



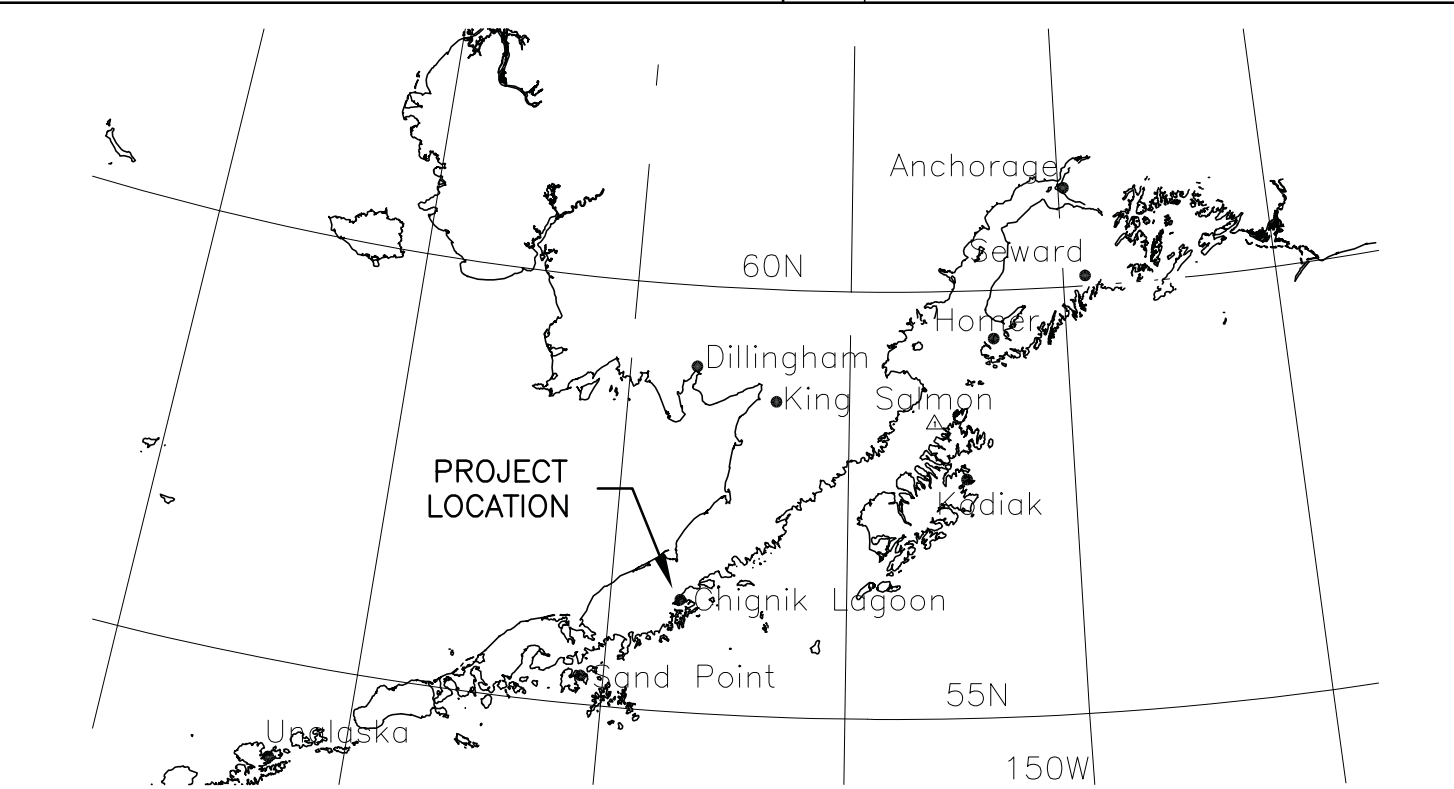
# PACKERS CREEK HYDROELECTRIC PROJECT CHIGNIK LAGOON, ALASKA PROJECT/GRANT #2195389

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  - G-2 EXISTING DIESEL POWER PLANT AND SCHOOL
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**PLANT DATA**

INSTALLED CAPACITY:	167 KW
TURBINE TYPE:	PELTON WHEEL
TURBINE DESIGN FLOW:	8.0 CFS
DAM SPILLWAY ELEVATION:	413.0 FEET (MLLW)
POWERHOUSE FINISH FLOOR:	96.0 FEET (MLLW)
AVERAGE OPERATING WATER ELEV.:	410.0 FEET (MLLW)
TOTAL PLANT GROSS HEAD:	314.0 FEET
FULL FLOW HEAD LOSS:	19.6 FEET
TOTAL PLANT NET HEAD:	294.4 FEET
PENSTOCK DIAMETER:	18 & 16 INCH
PENSTOCK LENGTH:	3,220 FEET
DRAINAGE BASIN:	1.7 SQ. MILES
ANNUAL AVERAGE PRECIPITATION:	100 INCHES
ACTIVE STORAGE:	0.1 ACRES
ANNUAL AVERAGE STREAMFLOW:	9.0 CFS
100 YEAR FLOOD FLOW:	495 CFS

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**1** SITE PLAN  
SCALE: 1" = 500'

**2** VICINITY MAP  
SCALE: 1" = NTS

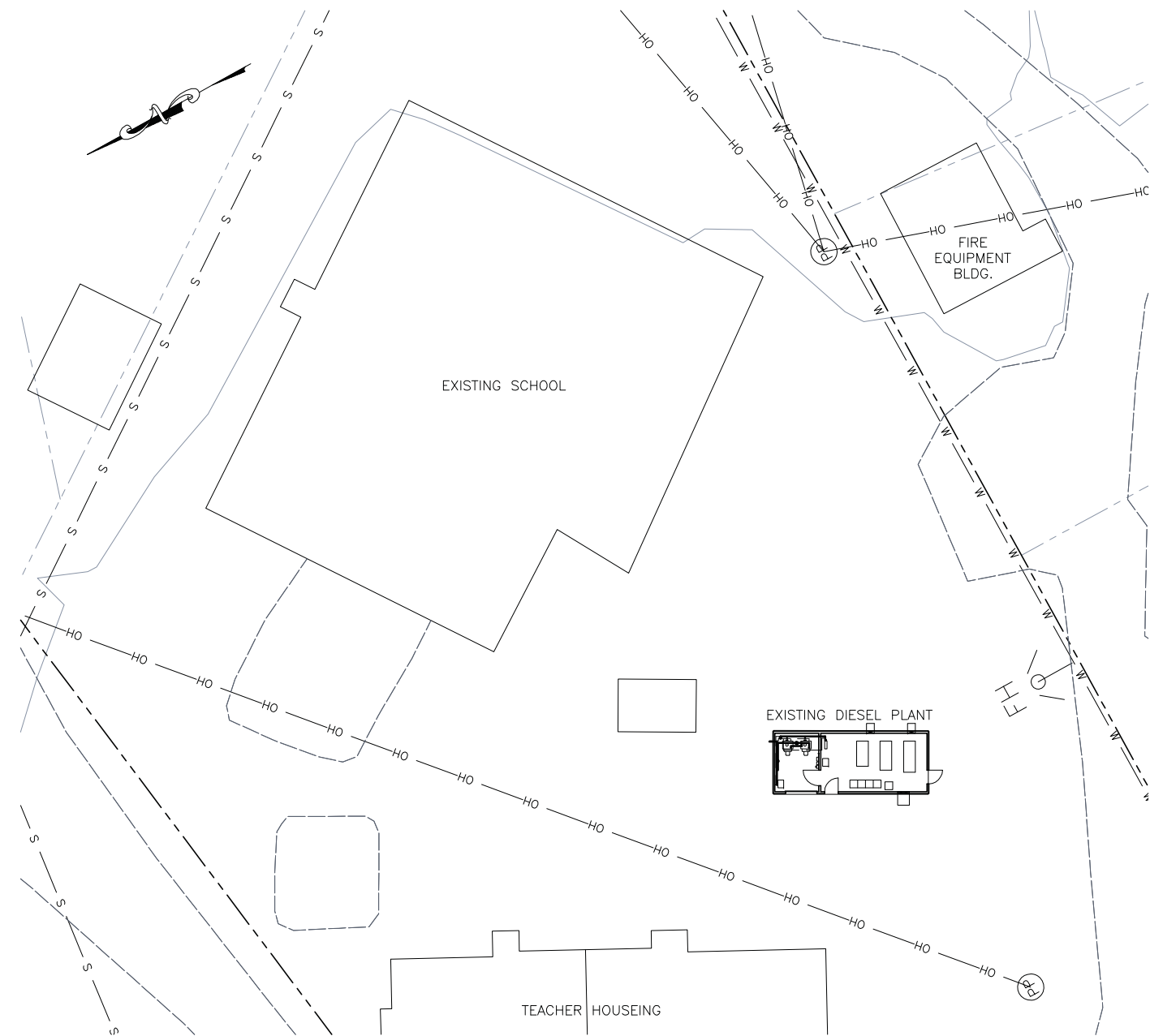


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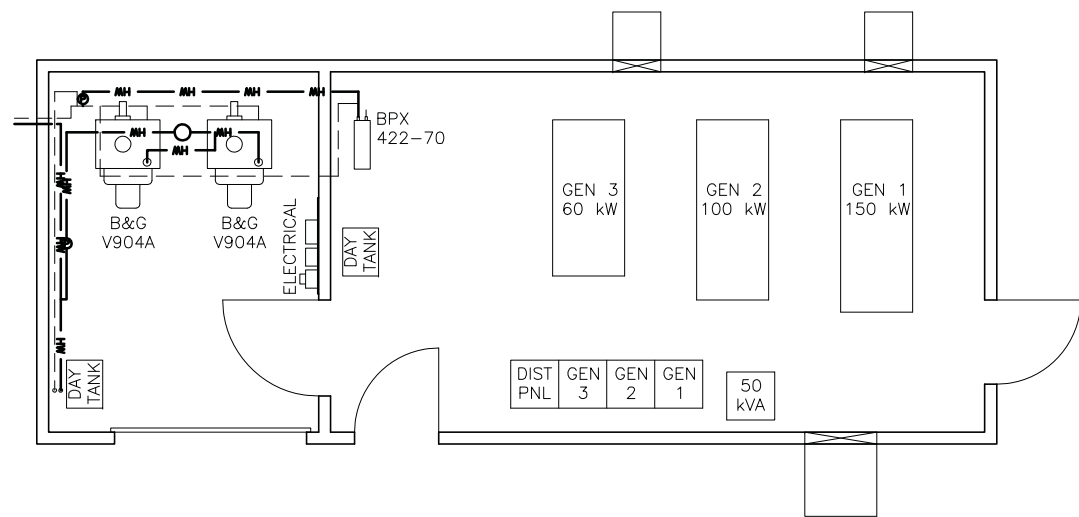
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Drawing: PROJECT SITE PLAN VICINITY MAP  
 Project: PACKERS CREEK HYDROELECTRIC PROJECT CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

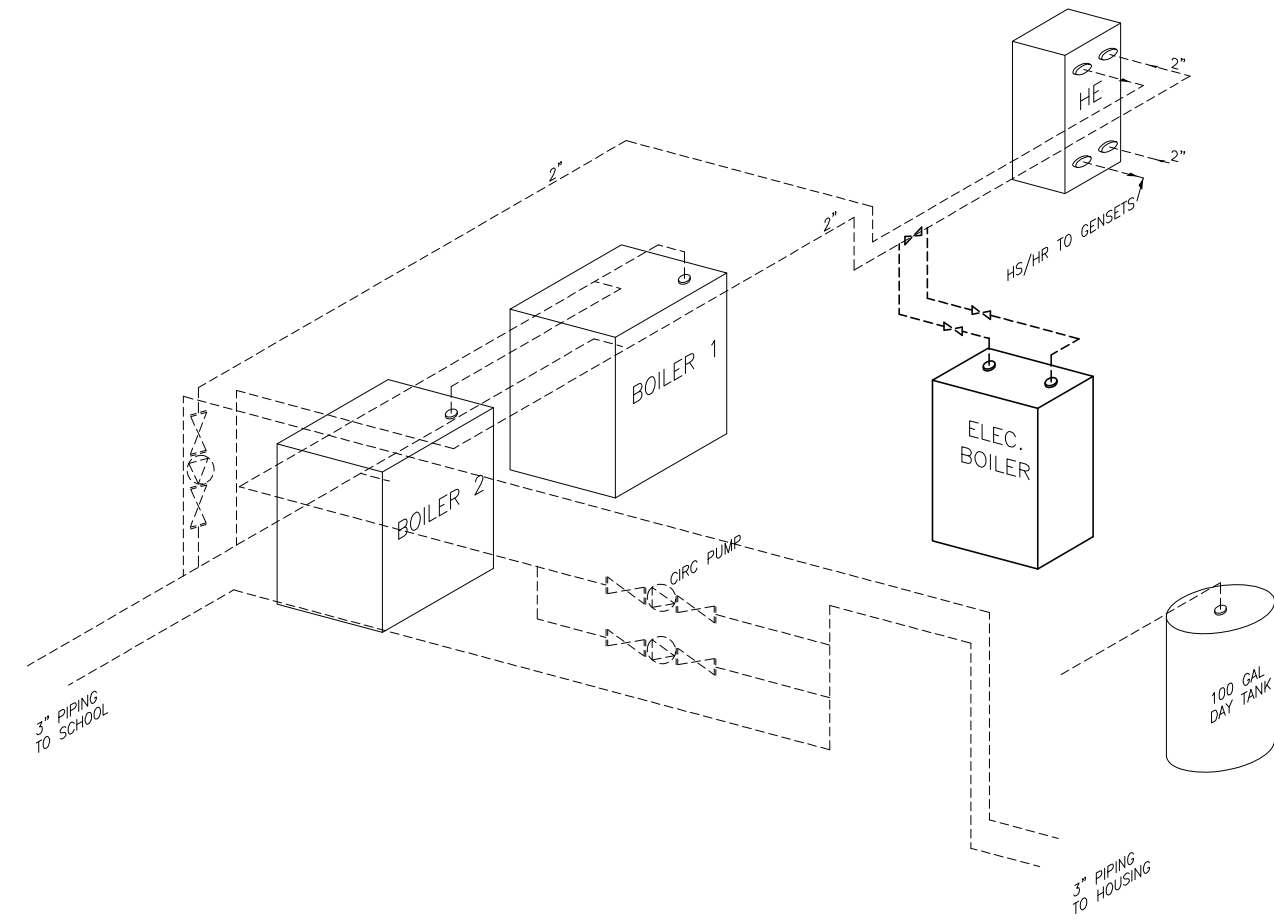
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**1** EXISTING SCHOOL AND DIESEL PLANT SITE PLAN  
SCALE: 1/4" = 1'-0"



**2** EXISTING DIESEL PLANT FLOOR PLAN  
SCALE: 1/4" = 1'-0"



**3** HEATING SYSTEM 1-LINE DIAGRAM  
SCALE: NTS

HEATING SYSTEM UPGRADE

EXISTING SYSTEM CONSISTS OF (2) EACH BURNHAM MODEL V904A BOILERS WITH GROSS OUTPUT OF 483 MBH; (2) EACH GRUNDFOS UPS 50-160F CIRCULATION PUMPS; (1) EACH BELL & GOSSETT BPX 422-70 HEAT EXCHANGER; 2-INCH COPPER PIPING FROM THE HEAT EXCHANGER TO THE BOILERS; AND 3-INCH PIPING FROM THE BOILERS TO THE SCHOOL.

EXISTING SCHOOL IS APPROXIMATELY 11,360 SQUARE FEET.

SUPPLY COMPLETE ELECTRIC HEATING SYSTEM TO SUPPLANT LOST WASTE HEAT FROM DIESEL FIRED GENERATORS WHEN HYDROELECTRIC PLANT IS OPEARTING AND DIESELS ARE SHUT DOWN.

SYSTEM TO INCLUDE A NEW 40 kW ELECTRIC LOAD BANK WITH MAXIMUM 4kW STEPS, PLUMBED INTO EXISTING 2-INCH HEATING SUPPLY LINE BETWEEN EXISTING HEAT EXCHANGER AND BOILERS. PROVIDE WITH NORMALLY CLOSED ISOLATION VALVE ON EXISTING 2-INCH LINE BETWEEN ELECTRIC HOT WATER HEATER 2-INCH SUPPLY AND RETURN LINES.

VERIFY EXISTING EQUIPMENT AND PIPING AND SUBMIT HEATING SYSTEM SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

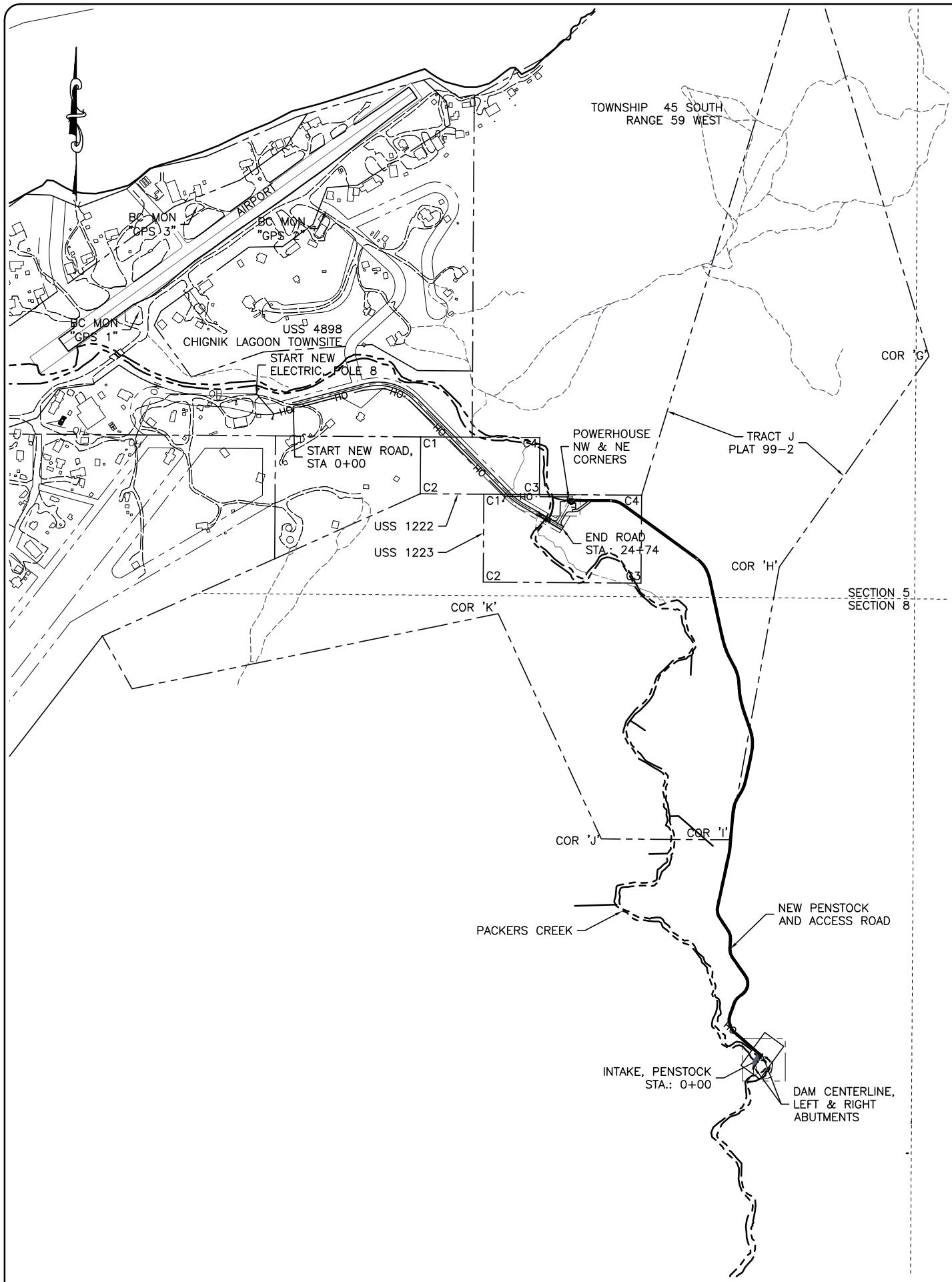


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Drawing: EXISTING SCHOOL AND DIESEL PLANT SITE PLAN, FLOOR PLAN, SCHEMATICS  
 Project: PACKERS CREEK HYDROELECTRIC PROJECT CHIGNIK LAGOON POWER UTILITY Chignik Lagoon, AK

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**SURVEY CONTROL:**

1. HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 6, NAD83(1992) IN U.S. SURVEY FEET HOLDING ADOT BCMON "GPS 1" AS N843,994.93 E1,531,481.31 AND ADOT BC MON "GPS 2" AS N844,469.13 E1,532,359.00. CONTROL VALUES ARE BASED ON ALASKA DEPARTMENT OF TRANSPORTATION SURVEY DATED 1/6/2008.
2. VERTICAL CONTROL IS IN U.S. SURVEY FEET AND IS BASED ON HOLDING ADOT BC MON "GPS-1" AS ELEVATION 28.80. THIS CONTROLLING ELEVATION WAS TAKEN FROM ADOT SURVEY DATED 1/6/2008.
3. NO PUBLISHED FLOOD DATA FOR CHIGNIK LAGOON. ALASKA COMMUNITY AND REGIONAL AFFAIRS SHOWS FLOOD AREAS ON COMMUNITY SITE MAP.

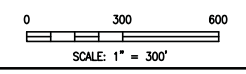
**PROJECT SURVEY CONTROL POINTS**

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
'GPS-1'	843,994.93	1,531,481.31	28.80	BC MON 'GPS-1' (4469-S) ADOT 2006
'GPS-2'	844,469.13	1,532,359.00	48.98	BC MON 'GPS-2' (4469-S) ADOT 2006
'GPS-3'	844,489.20	1,531,753.09	22.47	BC MON 'GPS-3' (4469-S) ADOT 2006
USS 1222 C1	843,406.76	1,532,797.78		BC IRON POST
USS 1222 C2	843,140.30	1,532,796.04		3" IRON PIPE
USS 1222 C3	843,136.66	1,533,354.13		3" IRON PIPE
USS 1222 C4	843,403.26	1,533,355.86		BC IRON POST
USS 1223 C1	843,138.36	1,533,093.69		3" IRON PIPE
USS 1223 C2	842,726.52	1,533,091.01		3" IRON PIPE
USS 1223 C3	842,721.70	1,533,830.19		3" IRON PIPE
USS 1223 C4	843,133.54	1,533,832.88		3" IRON PIPE
TR 'J' C 'G'	843,784.50	1,535,179.33		SS MON CLNC2 1997
TR 'J' C 'H'	842,797.87	1,534,477.85		SS MON CLNC2 1997
TR 'J' C 'I'	841,519.12	1,534,243.76		SS MON CLNC2 1997
TR 'J' C 'J'	841,523.55	1,533,643.78		SS MON CLNC2 1997
SEC COR 5/8	842,647.71	1,535,111.40		BC MON, SECTION CORNER

**PROJECT SURVEY LAYOUT POINTS**

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
RD START	843,558.30	1,532,200.59		ROAD STA 0+00
RD END	842,978.53	1,533,463.09		ROAD STA 24+74.73
BLDG COR	843,114.98	1,533,492.72		POWERHOUSE NW CORNER
BLDG COR	843,114.85	1,533,512.72		POWERHOUSE NE CORNER
START PIPE	840,495.52	1,534,393.29		PENSTOCK STA 0+00 AT INTAKE
END PIPE	843,109.12	1,533,512.68		PENSTOCK STA 47+63.57 AT PH
DAM, LEFT	840,453.49	1,534,357.35		DAM CL, LEFT ABUTMENT
DAM, RIGHT	840,512.56	1,534,397.64		DAM CL, RIGHT ABUTMENT
POLE 8	843,608.90	1,532,028.57		EXISTING ELECTRIC POLE
POLE 9	843,514.48	1,532,110.46		NEW POLE
POLE 10	843,551.13	1,532,250.75		NEW POLE
POLE 11	843,588.42	1,532,390.88		NEW POLE
POLE 12	843,625.71	1,532,531.01		NEW POLE
POLE 13	843,633.06	1,532,630.74		NEW POLE
POLE 14	843,597.52	1,532,724.21		NEW POLE
POLE 15	843,482.83	1,532,844.27		NEW POLE
POLE 16	843,364.54	1,532,960.74		NEW POLE
POLE 17	843,246.26	1,533,077.21		NEW POLE
POLE 18	843,127.97	1,533,193.68		NEW POLE
POLE 19	843,126.78	1,533,339.20		NEW POLE
POLE 20	843,125.52	1,533,484.72		NEW POLE
POLE 21	843,103.13	1,533,485.64		NEW POLE AT HYDRO PLANT

1 CONTROL SITE PLAN  
SCALE: 1" = 300'



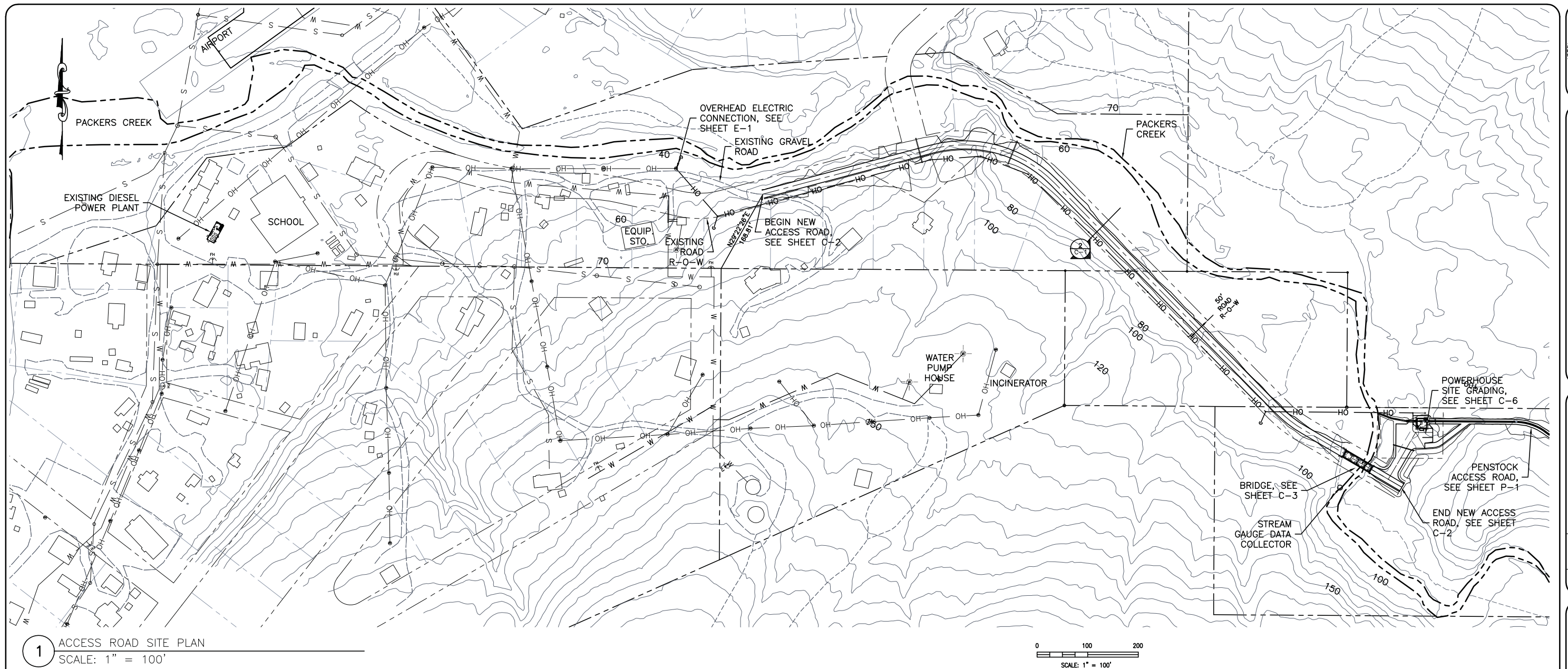
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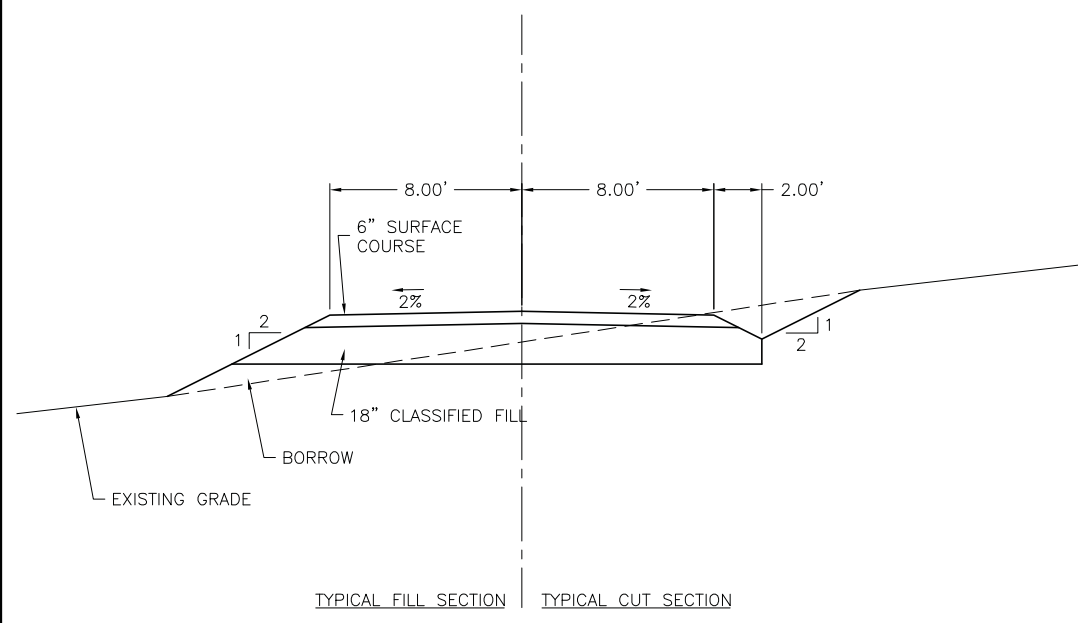
Drawing: **SURVEY CONTROL PLAN AND POINTS**  
 Project: **PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK**

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**1** ACCESS ROAD SITE PLAN  
SCALE: 1" = 100'



**2** TYPICAL ROAD SECTION  
SCALE: 1" = 4'

GENERAL PROJECT NOTES:

1. CONSTRUCT IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE IBC, LOCAL UTILITIES, STATE AND MUNICIPAL CODES AND GOOD PRACTICE. OBSERVE O.S.H.A. REQUIREMENTS DURING CONSTRUCTION.
2. PROVIDE ALL LABOR BY WORKERS SKILLED AND REGULARLY EMPLOYED AT THE APPROPRIATE TRADE.
3. RESTORE TO PRECONTRACT CONDITION ANY PUBLIC OR PRIVATE LAND DISTURBED BY CONTRACT ACTIVITY. THIS SHALL INCLUDE ANY RESEEDING OR REVEGETATION OF EXISTING HORTICULTURE.
4. WHERE EQUIPMENT OR MATERIALS ARE NOTED ON THESE DRAWINGS AS A MANUFACTURER AND MODEL NUMBER, OTHER MANUFACTURERS PRODUCTS THAT ARE EQUAL OR BETTER MAY BE SUBSTITUTED UPON APPROVAL BY THE ENGINEER.
5. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTION AND IDENTIFY EXISTING UTILITIES ENCOUNTERED IN THE FIELD, AND RECORD ANY CHANGES. SUPPLY ONE SET OF RED LINED RECORD DRAWING TO THE ENGINEER AFTER PROJECT CONSTRUCTION COMPLETED FOR PREPARATION OF PROJECT AS-BUILT DRAWINGS.
6. WHERE SUBMITTALS ARE REQUIRED, SUBMIT 3 COPIES TO ENGINEER FOR REVIEW AND APPROVAL.

EARTHWORK:

1. CLEAR AND REMOVE TREES FROM LIMITS OF EXCAVATION PRIOR TO PROCEEDING WITH EXCAVATION. STOCKPILE CLEARED TREES IN AREA APPROVED BY THE OWNER OUTSIDE THE FOOTPRINT OF NEW CONSTRUCTION.
2. EXCAVATE ORGANIC OVERBURDEN UNDER ACCESS ROAD, BRIDGE ABUTMENTS AND POWERHOUSE SITE. STOCKPILE ADEQUATE TOPSOIL AND ORGANIC MATERIAL FOR USE IN REVEGETATION OF DISTURBED AREAS AFTER COMPLETION OF EXCAVATION IF REQUIRED.

3. DISPOSE OF EXCESS EXCAVATION MATERIAL ALONG THE ACCESS ROAD ALIGNMENT FOR TURN-AROUNDS, OR IN AREA APPROVED BY THE OWNER OUTSIDE THE FOOTPRINT OF THE PROPOSED PROJECT.
4. DEVELOP A STORM WATER POLLUTION PREVENTION (SWPP) PLAN TO LIMIT EROSION AND TRANSPORT OF MATERIAL, INCLUDING WIND BLOWN DEBRIS, INCLUDING BUT NOT LIMITED TO, EROSION FENCING AND BARRIERS AND FILTRATION OR IMPOUND AND SETTLEMENT FACILITIES AS NEEDED. FOLLOW ADF&G REQUIREMENTS IN HABITAT PERMIT FOR THIS PROJECT.
5. BORROW MATERIAL SHALL BE 12 INCH MINUS MATERIAL OBTAINED FOR THE PROJECT AREA WITH NO ORGANICS PRESENT. COMPACT TO 85% MAXIMUM MODIFIED PROCTOR DENSITY (ASTM D-1557).
6. CLASSIFIED FILL FOR ROAD BED AND PARKING AREA SHALL BE 6 INCH MINUS FREE DRAINING PIT RUN MATERIAL COMPACTED TO 90% OF MAXIMUM MODIFIED PROCTOR DENSITY (ASTM D-1557).
7. SURFACE COURSE OF ROAD AND PARKING AREA SHALL BE 3/4 INCH MINUS WELL GRADED, SCREENED PIT RUN MATERIAL. SHAPE CLASSIFIED FILL TO ROAD PRISM BEFORE INSTALLING SURFACE COURSE.
8. SEE SHEET C-5 FOR BRIDGE SPECIFICATIONS.

