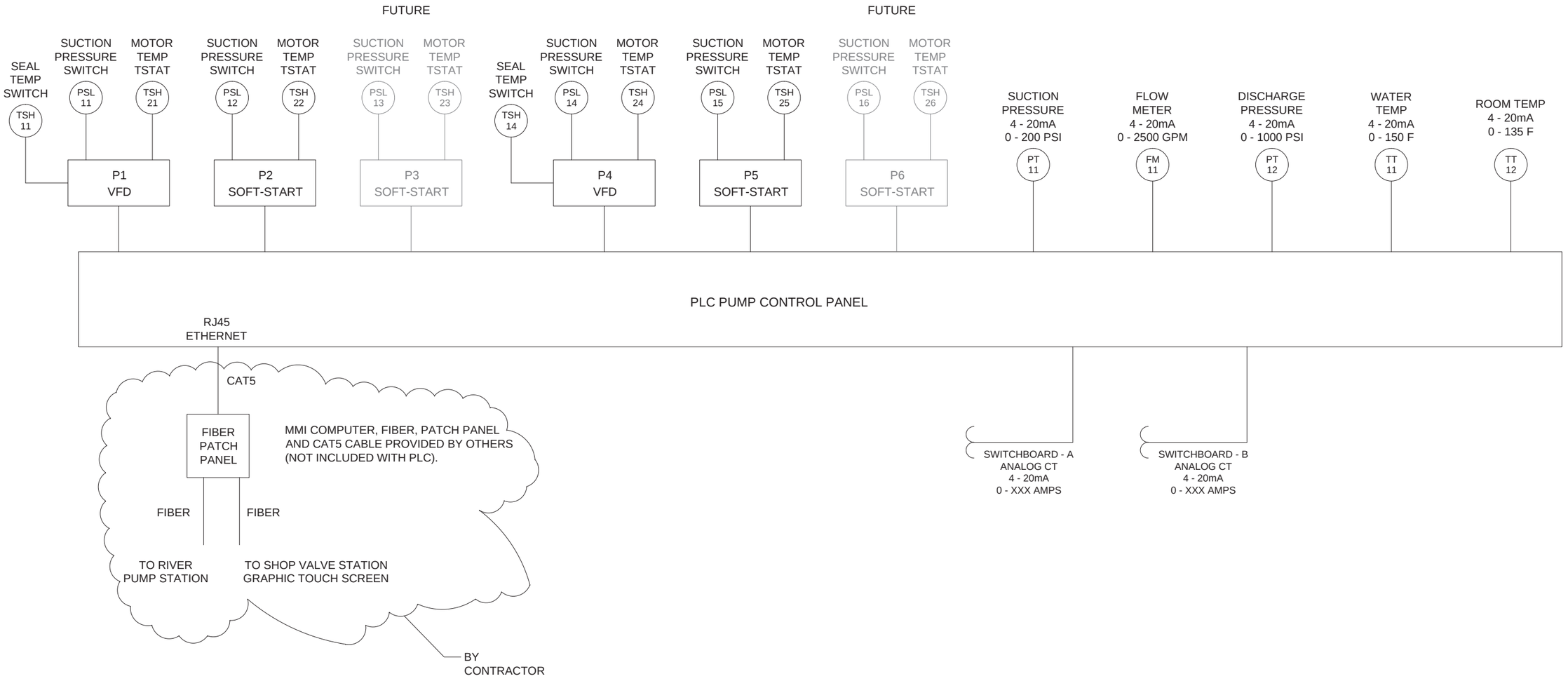
PRIMARY SNOW MAKING PUMPHOUSE
120/208V POWER ONE-LINE

DRAWN BY: RTR	CHECKED : RTR
DATE: 10-20-2014	APPROVED : MRM
SCALE: NONE	
DRAWING NUMBER : 782013-E2	
REV : 1	SHEET : 3 OF 4

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

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

FILE NO.
DATE 10-20-2014
E2



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0	09-08-2014	INITIAL DRAWING RELEASE	CAD

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SpiritMountain

SPIRIT MOUNTAIN SKI AREA
DULUTH, MINNESOTA

PRIMARY SNOW MAKING PUMPHOUSE
CONTROL BLOCK DIAGRAM

FILE NO.
DATE 10-20-2014
E2

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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