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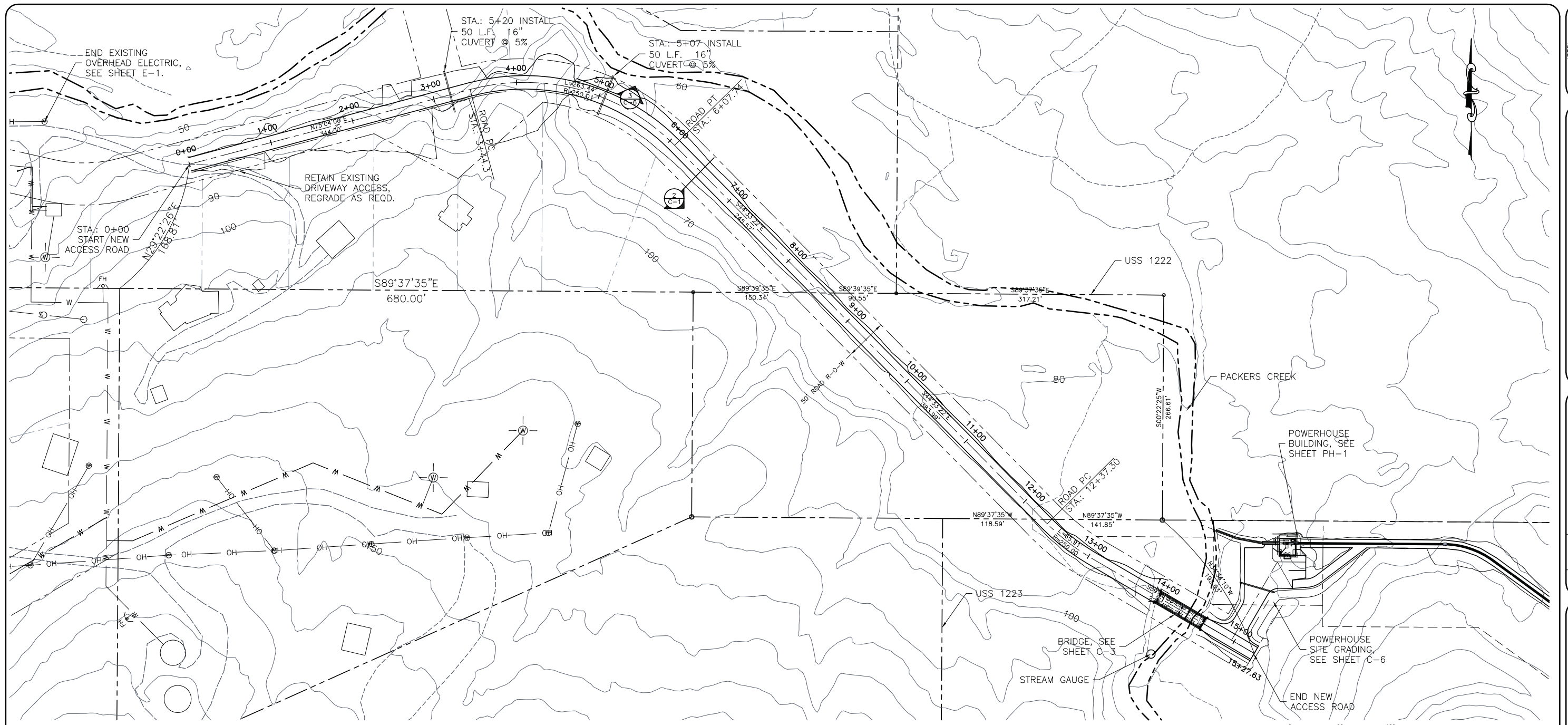
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Drawing: **ACCESS ROAD SITE PLAN**  
 Project: **TYPICAL ROAD SECTION**  
 NOTES:  
**PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

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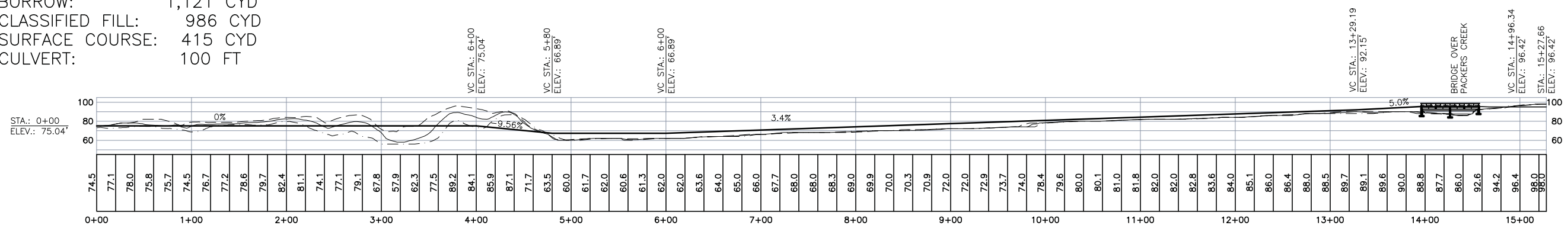
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**C-1**  
 OF 6



1 ACCESS ROAD PLAN  
SCALE: 1" = 60'

ACCESS ROAD QUANTITIES (NEAT)  
 CUT: 4,941 CYD  
 BORROW: 1,121 CYD  
 CLASSIFIED FILL: 986 CYD  
 SURFACE COURSE: 415 CYD  
 CULVERT: 100 FT

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2 ACCESS ROAD PROFILE  
SCALE: 1" = 60'



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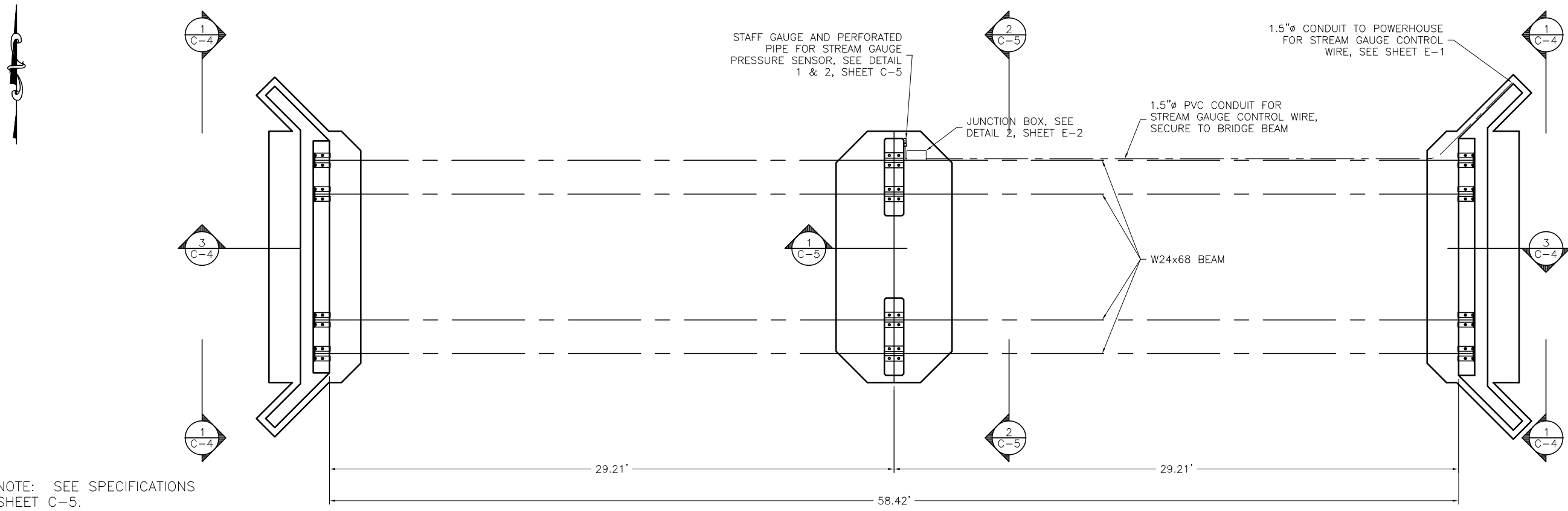
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POWERHOUSE ACCESS ROAD PLAN AND PROFILE  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

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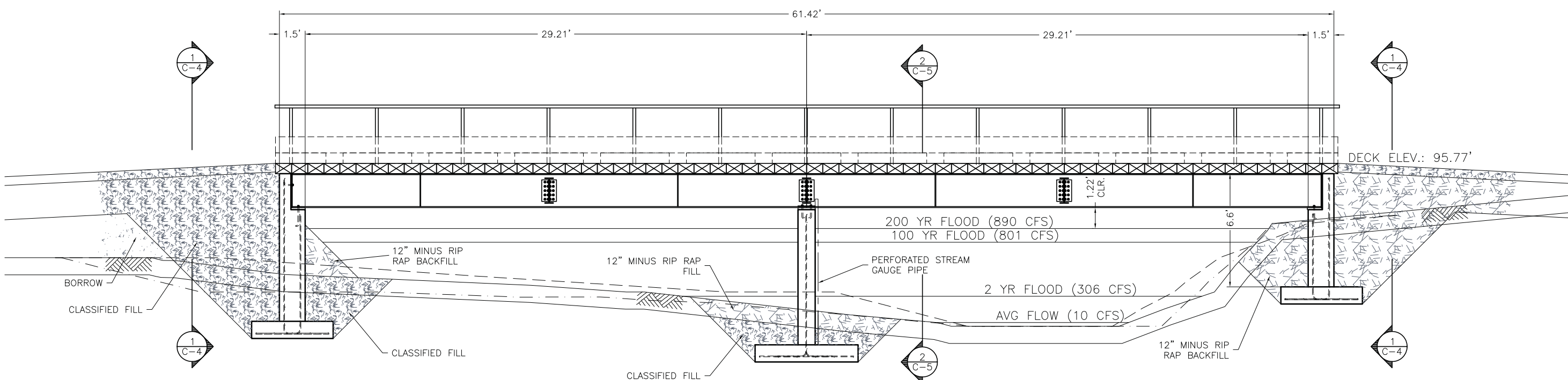


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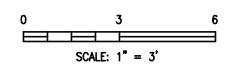


NOTE: SEE SPECIFICATIONS SHEET C-5.

1 BRIDGE SITE PLAN  
 SCALE: 1" = 3'



**MATERIAL QUANTITIES (NEAT)**  
 CONCRETE: 21.3 CYD  
 BRIDGE BEAMS: 240 FT  
 BRIDGE DECK: 860 SQ FT  
 CURB & RAIL: 123 FT

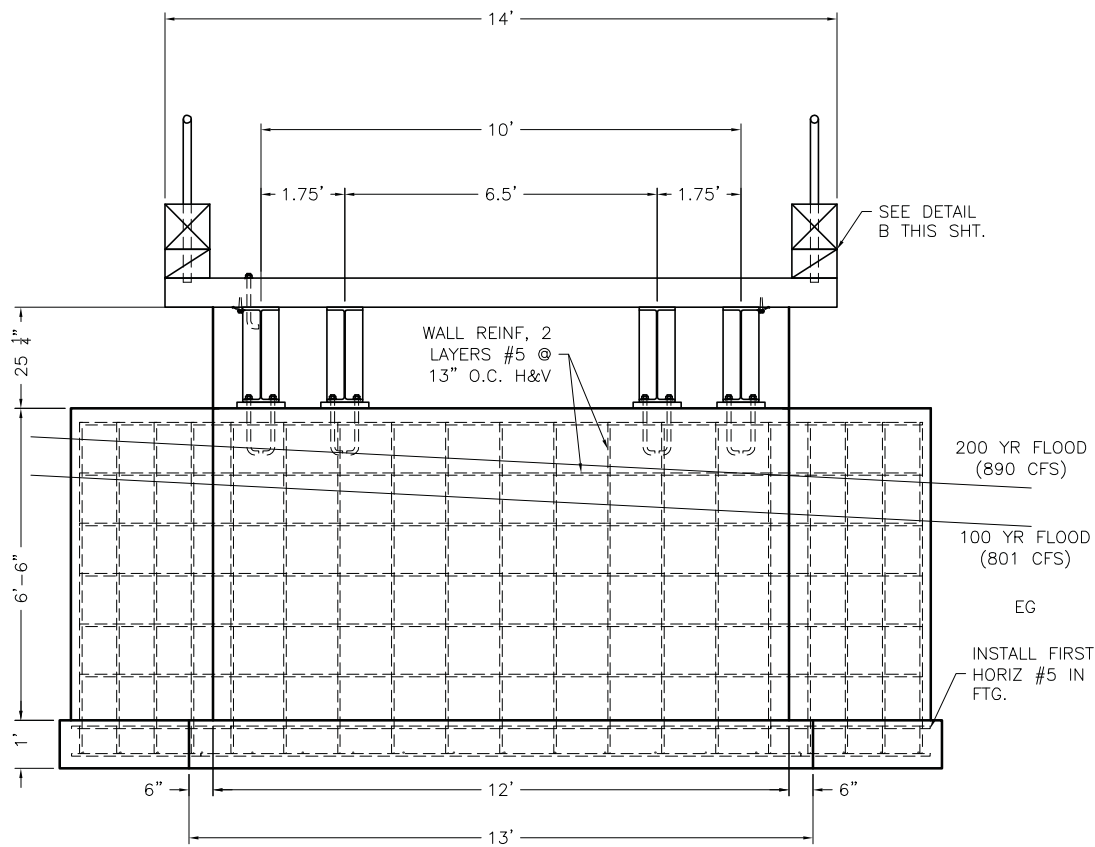


2 BRIDGE ELEVATION  
 SCALE: 1" = 3'

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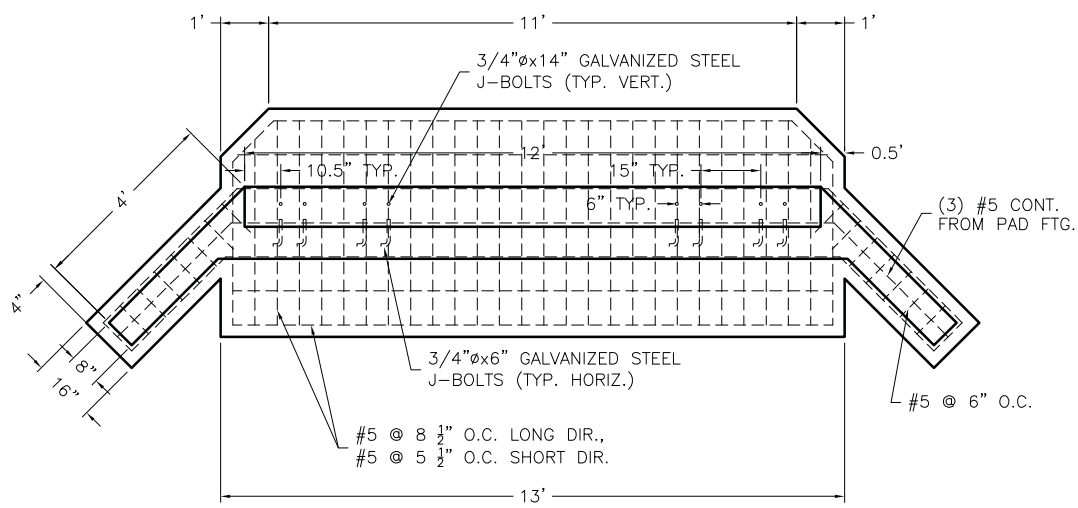
POWERHOUSE ACCESS ROAD BRIDGE  
 PLAN AND PROFILE  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
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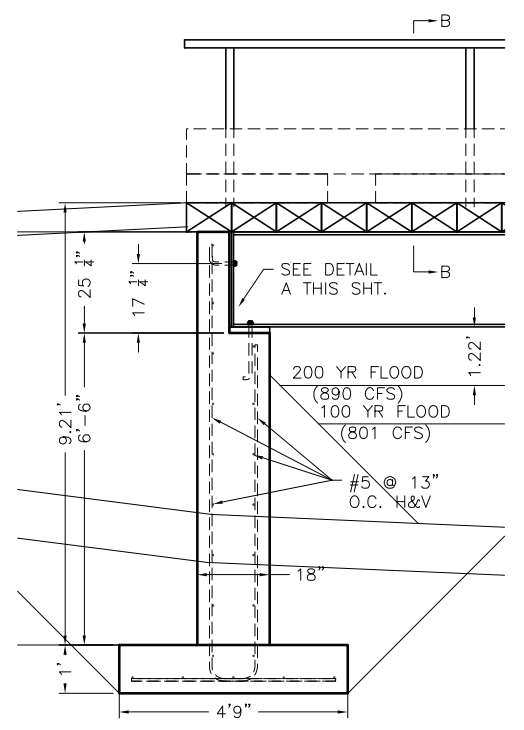


1 BRIDGE ABUTMENT ELEVATION  
SCALE: 1" = 2'

NOTE: PROVIDE 3" CLEARANCE FOR REBAR FROM FACE OF ALL CONCRETE.

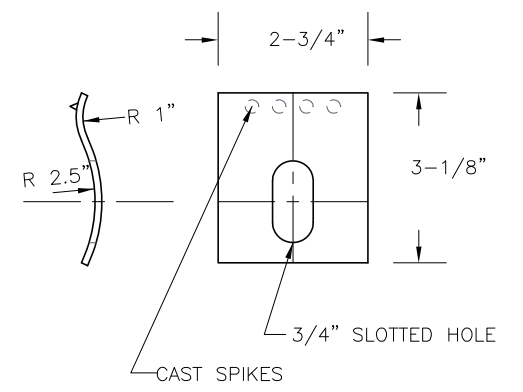


2 BRIDGE ABUTMENT PLAN  
SCALE: 1" = 2'

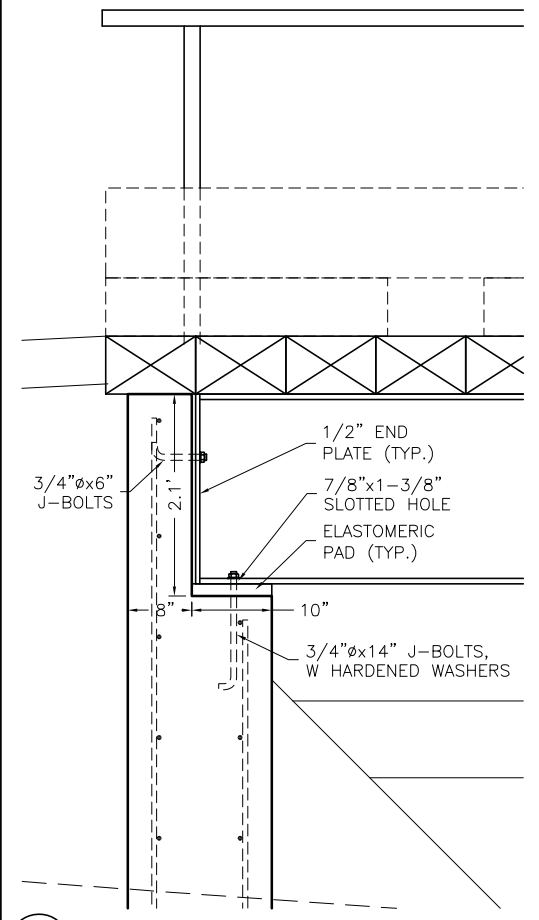


3 BRIDGE ABUTMENT SECTION  
SCALE: 1" = 2'

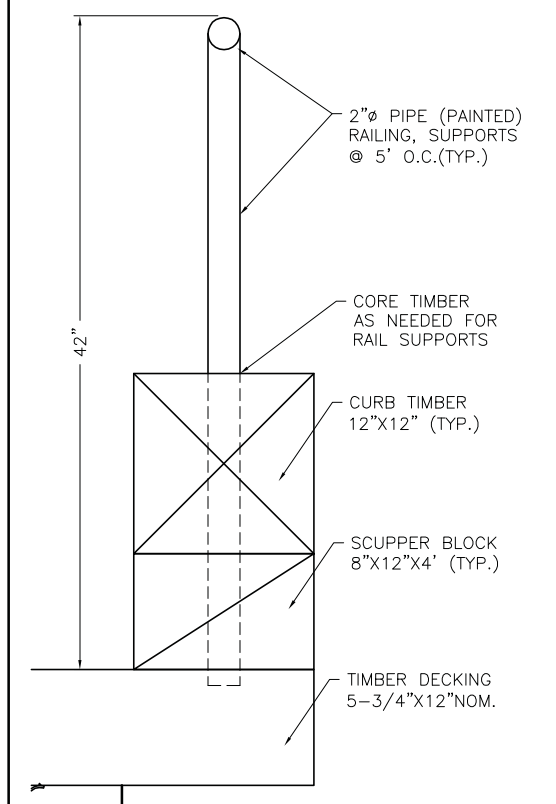
NOTE: INSTALL C-CLIP ON OUTSIDE FLANGE OF EACH DECKING BEAM WITH 1/2"x4" LAG SCREW W/ WASHER.



C CAST-IRON 'C' CLIPS  
SCALE: NTS



A BRIDGE ABUTMENT DETAIL  
SCALE: 1" = 1'



B BRIDGE RAILING DETAIL  
SCALE: 1" = 1/2'



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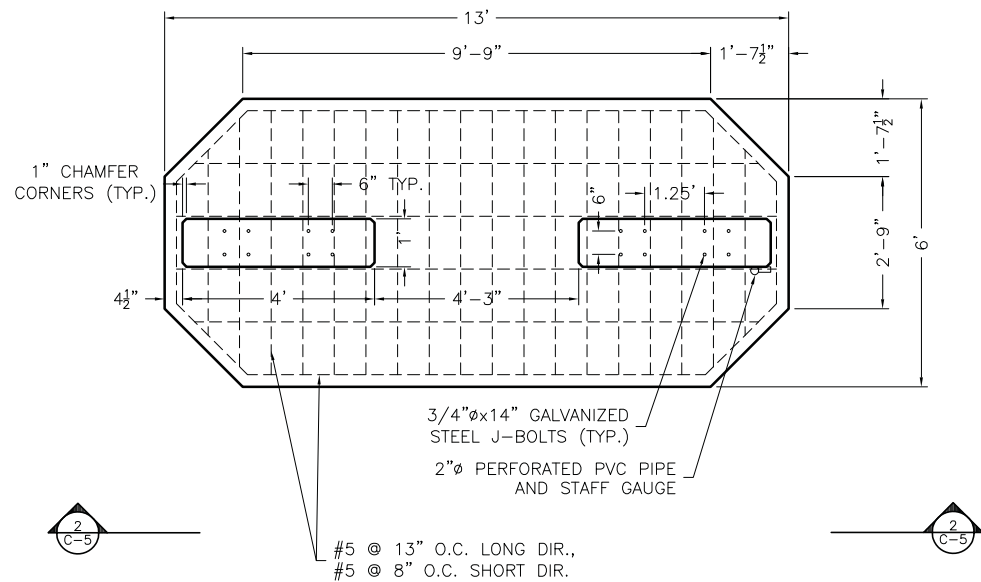
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POWERHOUSE ACCESS ROAD BRIDGE SECTION & DETAILS  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

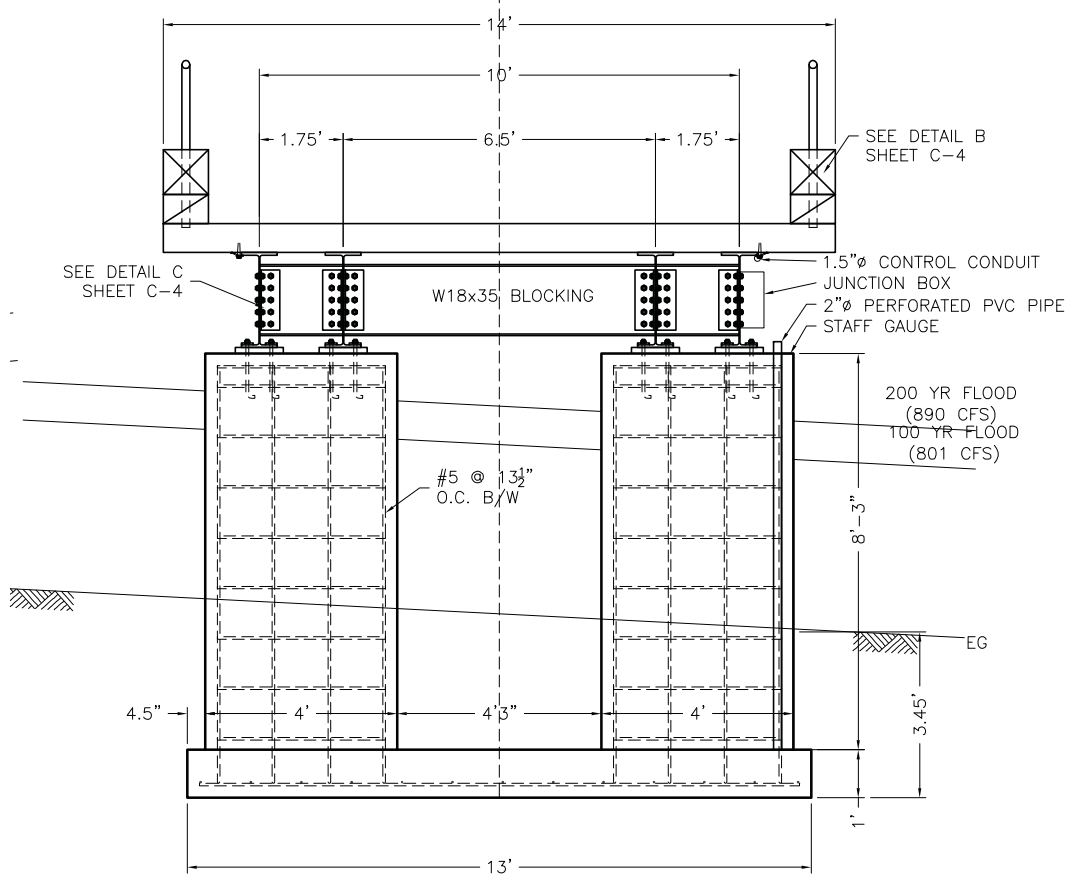
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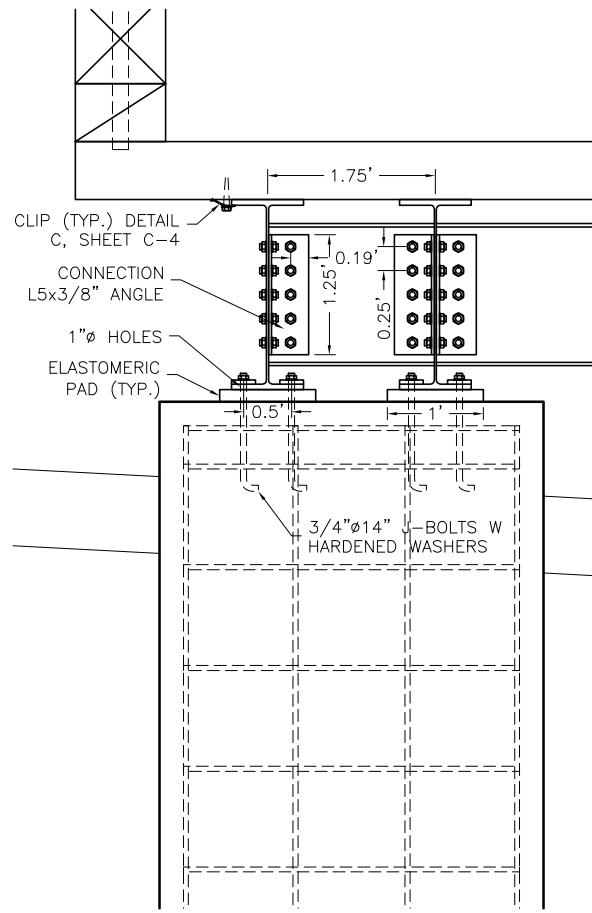
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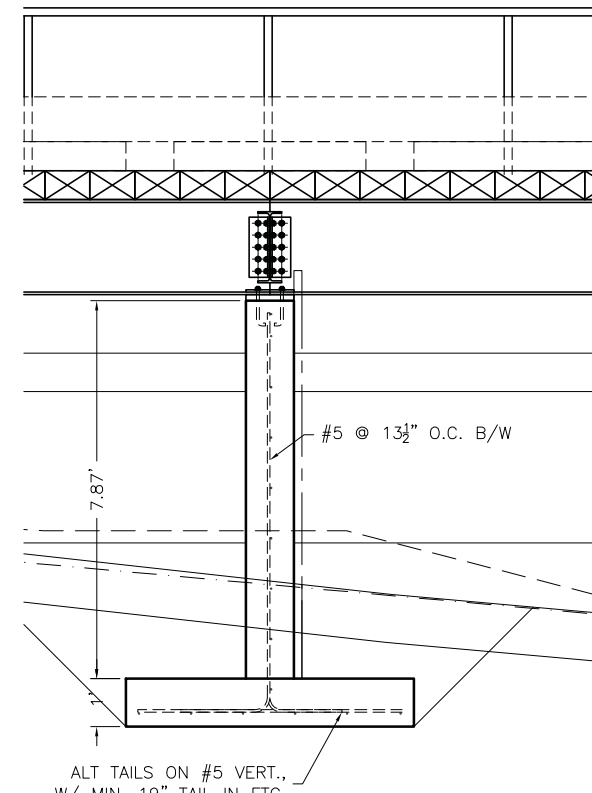
1 BRIDGE PIER PLAN  
SCALE: 1" = 2'



2 BRIDGE PIER ELEVATION  
SCALE: 1" = 2'



3 BRIDGE PIER DETAIL  
SCALE: 1" = 1'



4 BRIDGE PIER SECTION  
SCALE: 1" = 2'

**EARTHWORK:**

1. CLEAR AND REMOVE ORGANIC OVERBURDEN FROM THE BRIDGE ABUTMENTS PRIOR TO PROCEEDING WITH EXCAVATION AND BRIDGE CONSTRUCTION.
2. EXCAVATE FOR CONCRETE STRIP FOOTING TO THE MINIMUM DEPTH SHOWN ON THE DRAWING AND TO COMPETENT MATERIAL. LEVEL WITH WELL GRADED NON-FROST SUSCEPTIBLE GRAVEL AND COMPACT TO 95% MODIFIED PROCTOR. ENGINEER TO VERIFY MATERIAL QUALITY PRIOR TO CONCRETE CONSTRUCTION.
3. DISPOSE OF EXCESS EXCAVATION MATERIAL IN DISPOSAL AREA APPROVED BY THE OWNER OUTSIDE THE FOOTPRINT OF THE PROPOSED PROJECT FOOTPRINT.
4. DEVELOP A PLAN TO LIMIT EROSION AND TRANSPORT OF MATERIAL, INCLUDING WIND BLOWN DEBRIS, INCLUDING BUT NOT LIMITED TO, EROSION FENCING AND BARRIERS AND FILTRATION OR IMPOUND AND SETTLEMENT FACILITIES AS NEEDED.

**CONCRETE:**

1. CONCRETE WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301-05, "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND ACI 318-05, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS UNLESS NOTED OTHERWISE. TYPE III CEMENT MAY BE USED UPON AUTHORIZATION OF ENGINEER AND SHALL REACH DESIGN STRENGTH AT 7 DAYS.
3. ALL CONCRETE SHALL BE SUPPLIED IN BULK BAGS FROM A BATCH PLANT, WRAPPED FOR EXPORT SHIPMENT. SUBMIT DESIGN MIX SHOWING COMPLIANCE WITH SPECIFICATION AND RESULTS OF TRIAL MIXTURE STRENGTHS TO ENGINEER FOR APPROVAL.
4. AGGREGATES FOR CONCRETE SHALL BE WELL-GRADED, CLEAN, HARD GRAVEL AND COARSE SAND, NON-FROST SUSCEPTIBLE MATERIAL AND FREE OF DELETERIOUS MATTER AND COATINGS OF SILT OR CLAY. AGGREGATE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-33. MAXIMUM SIZE OF COARSE AGGREGATE SHALL NOT EXCEED 1-1/2 INCHES. COMBINED COARSE AND FINE AGGREGATES SHALL BE OF SUCH COMPOSITION THAT WHEN SEPARATED ON THE NUMBER 4 STANDARD SIEVE, WEIGHT PASSING SHALL NOT BE LESS THAN 30% NOR GREATER THAN 50% OF THE TOTAL WEIGHT.
5. AIR ENTRAINMENT OF 5% SHALL BE USED IN ALL CONCRETE. ENTRAINMENT SHALL BE ACHIEVED BY THE ADDITION OF AN APPROVED AIR ENTRAINING MIXTURE AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-260.
6. ALL STRUCTURAL CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4.5". HIGHER SLUMPS (UP TO 9" TOTAL) SHALL BE PERMITTED SO LONG AS THEY ARE OBTAINED BY THE ADDITION OF A CHEMICAL ADMIXTURES CONFORMING TO ACI REQUIREMENTS.
7. WATER USED FOR MIXING CONCRETE SHALL BE CLEAN AND FREE OF OIL OR ACID AND SHALL NOT CONTAIN SALT, ALKALI OR ORGANIC MATTER.
8. CONTRACTOR SHALL SECURE ONE (1) TEST CYLINDER IN THE FIELD FROM THE FIRST BATCH OF THE DAY AND ONE RANDOM SAMPLE FROM EACH ABUTMENT IN ACCORDANCE WITH ACI 318. CONTRACTOR SHALL HIRE AN INDEPENDENT TEST LAB TO VERIFY CONCRETE STRENGTH BY STANDARD TESTING PROCEDURES USING QUALIFIED TESTING TECHNICIANS. THE AVERAGE COMPRESSIVE STRENGTH SHALL BE CALCULATED IN ACCORDANCE WITH ACI PROCEDURES AND A REPORT SUBMITTED TO THE ENGINEER SUMMARIZING ALL TESTING RESULTS AND CONCLUSIONS.
9. FORMS SHALL BE OF SUITABLE MATERIAL AND OF A TYPE, SIZE, SHAPE, QUALITY AND STRENGTH TO ENSURE CONSTRUCTION AS DESIGNED.
10. CONCRETE SHALL BE PLACED SO THAT AT NO TIME SHALL CONCRETE FREE FALL MORE THAN SIX (6) FEET. PLACE CONCRETE CONTINUOUSLY FROM ONE SIDE OF AREA TO THE OTHER IN APPROXIMATELY HORIZONTAL LAYERS. NO PARTIALLY COMPLETED SURFACE SHALL BE ALLOWED TO STAND MORE THAN FORTY-FIVE (45) MINUTES BEFORE CONTINUING THE PLACEMENT OF CONCRETE THEREON.
11. MECHANICALLY VIBRATE ALL CONCRETE WHEN PLACED. VIBRATOR SHALL NOT BE MOVED TO TRANSPORT CONCRETE ACROSS POUR.
12. ALL IRREGULARITIES ON EXPOSED SURFACES SUCH AS GRAVEL POCKETS, BOLT HOLES, ETC. SHALL BE NEATLY PAINTED WITH MORTAR OF THE SAME PROPORTIONS AS USED IN CONCRETE.
13. BRIDGE ABUTMENTS SHALL BE POURED CONTINUOUSLY FROM STRIP FOOTING TO FULL HEIGHT. NO EXPANSION OR COLD JOINTS WILL BE ALLOWED EXCEPT WHERE SHOWN ON PLANS.
14. ALL EXPOSED CONCRETE SURFACES SHALL BE COVERED WITH PLASTIC WATERPROOF MEMBRANE, OR EQUAL, FOR SEVEN (7) DAYS.
15. PLACEMENT OF CONCRETE AT AN AMBIENT AIR TEMPERATURE OF LESS THAN FORTY (40) DEGREES FAHRENHEIT OR WHERE FOUNDATION MATERIAL IS FROZEN IS NOT ALLOWED, EXCEPT IN SPECIAL SITUATIONS WHERE AUTHORIZED BY THE ENGINEER.
16. REMOVE STANDING WATER IN FORMS PRIOR TO PLACEMENT OF CONCRETE.

**CONCRETE REINFORCING:**

1. DEFORMED BARS SHALL BE 60 KSI - ASTM A615 (GRADE 60).
2. ALL REINFORCING SHALL BE EPOXY COATED AND SHALL COMPLY WITH ASTM A775.
3. REINFORCING BAR SPACING SHOWN ARE MAXIMUM ON CENTERS. SECURELY TIE ALL BARS IN LOCATION WITH ANNEALED 12 GAUGE IRON WIRE BEFORE PLACING CONCRETE.
4. ALL DOWELS, ANCHOR BOLTS, REBAR, ETC SHALL BE SECURELY HELD IN FORMS BEFORE PLACING OF CONCRETE.
5. LAP SPLICES IN CONCRETE: STAGGER ALTERNATE SPLICES A MINIMUM OF ONE LAP LENGTH. LAP SPLICE LENGTH, #4 BAR = 29", #5 BAR = 35"
6. TYPICAL CLEAR CONCRETE COVERAGE FOR REINFORCING AND EMBEDMENT:  
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH = 3"  
FORMED CONCRETE EXPOSED TO EARTH OR WEATHER = 1.5"
7. IF INTERNAL FORM TIES USED, SHALL BE CONSTRUCTED IN SUCH MANNER THAT AFTER STRIPPING TIES MAY BE REMOVED FOR A DISTANCE AT LEAST ONE (1) INCH BELOW THE CONCRETE SURFACE.

**BOLTS AND NUTS:**

1. BOLTS SHALL CONFORM TO ASTM A490 WITH HEAVY HEX NUTS AND WASHERS. ALL NUTS, WASHERS AND BOLTS SHALL BE HOT DIPPED GALVANIZED.
2. STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A598 WHERE STAINLESS STEEL CALLED FOR.
3. "C" CLIPS SHALL BE GALVANIZED (ASTM A-153) CAST IRON - GRADE 30.

**STRUCTURAL STEEL:**

1. STRUCTURAL STEEL SHAPES AND PLATE SHALL CONFORM TO ASTM A529 GRADE 50, A572 GRADE 50, OR A588 GRADE 50 WITH MINIMUM YIELD STRENGTH OF 50 KSI.
2. STEEL PIPE SHALL CONFORM TO ASTM A53 GRADE B WITH MINIMUM YIELD STRENGTH OF 42 KSI WITH A MINIMUM WALL THICKNESS OF 3/16-INCH OR AS SPECIFIED ON THE DRAWINGS.
3. LATEST AISC AND AWS CODES APPLY. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH LATEST AISC HANDBOOK.
4. ALL WELDING BY WELDERS HOLDING VALID CERTIFICATES AND HAVING CURRENT EXPERIENCE IN TYPE OF WELD SHOWN ON THE DRAWINGS OR NOTES. CERTIFICATES SHALL BE THOSE ISSUED BY AN ACCEPTED TESTING AGENCY.
5. ALL WELDING DONE BY E70 SERIES LOW HYDROGEN RODS. ALL WELDING PER AMERICAN WELDING SOCIETY STANDARDS. CONTRACTOR MAY SHOP WELD OR FIELD WELD AT HIS DISCRETION.
6. ALL STEEL SHAPES AND FABRICATED ASSEMBLIES SHALL BE COATED IN ACCORDANCE WITH "STEEL COATINGS" SPECIFICATION SECTION.
7. SUBMIT SHOP DRAWINGS OF STEEL SHOP FABRICATED ASSEMBLIES TO ENGINEER FOR APPROVAL.
8. INSTALL ANCHORING DEVICES AND FASTENERS AS SHOWN AND AS NECESSARY FOR SECURING METAL FABRICATIONS TO THE BRIDGE ABUTMENT AS SPECIFIED.

**STEEL COATINGS:**

1. ALL STEEL SHAPES AND FABRICATED ASSEMBLIES SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A123, G90.
2. PREPARE ALL WELDED MATERIALS TO BE COATED BY BLASTING OR GRINDING TO A SP-10 FINISH, AND CLEAN TO REMOVE ALL DUST, WATER AND OILS PRIOR TO INSTALLATION OF HOT DIP GALVANIZING COATING.
3. REPAIR DAMAGED GALVANIZED SURFACES. ALL FIELD WELDED JOINTS AND CUT MEMBERS WITH GALVILITE COLD GALVANIZING COMPOUND. WIRE BRUSH SURFACE TO BE COATED TO REMOVE ALL LOOSE MATERIAL, SCALE AND WASH CLEAN. APPLY 3 COATS OF MINIMUM 1.5 MILS DRY FILM THICKNESS PER COAT.

**BEARING PADS:**

1. BEARING PADS SHALL BE 1/2-INCH THICK ELASTOMER IN ACCORDANCE WITH AASHTO M251-04 WITH A SPECIFIED SHORE A SCALE HARDNESS OF 60 ±5 DUROMETERS. THE ELASTOMER COMPOUNDS SHALL BE CLASSIFIED AS LOW-TEMPERATURE GRADE 4 AS SPECIFIED BY THE GRADE REQUIREMENTS OF TABLE 14.7.5.2-2, "LOW TEMPERATURE ZONES AND MINIMUM GRADE OF ELASTOMER" OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

**TIMBER MATERIALS:**

1. ALL MATERIAL TO BE #2 DOUGLAS FIR OR BETTER.
2. ALL LUMBER SHALL BE TREATED WITH PENTACHLOROPHENOL IN TYPE A OIL CONFORMING TO AWPA STANDARD C-28, C-14, P-9 & U1-07. RETENTION LEVEL SHALL BE 0.6 PCF AS PER AWPA STANDARD C-28.

**CLEANUP:**

1. REMOVE ALL EXCESS BUILDING MATERIALS AND DEBRIS FROM AREA.
2. REVEGETATE DISTURBED ORGANIC AREAS IN ACCORDANCE WITH EARTHWORK SPECIFICATION.



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NO.	DATE	REVISIONS

POWERHOUSE ACCESS ROAD BRIDGE  
SECTION & DETAILS  
SPECIFICATIONS  
PACKERS CREEK HYDROELECTRIC PROJECT  
CHIGNIK LAGOON POWER UTILITY  
Chignik Lagoon, AK

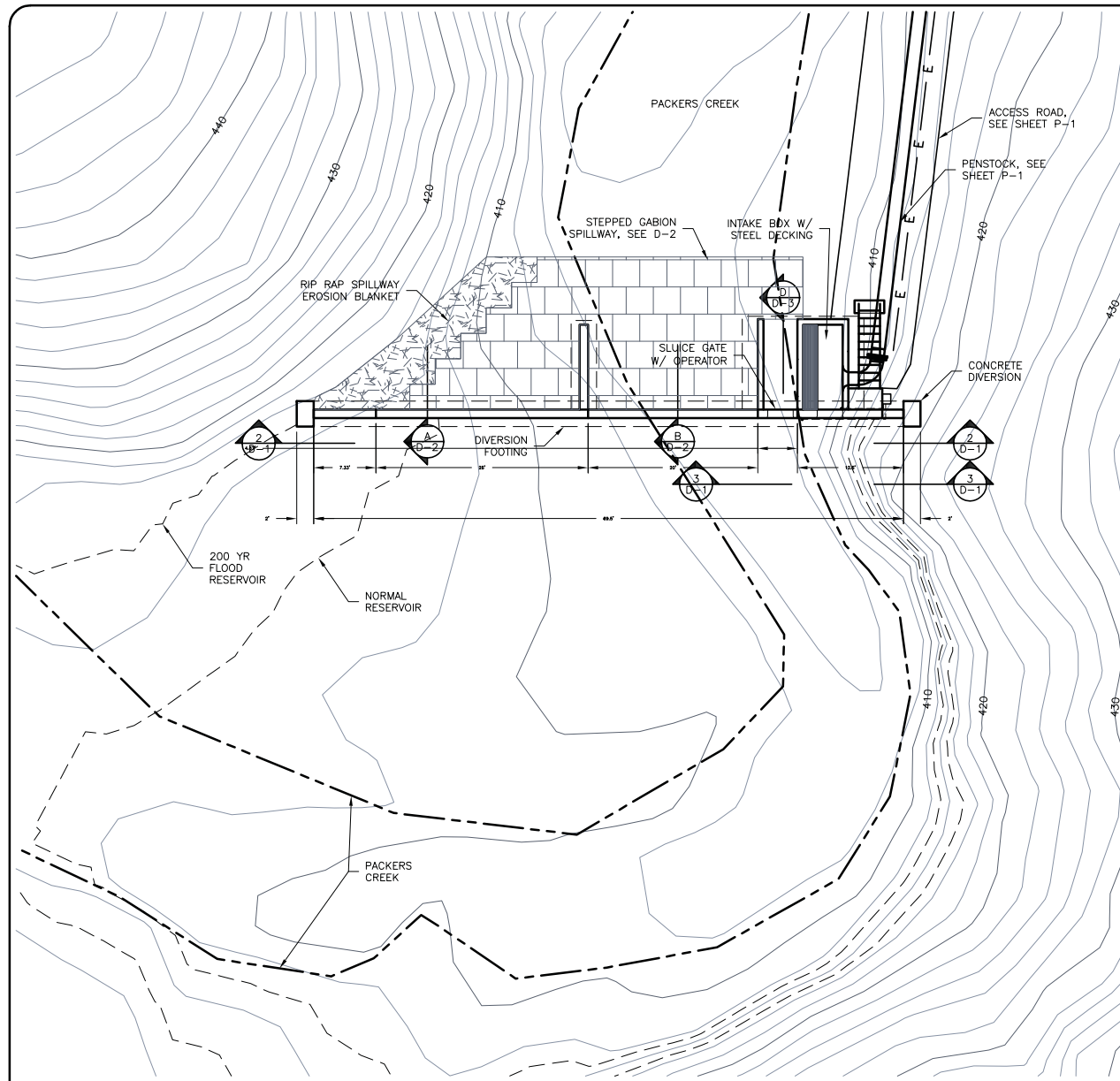
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FILE: PackersCrkHydro

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OF 6

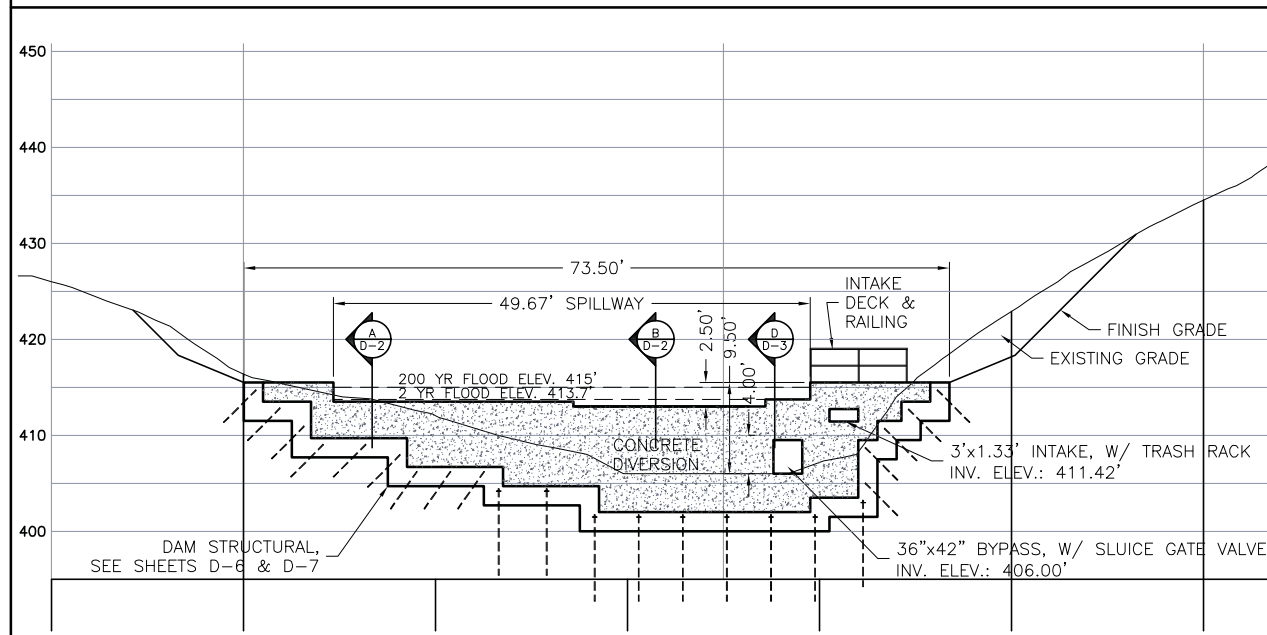
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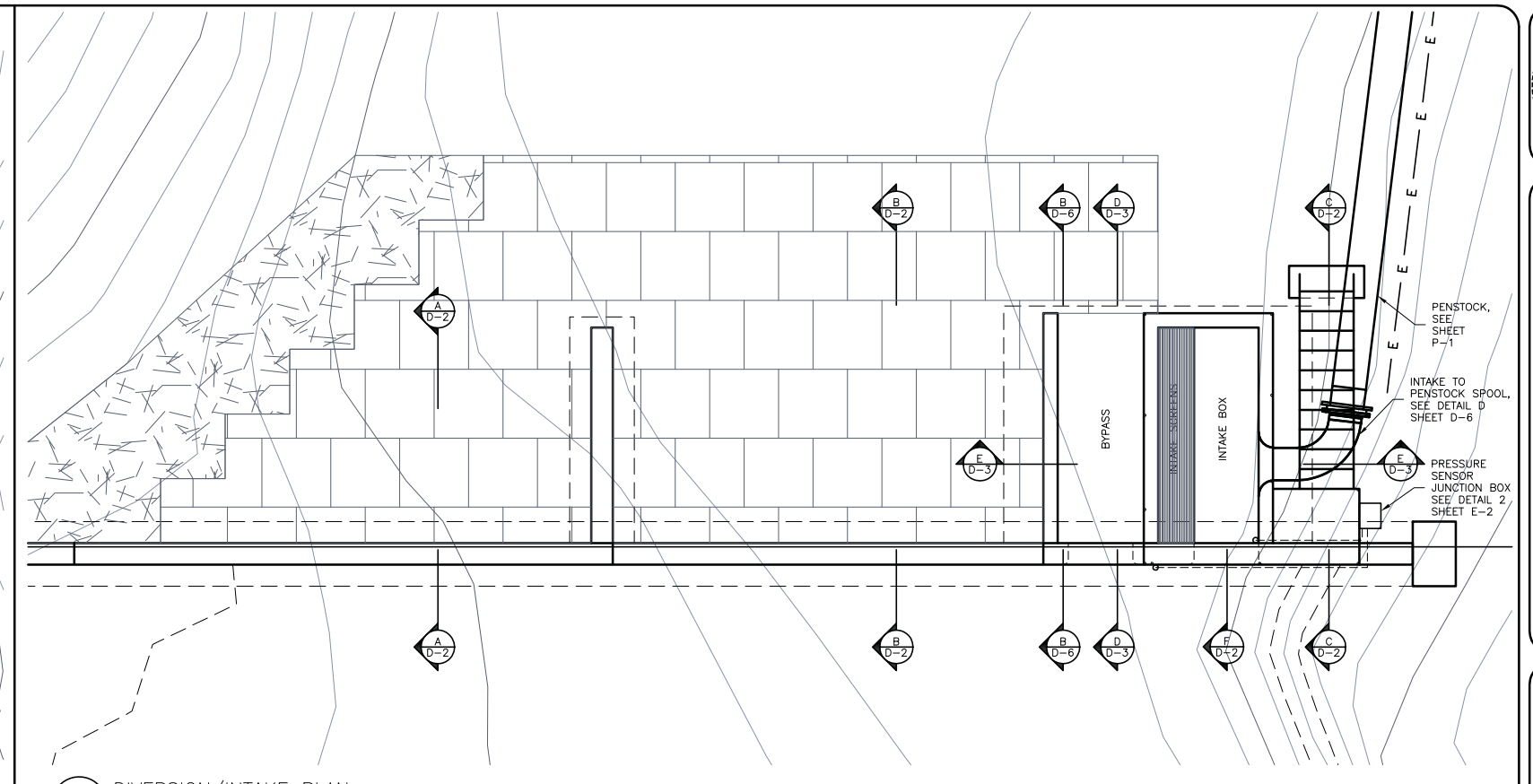




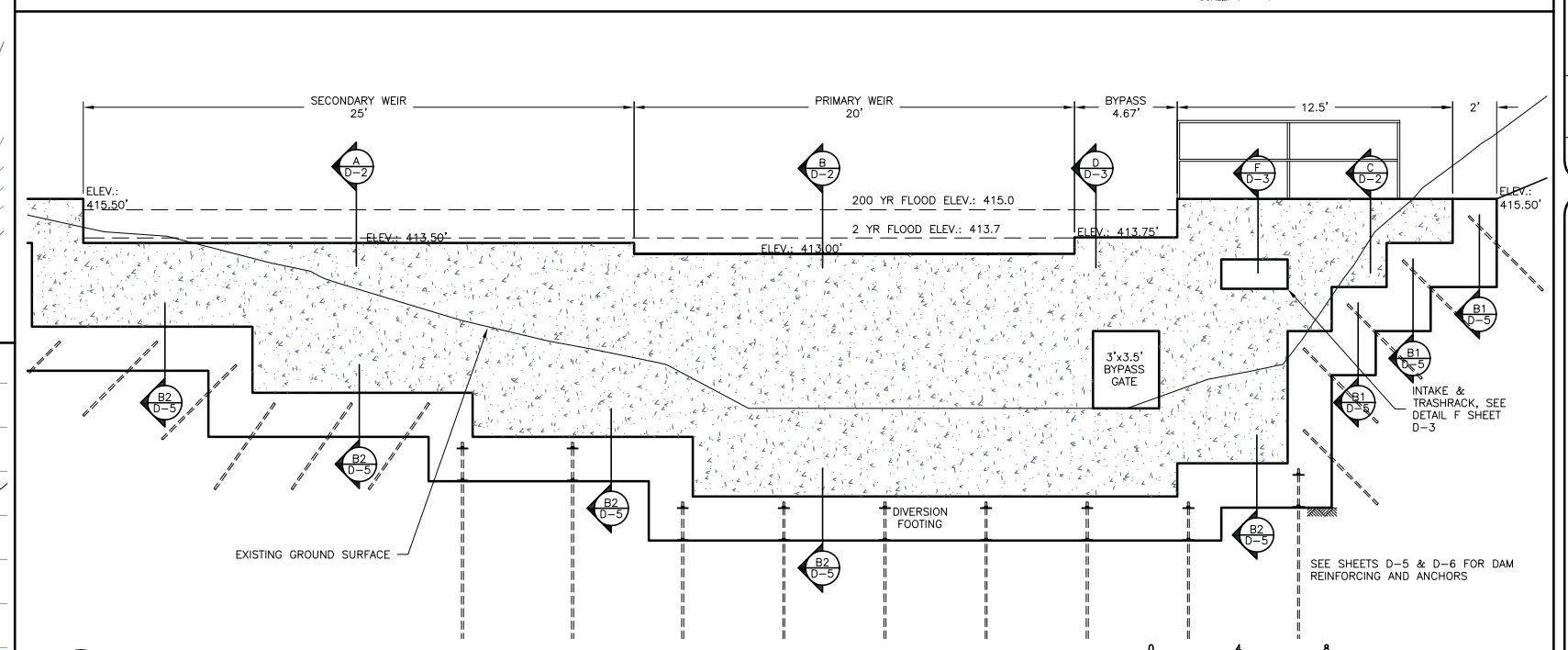
**1** DIVERSION PLAN  
SCALE: 1" = 10'



**2** DIVERSION ELEVATION  
SCALE: 1" = 10'



**3** DIVERSION/INTAKE PLAN  
SCALE: 1" = 4'



**4** DIVERSION/INTAKE ELEVATION  
SCALE: 1" = 4'

**INTAKE MATERIAL QUANTITIES (NEAT)**  
 CONCRETE: 63 CYD  
 ROCK ANCHORS: 18 EACH  
 GABION FILL: 67 CYD  
 12"- RIP-RAP: 10 CYD

ISSUED FOR CONSTRUCTION



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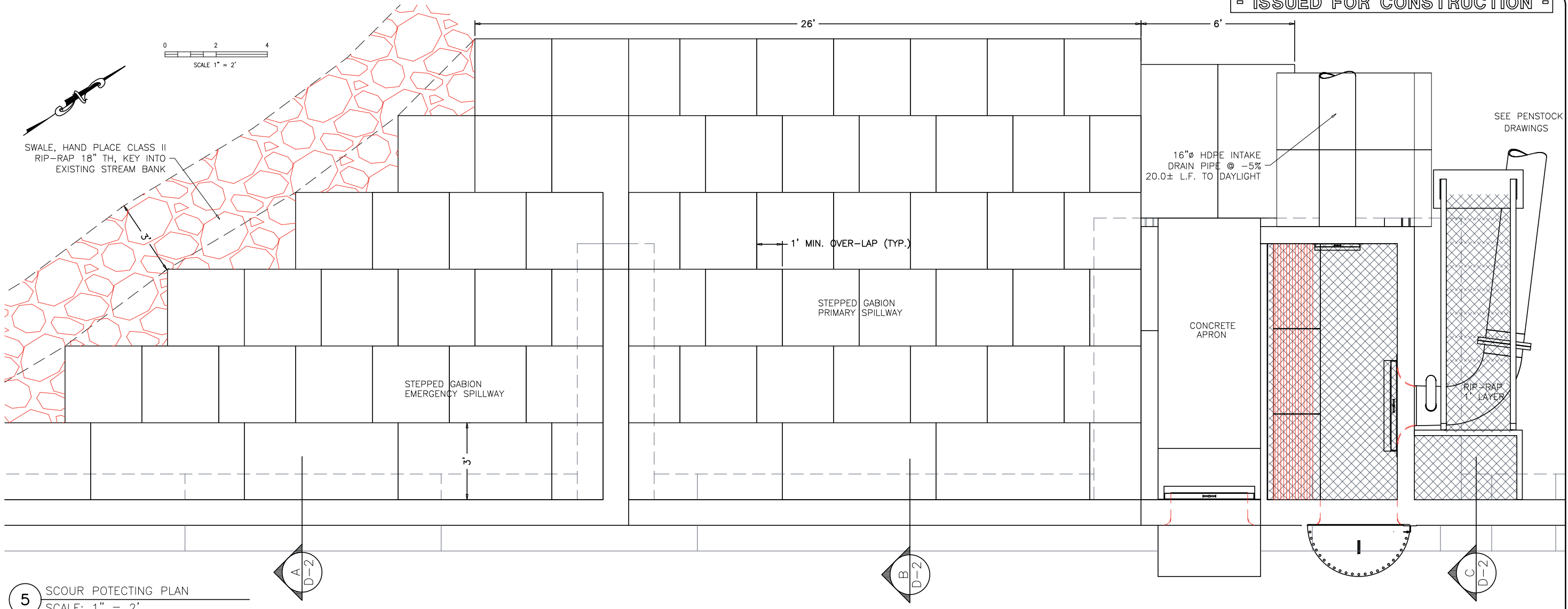
**DIVERSION PLAN & ELEVATION**  
**INTAKE PLAN & ELEVATION**  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
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 FILE: PackersCrkHydro

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**D-1**  
 OF 7

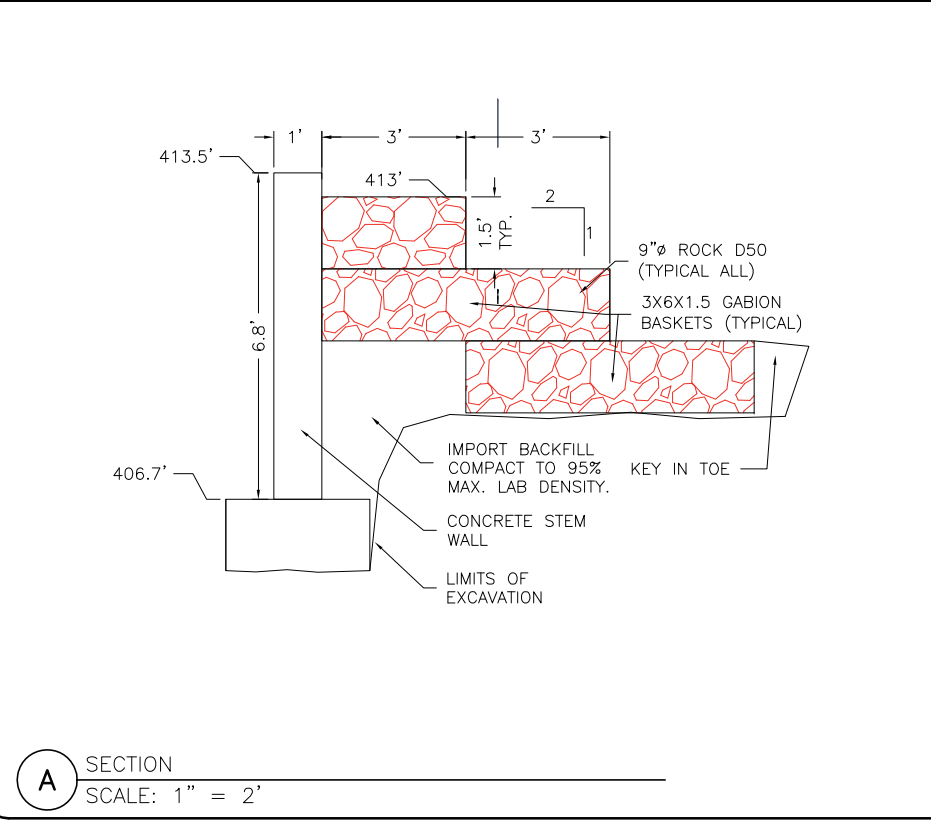


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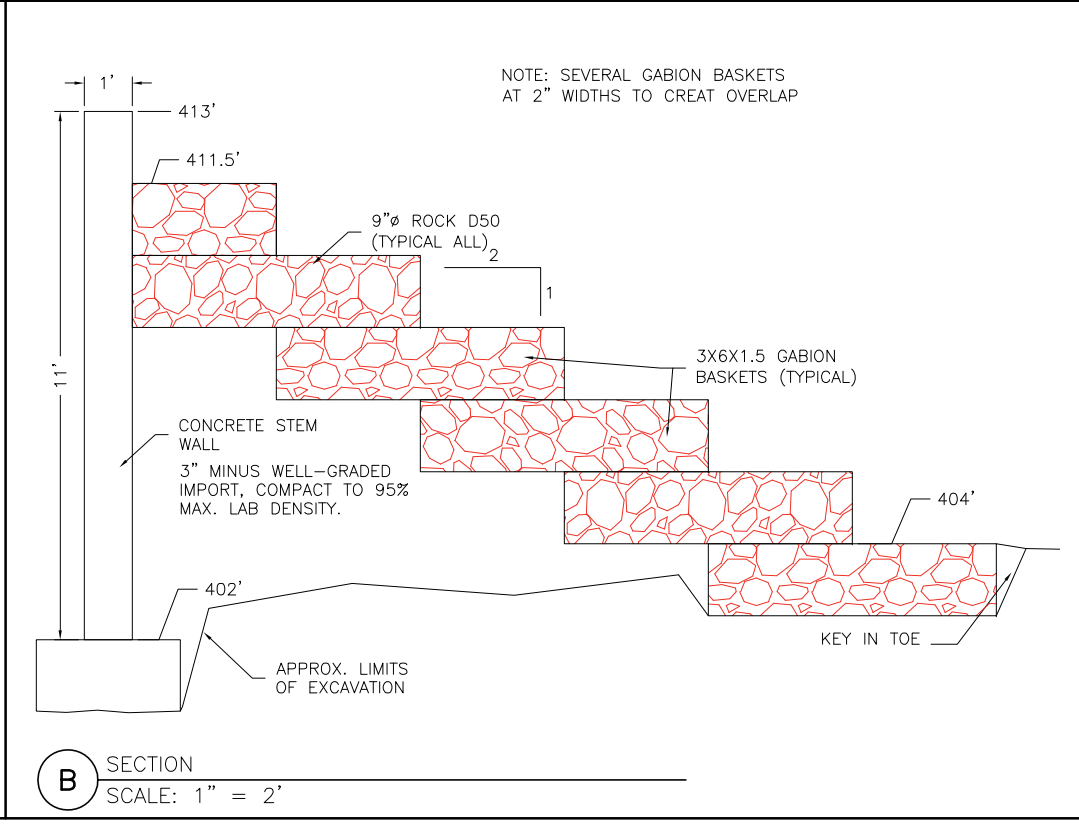


**5** SCOUR PROTECTING PLAN  
 SCALE: 1" = 2'

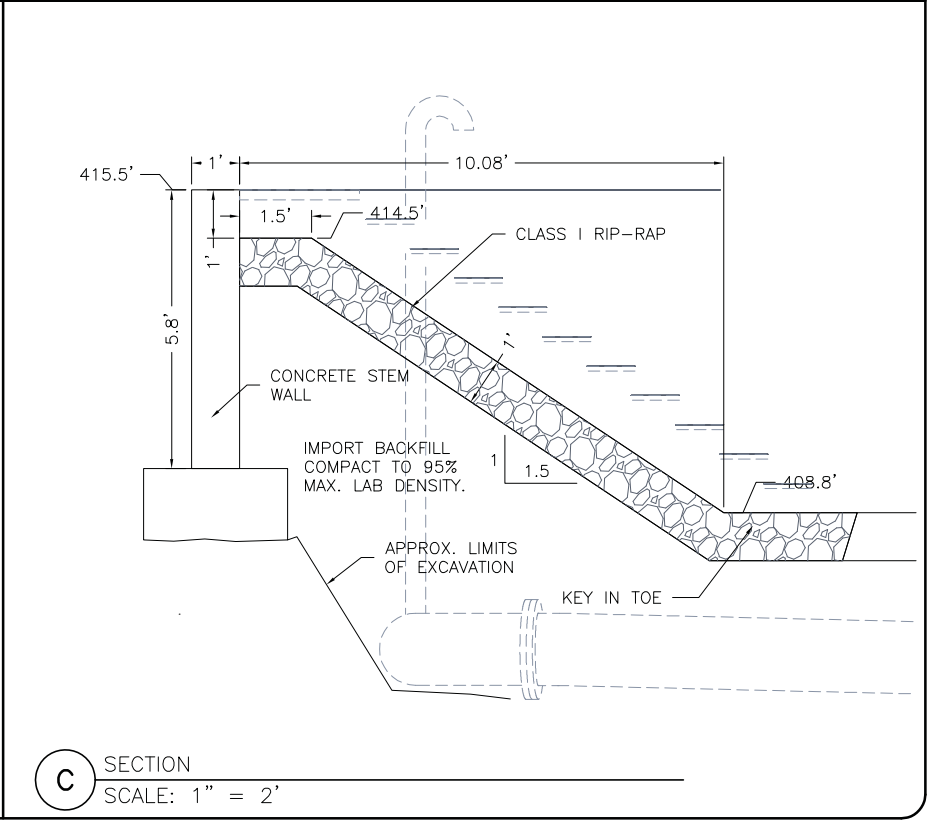
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**A** SECTION  
 SCALE: 1" = 2'



**B** SECTION  
 SCALE: 1" = 2'



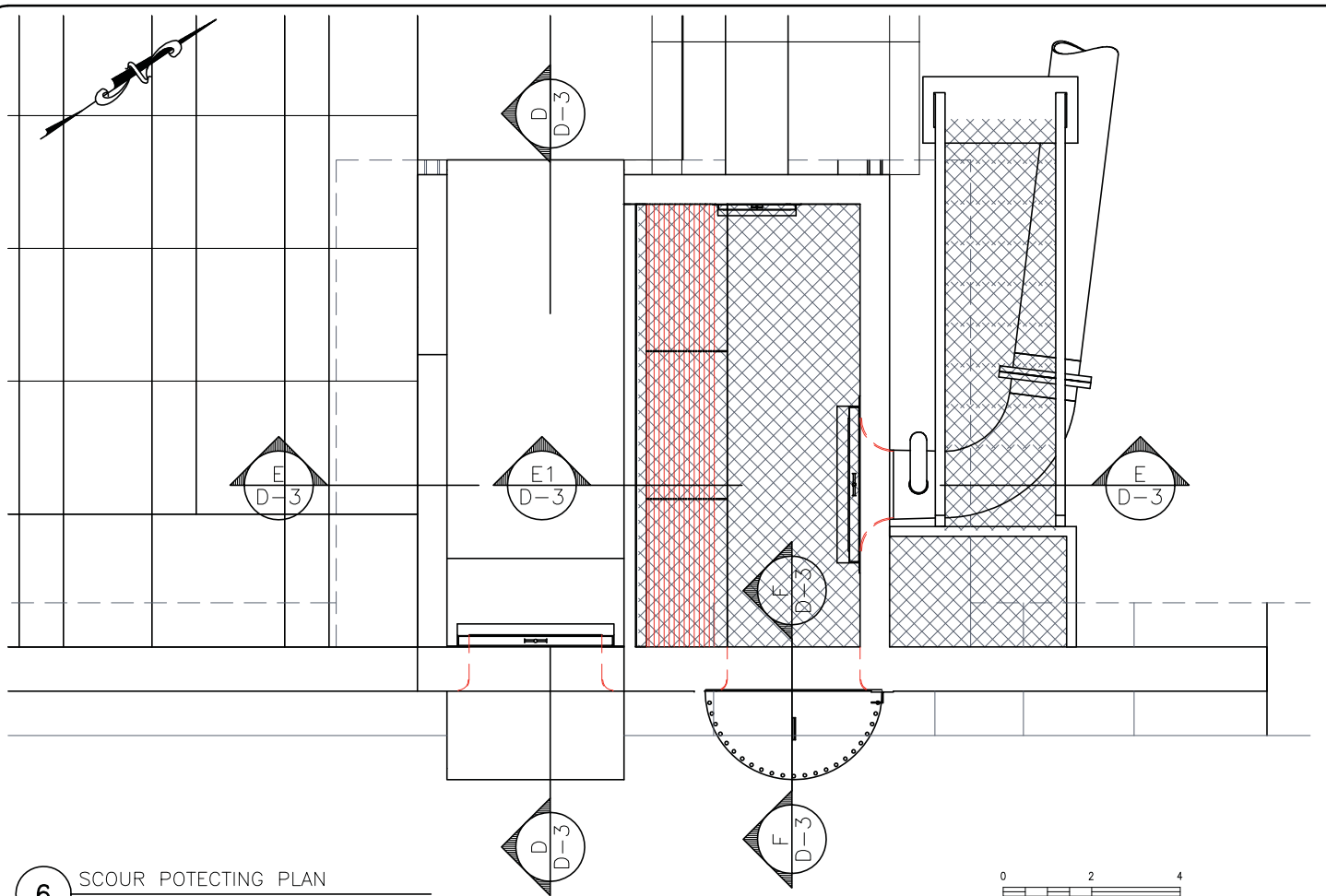
**C** SECTION  
 SCALE: 1" = 2'

Project  
**INTAKE CIVIL SITEWORK**  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

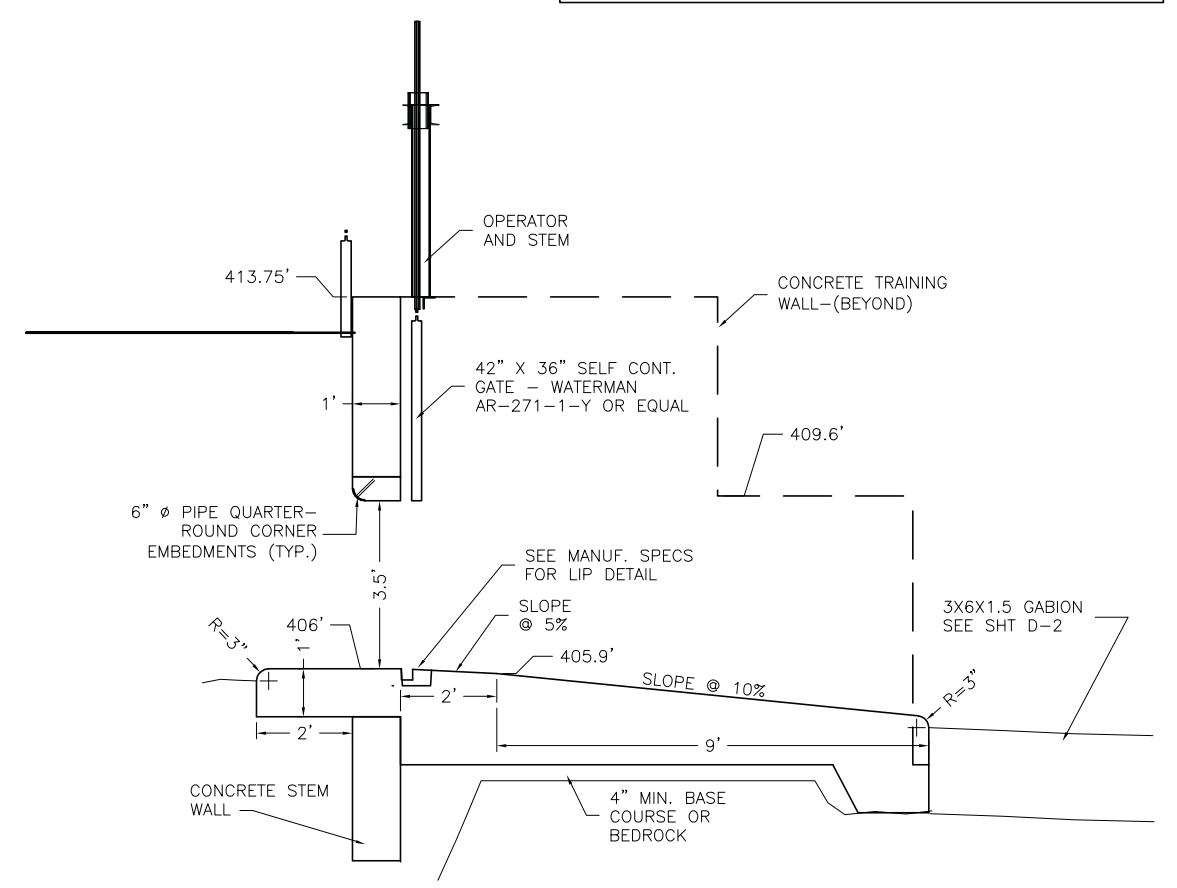
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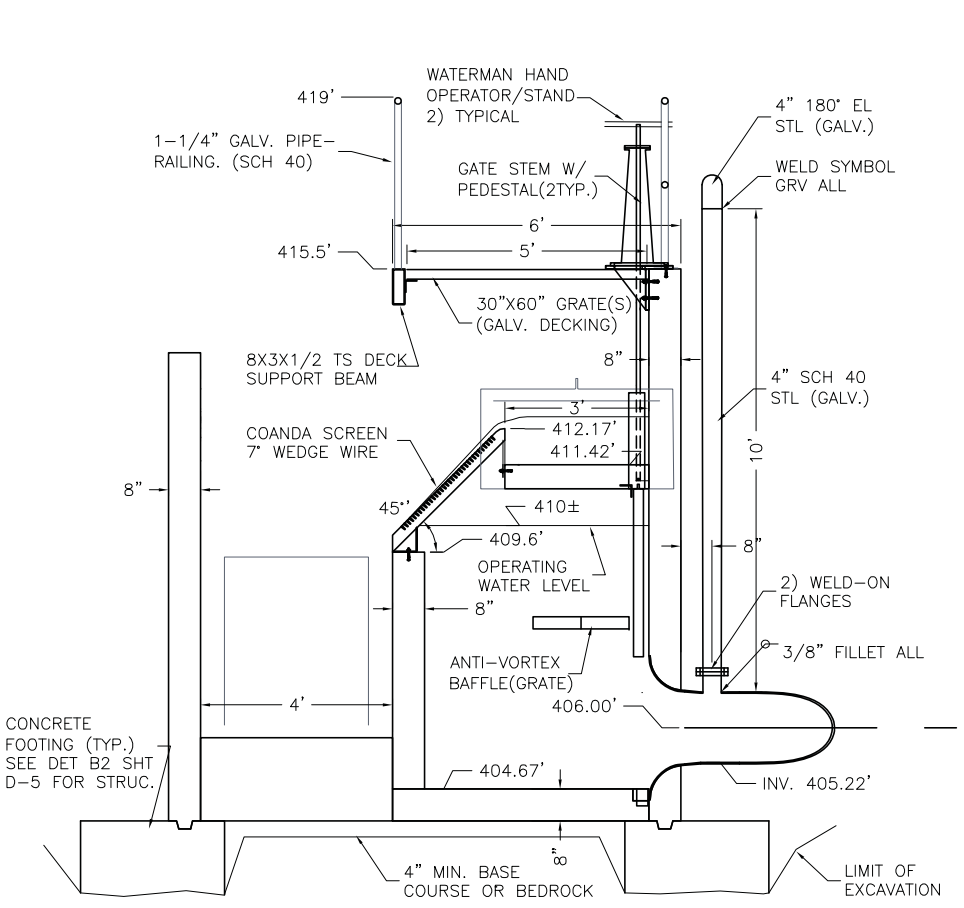
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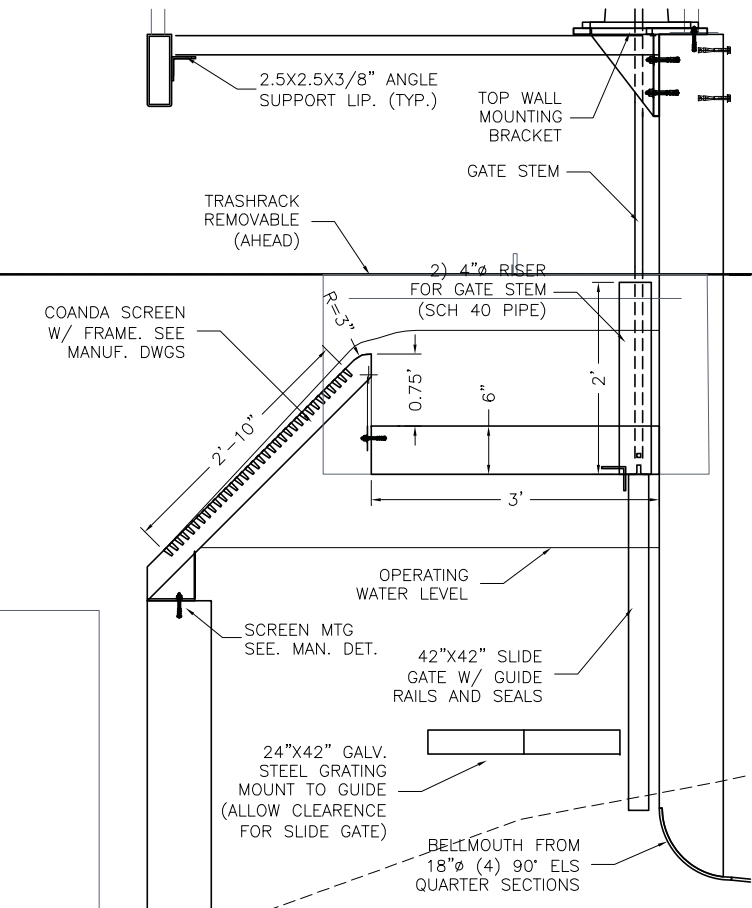
**6** SCOUR POTECTING PLAN  
 SCALE: 1" = 2'-0"



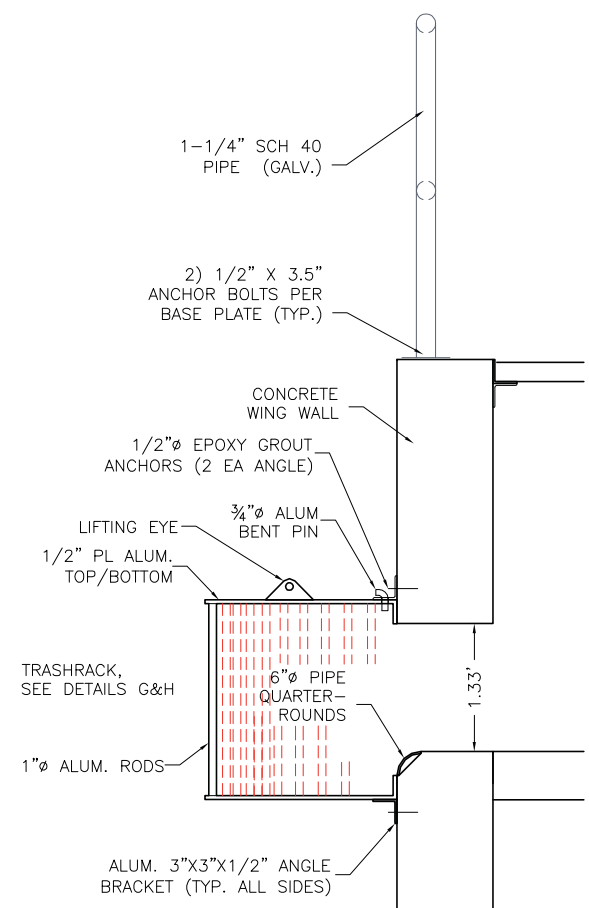
**D** SLUICE GATE / APRON SECTION  
 SCALE: 1" = 2'-0"



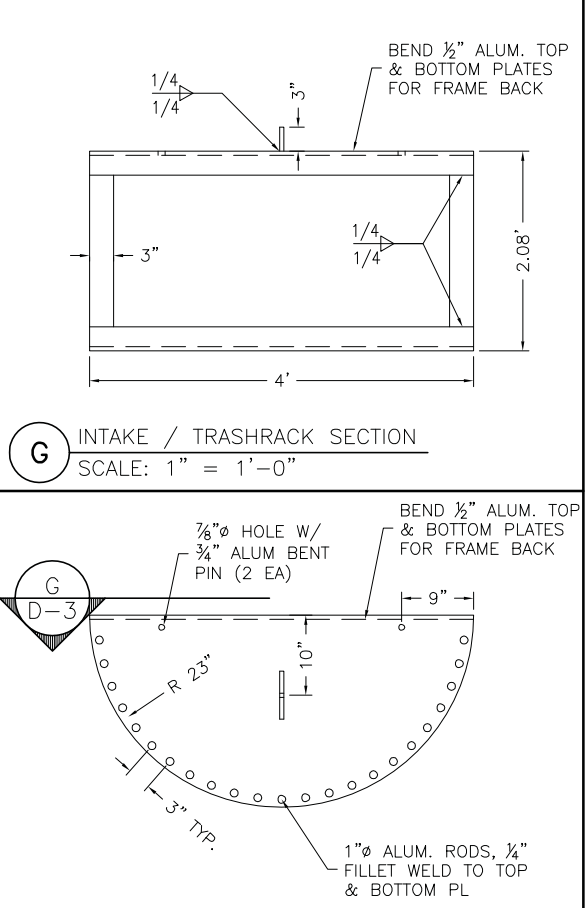
**E** INTAKE BOS W/ SCREEN SECTION  
 SCALE: 1" = 2'-0"



**E1** SCREEN / WEIR DETAIL SECTION  
 SCALE: 1" = 1'-0"



**F** INTAKE / TRASHRACK SECTION  
 SCALE: 1" = 1'-0"



**H** INTAKE / TRASHRACK PLAN  
 SCALE: 1" = 1'-0"

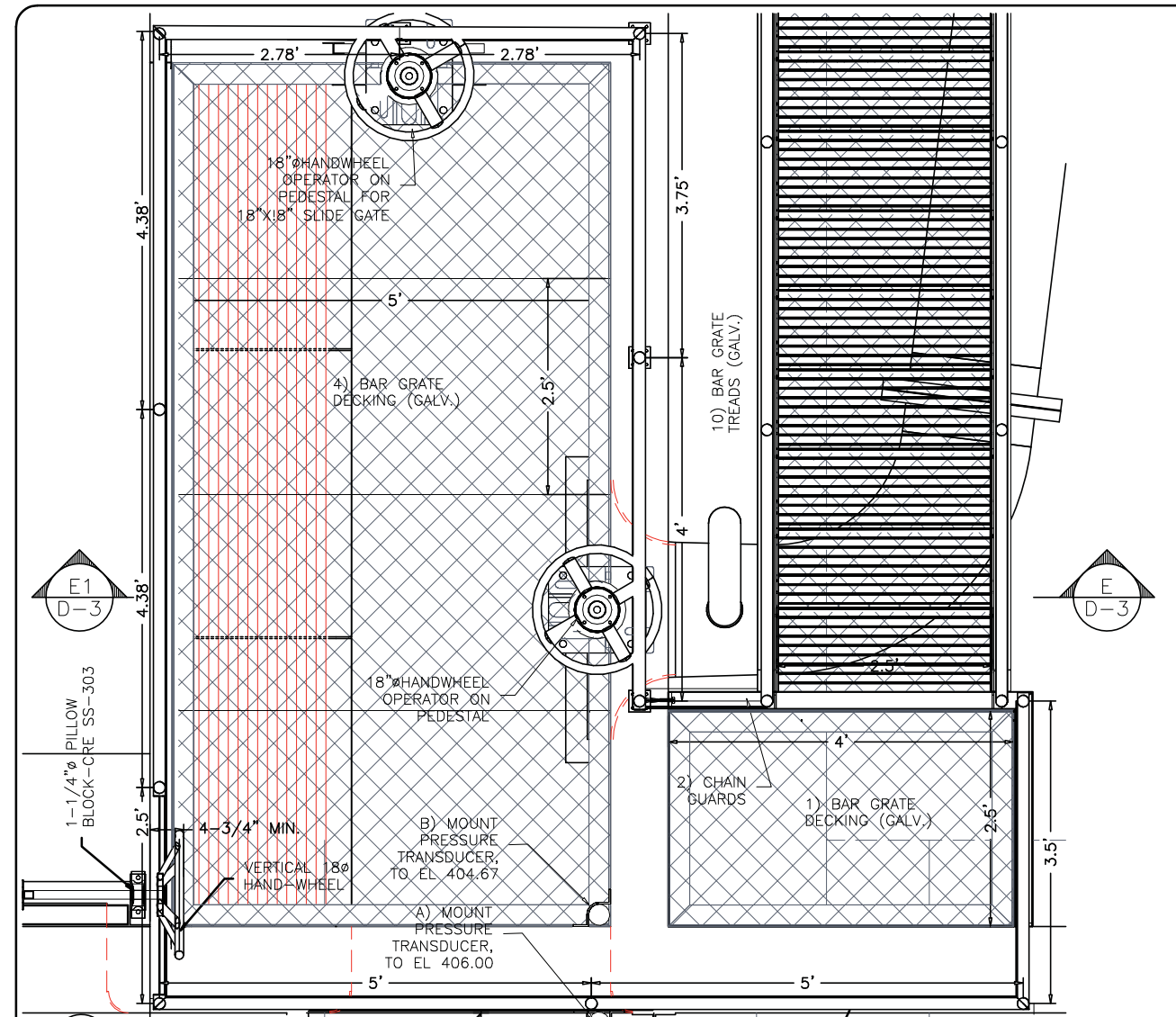
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**INTAKE SECTION & DETAILS**  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

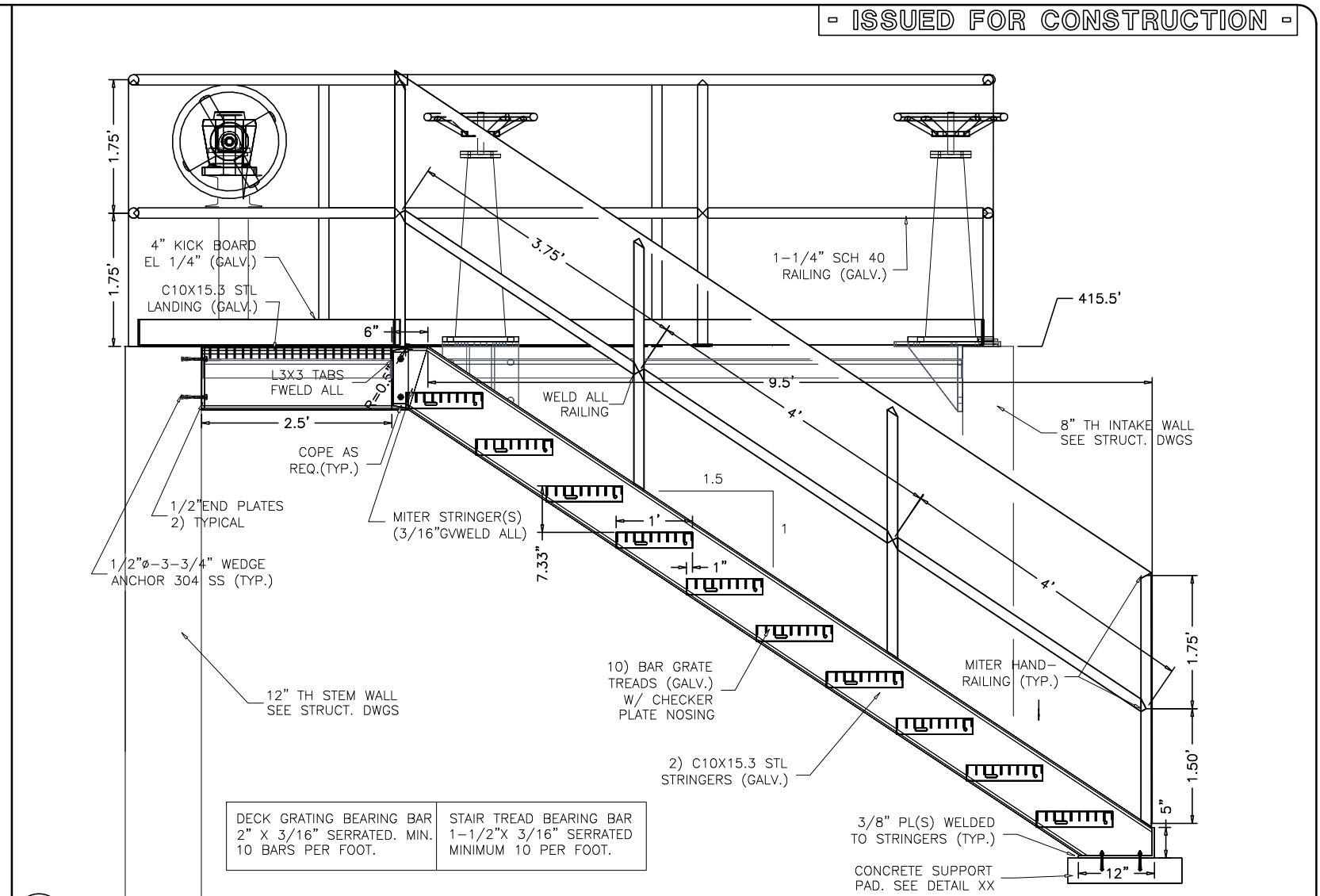
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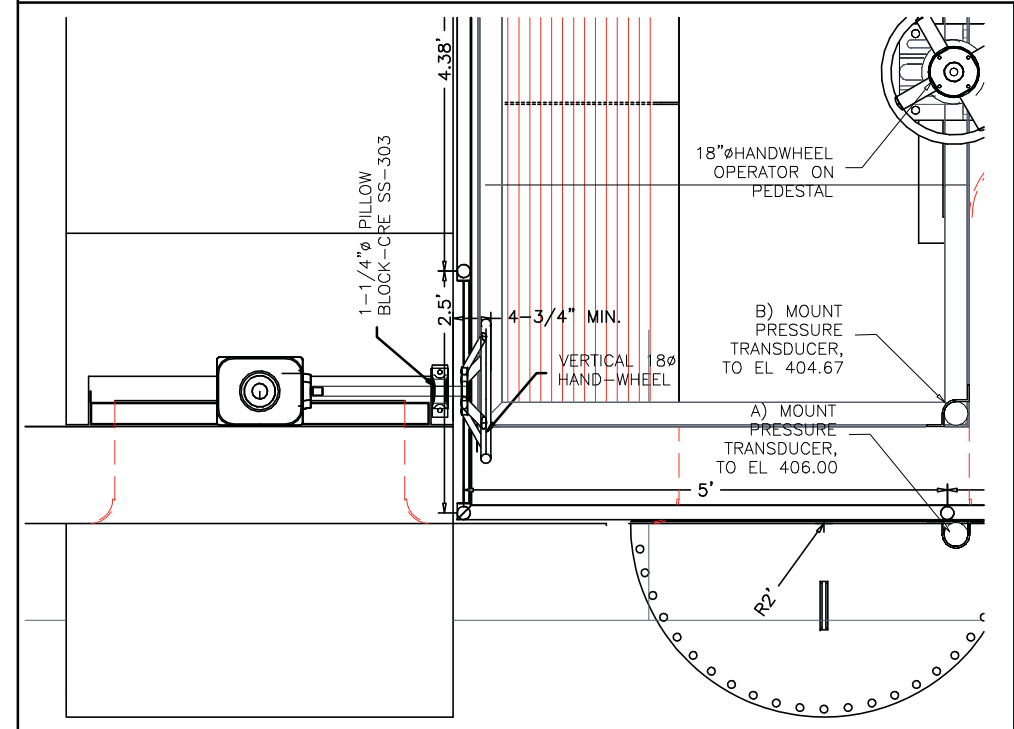
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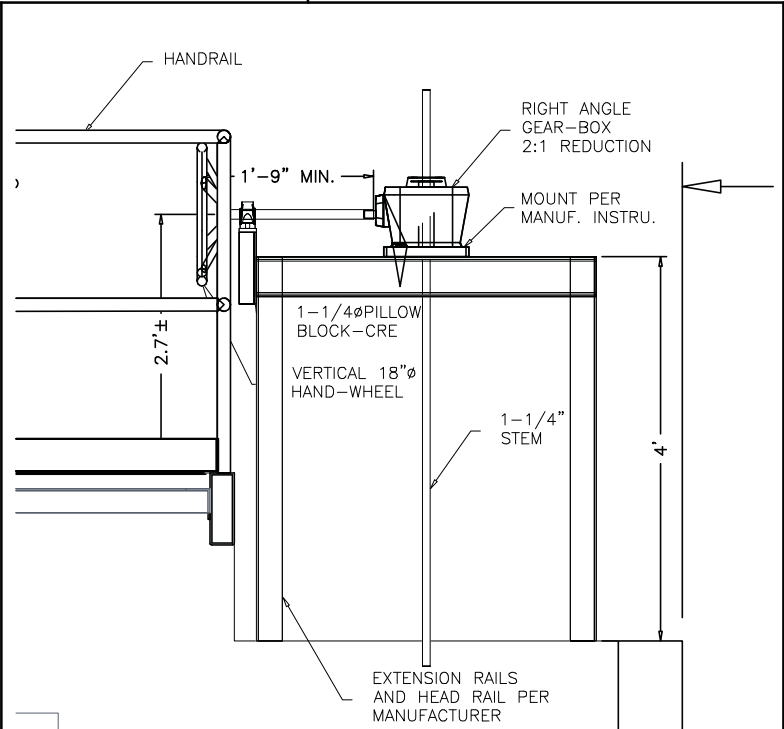
7 STAIR/LANDING/RAILING PLAN  
 SCALE: 1" = 1'



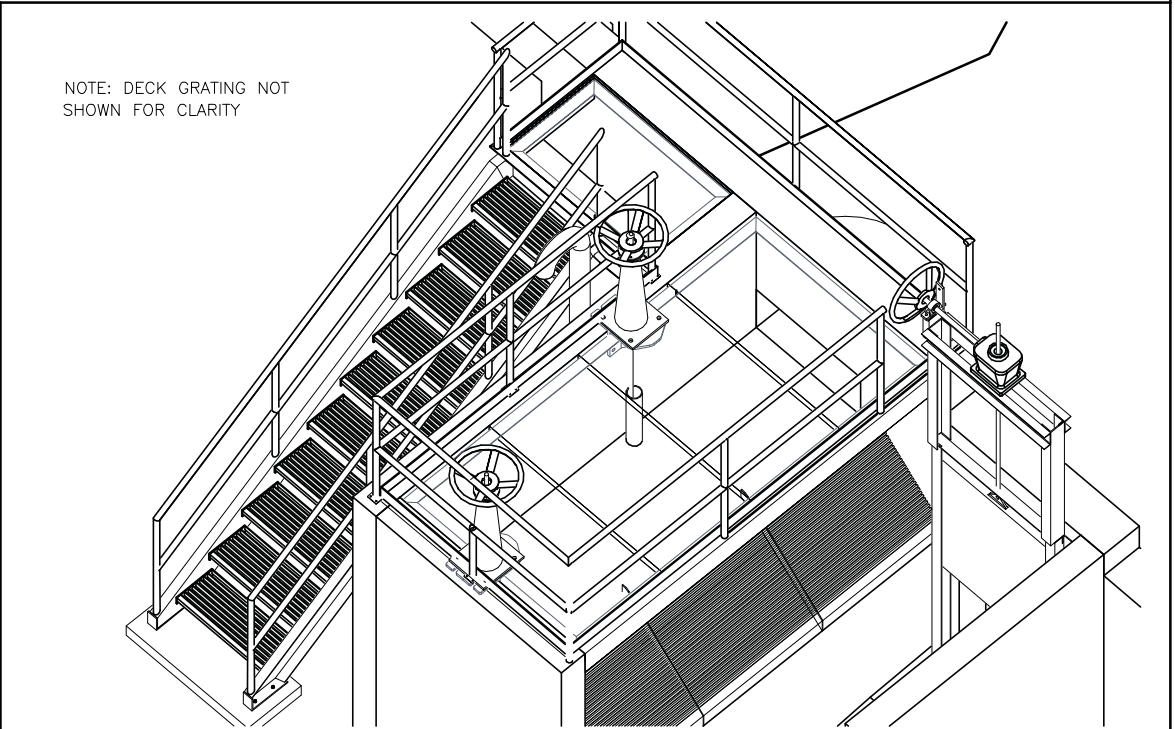
8 STAIR / LANDING ELEVATION  
 SCALE: 1" = 1'



9 MANUAL GATE OPERATOR PLAN  
 SCALE: 1" = 1'



10 MANUAL GATE OPERATOR ELEVATION  
 SCALE: 1" = 1'



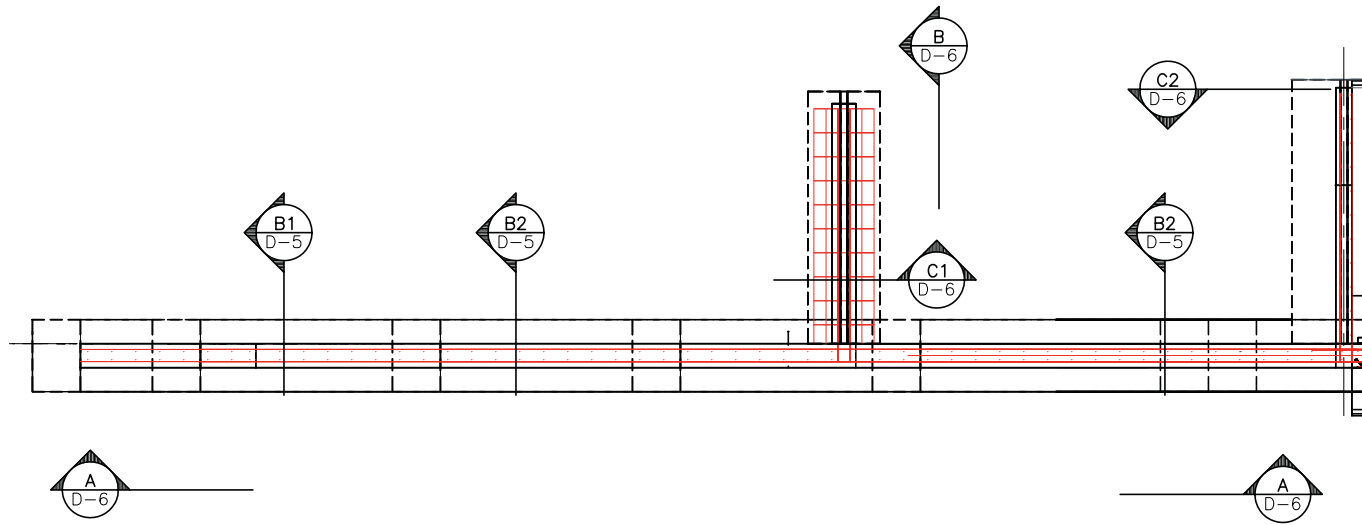
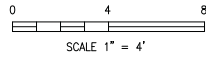
11 ISOMETRIC VIEW - DECK LAYOUT  
 SCALE: NTS

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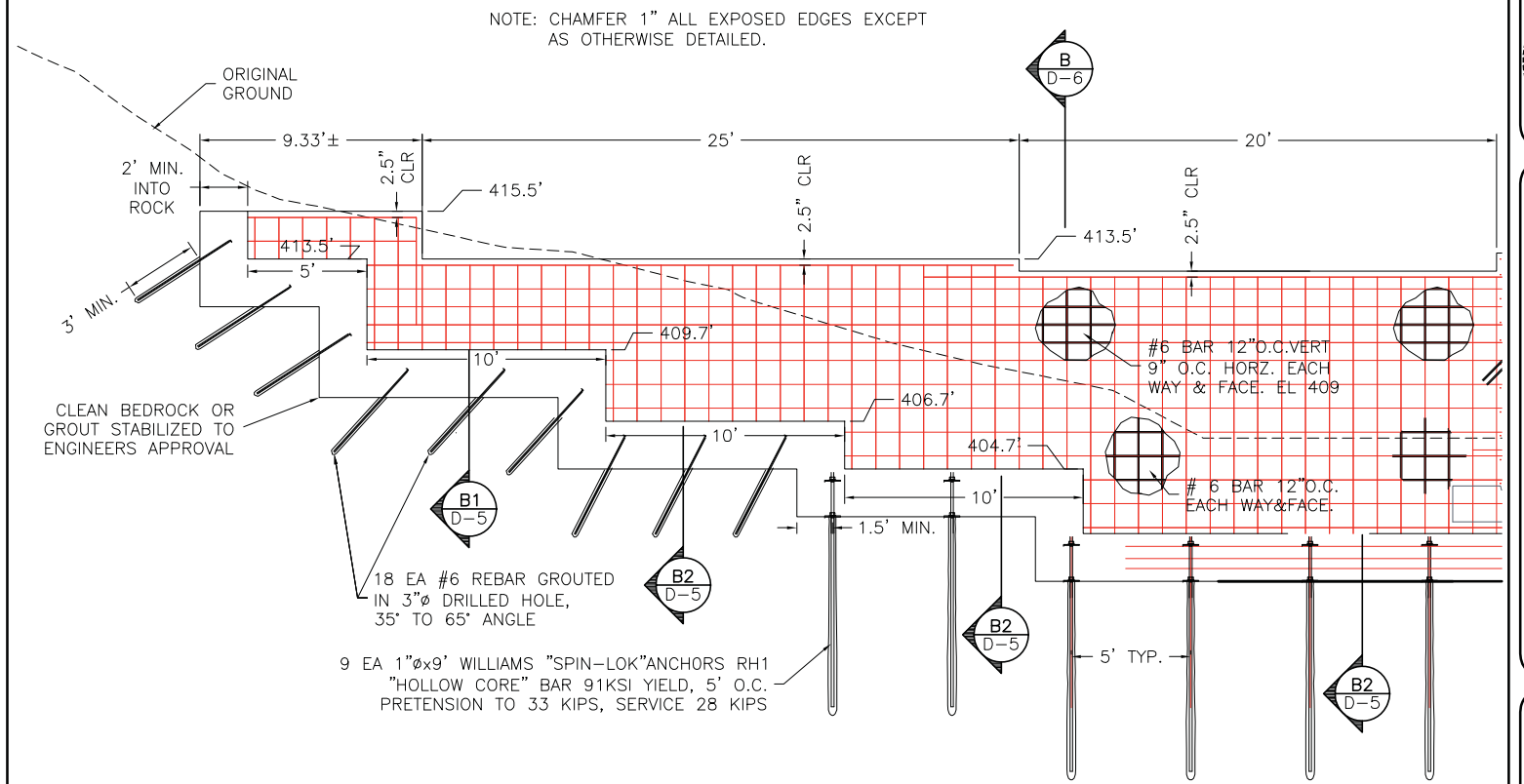
INTAKE SECTION & DETAILS  
 PROJECT: PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
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 DRAWN: MDD  
 CHECKED: AsNoted  
 FILE: PackersCrkHydro

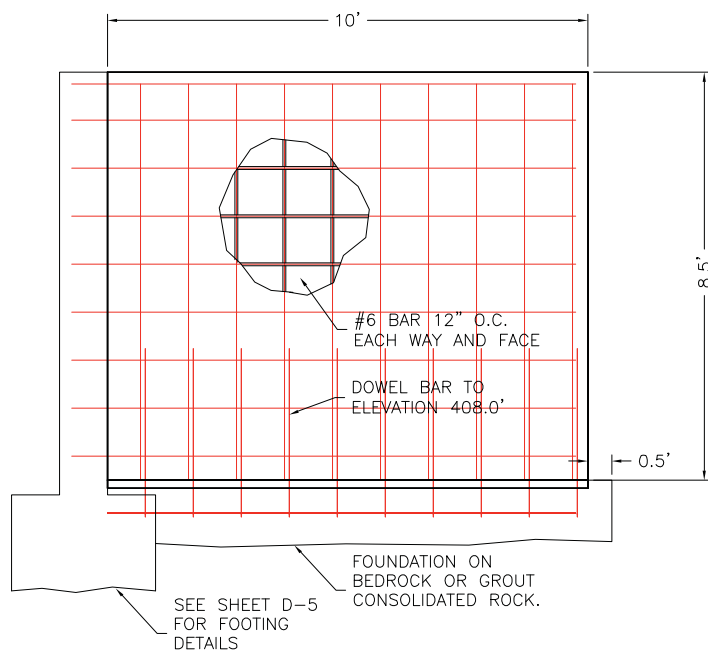




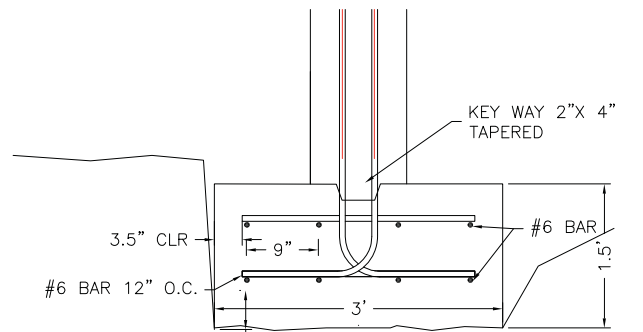
**13** STRUCTURAL PLAN - LEFT ABUTMENT & CENTER  
SCALE: 1" = 4'



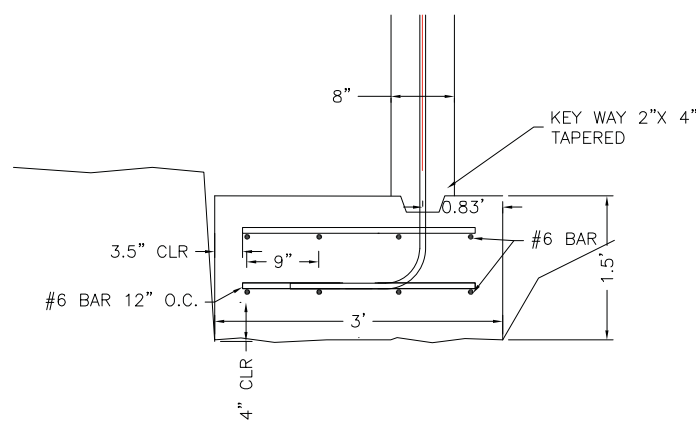
**A** ELEVATION - LEFT ABUTMENT & CENTER  
SCALE: 1" = 4'



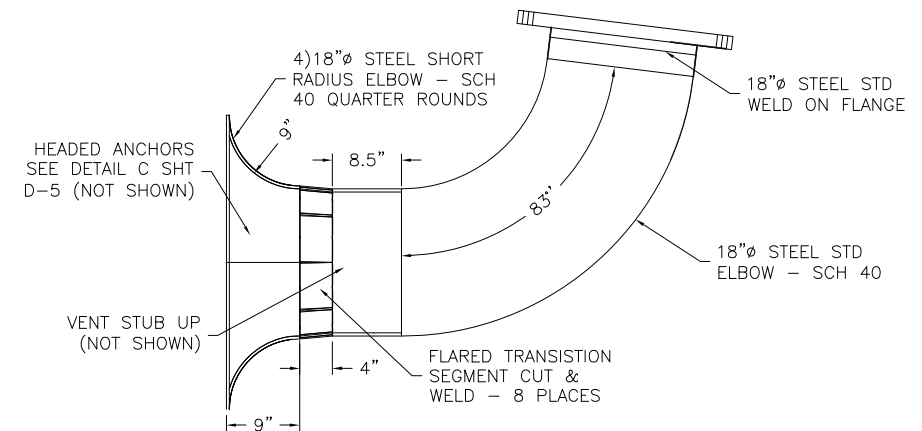
**B** ELEVATION COUNTERFORT WALL  
SCALE: 1" = 2'



**C1** COUNTERFORT FOOTING DETAIL  
SCALE: 1" = 1'



**C2** INTAKE FOOTING DETAIL (MIRRORED)  
SCALE: 1" = 1'



**D** INTAKE SPOOL DETAIL  
SCALE: 1" = 1'



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**INTAKE STRUCTURAL PLAN, PROFILE & DETAILS**  
 Project: **PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: GP  
 DRAWN: GP  
 CHECKED: AsNoted  
 SCALE: AsNoted  
 FILE: PackersCrkHydro

GENERAL PROJECT NOTES:

1. CONSTRUCT IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE ACI, IBC, AWS, AISC, LOCAL UTILITIES, STATE AND MUNICIPAL CODES AND GOOD PRACTICE. OBSERVE O.S.H.A. REQUIREMENTS DURING CONSTRUCTION.
2. PROVIDE ALL LABOR BY WORKERS SKILLED AND REGULARLY EMPLOYED AT THE APPROPRIATE TRADE.
3. SET ALL WORK ACCURATELY, IN ALIGNMENT AND WHERE SHOWN, PLUMB, LEVEL, FREE OF RACK AND TWIST, AND SET PARALLEL OR PERPENDICULAR AS REQUIRED TO LINE AND PLANE OF SURFACE.  
ELEVATION TOLERANCE = 1/4" AT WALL OPENINGS
4. PROVIDE TEMPORARY BRACING FOR FORMS AND EQUIPMENT UNTIL CONCRETE IS SET. PLACE IN ACCORDANCE WITH DRAWINGS AND MANUFACTURERS INSTRUCTIONS.
5. SET ASSEMBLIES AND VALVES FLUSH WITH WALL FACE OR AS SHOWN IN DETAILS.
6. RESTORE TO PRECONTRACT CONDITION ANY PUBLIC OR PRIVATE LAND DISTURBED BY CONTRACT ACTIVITY. THIS SHALL INCLUDE ANY RESEEDING OR REVEGETATION OF EXISTING HORTICULTURE.
7. WHERE EQUIPMENT OR MATERIALS ARE NOTED ON THESE DRAWINGS AS A MANUFACTURER AND MODEL NUMBER, OTHER MANUFACTURERS PRODUCTS THAT ARE EQUAL OR BETTER MAY BE SUBSTITUTED UPON APPROVAL BY THE ENGINEER.
8. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTION IN THE FIELD, AND RECORD ANY CHANGES. SUPPLY ONE SET OF RED LINED RECORD DRAWINGS TO THE ENGINEER AFTER PROJECT CONSTRUCTION COMPLETED FOR PREPARATION OF PROJECT AS-BUILT DRAWINGS.
9. WHERE SUBMITTALS ARE REQUIRED, SUBMIT 3 COPIES TO ENGINEER FOR REVIEW AND APPROVAL.
10. DEVELOP A PLAN TO LIMIT EROSION AND TRANSPORT OF MATERIAL, INCLUDING WIND BLOWN DEBRIS, INCLUDING BUT NOT LIMITED TO, EROSION FENCING AND BARRIERS AND FILTRATION OR IMPOUND AND SETTLEMENT FACILITIES AS NEEDED.

MATERIALS:

1. SLIDE GATE VALVES SHALL BE WATERMAN MODEL AR-271-1-Y-NRS OR EQUAL. CAST IRON FRAME WITH STAINLESS STEEL GATE, ULTA HIGH WEIGHT POLYETHYLENE GATE SEALS, STAINLESS STEEL HARDWARE. SUPPLY WITH TOTALLY ENCLOSED WORM GEAR OPERATOR AND MOTOR VALVE ACTUATOR, 480V, 3-PHASE, OUTDOOR WATERPROOF RATED, 10 PSI MAX STATIC WATER PRESSURE, REMOTE ANALOGUE 4-20 MA CONTROL SYSTEM OPERATED, AND MANUAL HAND WHEEL OPERATOR.
2. PREMOLDED WATER STOP SHALL BE GREENSTREAK MODEL 705, 6 INCH PVC RIBBED WITH CENTER BULB, TAPERED, OR APPROVED EQUAL.

EARTHWORK:

1. CUT AND FILL SLOPES SHOWN ARE ASSUMED APPROPRIATE FOR THE SITE CONDITIONS AND MATERIALS AVAILABLE FOR CONSTRUCTION.
2. VERTICAL ROCK FACES ARE ACCEPTABLE WHERE GEOLOGY CAN SUPPORT AND OVERBURDEN AT THE TOP OF THE CUT IS STABILIZED. STEEPER FILL SLOPES UP TO 1:1 WILL BE ALLOWED IF SUITABLE ROCK, OR OTHER MEANS, IS AVAILABLE FOR FILL STABILIZATION AND EROSION CONTROL.
3. CLEAR AND REMOVE ORGANIC OVERBURDEN FROM THE DAM AND SPILLWAY AREA AS SHOWN ON THE DRAWINGS PRIOR TO PROCEEDING WITH EXCAVATION AND DAM CONSTRUCTION. DESIGN ENGINEER TO INSPECT SUBSURFACE MATERIALS TO VERIFY STABILITY AND SUITABILITY OF FOOTING SIZE AND LOCATION. IF NOT SUITABLE, STABILIZATION OF ROCK OR REALIGNMENT OF DAM MAY BE REQUIRED.
4. EXCAVATE ROCK FOR CONCRETE STRIP FOOTING TO THE MINIMUM DEPTH SHOWN ON THE DRAWING AND TO COMPETENT MATERIAL. ENGINEER TO VERIFY MATERIAL QUALITY PRIOR TO CONCRETE CONSTRUCTION. CONSTRUCT CONCRETE FOOTING AS SHOWN ON THE DRAWINGS IN ACCORDANCE WITH "CONCRETE" SECTION OF THIS SPECIFICATION.
5. STOCKPILE ADEQUATE TOPSOIL AND ORGANIC MATERIAL FOR USE IN REVEGETATION OF DISTURBED AREAS AFTER COMPLETION OF EXCAVATION IF REQUIRED.
6. FINAL LINES AND GRADES OF CUT AND FILL CAN BE ALTERED IF NO CHANGE TO PENSTOCK GRADE SHOWN ON PLANS IS REQUIRED. CORRECT AND REPAIR ANY SETTLEMENT OF FILL OR BACKFILL PRIOR TO INSTALLATION OF PENSTOCK.
7. DISPOSE OF EXCESS EXCAVATION MATERIAL IN DISPOSAL AREA APPROVED BY THE OWNER OUTSIDE THE FOOTPRINT OF THE PROPOSED NEW DAM RESERVOIR AND ACCESS ROAD.

CONCRETE:

1. CONCRETE WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301-05, "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND ACI 318-05, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS UNLESS NOTED OTHERWISE. TYPE III CEMENT MAY BE USED UPON AUTHORIZATION OF ENGINEER AND SHALL REACH DESIGN STRENGTH AT 7 DAYS.
3. ALL CONCRETE SHALL BE SUPPLIED IN BULK BAGS FROM A BATCH PLANT, WRAPPED FOR EXPORT SHIPMENT. SUBMIT DESIGN MIX SHOWING COMPLIANCE WITH SPECIFICATION AND RESULTS OF TRIAL MIXTURE STRENGTHS TO ENGINEER FOR APPROVAL.
4. AGGREGATES FOR CONCRETE SHALL BE WELL-GRADED, CLEAN, HARD GRAVEL AND COARSE SAND, NON-FROST SUSCEPTIBLE MATERIAL AND FREE OF DELETERIOUS MATTER AND COATINGS OF SILT OR CLAY. AGGREGATE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-33. MAXIMUM SIZE OF COARSE AGGREGATE SHALL NOT EXCEED 1-1/2 INCHES. COMBINED COARSE AND FINE AGGREGATES SHALL BE OF SUCH COMPOSITION THAT WHEN SEPARATED ON THE NUMBER 4 STANDARD SIEVE, WEIGHT PASSING SHALL NOT BE LESS THAN 30% NOR GREATER THAN 50% OF THE TOTAL WEIGHT.
5. AIR ENTRAINMENT OF 5% SHALL BE USED IN ALL CONCRETE. ENTRAINMENT SHALL BE ACHIEVED BY THE ADDITION OF AN APPROVED AIR ENTRAINING MIXTURE AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-260.
6. ALL STRUCTURAL CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4.5". HIGHER SLUMPS (UP TO 9" TOTAL) SHALL BE PERMITTED SO LONG AS THEY ARE OBTAINED BY THE ADDITION OF A CHEMICAL ADMIXTURES CONFORMING TO ACI REQUIREMENTS.
7. WATER USED FOR MIXING CONCRETE SHALL BE CLEAN AND FREE OF OIL OR ACID AND SHALL NOT CONTAIN SALT, ALKALI OR ORGANIC MATTER.
8. CONTRACTOR SHALL SECURE ONE (1) TEST CYLINDER IN THE FIELD FROM THE FIRST BATCH OF THE DAY AND AN ADDITIONAL RANDOM SAMPLE FROM EACH CONCRETE SECTION OF DAM POURED IN ACCORDANCE WITH ACI 318. CONTRACTOR SHALL HIRE AN INDEPENDENT TEST LAB TO VERIFY CONCRETE STRENGTH BY STANDARD TESTING PROCEDURES USING QUALIFIED TESTING TECHNICIANS. THE AVERAGE COMPRESSIVE STRENGTH SHALL BE CALCULATED IN ACCORDANCE WITH ACI PROCEDURES AND A REPORT SUBMITTED TO THE ENGINEER SUMMARIZING ALL TESTING RESULTS AND CONCLUSIONS.
9. CONCRETE SHALL BE PLACED SO THAT AT NO TIME SHALL CONCRETE FREE FALL MORE THAN THREE (3) FEET. PLACE CONCRETE CONTINUOUSLY FROM ONE SIDE OF SECTION TO THE OTHER IN APPROXIMATELY HORIZONTAL LAYERS. NO PARTIALLY COMPLETED SURFACE SHALL BE ALLOWED TO STAND MORE THAN FORTY-FIVE (45) MINUTES BEFORE CONTINUING THE PLACEMENT OF CONCRETE THEREON.
10. LOWER SECTION OF WATER STOPS SHALL BE WET SET IN STRIP FOOTING AND TAMPED OR VIBRATED TO REMOVE AIR BUBBLES AND VOIDS.
11. MECHANICALLY VIBRATE ALL CONCRETE WHEN PLACED, EXCEPT THAT SLABS ON GRADE NEED TO BE VIBRATED ONLY AROUND PERIMETER AND AT PIPE PENETRATIONS. VIBRATOR SHALL NOT BE MOVED TO TRANSPORT CONCRETE ACROSS POUR. NO EXPANSION JOINTS ALLOWED IN CONCRETE STRUCTURES EXCEPT IN LOCATIONS SHOWN ON THE DRAWINGS.
12. ALL IRREGULARITIES ON EXPOSED SURFACES SUCH AS GRAVEL POCKETS, BOLT HOLES, ETC. SHALL BE NEATLY PAINTED WITH MORTAR OF THE SAME PROPORTIONS AS USED IN CONCRETE.
13. NO COLD JOINTS ARE ALLOWED EXCEPT WHERE SHOWN ON THE PLANS.
14. ALL EXPOSED CONCRETE SURFACES SHALL BE COVERED WITH PLASTIC WATERPROOF MEMBRANE, OR EQUAL, FOR SEVEN (7) DAYS.
15. PLACEMENT OF CONCRETE SHALL BE PROHIBITED AT AN AMBIENT AIR TEMPERATURE OF LESS THAN FORTY (40) DEGREES FAHRENHEIT OR WHERE FOUNDATION MATERIAL IS FROZEN, EXCEPT IN SPECIAL SITUATIONS WHERE AUTHORIZED BY THE ENGINEER.
16. REMOVE STANDING WATER FROM FORMS PRIOR TO PLACEMENT OF CONCRETE.

CONCRETE REINFORCING:

1. DEFORMED BARS TO BE 60 KSI - ASTM A615 (GRADE 60).
2. ALL REINFORCING TO BE EPOXY COATED AND SHALL COMPLY WITH ASTM A775.
3. REINFORCING BAR SPACING SHOWN ARE MAXIMUM ON CENTERS. SECURELY TIE ALL BARS IN LOCATION WITH ANNEALED 12 GAUGE IRON WIRE BEFORE PLACING CONCRETE.
4. ALL DOWELS, ANCHOR BOLTS, REBAR, ETC SHALL BE SECURELY HELD IN FORMS BEFORE PLACING OF CONCRETE.
5. LAP SPLICES IN CONCRETE: STAGGER ALTERNATE SPLICES A MINIMUM OF ONE LAP LENGTH. LAP SPLICE LENGTHS: #4 BAR = 28"  
#5 BAR = 35"  
#6 BAR = 40".
6. TYPICAL CLEAR CONCRETE COVERAGE FOR REINFORCING AND EMBEDMENT:  
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH = 3"  
FORMED CONCRETE EXPOSED TO EARTH OR WEATHER = 1.5"
7. IF INTERNAL FORM TIES USED, SHALL BE CONSTRUCTED IN SUCH MANNER THAT AFTER STRIPPING TIES MAY BE REMOVED FOR A DISTANCE AT LEAST ONE (1) INCH BELOW THE CONCRETE SURFACE.

GROUT:

1. GROUT SHALL BE PREMIXED, NONMETALLIC, NON CORROSIVE, NON STAINING GROUT CONTAINING SELECTED SILICA SANDS, PORTLAND CEMENT, SHRINKING-COMPENSATING AGENTS, PLASTICIZING AND WATER-REDUCING AGENTS, COMPLYING WITH ASTM C1107, WITH FLUID CONSISTENCY AND A 30 MINUTE WORKING TIME.

POLYURETHANE CAULK:

1. POLYURETHANE CAULK SHALL BE SIKAFLEX, CONSTRUCTION SEALANT OR EQUAL. PRODUCT IS A MOISTURE-CURED, 1-COMPONENT, POLYURETHANE BASED, NON-SAG ELASTOMERIC SEALANT, COMPLYING WITH ASTM C-900, TYPE S, GRADE NS.

ROCK ANCHORS:

1. ALL ROCK ANCHORS SHALL BE WILLIAMS R1S HOLLOW CORE SPIN LOCK DEFORMED BARS OF THE DIAMETER AND LENGTH INDICATED, OR APPROVED EQUAL UNLESS OTHERWISE INDICATED.
2. ALL ROCK ANCHORS AND BOLTS SHALL BE INSTALLED IN COMPETENT ROCK IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ENGINEER SHALL DETERMINE SUITABILITY OF BEDROCK.
3. EACH ROCK ANCHOR SHALL BE TENSIONED TO TENSION LOAD LISTED IN THE PLANS FOR THE ANCHOR. ROCK ANCHORS SHALL BE FULLY GROUTED IN PLACE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AFTER PASSING TENSION TEST.

BOLTS AND NUTS:

1. BOLTS SHALL CONFORM TO ASTM A490 WITH HEAVY HEX NUTS AND WASHERS. ALL NUTS, WASHERS AND BOLTS SHALL BE HOT DIPPED GALVANIZED.
2. STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A598 WHERE STAINLESS STEEL CALLED FOR.

GABION BASKETS:

1. GABIONS SHALL BE "MACCAFERRI" GALVANIZED AND PVC COATED FLEXIBLE WOVEN WIRE MESH BOXES WITH DIMENSIONS AS SPECIFIED IN THE DRAWINGS AND MANUFACTURED AND CERTIFIED TO MEET QUALITY ASSURANCE STANDARDS OF ASTM A975.
2. BOXES SHALL BE DIVIDED BY DIAPHRAMS INTO CELLS OF LENGTH NOT GREATER THAN THE WIDTH OF THE GABION, UNLESS NOTED OTHERWISE IN THE DRAWINGS.
3. END PANELS OF ALL GABIONS SHALL BE MECHANICALLY SELVEDGED TO THE GABION BASE. DIAPHRAMS SHALL BE CONNECTED TO THE BASE BY A LARGER DIAMETER SPIRAL WIRE PASSING IN TURN THROUGH EACH MESH OPENING OF THE BASE AND EACH MESH OPENING OF THE DIAPHRAM PANEL.
4. ROCK FILL FOR GABIONS SHALL BE HARD, ANGULAR TO ROUND, DURABLE ROCK OF THE SIZE GRADATION SHOWN ON THE DRAWINGS.
5. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS INSTALLATION GUIDE.

STRUCTURAL STEEL:

1. STRUCTURAL STEEL SHAPES AND PLATE SHALL CONFORM TO ASTM A529 GRADE 50, A572 GRADE 50, OR A588 GRADE 50 WITH MINIMUM YIELD STRENGTH OF 50 KSI.
2. STEEL PIPE SHALL CONFORM TO ASTM A53 GRADE B WITH MINIMUM YIELD STRENGTH OF 42 KSI WITH A MINIMUM WALL THICKNESS OF 3/16-INCH OR AS SPECIFIED ON THE DRAWINGS.
3. PIPE FLANGES SHALL BE SCHEDULE 40 WELD NECK OR SLIP ON WELD FLANGES WITH SCHEDULE 40 PIPE TO PROVIDE OFFSET DIMENSION OFF THE FACE OF THE DAM SHOWN ON THE PLANS.
4. LATEST AISC AND AWS CODES APPLY. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH LATEST AISC HANDBOOK.
5. ALL WELDING BY WELDERS HOLDING VALID CERTIFICATES AND HAVING CURRENT EXPERIENCE IN TYPE OF WELD SHOWN ON THE DRAWINGS OR NOTES. CERTIFICATES SHALL BE THOSE ISSUED BY AN ACCEPTED TESTING AGENCY.
6. ALL WELDING DONE BY E70 SERIES LOW HYDROGEN RODS. ALL WELDING PER AMERICAN WELDING SOCIETY STANDARDS. CONTRACTOR MAY SHOP WELD OR FIELD WELD AT HIS DISCRETION.
7. ALL PIPE, STEEL SHAPES AND FABRICATED ASSEMBLIES SHALL BE COATED IN ACCORDANCE WITH "STEEL COATINGS" SPECIFICATION SECTION.
8. SUBMIT SHOP DRAWINGS OF STEEL SHOP FABRICATED ASSEMBLIES TO ENGINEER FOR APPROVAL.
9. INSTALL ANCHORING DEVICES AND FASTENERS AS SHOWN AND AS NECESSARY FOR SECURING METAL FABRICATIONS TO THE DAM CONSTRUCTION AS SPECIFIED.

STEEL COATINGS:

1. ALL STEEL PIPE, SHAPES AND FABRICATED ASSEMBLIES SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A123, G90.
2. PREPARE ALL WELDED MATERIALS TO BE COATED BY BLASTING OR GRINDING TO A SP-10 FINISH, AND CLEAN TO REMOVE ALL DUST, WATER AND OILS PRIOR TO INSTALLATION OF HOT DIP GALVANIZING COATING.
3. REPAIR DAMAGED GALVANIZED SURFACES, ALL FIELD WELDED JOINTS AND CUT MEMBERS WITH GALVILITE COLD GALVANIZING COMPOUND. WIRE BRUSH SURFACE TO BE COATED TO REMOVE ALL LOOSE MATERIAL, SCALE AND WASH CLEAN. APPLY 3 COATS OF MINIMUM 1.5 MILS DRY FILM THICKNESS PER COAT.

FLAT PLATE SCREEN:

1. WEDGEWIRE FLAT SCREEN SHALL BE CONFIGURED WITH THE FOLLOWING DIMENSIONS:  
WEDGEWIRE SLOT OPENING: 1.0 MM (0.040 IN.)  
WEDGEWIRE TOP WIDTH: 2.636 MM (0.093 IN.)  
WEDGEWIRE TILE ANGLE: 7 DEGREES
2. SCREEN SUPPORTING RODS OR BARS SHALL BE SIZED FOR A HYDRAULIC LOADING OF 4 FEET OF HEAD OR 250 POUNDS PER SQUARE FOOT. ALL STEEL SUPPORT FRAMING MATERIAL SHALL BE 304 STAINLESS STEEL. SUPPORT FRAME SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS OR AS NECESSARY.

FABRICATED ALUMINUM:

1. STRUCTURAL ALUMINUM PLATE SHALL CONFORM TO ASTM B209 MARINE GRADE 5086-0 WITH MINIMUM YIELD STRENGTH OF 14 KSI.
2. ALUMINUM EXTRUSIONS SHALL CONFORM TO ASTM B221 MARINE GRADE 5086-0 WITH MINIMUM YIELD STRENGTH OF 14 KSI.
3. WELD IN ACCORDANCE WITH LATEST AWS CODE. CONSTRUCT IN ACCORDANCE WITH LATEST AISC HANDBOOK.
4. ALL WELDING BY WELDERS HOLDING VALID CERTIFICATES ISSUED BY AN ACCEPTED TESTING AGENCY, AND HAVING CURRENT EXPERIENCE IN TYPE OF WELD SHOWN ON THE DRAWINGS OR NOTES.
5. INSULATE ALUMINUM SURFACES THAT WILL COME IN CONTACT WITH CONCRETE OR METAL BY INSTALLING A COAT OF HEAVY-BODIED ALKALI RESISTING BITUMINOUS PAINT OR OTHER APPROVED PAINT IN THE SHOP.

CLEANING AND DISINFECTION:

1. REMOVE ALL EXCESS BUILDING MATERIALS AND DEBRIS FROM AREA.
2. REVEGETATE DISTURBED ORGANIC AREAS IN ACCORDANCE WITH EARTHWORK SPECIFICATION.

TESTING:

1. ALLOW ALL CONCRETE TO CURE FOR MINIMUM 28 DAYS OR CONCRETE HAS REACHED DESIGN STRENGTH AS INDICATED THROUGH CONCRETE CYLINDER TESTING.
2. CLOSE OFF PENSTOCK INTAKE AND DAM BYPASS TO ALLOW RESERVOIR TO FILL. INSPECT DAM FOR LEAKS WHILE FILLING AND DAILY FOR ONE ADDITIONAL WEEK AFTER RESERVOIR REACHES SPILLWAY HEIGHT. NOTIFY ENGINEER IF ANY LEAKING IS OBSERVED UNDER OR THROUGH DAM, OR OTHER SIGNS OF DISTRESS.



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NO.	DATE	REVISIONS

**INTAKE SPECIFICATIONS**

Drawing

Project

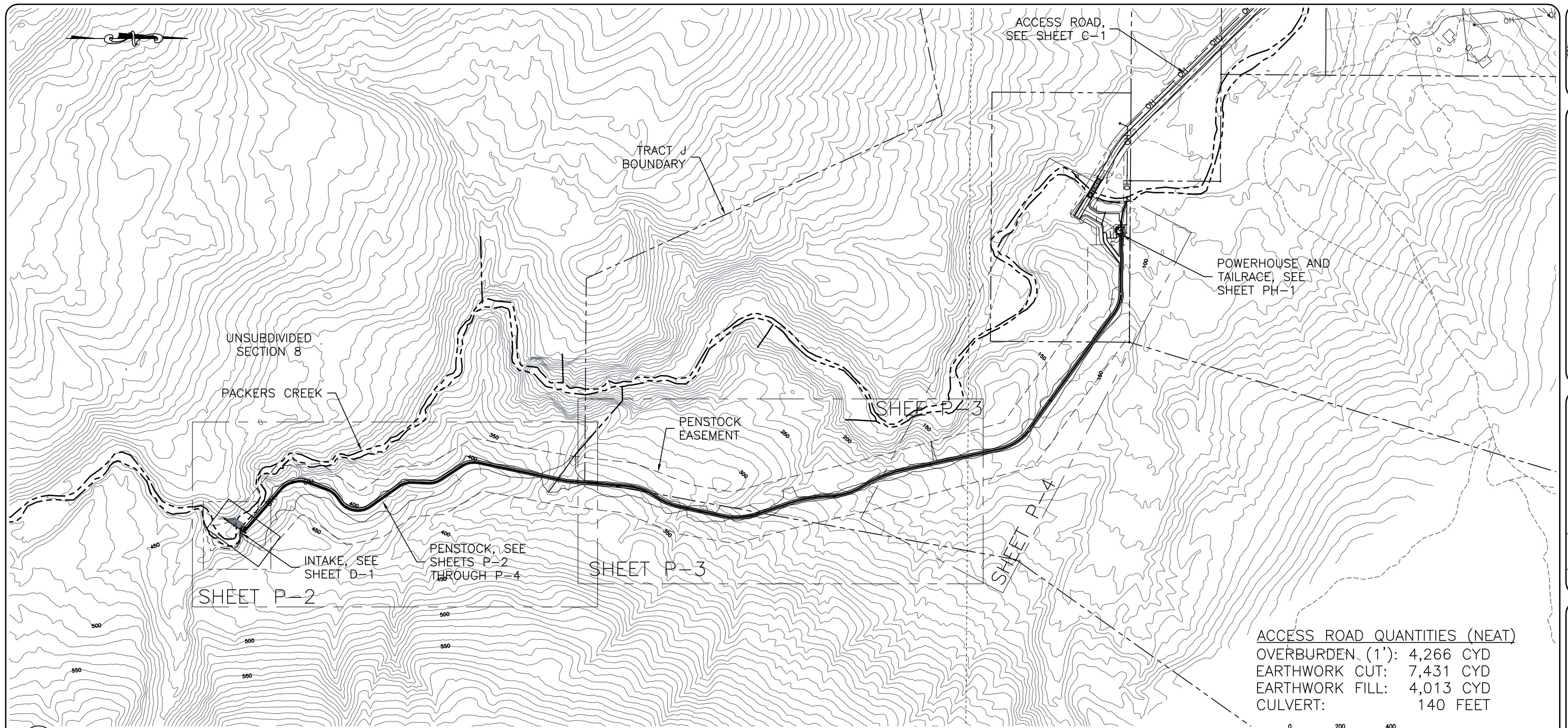
**PACKERS CREEK HYDROELECTRIC PROJECT  
CHIGNIK LAGOON POWER UTILITY  
Chignik Lagoon, AK**

DATE:	11/30/12
DESIGNED:	GP
DRAWN:	
CHECKED:	MD
SCALE:	AsNoted
FILE:	PackersCrkHydro

Sheet  
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 OF 7

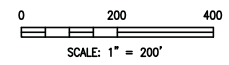
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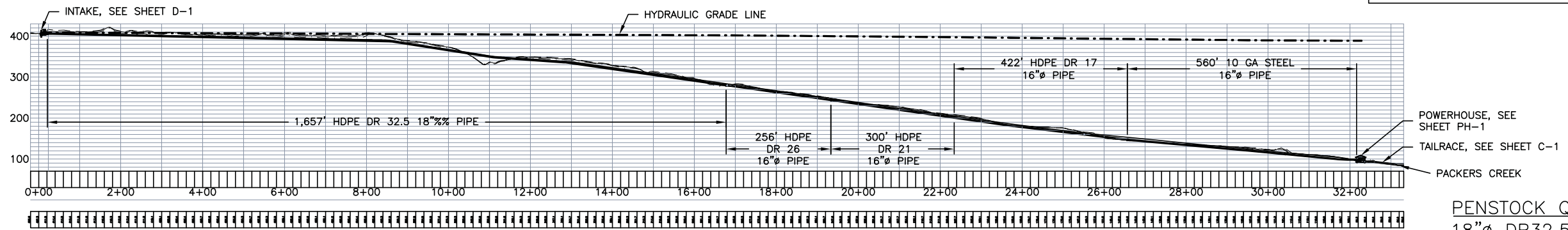


1 PENSTOCK SITE PLAN  
SCALE: 1" = 200'

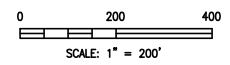
ACCESS ROAD QUANTITIES (NEAT)  
 OVERBURDEN (1'): 4,266 CYD  
 EARTHWORK CUT: 7,431 CYD  
 EARTHWORK FILL: 4,013 CYD  
 CULVERT: 140 FEET



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PENSTOCK QUANTITIES (NEAT)  
 18"Ø DR32.5 HDPE: 1,657 FT  
 16"Ø DR26 HDPE: 256 FT  
 16"Ø DR21 HDPE: 300 FT  
 16"Ø DR17 HDPE: 422 FT  
 16"Ø 10 GA STEEL: 560 FT



2 PENSTOCK PROFILE  
SCALE: 1" = 200'



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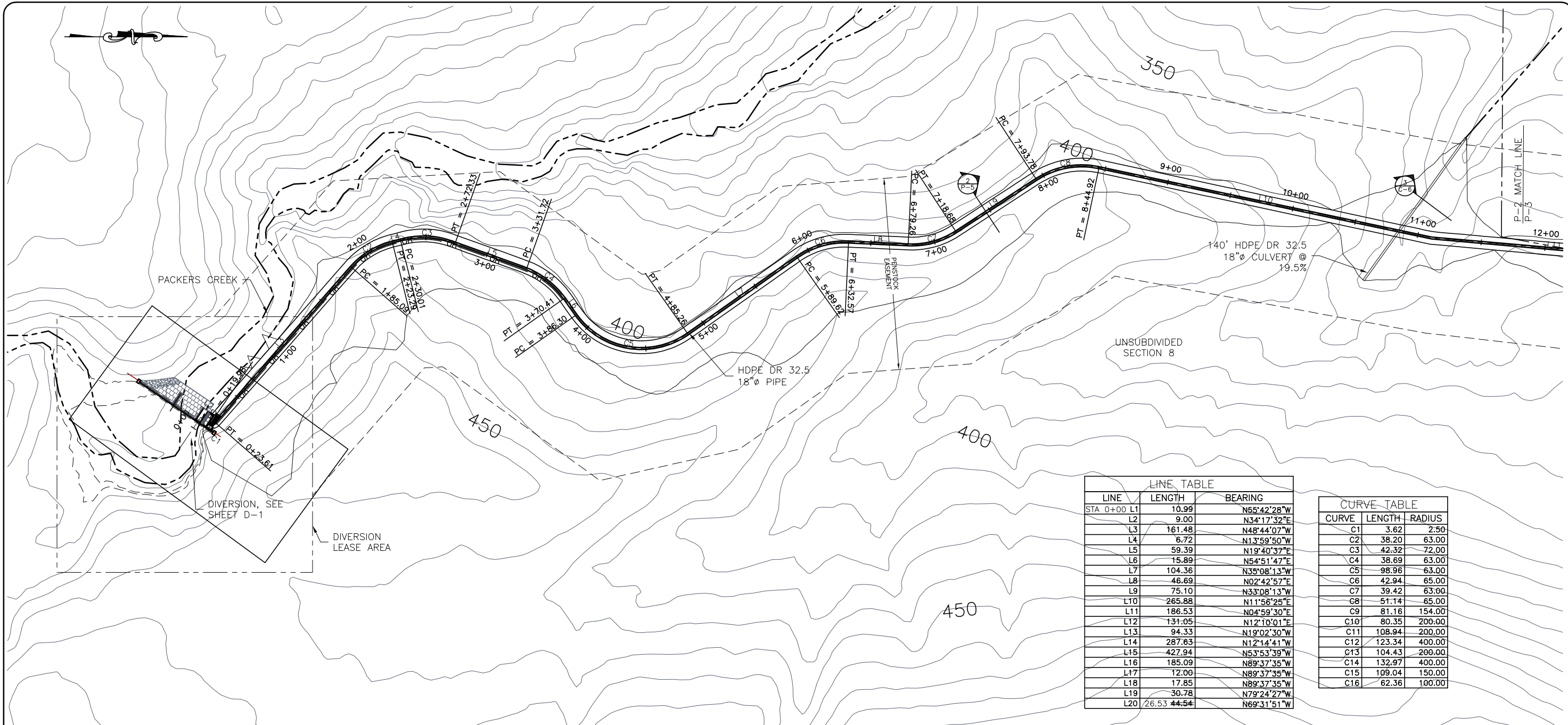
Drawing: **PENSTOCK PLAN AND PROFILE**  
 Project: **PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: MDD  
 DRAWN: MDD  
 CHECKED: \_\_\_\_\_  
 SCALE: AsNoted  
 FILE: PackersCrkHydro

Sheet  
**P-1**  
 OF 6

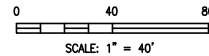


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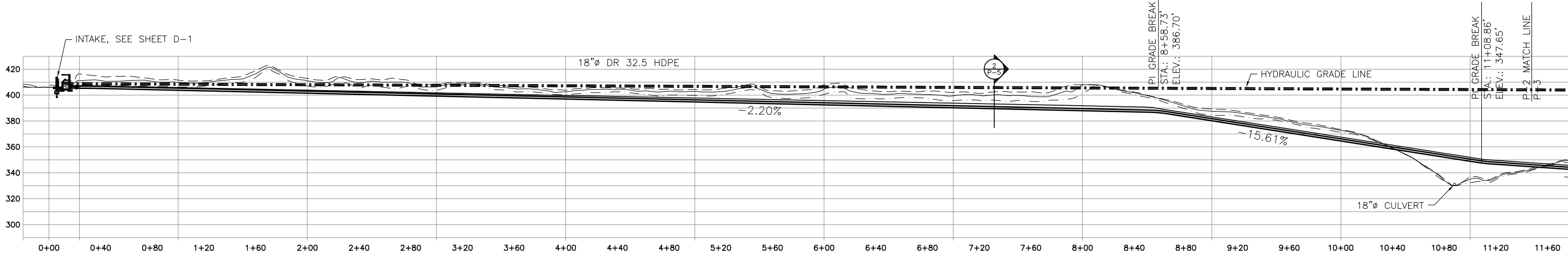
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L2	9.00	N34°17'32"E
L3	161.48	N48°44'07"W
L4	6.72	N13°59'50"W
L5	59.39	N19°40'37"E
L6	15.89	N54°51'47"E
L7	104.36	N35°08'13"W
L8	46.69	N02°42'57"E
L9	75.10	N33°08'13"W
L10	265.88	N11°56'25"E
L11	186.53	N04°59'30"E
L12	131.05	N12°10'01"E
L13	94.33	N19°02'30"W
L14	287.63	N12°14'41"W
L15	427.94	N53°53'39"W
L16	185.09	N89°37'35"W
L17	12.00	N89°37'35"W
L18	17.85	N89°37'35"W
L19	30.78	N79°24'27"W
L20	26.53	N69°31'51"W

CURVE TABLE		
CURVE	LENGTH	RADIUS
C1	3.62	2.50
C2	38.20	63.00
C3	42.32	72.00
C4	38.69	63.00
C5	98.96	63.00
C6	42.94	65.00
C7	39.42	63.00
C8	51.14	65.00
C9	81.16	154.00
C10	80.35	200.00
C11	108.94	200.00
C12	123.34	400.00
C13	104.43	200.00
C14	132.97	400.00
C15	109.04	150.00
C16	62.36	100.00



**1** PENSTOCK PLAN - STA 0+00 TO 12+00  
 SCALE: 1" = 40'

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**2** PENSTOCK PROFILE - STA 0+00 TO 12+00  
 SCALE: 1" = 40'

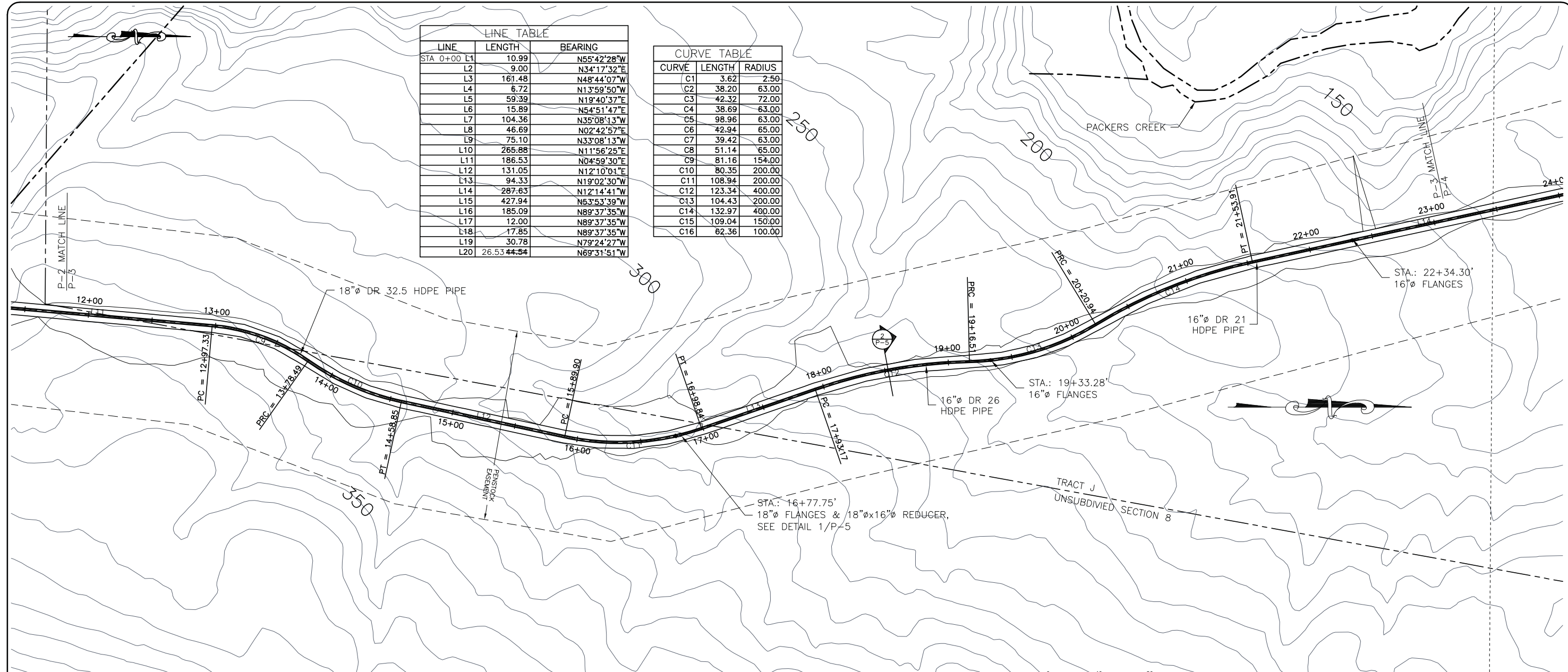
REVISIONS	
NO.	DATE

**Drawing**  
 PENSTOCK PLAN AND PROFILE  
 STA. 0+00 TO STA. 11+50  
**Project**  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
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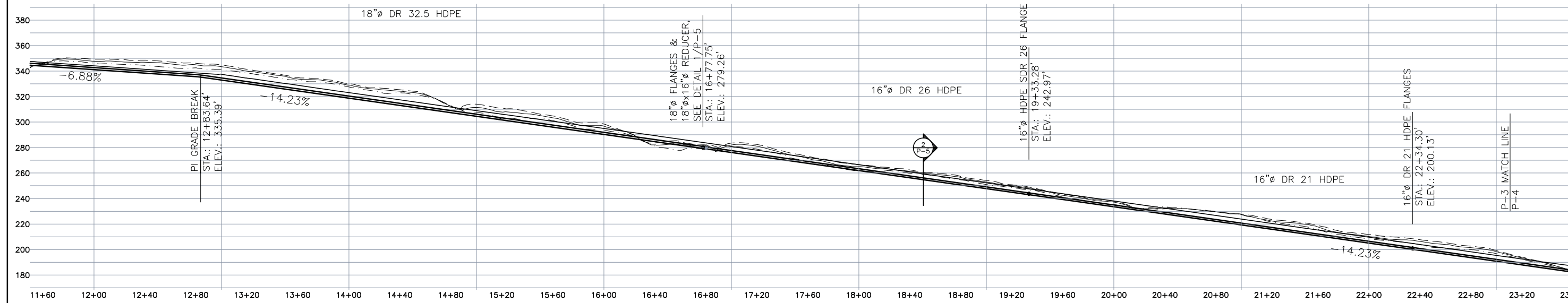
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LINE	LENGTH	BEARING
STA 0+00 L1	10.99	N55°42'28"W
L2	9.00	N34°17'32"E
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L9	75.10	N33°08'13"W
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C10	80.35	200.00
C11	108.94	200.00
C12	123.34	400.00
C13	104.43	200.00
C14	132.97	400.00
C15	109.04	150.00
C16	82.36	100.00

1 PENSTOCK PLAN - STA 12+00 TO 23+00  
 SCALE: 1" = 40'



2 PENSTOCK PROFILE - STA 12+00 TO 23+00  
 SCALE: 1" = 40'

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NO.	DATE	REVISIONS

Penstock Plan and Profile  
 STA. 11+50 TO STA. 23+00  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

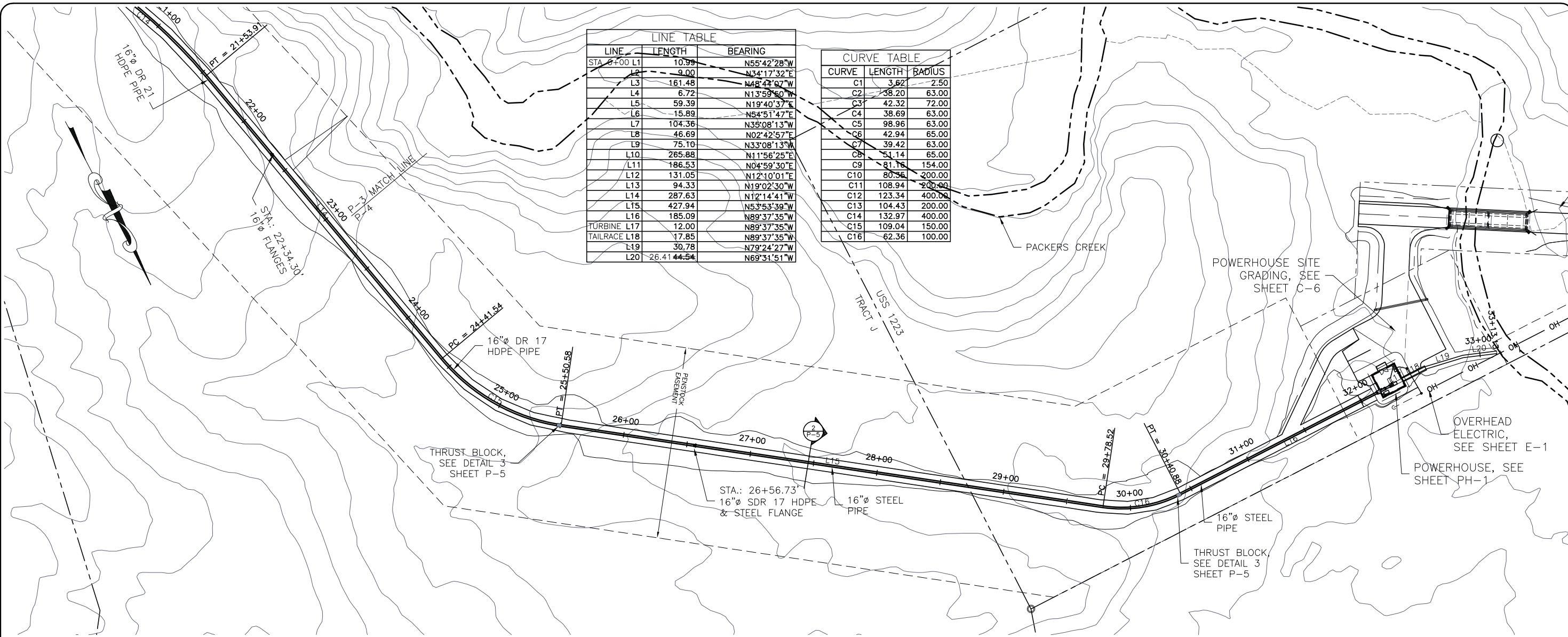
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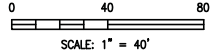
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TURBINE L17	12.00	N89°37'35"W
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L19	30.78	N79°24'27"W
L20	26.41	N69°31'51"W

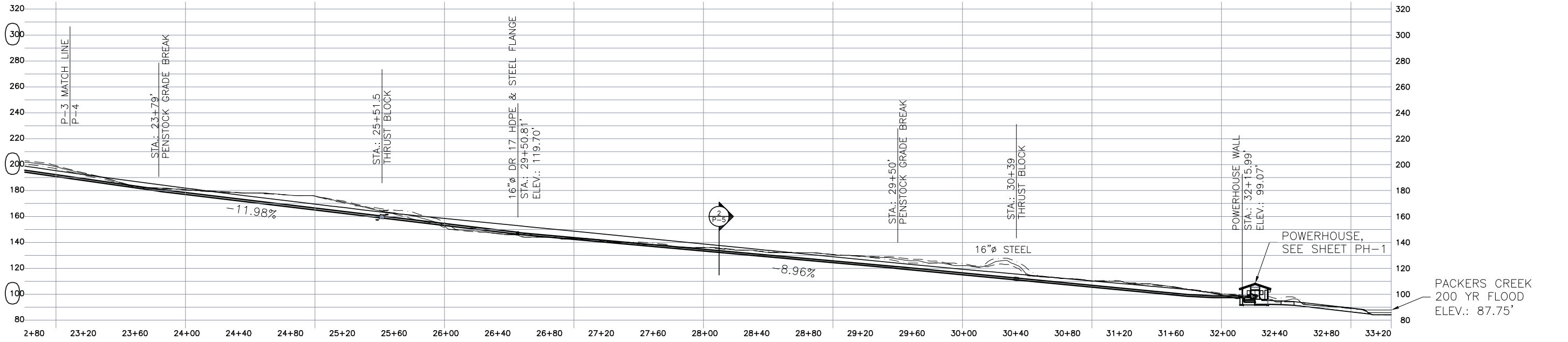
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C9	81.76	154.00
C10	80.56	200.00
C11	108.94	200.00
C12	123.34	400.00
C13	104.43	200.00
C14	132.97	400.00
C15	109.04	150.00
C16	62.36	100.00



1 PENSTOCK PLAN - STA 23+00 TO POWERHOUSE  
 SCALE: 1" = 40'



ISSUED FOR CONSTRUCTION



2 PENSTOCK PROFILE - STA 23+00 TO POWERHOUSE  
 SCALE: 1" = 40'

REVISIONS	
NO.	DATE

ACCESS ROAD & PENSTOCK PLAN AND PROFILE  
 STA 23+00 TO END  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: MDD  
 DRAWN: MDD  
 CHECKED: AsNoted  
 FILE: PackersCrkHydro

**GENERAL NOTES:**

1. CONSTRUCT IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE IPC, IBC, NESC, LOCAL UTILITIES, STATE AND MUNICIPAL CODES AND GOOD PRACTICE. OBSERVE O.S.H.A. REQUIREMENTS DURING CONSTRUCTION.
2. PROVIDE ALL LABOR BY WORKERS SKILLED AND REGULARLY EMPLOYED AT THE APPROPRIATE TRADE.
3. RESTORE TO PRE-CONTRACT CONDITION ANY PUBLIC OR PRIVATE LAND DISTURBED BY CONTRACT ACTIVITY. THIS SHALL INCLUDE ANY RESEEDING OR REVEGETATION OF EXISTING HORTICULTURE.
4. WHERE EQUIPMENT OR MATERIALS ARE NOTED ON THESE DRAWINGS AS A MANUFACTURER AND MODEL NUMBER, OTHER MANUFACTURERS PRODUCTS THAT ARE EQUAL OR BETTER MAY BE SUBSTITUTED UPON APPROVAL BY THE ENGINEER.
5. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTION AND IDENTIFY EXISTING UTILITIES ENCOUNTERED IN THE FIELD, AND RECORD ANY CHANGES. SUPPLY ONE SET OF RED LINED RECORD DRAWING TO THE ENGINEER AFTER PROJECT CONSTRUCTION COMPLETED FOR PREPARATION OF PROJECT AS-BUILT DRAWINGS.
6. WHERE SUBMITTALS ARE REQUIRED, SUBMIT 3 COPIES TO ENGINEER FOR REVIEW AND APPROVAL.
7. DEVELOP A STORM WATER POLLUTION PREVENTION (SWPP) PLAN TO LIMIT EROSION AND TRANSPORT OF MATERIAL, INCLUDING WIND BLOWN DEBRIS, INCLUDING BUT NOT LIMITED TO: EROSION FENCING, BARRIERS AND FILTRATION OR IMPOUND AND SETTLEMENT FACILITIES AS NEEDED. FOLLOW ADF&G REQUIREMENTS IN HABITAT PERMIT FOR THIS PROJECT.

**PENSTOCK ACCESS ROAD:**

1. FINAL ALIGNMENT AND GRADE OF PENSTOCK ACCESS ROAD MAY BE ALTERED TO FIT EXISTING SITE CONDITIONS WITHIN THE FOLLOWING TOLERANCES:  
 ALLOWABLE MAXIMUM ACCESS ROAD GRADE IS 16%. NO MINIMAL ALLOWABLE ACCESS ROAD GRADE AS LONG AS PENSTOCK CAN BE INSTALLED AT A MINIMUM GRADE OF MINUS 2.2%. NO REVERSE SLOPE OF PENSTOCK PIPE IS ALLOWED.  
 ALLOWABLE MINIMUM ACCESS ROAD CURVE RADIUS IS 63 FEET.
2. CUT AND FILL SLOPES SHOWN ARE ASSUMED APPROPRIATE FOR THE SITE CONDITIONS AND MATERIALS AVAILABLE FOR CONSTRUCTION.
3. VERTICAL ROCK FACES ARE ACCEPTABLE WHERE GEOLOGY CAN SUPPORT AND OVERBURDEN AT THE TOP OF THE CUT IS STABILIZED. STEEPER FILL SLOPES UP TO 1:1 WILL BE ALLOWED IF SUITABLE ROCK, OR OTHER MEANS, IS AVAILABLE FOR FILL STABILIZATION AND EROSION CONTROL.
4. CLEAR AND REMOVE ORGANIC OVERBURDEN FROM THE ACCESS ROAD ALIGNMENT. STOCKPILE ADEQUATE TOPSOIL AND ORGANIC MATERIAL FOR USE IN REVEGETATION OF DISTURBED AREAS AFTER COMPLETION OF EXCAVATION IF REQUIRED.
5. DISPOSE OF EXCESS EXCAVATION MATERIAL ALONG THE PENSTOCK ACCESS ROAD ALIGNMENT FOR TURN-AROUNDS, WIDENING OF ACCESS ROAD, OR IN AREAS APPROVED BY THE OWNER. DO NOT DISPOSE OF ANY MATERIALS WITHIN PACKERS CREEK.
6. ROCK EXCAVATION MAY BE REQUIRED IN SOME AREAS ALONG PENSTOCK ACCESS ROAD.
7. SURFACE COURSE OF ACCESS ROAD SHALL BE 1 INCH MINUS WELL GRADED PIT RUN MATERIAL.

**HDPE PIPE AND FITTINGS:**

1. HDPE PIPE SHALL BE MANUFACTURED FROM A PE 4710 RESIN LISTED WITH THE PLASTIC PIPE INSTITUTE (PPI) AS TR-4. THE RESIN MATERIAL WILL MEET THE SPECIFICATIONS OF ASTM D3350 WITH A CELL CLASSIFICATION OF 445574C/E. PIPE SHALL BE FORMULATED WITH CARBON BLACK AND/OR ULTRAVIOLET STABILIZER FOR MAXIMUM PROTECTION AGAINST UV RAYS. PIPE SHALL HAVE A MANUFACTURING STANDARD OF ASTM F714. PIPE SHALL CONTAIN NO RECYCLED COMPOUNDS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL.
2. PIPE SHALL BE 18 INCH DIAMETER DR32.5 (64 PSI WATER RATING); AND 16 INCH DIAMETER DLR26 (80 PSI WATER RATING), DR 21 (100 PSI WATER RATING) AND DR 17 (125 PSI WATER RATING) AS NOTED ON PLANS.
3. PIPE SHALL BE MARKED ACCORDING TO ASTM F-714 AND AT A MINIMUM SHALL BE MARKED AT 5 FOOT INTERVALS WITH PIPE MANUFACTURER, NOMINAL PIPE SIZE, MATERIAL DESIGNATION, MANUFACTURING STANDARD REFERENCE, DIMENSION RATIO OR PRESSURE RATING, AND PRODUCTION CODE FROM WHICH DATE AND PLACE OF MANUFACTURER CAN BE DETERMINED.
4. BUTT FUSION FITTINGS SHALL BE THE SAME RESIN MATERIAL AND SPECIFICATION AS HDPE PIPE. BUTT FUSION FITTING SHALL MEET THE MANUFACTURING SPECIFICATIONS OF ASTM D3261. MOLDED AND FABRICATED FITTINGS SHALL HAVE THE SAME PRESSURE RATING AS THE PIPE. FABRICATED FITTINGS ARE TO BE MANUFACTURED USING A DATA LOGGER. TEMPERATURE, FUSION PRESSURE AND A GRAPHIC REPRESENTATION OF THE FUSION CYCLE SHALL BE PART OF THE QUALITY CONTROL RECORDS.
5. FITTINGS SHALL BE MARKED BY PRINTING OR OTHER INDELIBLE MARKING ACCORDING TO ASTM D 3261 WITH NAME OF PIPE MANUFACTURER, NOMINAL PIPE SIZE, MATERIAL DESIGNATION, MANUFACTURING STANDARD REFERENCE, DIMENSION RATIO OR PRESSURE RATING, AND PRODUCTION CODE FROM WHICH DATE AND PLACE OF MANUFACTURER CAN BE DETERMINED.
6. MECHANICAL CONNECTION OF HDPE PIPE SHALL BE BY MEANS OF A SUITABLE FLANGE ASSEMBLY. FLANGE ASSEMBLY SHALL CONSIST OF A MOLDED POLYETHYLENE STUB END MADE OF THE SALME RESIN AS THE PIPE RESIN MATERIAL AS THE PIPE MATERIAL AND A BACKUP FLANGE OF GALVANIZED STEEL MADE TO CLASS 150, ANSI B16.5 DIMENSION STANDARDS; RUBBER GASKET, AND CONNECTED WITH GALVANIZED STEEL BOLTS OF CORRECT SIZE AND STRENGTH FOR THE FLANGE.

**STEEL PIPE:**

1. STEEL PENSTOCK PIPE SECTION SHALL BE 16 INCH DIAMETER ATSM A53 GRADE B WITH A WALL THICKNESS OF 3/16-INCH.
2. PIPE FLANGES SHALL BE SCHEDULE 40 SLIP ON WELD FLANGES.
3. LATEST AISC AND AWS CODES APPLY. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH LATEST AISC HANDBOOK.
4. ALL WELDING BY WELDERS HOLDING VALID CERTIFICATES AND HAVING CURRENT EXPERIENCE IN TYPE OF WELD SHOWN ON THE DRAWINGS OR NOTES. CERTIFICATES SHALL BE THOSE ISSUED BY AN ACCEPTED TESTING AGENCY.
5. ALL WELDING DONE BY E70 SERIES LOW HYDROGEN RODS. ALL WELDING PER AMERICAN WELDING SOCIETY STANDARDS. CONTRACTOR MAY SHOP WELD OR FIELD WELD AT HIS DISCRETION.
6. ALL PIPE, STEEL SHAPES AND FABRICATED ASSEMBLIES SHALL BE COATED IN ACCORDANCE WITH "STEEL COATINGS" SPECIFICATION SECTION.

**STEEL COATINGS:**

1. PENSTOCK 16-INCH DIAMETER PIPE SHALL BE COATED INTERNALLY AND EXTERNALLY WITH POLYURETHANE COATING IN ACCORDANCE WITH AWWA C222. COATING THICKNESS SHALL BE A MINIMUM OF 25 MILS.
2. PREPARE ALL WELDED MATERIALS TO BE COATED BY BLASTING OR GRINDING TO A SP-10 FINISH, AND CLEAN TO REMOVE ALL DUST, WATER AND OILS PRIOR TO INSTALLATION OF HOT DIP GALVANIZING COATING.
3. REPAIR DAMAGED PENSTOCK EXTERIOR POLYURETHANE COATED SURFACES, FIELD WELDED JOINTS AND CUT MEMBERS WITH COLD APPLIED TAPE CONFORMING TO AWWA C209. THE COLD TAPE SHALL CONSIST OF TWO WRAPS OF 35 MIL TAPE FOR A TOTAL THICKNESS OF 70 MILS.

**PENSTOCK CONSTRUCTION:**

1. DURING LOADING, TRANSPORTATION AND UNLOADING OF PIPE, EVERY PRECAUTION SHALL BE TAKEN TO PREVENT INJURY TO THE PIPE. NO PIPE SHALL BE DROPPED FROM TRUCKS, OR ALLOWED TO ROLL DOWN SLIDES WITHOUT PROPER RETAINING ROPES. DURING TRANSPORT EACH PIPE SHALL REST ON SUITABLE PADS, STRIP, SKIDS OR BLOCKS SECURELY WEDGE OR TIED IN PLACE. INTERNAL PIPE BRACING SHALL BE INSTALLED WHERE RECOMMENDED BY PIPE MANUFACTURER. ANY DAMAGED PIPE SHALL BE REPLACED.
2. FUSION OF HDPE PIPE AND FITTINGS: SECTIONS OF POLYETHYLENE PIPE SHALL BE JOINED INTO CONTINUOUS LENGTHS ON THE JOBSITE ABOVE GROUND. JOINING SHALL BE DONE BY THE THERMAL BUTT FUSION METHOD AND SHALL BE PERFORMED IN ACCORDANCE WITH PROCEDURES ESTABLISHED BY THE PIPE MANUFACTURER. BUTT FUSION EQUIPMENT USED IN THE JOINING PROCEDURES SHOULD BE CAPABLE OF MEETING ALL CONDITIONS RECOMMENDED BY THE PIPE MANUFACTURER. FUSION PRESSURES, TEMPERATURES AND CYCLE TIMES SHALL BE ACCORDING TO PIPE MANUFACTURERS RECOMMENDATIONS.
3. PERSONNEL CONDUCTING BUTT FUSION JOINING SHALL BE TRAINED AND CERTIFIED IN BUTT FUSION OF HDPE PIPE.
4. WELDING OF STEEL PIPE AND FITTINGS SHALL BE DONE IN ACCORDANCE WITH AMERICAN PETROLEUM INSTITUTE (API) SPECIFICATION 1104. FULL PENETRATION BUTT WELDS OR SINGLE FULL-FILLET LAP JOINTS ARE ACCEPTABLE.
5. INSPECT PIPE FOR DEFECTS BEFORE FUSION OR WELDING AND INSTALLATION. DEFECTIVE, DAMAGED OR UNSOUND PIPE SHALL BE REJECTED.
6. CUT PIPE TRUE AND SQUARE IN A NEAT AND WORKMANLIKE MANNER WITHOUT DAMAGE TO THE PIPE. MARK PIPE OR USE TEMPLATE IF REQUIRED TO MAKE TRUE AND SQUARE CUT ALIGNMENT.
7. INSTALL PENSTOCK IN ALIGNMENT AND TO GRADE SHOWN ON THE DRAWINGS. ALIGNMENT AND GRADE MAY BE ALTERED TO MEET SITE CONDITIONS AND MAINTAIN MINIMUM PENSTOCK GRADE OF 2.2 PERCENT. NEGATIVE PENSTOCK GRADE IS NOT ALLOWED.
8. PENSTOCK SHALL BE TRENCHED AND INSTALLED IN NATIVE CUT AREAS WITH THE EXCEPTION OF ROAD FILL ACROSS GULLY AT STATION 11+00.
9. THE FULL LENGTH OF EACH SECTION OF PIPE SHALL REST SOLIDLY UPON THE PIPE BED WITH RECESSES EXCAVATED TO ACCOMMODATE COUPLINGS AND ANCHORS. PIPE SHALL NOT BE LAID IN WATER OR WHEN TRENCH/BEDDING CONDITIONS ARE UNSUITABLE FOR THE WORK.
10. WHEN WORK IS NOT IN PROGRESS, OPEN ENDS OF PIPE, FITTING AND VALVES SHALL BE SECURELY CLOSED SO THAT NO EARTH, TRENCH WATER, OR OTHER SUBSTANCES WILL ENTER THE PIPES OR FITTINGS. PIPE ENDS LEFT FOR FUTURE CONNECTIONS SHALL BE VALVED, PLUGGED, OR CAPPED.
11. CORRECT AND REPAIR ANY SETTLEMENT OF FILL OR BACKFILL PRIOR TO INSTALLATION OF PENSTOCK.
12. HDPE FLANGE ASSEMBLIES SHALL BE CONNECTED AND ALL BOLTS DRAWN UP EVENLY AND IN-LINE USING PROCEDURES RECOMMENDED BY THE PIPE MANUFACTURER.

**BOLTS AND NUTS:**

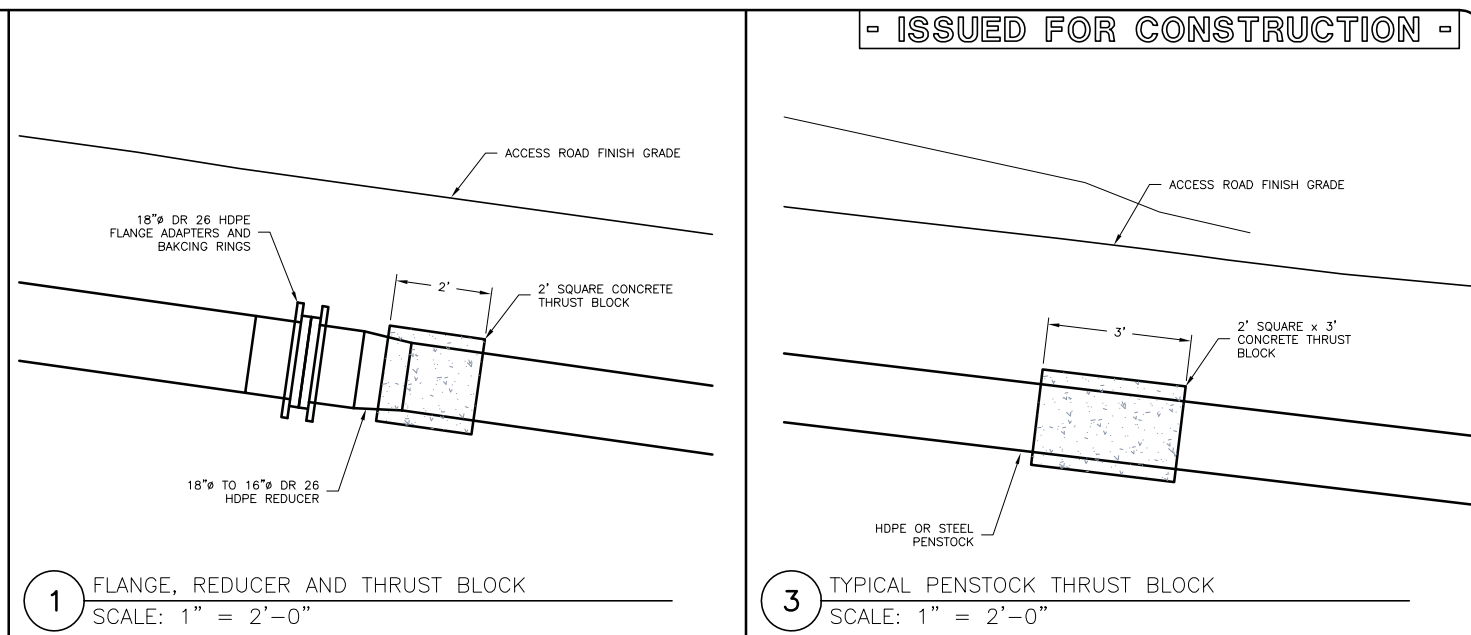
1. BOLTS SHALL CONFORM TO ASTM A490 WITH HEAVY HEX NUTS AND WASHERS. ALL NUTS, WASHERS AND BOLTS SHALL BE HOT DIPPED GALVANIZED.
2. STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A598 WHERE STAINLESS STEEL CALLED FOR.

**CLEANING AND DISINFECTION:**

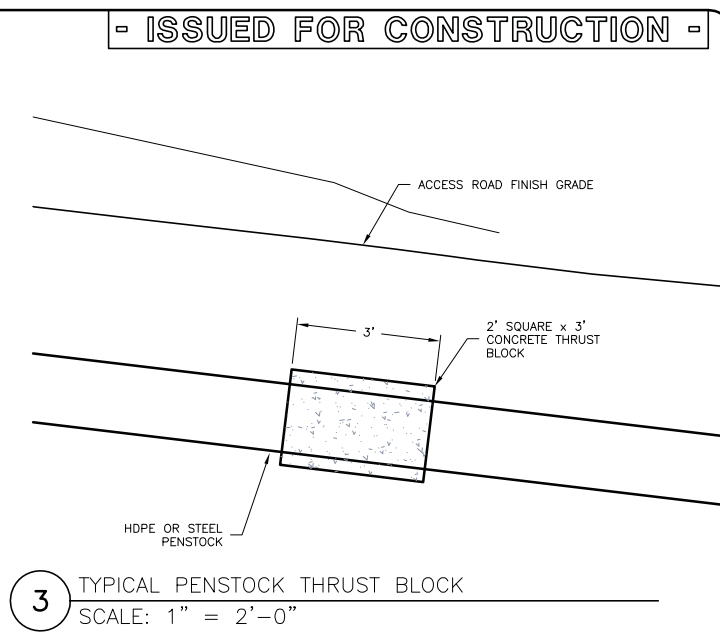
1. REMOVE ALL EXCESS MATERIALS AND DEBRIS FROM AREA.PE
2. CLEAN INTERIOR OF PENSTOCK OF ALL TRASH, DEBRIS, SHAVINGS AND WELDING RESIDUE.
3. REVEGETATE DISTURBED ORGANIC AREAS IN ACCORDANCE WITH EARTHWORK SPECIFICATION.

**HYDROSTATIC TESTING:**

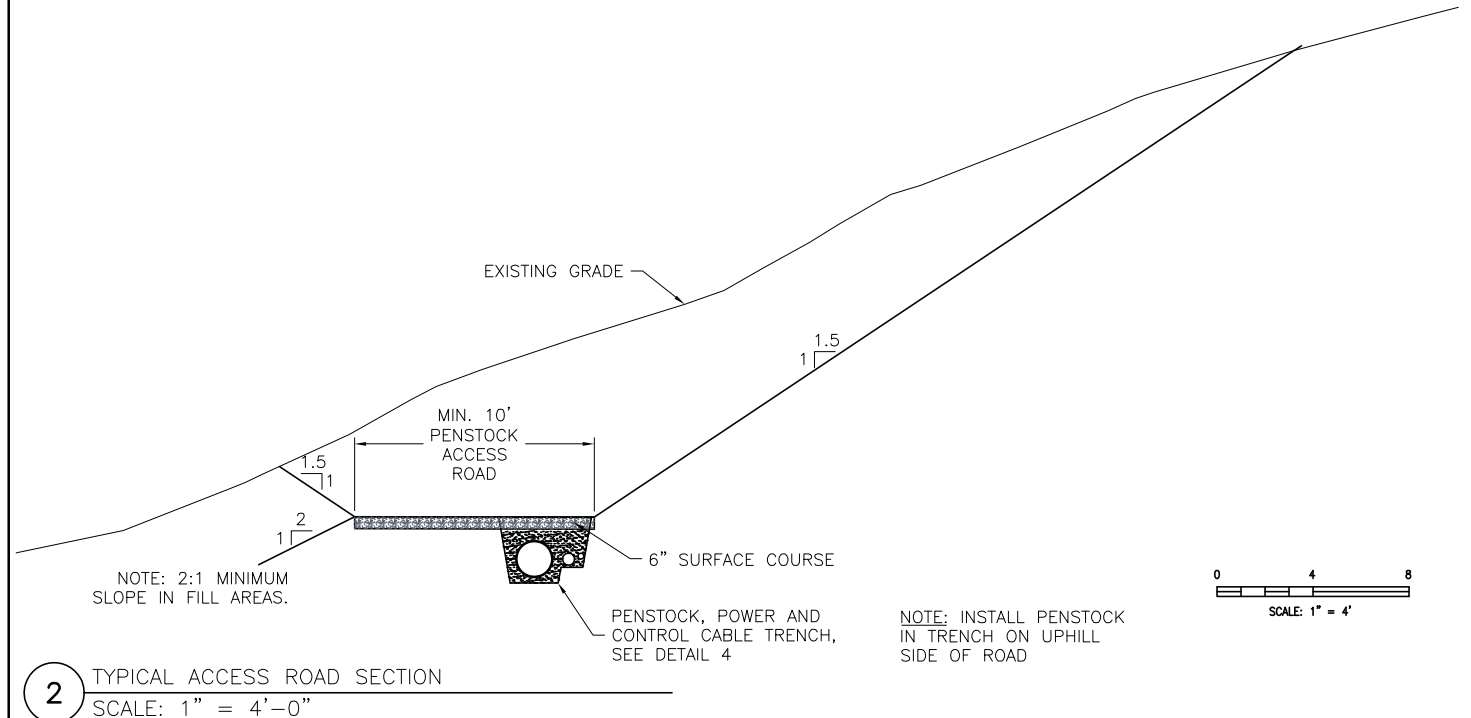
1. BACKFILL PENSTOCK TO CENTERLINE OF PIPE LEAVING JOINTS EXPOSED.
2. PRIOR TO HYDROSTATIC TEST ALL JOINT RESTRAINTS SHALL BE COMPLETELY INSTALLED AND INSPECTED.
3. IF PENSTOCK IS TESTED IN SECTIONS, AND AT TEMPORARY CAPS AT CONNECTION TO POWER HOUSE, CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED TEMPORARY THRUST RESTRAINTS REQUIRED TO SAFELY CONDUCT THE TEST.
4. FILL PENSTOCK WITH WATER AND BLEED ALL AIR FROM SYSTEM. ALLOW WATER TO STABILIZE FOR 12 HOURS. VISUALLY INSPECT ALIGNMENT FOR VISIBLE LEAKS.
5. PERFORM PRESSURE AND LEAKAGE TEST FOR TWO (2) HOURS AT 170 PSI MEASURED AT THE POWERHOUSE. 1.25 TIMES THE OPERATING PRESSURE.
6. LEAKAGE SHALL NOT EXCEED THE FOLLOWING REQUIREMENTS.  
 A. STEEL PIPE: NO LEAKS.  
 B. HDPE PIPE: NO LEAKS. PRESSURE DROP IN ACCORDANCE WITH PIPE MANUFACTURERS RECOMMENDATIONS.



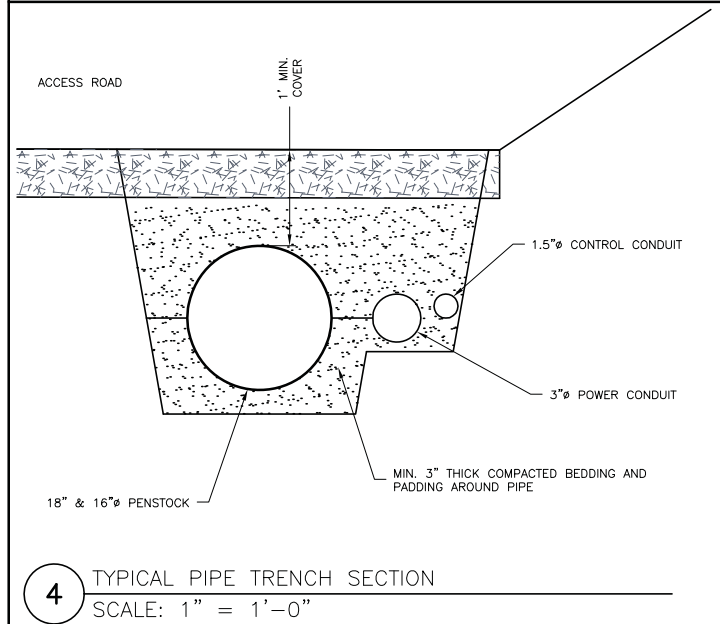
**1 FLANGE, REDUCER AND THRUST BLOCK**  
SCALE: 1" = 2'-0"



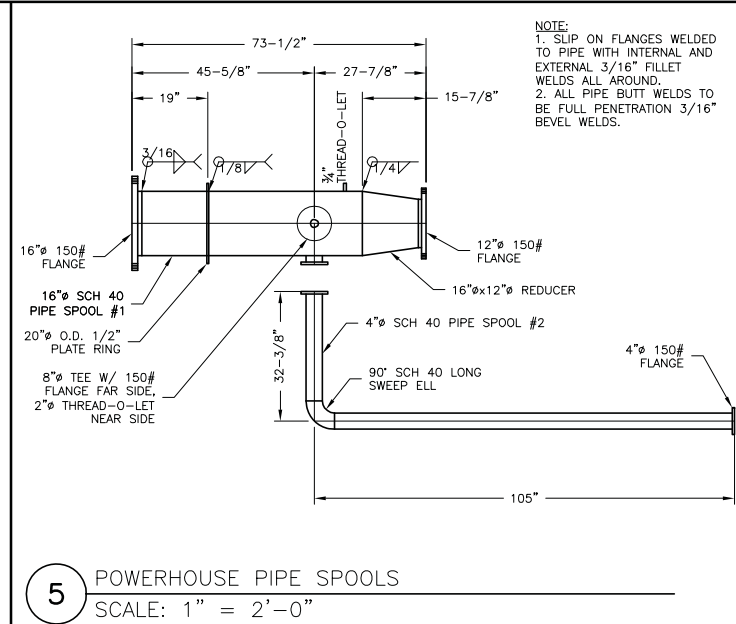
**3 TYPICAL PENSTOCK THRUST BLOCK**  
SCALE: 1" = 2'-0"



**2 TYPICAL ACCESS ROAD SECTION**  
SCALE: 1" = 4'-0"



**4 TYPICAL PIPE TRENCH SECTION**  
SCALE: 1" = 1'-0"



**5 POWERHOUSE PIPE SPOOLS**  
SCALE: 1" = 2'-0"



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 PHONE (907) 258-2420 FAX (907) 258-2419

NO.	DATE	REVISIONS

**PENSTOCK SPECIFICATIONS & DETAILS**

Project: **PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

DATE:	11/30/12
DESIGNED:	MDD
DRAWN:	MDD
CHECKED:	
SCALE:	AsNoted
FILE:	PackersCrkHydro

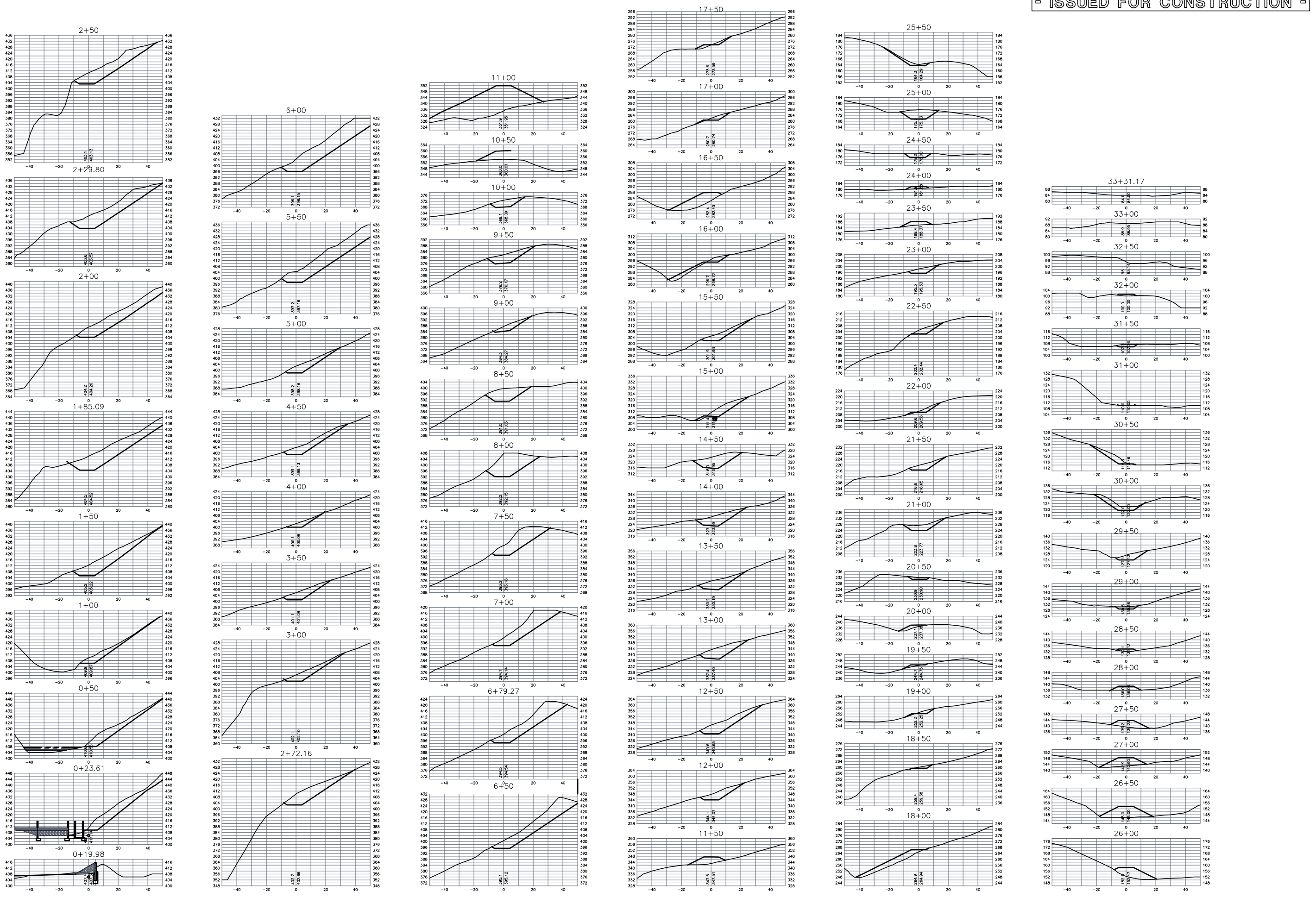


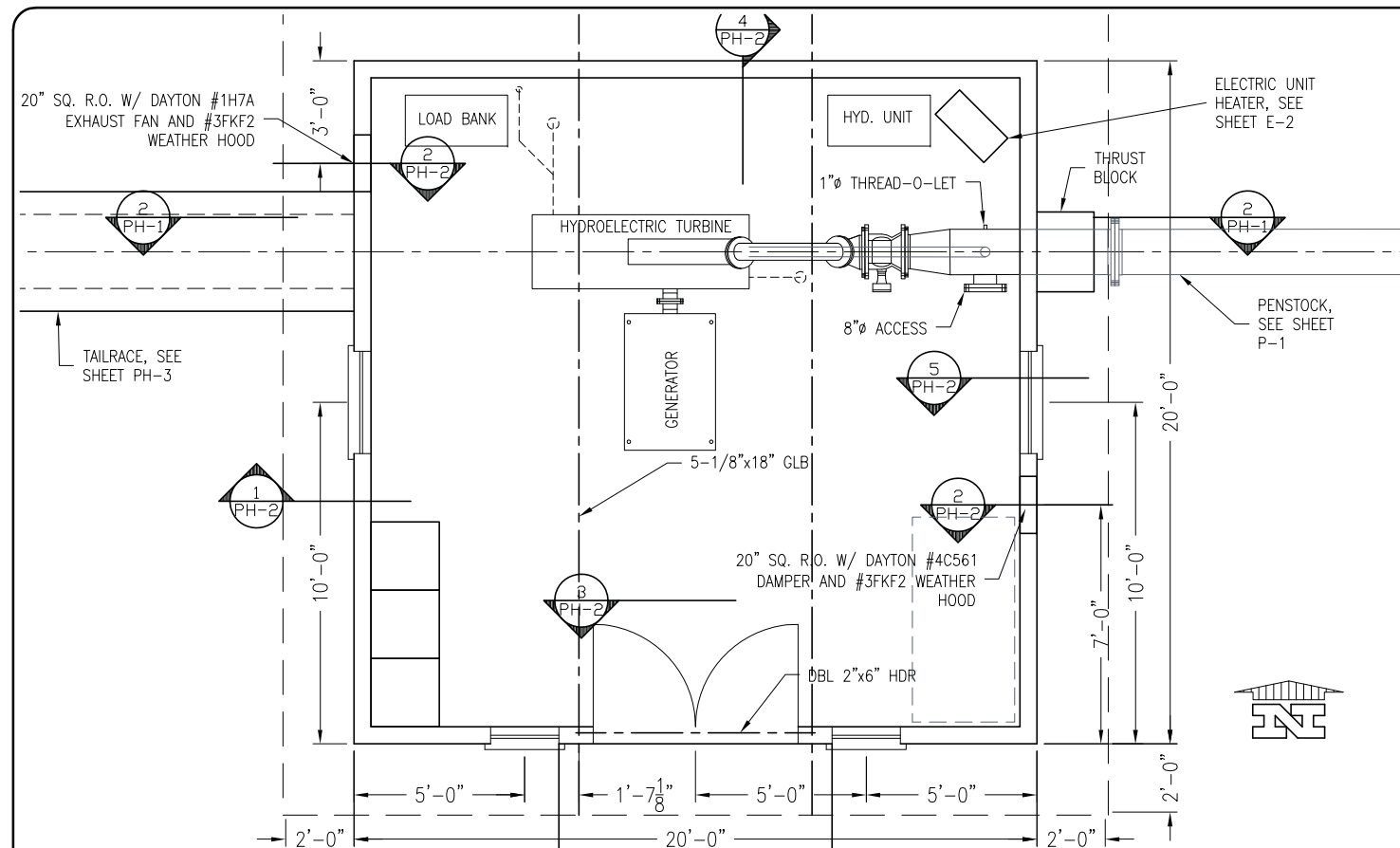
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NO.	DATE	REVISIONS

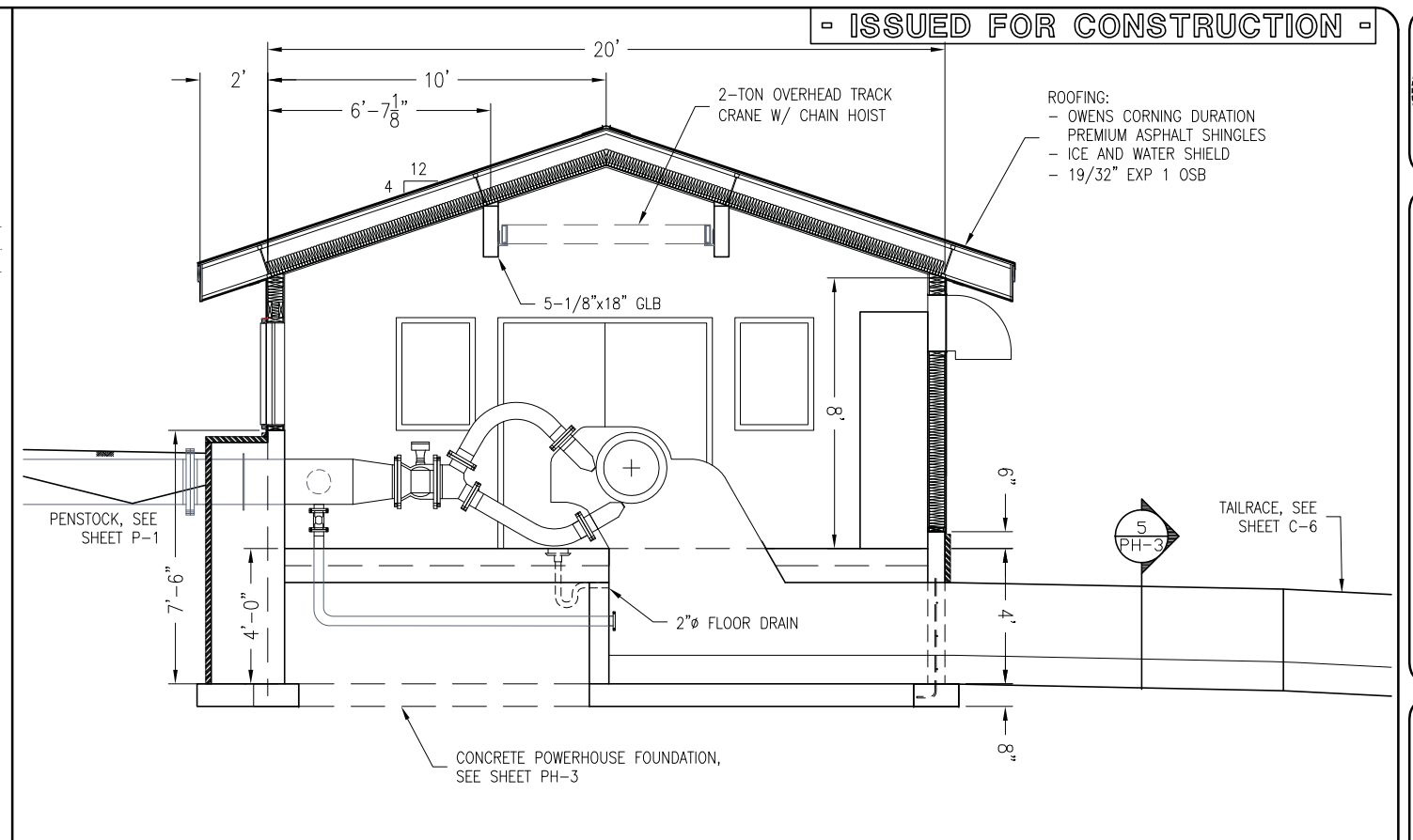
**PENSTOCK & ACCESS CROSS SECTIONS**  
 Project: **PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: MDD  
 DRAWN: MDD  
 CHECKED: MDD  
 SCALE: 1"=30'  
 FILE: PackersCrkHydro

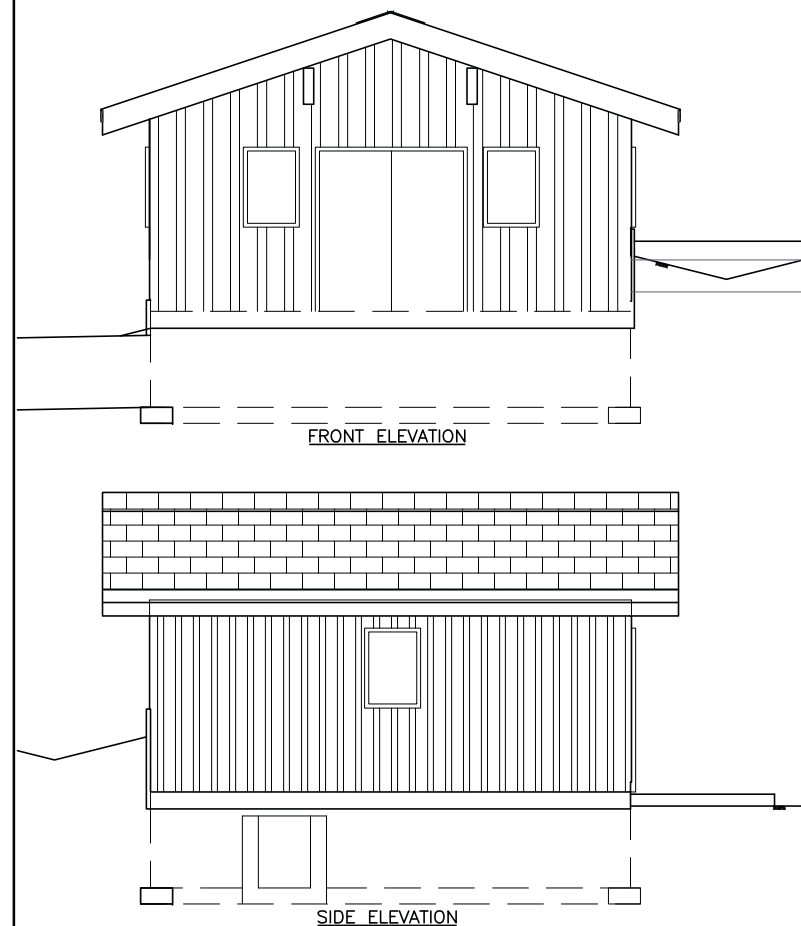




1 POWER HOUSE FLOOR PLAN  
SCALE: 3/8" = 1'-0"



2 POWER HOUSE SECTION  
SCALE: 3/8" = 1'-0"



3 POWER HOUSE ELEVATIONS  
SCALE: 1/4" = 1'-0"

**CODE INFORMATION:**  
**APPLICABLE CODE:** 2006 INTERNATIONAL BUILDING CODE  
**OCCUPANCY CLASSIFICATION:** F-2  
**TYPE OF CONSTRUCTION:** V-B  
**BASIC ALLOWABLE AREA:** 13,000 SQ. FT. (IBC TABLE 503)  
**PROPOSED BUILDING AREA:** 400 SQ. FT. CONFORMS  
**ALLOWABLE HEIGHT:** 2 STORIES  
**PROPOSED BUILDING HEIGHT:** 1 STORY - CONFORMS.

**OCCUPANT LOAD:** 2 (400 SF AREA / 300 SF PER PERSON)  
**PARKING REQUIREMENTS:** NO LOCAL REQUIREMENTS  
**PARKING PROVIDED:** 2 SPACES PER EMPLOYEE  
**YARD REQUIREMENTS:** NO LOCAL REQUIREMENTS, GREATER THAN 20 FEET PROVIDED  
**DESIGN CRITERIA:**  
**WIND LOAD:** 130 MPH, EXPOSURE C  
**SNOW LOAD:** 30 PSF  
**SEISMIC:** S<sub>s</sub> = 150 S<sub>1</sub> = 50 SITE CLASS: C  
**SOILS:** 1500 PSF

**GENERAL PROJECT NOTES:**

1. THE CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING OF LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.
2. CONSTRUCT IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE IBC, IPC, IMC, NESC, ADA, LOCAL UTILITIES, STATE AND LOCAL CODES AND GOOD PRACTICE. OBSERVE O.S.H.A. REQUIREMENTS DURING CONSTRUCTION.
3. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.
5. WHERE ANY DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL STRUCTURAL NOTES AND SPECIFICATIONS, THE GREATER REQUIREMENTS SHALL GOVERN.
6. WHERE EQUIPMENT OR MATERIALS ARE NOTED ON THESE DRAWINGS AS A MANUFACTURER AND MODEL NUMBER, OTHER MANUFACTURERS PRODUCTS THAT ARE EQUAL OR BETTER MAY BE SUBSTITUTED UPON APPROVAL BY THE ENGINEER.
7. PROVIDE ALL LABOR BY WORKERS SKILLED AND REGULARLY EMPLOYED AT THE APPROPRIATE TRADE.
8. RESTORE TO PRECONTRACT CONDITION ANY PUBLIC OR PRIVATE LAND DISTURBED BY CONTRACT ACTIVITY. THIS SHALL INCLUDE ANY RESEEDING OR REVEGETATION OF EXISTING HORTICULTURE.
9. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTION, AND RECORD ANY CHANGES. SUPPLY ONE SET OF RED LINED RECORD DRAWING TO THE ENGINEER AFTER PROJECT CONSTRUCTION COMPLETED FOR PREPARATION OF PROJECT AS-BUILT DRAWINGS.

**DOORS AND WINDOWS:**

1. WINDOWS: 2' WIDE x 3' TALL FIXED DOUBLE PANE, SERIES 3255 VINYL WINDOW, AS MANUFACTURED BY "CAPITAL GLASS NORTHERM WINDOWS" OR EQUAL.
2. ENTRY DOOR: DOUBLE 30x68, WOOD GRAIN IMPACT SERIES, INSULATED FIBERGLASS DOOR, AS MANUFACTURED BY "PLASTPRO INC." OR EQUAL.

**WOOD FRAMING:**

1. ALL FRAMING SHALL BE HEM FIR #2 OR BETTER. FRAMING LUMBER SHALL COMPLY WITH THE LATEST EDITION OF THE GRADING RULES OF THE WPA OR WCLIB. ALL SAWN LUMBER SHALL BE STAMPED WITH THE GRADE MARK OF THE APPROVED GRADING AGENCY. ALL BEAM AND HEADER MATERIAL SHALL BE FREE OF SPLITS AND SHAKES.
2. NAILING OF FRAMING SHALL CONFORM TO TABLE 2304.9.1 OF THE 2006 IBC AND THE PLANS.
3. ALL WOOD SILLS ON CONCRETE SHALL BE PRESSURE TREATED LUMBER.
4. ALL NAILS SPECIFIED IN THE PLANS ARE COMMON NAIL SIZES. NAILS SHALL BE GALVANIZED. 6d COMMON SHANK DIAMETER IS 0.113" 8d COMMON SHANK DIAMETER IS 0.131". 10d COMMON SHANK DIAMETER IS 0.148". OTHER NAILS HAVING THE SAME SHANK DIAMETER MAY BE SUBSTITUTED.
5. ROOF JOISTS SHALL BE BOISE CASCADE SERIES 400 I-JOISTS OR APPROVED EQUAL.

6. PLYWOOD: ALL PLYWOOD SHALL BE APA RATED SHEATHING WITH AN EXTERIOR OR EXPOSURE 1 DURABILITY CLASSIFICATION AND SHALL BEAR THE STAMP OF AN APPROVED TESTING AGENCY.
7. LAY UP ROOF SHEATHING WITH THE FACE GRAIN PERPENDICULAR TO SUPPORTS. STAGGER JOINTS.
8. LAY UP WALL SHEATHING WITH FACE GRAIN PARALLEL TO SUPPORTS. FULLY BLOCK ALL EDGES OF WALL SHEATHING.
8. GLULAMS: SIMPLE SPAN GLULAM BEAMS SHALL BE 24F-V4. BEAMS CANTILEVERING OVER SUPPORTS SHALL HAVE THE SPECIFIED MINIMUM PROPERTIES TOP AND BOTTOM (24F-E4). SPECIES FOR OUTER LAMINATIONS SHALL BE DOUGLAS FIR. NO COARSE-GRAIN MATERIAL IS ALLOWED IN THE BEAM. WANE CAN EXIST ON ONE SIDE ONLY. ALL BEAMS SHALL BE FABRICATED USING WATERPROOF GLUE. FABRICATION AND HANDLING PER LATEST AITC STANDARDS. BEAMS TO BEAR AITC STAMP AND CERTIFICATE AND GRADE STAMP.

**ROOFING:**

1. INSTALL ICE AND WATER SHIELD ON ROOF SHEATHING OVER ENTIRE ROOF.
2. ROOF SHINGLES SHALL BE OWENS CORNING DURATION PREMIUM ASPHALT SHINGLES.

**ANCHOR BOLTS:**

1. ALL BOLTS, ANCHOR BOLTS, EXPANSION BOLTS, ETC., SHALL BE HOT DIPPED GALVANIZED, AND INSTALLED WITH HEAVY HEX NUT AND STEEL PLATE WASHERS WHERE REQUIRED.
2. BASE FRAME(S) AND ANCHOR BOLTS FOR HYDROELECTRIC TURBINE AND GENERATOR BASE TO BE SUPPLIED BY TURBINE MANUFACTURER.

**CONCRETE:**

1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS UNLESS NOTED OTHERWISE.
2. ALL STRUCTURAL CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4.5". HIGHER SLUMPS (UP TO 9" TOTAL) SHALL BE PERMITTED SO LONG AS THEY ARE OBTAINED BY THE ADDITION OF A CHEMICAL ADMIXTURES CONFORMING TO ACI REQUIREMENTS.
3. CONCRETE WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301-05, "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND ACI 318-05, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
4. CONTRACTOR SHALL HIRE AN INDEPENDENT TEST LAB TO VERIFY CONCRETE STRENGTH BY STANDARD SAMPLING AND TESTING PROCEDURES USING QUALIFIED FIELD TESTING TECHNICIANS. THE AVERAGE COMPRESSIVE STRENGTH SHALL BE CALCULATED IN ACCORDANCE WITH ACI PROCEDURES AND A REPORT SUBMITTED TO THE ENGINEER SUMMARIZING ALL TESTING RESULTS AND CONCLUSIONS.
5. MECHANICALLY VIBRATE ALL CONCRETE WHEN PLACED, EXCEPT THAT SLABS ON GRADE NEED TO BE VIBRATED ONLY AROUND PERIMETER AND AT PIPE AND CONDUIT PENETRATIONS. UNLESS APPROVED OTHERWISE IN WRITING BY THE ENGINEER, ONLY KEYED CONSTRUCTION JOINTS ARE ALLOWED IN CONCRETE SLABS ON GRADE.

**CONCRETE REINFORCING:**

1. DEFORMED BARS TO BE EPOXY COATED 60 KSI - ASTM A615 (GR60)
2. REINFORCING BAR SPACING SHOWN ARE MAXIMUM ON CENTERS. SECURELY TIE ALL BARS IN LOCATION BEFORE PLACING CONCRETE.
3. ALL DOWELS, ANCHOR BOLTS, REBAR, ETC SHALL BE SECURELY HELD IN FORMS BEFORE PLACING OF CONCRETE.
4. LAP SPLICES IN CONCRETE: STAGGER ALTERNATE SPLICES A MINIMUM OF ONE LAP LENGTH. LAP SPlice, LENGTH #4 BAR = 25"
5. TYPICAL CLEAR CONCRETE COVERAGE FOR REINFORCING: 3" CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 1.5" FORMED CONCRETE EXPOSED TO EARTH OR WEATHER

**FINISH:**

1. INTERIOR FINISH SHALL BE WHITE FRP PANELS OVER OSB SHEATHING ON WALLS. CEILING FINISH SHALL BE 1 COAT LATEX ENAMEL PRIMER AND 2 COATS SEMI-GLOSS LATEX ENAMEL WHITE INTERIOR PAINT OVER OSB SHEATHING.
2. EXTERIOR FINISH SHALL BE 2 COATS CABOTS CLEAR SOLUTION, CEDAR SEMI SOLID STAIN ON BUILDING BODY. TRIM SHALL BE PAINTED WITH 2 COATS SEMI-GLOSS LATEX ENAMEL FOREST GREEN EXTERIOR PAINT.



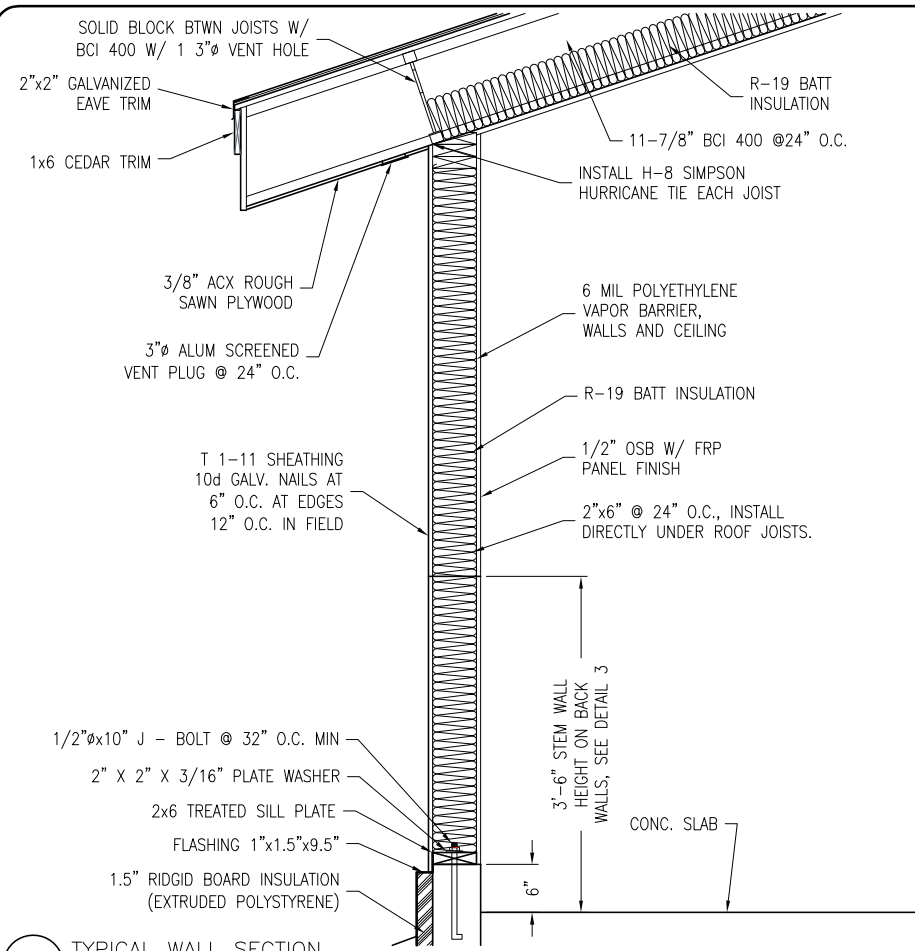
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NO.	DATE	REVISIONS

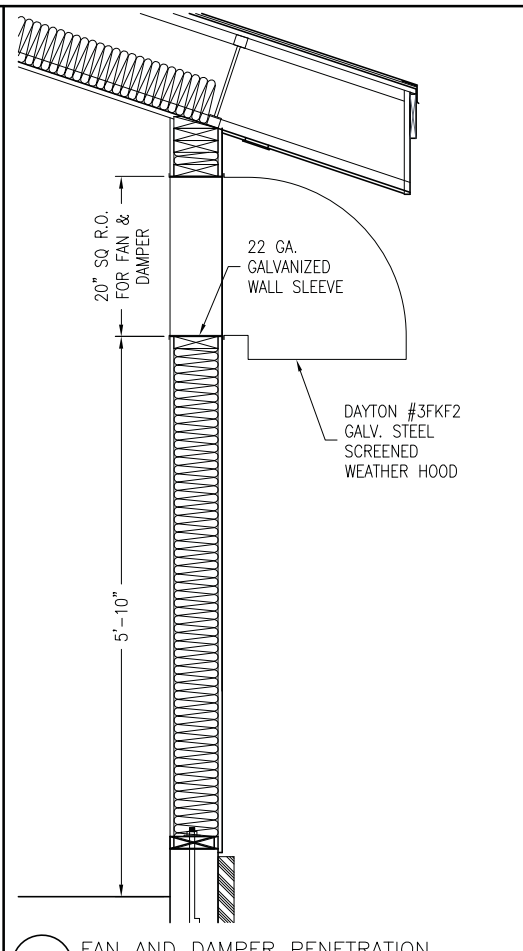
**POWERHOUSE PLAN, SECTION ELEVATIONS, CODE INFORMATION AND SPECIFICATIONS**  
 PROJECT: **PACKERS CREEK HYDROELECTRIC PROJECT**  
**CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: MDD  
 DRAWN: MDD  
 CHECKED: AsNoted  
 FILE: PwrHseR

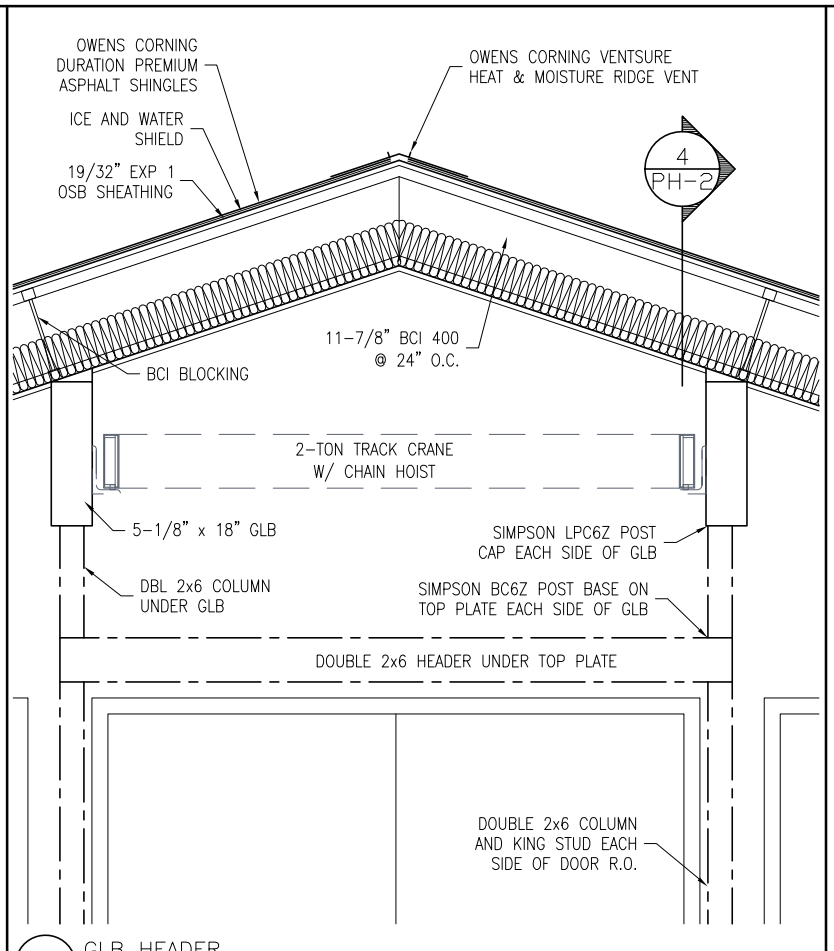
Sheet  
**PH-1**  
 OF 3



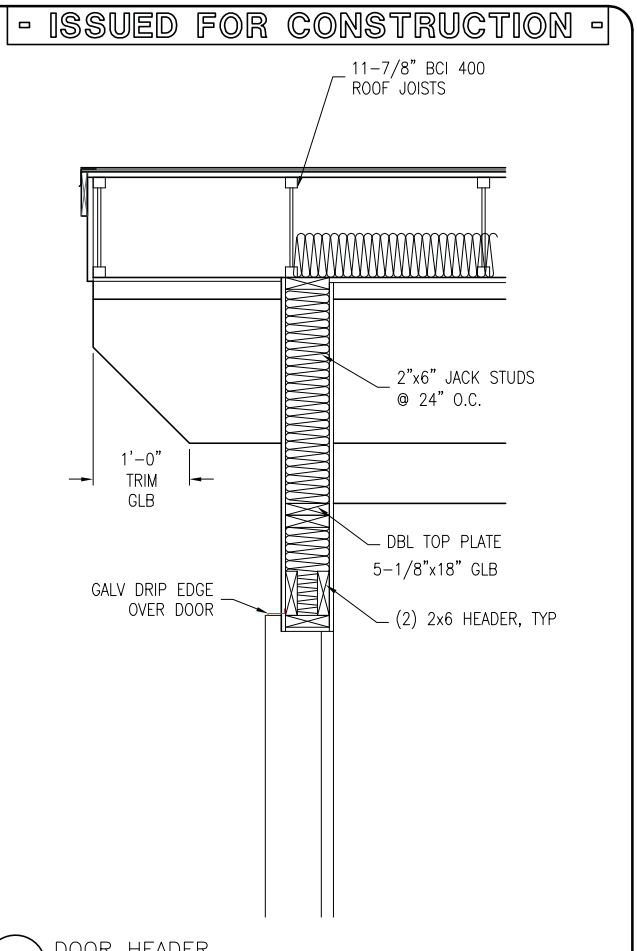
**1** TYPICAL WALL SECTION  
SCALE: 1" = 1'-0"



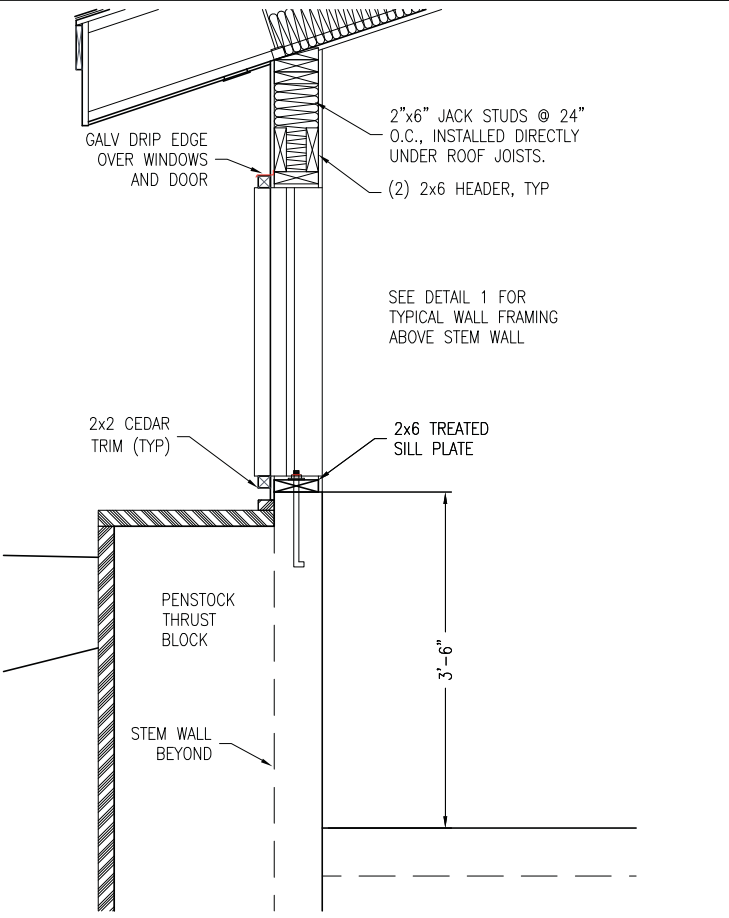
**2** FAN AND DAMPER PENETRATION  
SCALE: 1" = 1'-0"



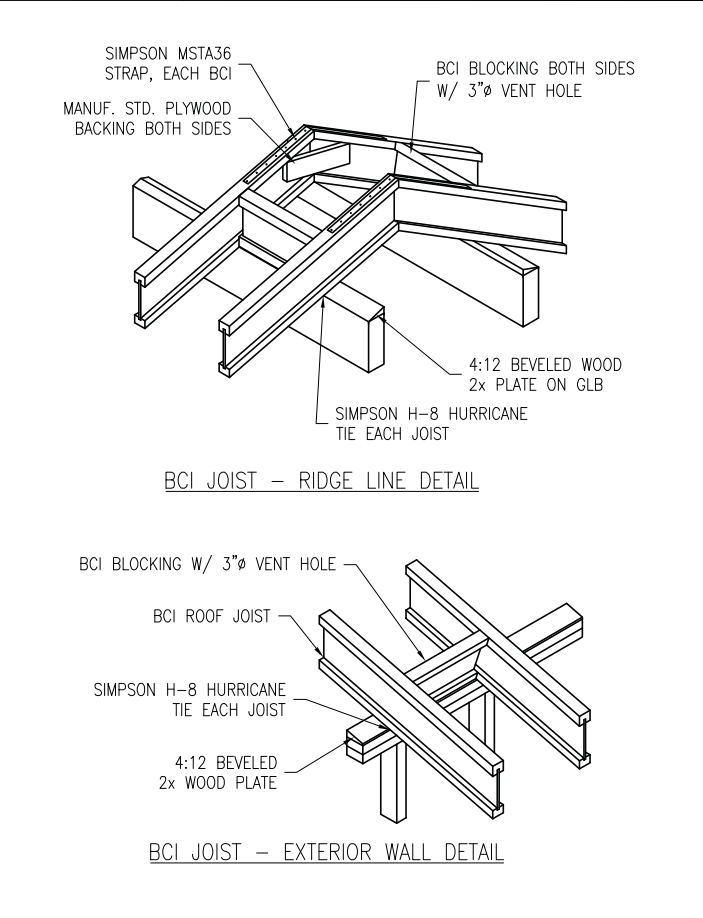
**3** GLB HEADER  
SCALE: 1" = 1'-0"



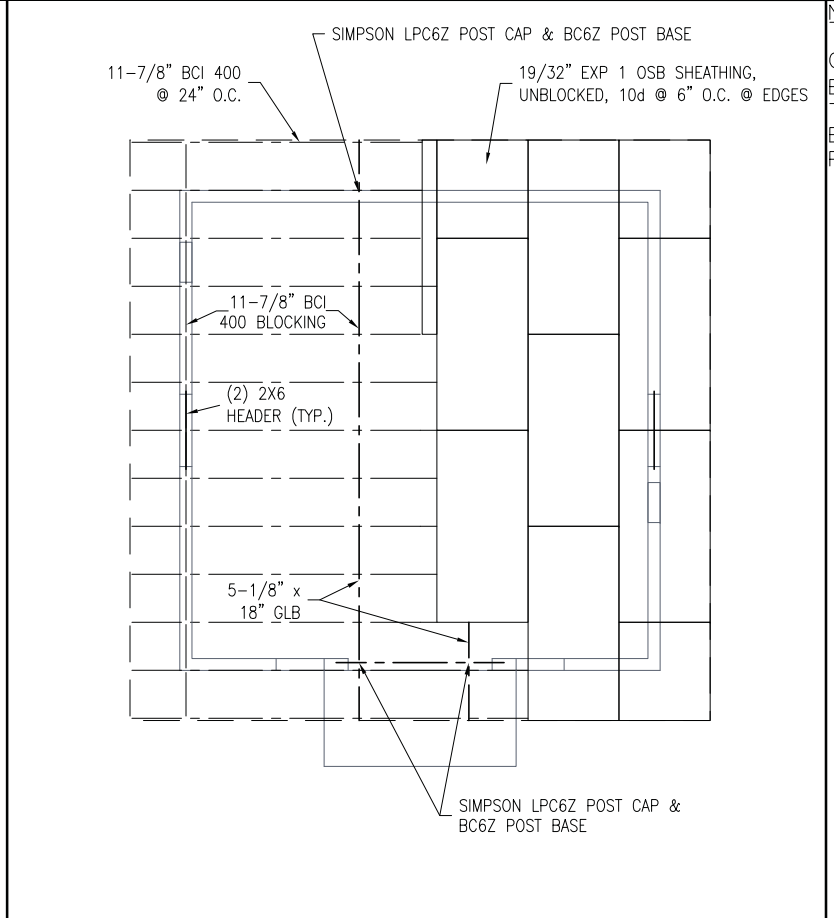
**4** DOOR HEADER  
SCALE: 1" = 1'-0"



**5** 42" STEM WALL AND HEADER SECTION  
SCALE: 1" = 1'-0"



**6** BCI JOIST FRAMING DETAILS  
SCALE: NTS



**7** ROOF PLAN  
SCALE: 1/4" = 1'-0"

- ISSUED FOR CONSTRUCTION -

NOTES:  
CRANE: SUPPLY AND INSTALL 2-TON TRACK CRANE BETWEEN GLB'S. PROVIDE WITH CROSS BEAM AND TRACK TO ALLOW MOVEMENT FROM SIDE TO SIDE BETWEEN BEAMS AND FROM TURBINE TO DOOR. PROVIDE WITH LOW CLEARANCE 2-TON CHAIN HOIST LIFT.



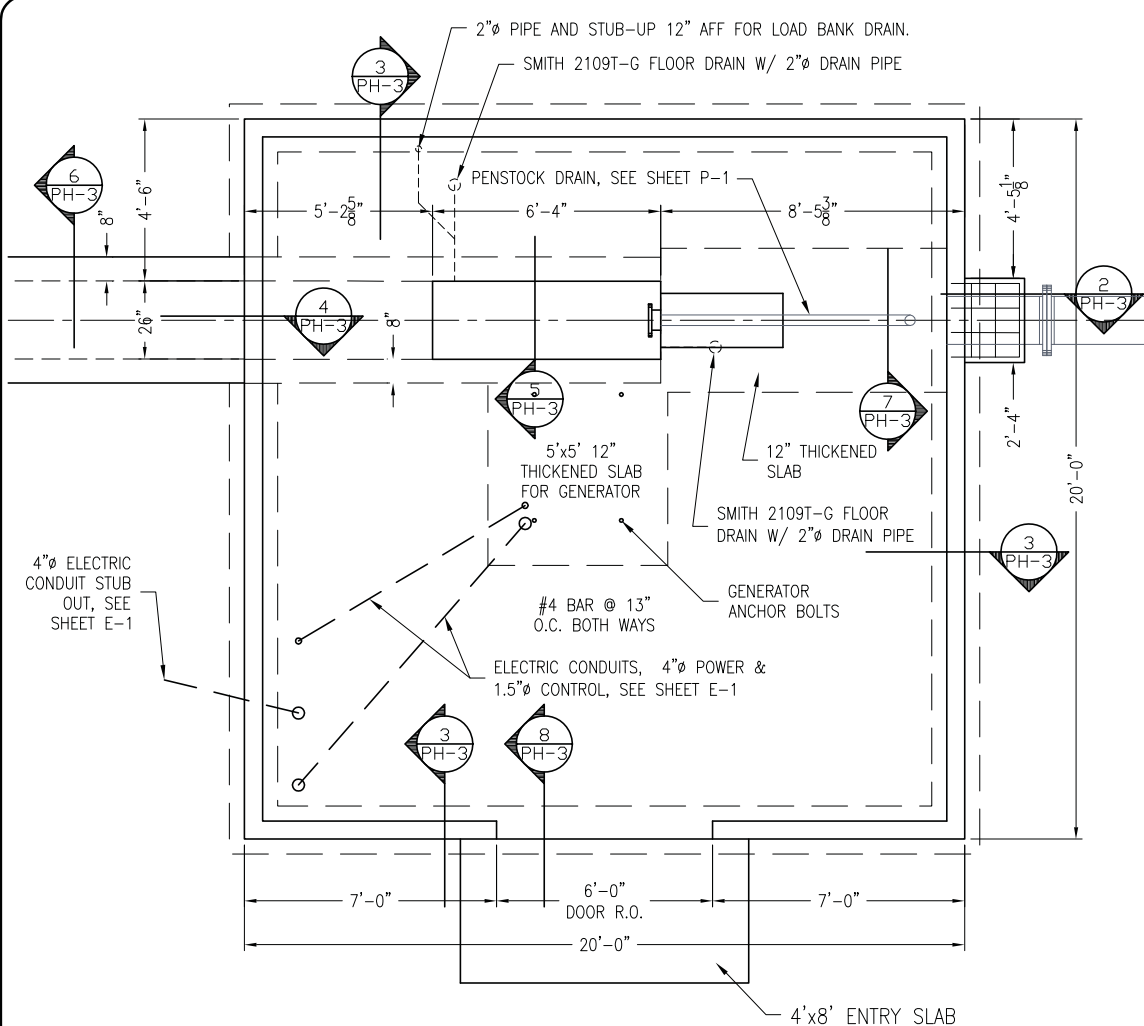
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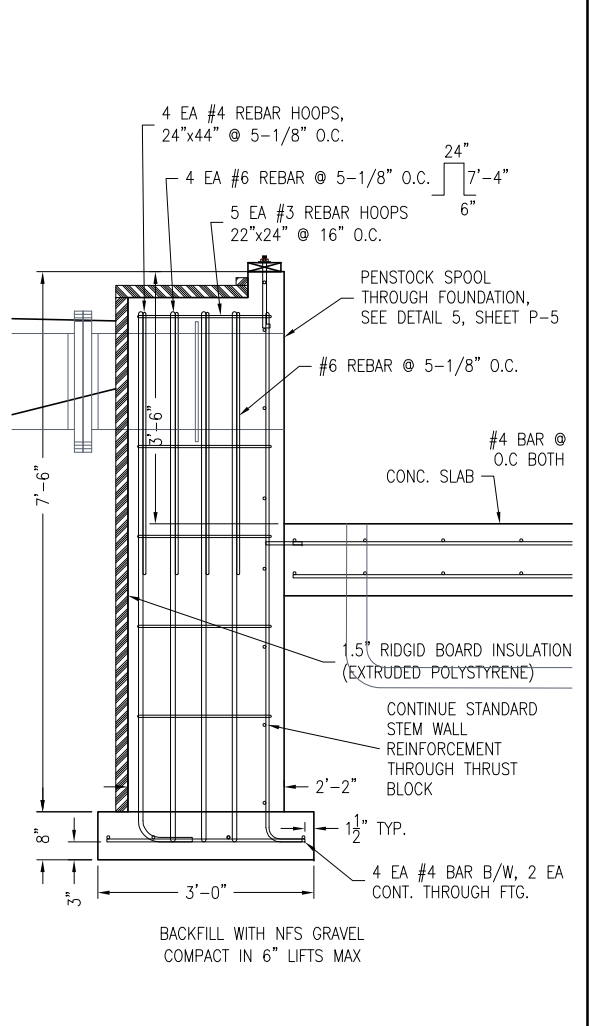
Drawing: **POWERHOUSE FRAMING DETAILS**  
Project: **PACKERS CREEK HYDROELECTRIC PROJECT CHIGNIK LAGOON POWER UTILITY Chignik Lagoon, AK**

DATE: 11/30/12  
DESIGNED: MDD  
DRAWN: MDD  
CHECKED: AsNoted  
SCALE: AsNoted  
FILE: PwrHseR

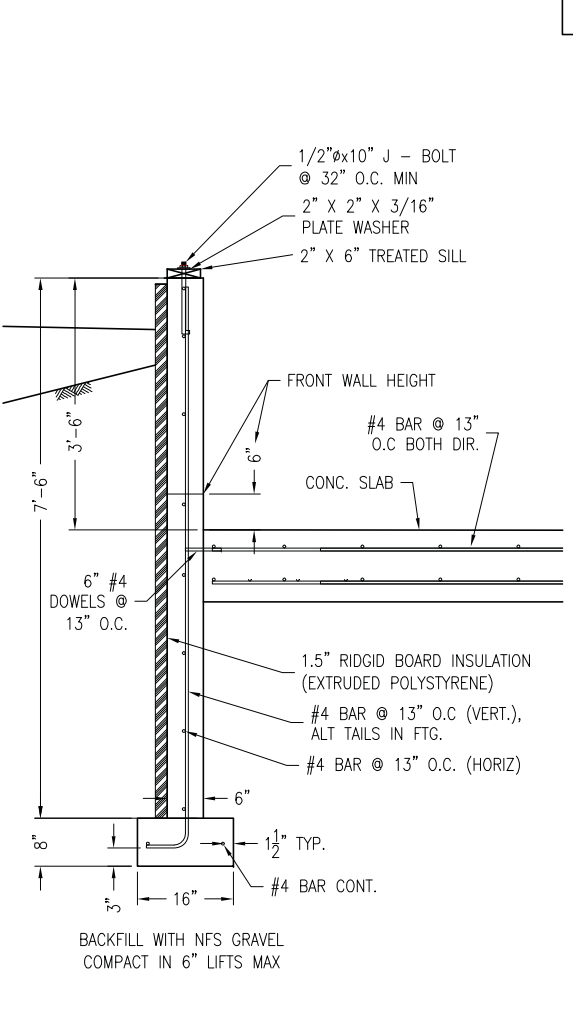




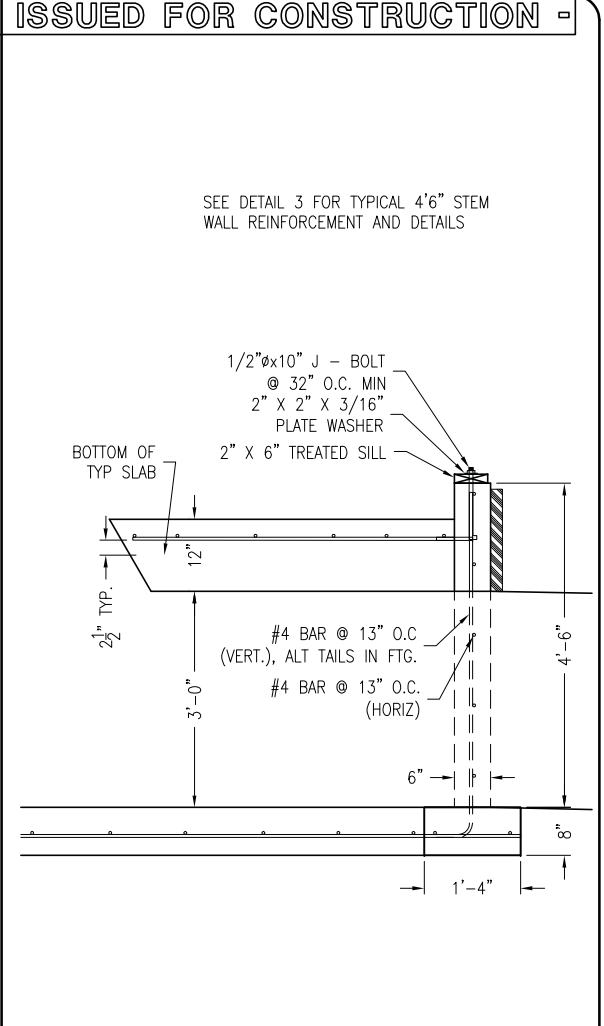
1 POWER HOUSE FOUNDATION PLAN  
SCALE: 3/8" = 1'-0"



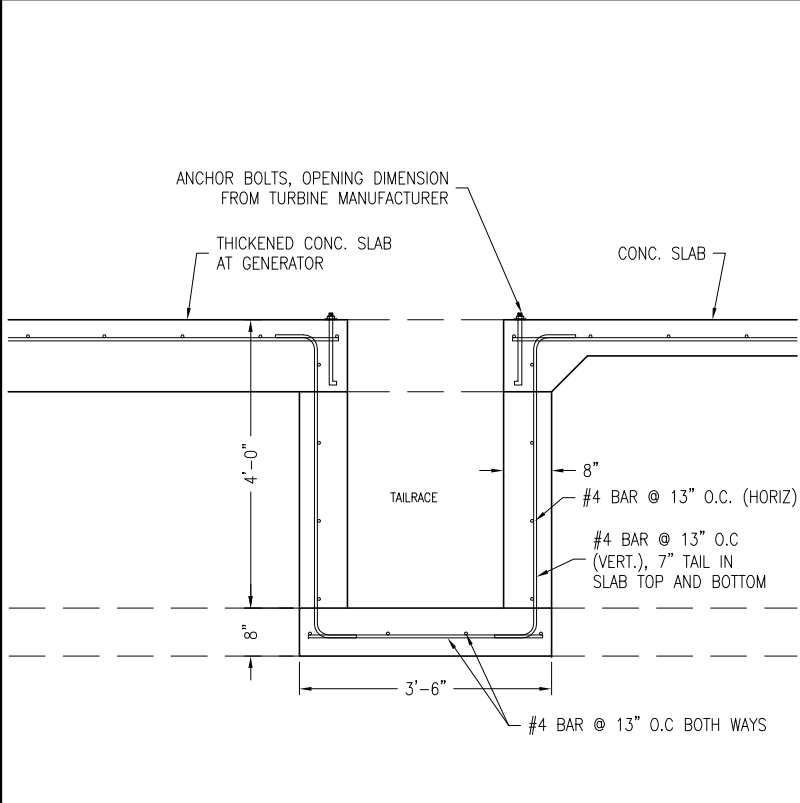
2 PENSTOCK THRUST BLOCK SECTION  
SCALE: 3/4" = 1'-0"



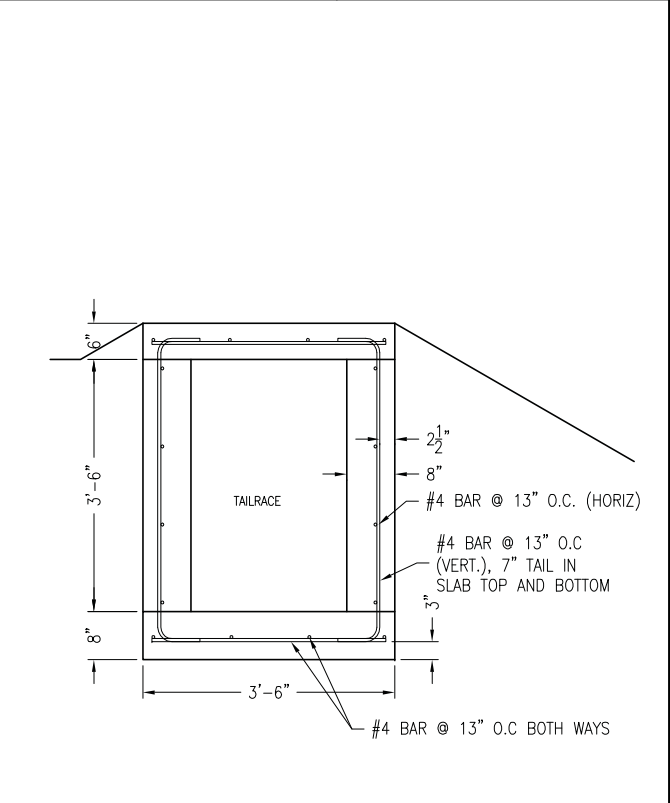
3 FOUNDATION STEM WALL SECTION  
SCALE: 3/4" = 1'-0"



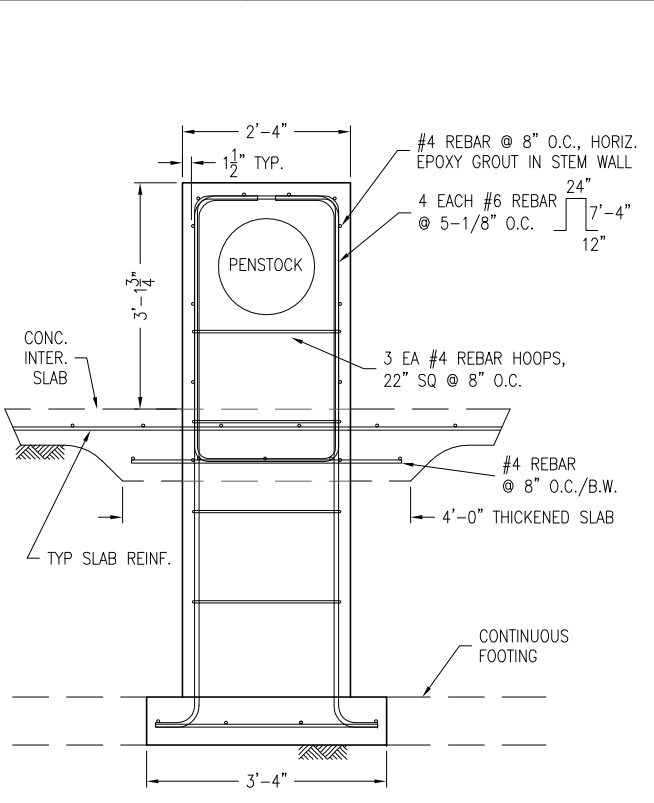
4 FOUNDATION STEM WALL SECTION AT TAILRACE  
SCALE: 3/4" = 1'-0"



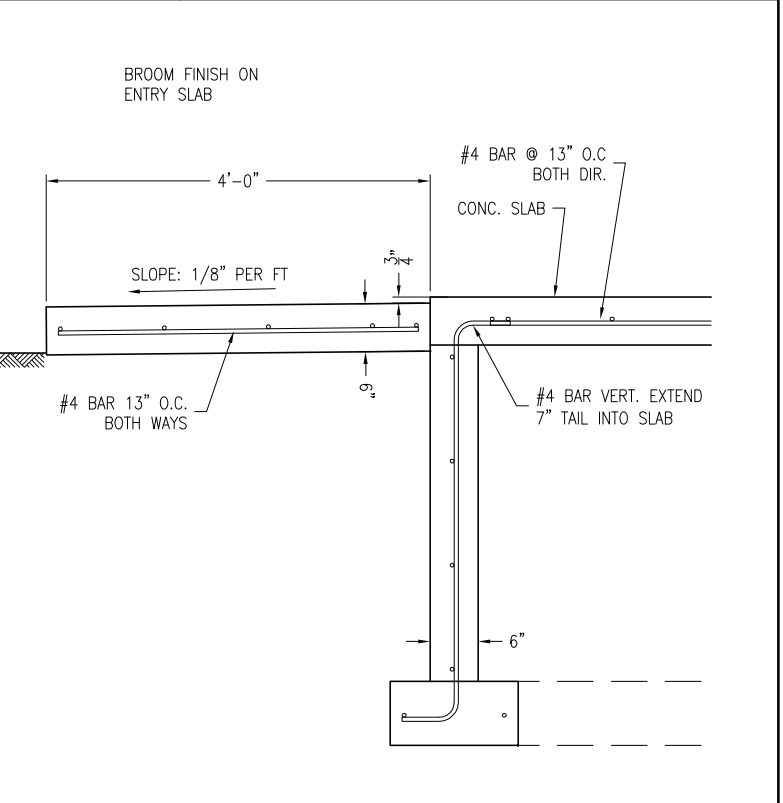
5 TAILRACE SECTION, IN BUILDING  
SCALE: 3/4" = 1'-0"



6 TAILRACE SECTION, OUTSIDE BUILDING  
SCALE: 3/4" = 1'-0"



7 THRUST BLOCK SECTION  
SCALE: 3/4" = 1'-0"



8 POWER HOUSE ENTRY DOOR & SLAB  
SCALE: 1" = 1'-0"



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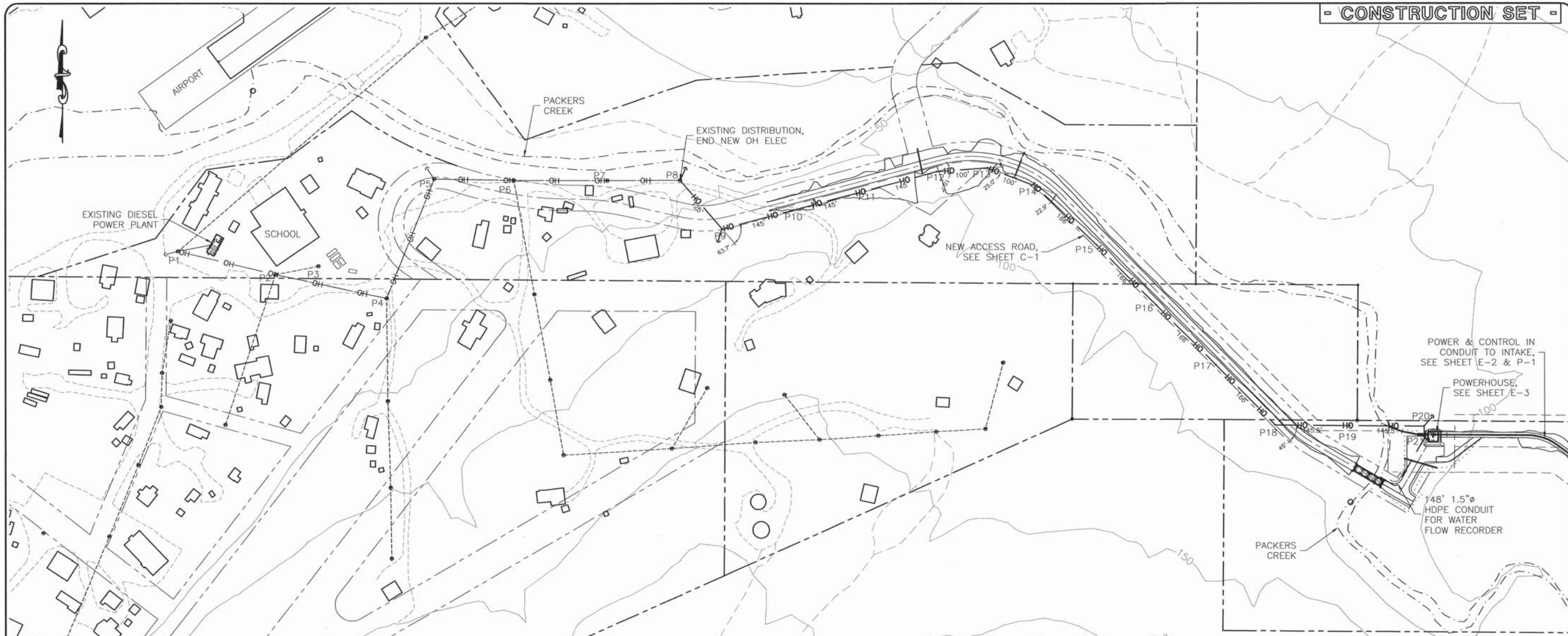
NO.	DATE	REVISIONS

POWERHOUSE FOUNDATION PLAN AND DETAILS  
 PROJECT: PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: MDD  
 DRAWN: MDD  
 CHECKED: AsNoted  
 FILE: PwrHseP

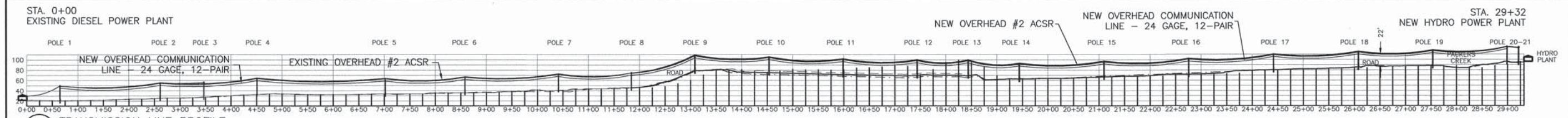
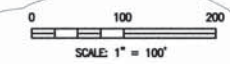


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1 ELECTRICAL SITE PLAN  
 SCALE: 1" = 100'

NOTE: SEE SHEET V-1 FOR SURVEY CONTROL AND POLE LOCATIONS.



2 TRANSMISSION LINE PROFILE  
 SCALE: 1" = 100'

**GENERAL CONSTRUCTION SPECIFICATIONS**

ALL WORK SHALL BE COMPLETED IN COMPLIANCE WITH THE APPLICABLE PROVISION OF THE CURRENT EDITION OF THE NATIONAL ELECTRIC SAFETY CODE (NEC).

ALL MATERIAL SHALL BE NEW.

THE CONTRACTOR SHALL VERIFY THAT HE HAS INSPECTED THE SITE AND THAT HIS BID COVERS ALL WORK NECESSARY TO PROVIDE A COMPLETE AND FULLY OPERABLE SYSTEM.

CHECK ALL DRAWINGS AND SPECIFICATIONS FOR DISCREPANCIES BETWEEN THIS AND OTHER DIVISION OF THE WORK AND SITE. REPORT IN WRITING ANY SUCH DISCREPANCIES WITHIN FIVE WORKING DAYS.

ALL CONSTRUCTION SHALL BE PERFORMED IN A SAFE, THOROUGH, AND SKILLFUL MANNER IN ACCORDANCE WITH THE STAKING SHEETS, PLANS AND SPECIFICATIONS, BY WORKERS SKILLED AND REGULARLY EMPLOYED AT THE APPROPRIATE TRADE.

POWER INTERRUPTIONS TO BE COORDINATED WITH THE UTILITY. TEMPORARY SERVICE SHALL BE PROVIDED BY THE CONTRACTOR.

RESTORE ALL DISTURBED ROADWAYS TO ORIGINAL CONDITION.

A ONE YEAR GUARANTEE SHALL BE FURNISHED FOR ALL ELECTRICAL MATERIALS AND LABOR COMMENCING UPON FINAL COMPLETION OF THE WORK. ALL CALLBACK REPAIRS AND REPLACEMENTS SHALL BE COMPLETED IN A TIMELY MANNER AT NO COST TO THE OWNER.

SEE HYDROELECTRIC PLANT SWITCHGEAR AND CONTROLS SPECIFICATION FOR POWER TERMINATIONS IN HYDROELECTRIC PLANT AND CONTROL INTERCONNECTION WITH UTILITY.

SEE HYDROELECTRIC PLANT TURBINE GENERATOR SPECIFICATION FOR GENERATOR CONNECTION AND SENSOR TERMINATIONS IN HYDROELECTRIC PLANT.

LOCKWASHERS SHALL BE INSTALLED ON ALL THREADED MATERIAL AND HARDWARE IN ADDITION TO NUTS AND WASHERS.

**POLES AND CROSS ARMS**

POLES SHALL BE THIRTY FIVE (35) FEET LONG, CLASS THREE (3). POLES SHALL BE SET WITH MINIMUM 6 FEET BURIAL DEPTH.

POLES SHALL BE BACKFILLED AND TAMPED TO THE FULL DEPTH. EXCESS DIRT SHALL BE BANKED AROUND THE BASE OF THE POLE.

LARGE, DENSE POLES THAT HAVE NO SERIOUS DEFECTS SHALL BE USED AT TRANSFORMER, DEADEND, ANGLE, AND CORNER LOCATIONS.

POLES SHALL BE SET SO THAT THE CROSSARM GAINS FACE IN OPPOSITE DIRECTIONS ON EVERY OTHER POLE. AT LINE DEADENDS, THE LAST TWO POLES SHALL BE SET SO THAT THE CROSSARM IS LOCATED ON THE SIDE OF THE POLE AWAY FROM THE LONG SPAN. ON LINES THAT CURVE, CROSSARMS SHALL BE INSTALLED ON THE SIDE OF THE POLE THAT FACES THE MIDDLEPOINT OF THE CURVE. ON SLOPING TERRAIN, CROSSARMS SHALL BE INSTALLED ON THE UPHILL SIDE OF THE POLE. POLE TOP INSULATOR BRACKETS AND POLE TOP PINS SHALL BE INSTALLED ON THE OPPOSITE SIDE OF THE POLE FROM THE GRAIN.

AT LINE ANGLES AND DEADENDS, POLES SHALL BE SET SUCH THAT THEY LEAN AWAY FROM THE STRAIN OF THE PRIMARY CONDUCTORS. THEY SHALL BE SET SUCH THAT THE FINAL RAKE IS NOT LESS THAN 1 INCH FOR EACH 10 FEET OF POLE HEIGHT ABOVE GROUND AFTER THE CONDUCTORS ARE INSTALLED AT THE REQUIRED TENSION.

**POLE TOP ASSEMBLIES**

NEUTRAL CONDUCTOR SHALL BE INSTALLED ON THE SAME SIDE (PREFERABLY THE ROADSIDE) OF ALL TANGENT AND SMALL ANGLE POLES THROUGHOUT THE LINE SECTION.

CONDUCTOR SHALL BE TIED TO THE TOP GROOVE OF PIN-TYPE OR POST-TYPE INSULATORS ON TANGENT POLES. ON ANGLE STRUCTURES THE CONDUCTOR SHALL BE TIED ON THE SIDE OF THE INSULATOR OPPOSITE THE DIRECTION OF THE STRAIN. PIN-TYPE AND POST-TYPE INSULATORS SHALL BE TIGHT ON THE PINS AND BRACKETS, RESPECTIVELY, AND THE TOP GROOVE SHALL BE IN LINE WITH THE CONDUCTOR AFTER LAYING. UPSTRAIN IS NOT ALLOWED ON PIN-TYPE OR POST-TYPE INSULATORS.

A 3-INCH BY 3-INCH MINIMUM SQUARE, CURVED WASHER (ITEM "g") SHALL BE USED ABUTTING THE POLE WHEN INSTALLING PRIMARY DEADEND, NEUTRAL DEADEND AND GUY ASSEMBLIES DIRECTLY TO THE POLE.

A 2-1/4 INCH MINIMUM SQUARE WASHER SHALL BE PLACED UNDER THE SHOULDER OF 7.2KV CROSSARM INSULATOR PINS WHOSE SURFACE AREA ABUTTING THE CROSSARM IS LESS THAN 4 SQUARE INCHES.

**CONDUCTOR INSTALLATION**

CONDUCTORS SHALL BE HANDLED WITH CARE AND SHALL NOT BE TRAMPLED ON OR RUN OVER BY VEHICLES. EACH REEL SHALL BE EXAMINED AND THE WIRE SHALL BE INSPECTED FOR CUTS, KINKS, OR OTHER DAMAGE. DAMAGED PORTIONS SHALL BE CUT OUT AND THE CONDUCTOR SPLICED. THE CONDUCTORS SHALL BE PULLED OVER SUITABLE ROLLERS OR STRINGING BLOCKS PROPERLY MOUNTED ON THE POLE OR CROSSARM TO PREVENT BINDING OR DAMAGE WHILE STRINGING.

CONDUCTORS SHALL BE SAGGED EVENLY AND IN ACCORDANCE WITH THE CONDUCTOR MANUFACTURER'S RECOMMENDATIONS. THE AIR TEMPERATURE AT THE TIME AND PLACE OF SAGGING SHALL BE DETERMINED BY THE USE OF A CERTIFIED THERMOMETER. THE SAG OF ALL CONDUCTORS AFTER STRINGING SHALL BE IN ACCORDANCE WITH THE ENGINEER'S INSTRUCTIONS.

SPLICERS SHALL BE NO CLOSER THAN 1,000 FEET FROM ONE ANOTHER AND THERE SHALL BE NO MORE THAN 3 SPLICES PER MILE IN ANY PRIMARY PHASE OR NEUTRAL CONDUCTOR. SPLICES SHALL BE NOT BE LOCATED WITHIN 10 FEET OF ANY SUPPORTING STRUCTURE. SPLICES SHALL NOT BE LOCATED IN CROSSING SPANS AND PREFERABLY NOT IN ADJACENT SPANS. SPLICES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

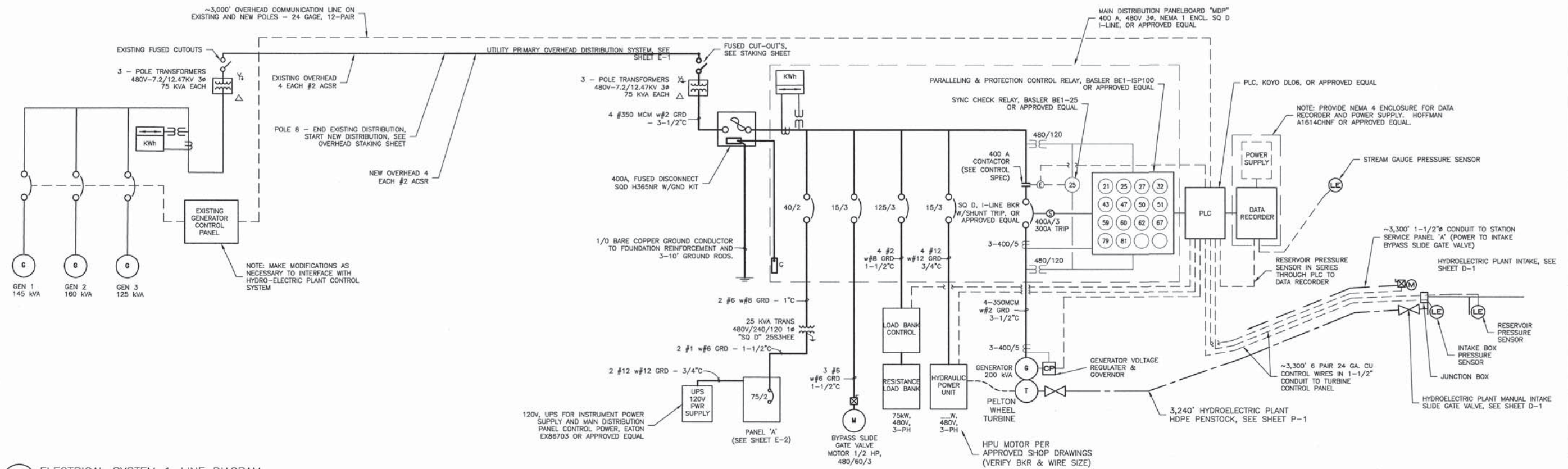
ALL CONDUCTORS SHALL BE CLEANED THOROUGHLY BY WIREBRUSHING BEFORE SPLICING OR INSTALLING CONNECTORS OR CLAMPS. A SUITABLE OXIDATION INHIBITOR SHALL BE APPLIED BEFORE SPLICING OR APPLYING CONNECTORS OVER ALUMINUM CONDUCTOR.

NO.	DATE	REVISIONS

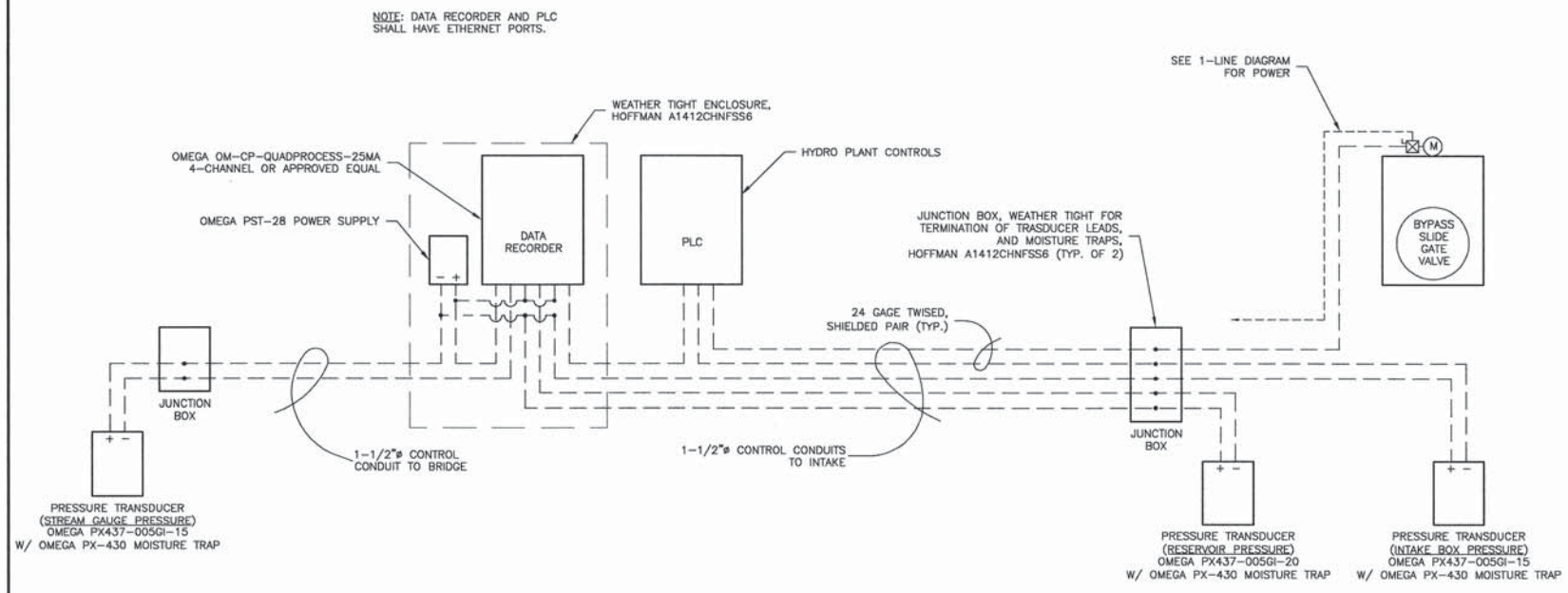
Electrical  
 TRANSMISSION LINE PLAN & PROFILE  
 Project  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
 DESIGNED: SH  
 DRAWN: MDD  
 CHECKED: AsNoted  
 SCALE: AsNoted  
 FILE: PackersCreekHydroElec

NOTE: PROVIDE SEPARATE ENCLOSURES FOR CONTACTORS AND RELAYS AS REQUIRED W/ MAIN DISTRIBUTION PANEL.



1 ELECTRICAL SYSTEM 1-LINE DIAGRAM  
SCALE: NTS



2 PRESSURE SENSORS LOOP DIAGRAM  
SCALE: NTS

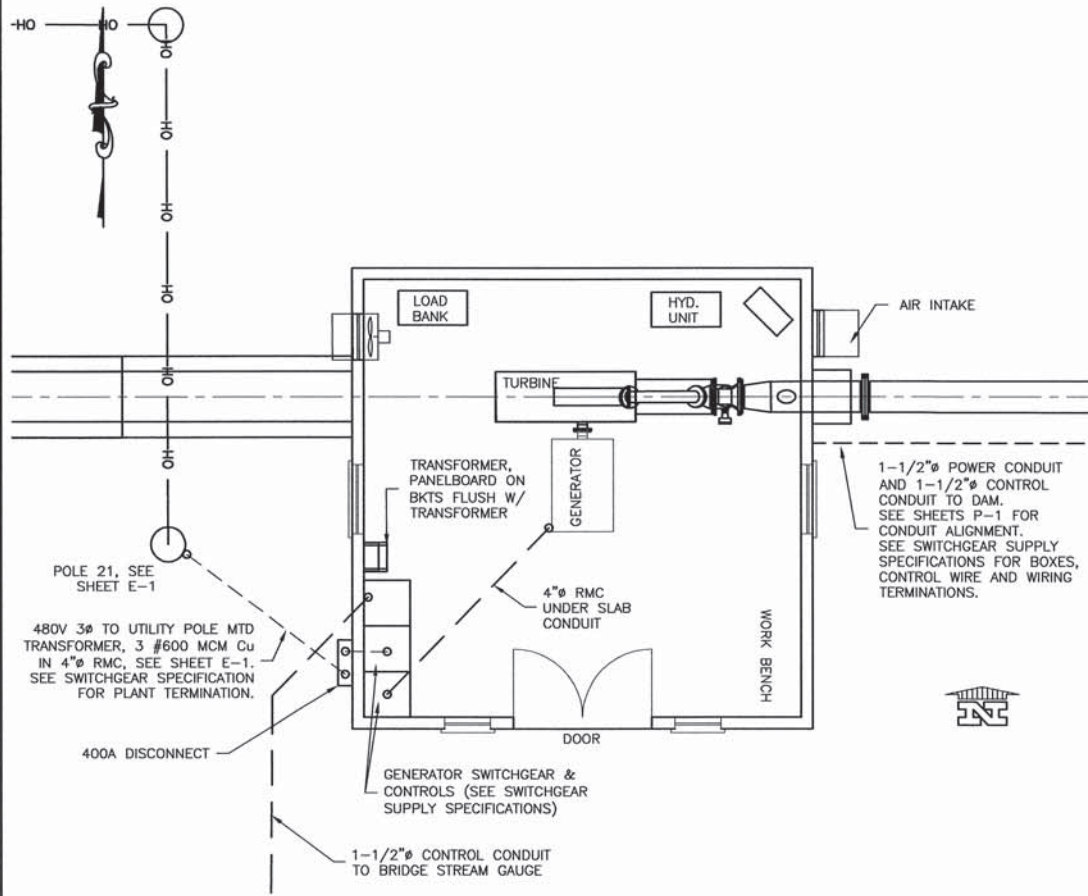


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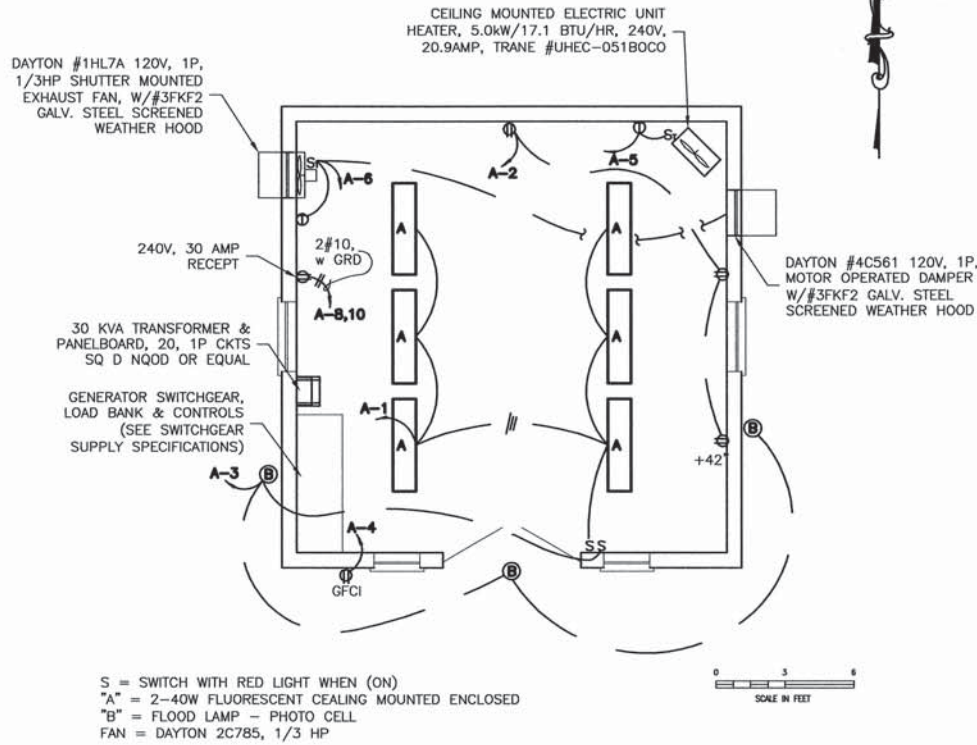
NO.	DATE	REVISIONS
1	4/15/13	ADD TRIP RATING, REV. BKR SIZES, ADD HPU

Design: **ELECTRICAL 1-LINE DIAGRAM AND PRESSURE SENSOR LOOP DIAGRAM**  
 Project: **PACKERS CREEK HYDROELECTRIC PROJECT CHIGNIK LAGOON POWER UTILITY**  
 Chignik Lagoon, AK

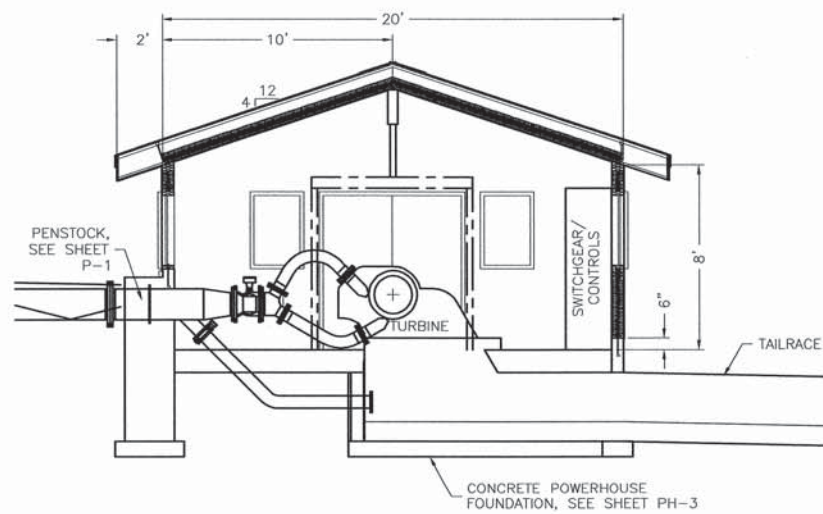
DATE: 4/15/13  
 DESIGNED: SH  
 DRAWN: MDD  
 CHECKED: AsNoted  
 SCALE: AsNoted  
 FILE: PackersCrkHydroElec



1 POWERHOUSE ELECTRICAL SITE PLAN  
SCALE: 1" = 4'



2 POWERHOUSE ELECTRICAL POWER AND LIGHTING PLAN  
SCALE: 1" = 4'



3 POWERHOUSE SECTION  
SCALE: 1" = 4'

PANEL "A"		LOCATION: POWER PLANT									
INTERRUPTING CAPACITY: 10,000 MOUNTING: SURFACE		VOLTAGE: 120/240V, 1PH, 3W MAIN: 100 AMP MB									
Ckt	DESCRIPTION	kVA		BUS		kVA		BRKR	DESCRIPTION	Ckt	
		A	B	A	B	A	B				
1	LIGHTING	20/1	1.0			1.0	1.0	20/1	RECEPTS	2	
3	EXT LIGHTING	20/1	0.2			1.0	1.0	20/1	EXT RECEPTS (GFCI)	4	
5	ELEC HEAT	30/2	2.5			0.5	15/1	15/1	EXH FAN	6	
7						3.7	3.7	30/2	30 A RECEPTS	8	
9	UPS PANEL	20/1	0.5			3.7	3.7	30/2		10	
11	SPACE							20/1	SPARE	12	
13	SPACE								SPARE	14	
15	SPACE								SPARE	16	
17	SPACE								SPARE	18	
19	SPACE								SPARE	20	
PHASE A kVA: 9.2		PHASE B kVA: 7.4		CONNECTED kVA: 16.6		DIVERSITY: 1.0		TOTAL Kva: 16.6		AMPS: 69.2	

LIGHT FIXTURE SCHEDULE:				
SYMBOL	LAMPS		DESCRIPTION	MANUFACTURER
	NO	WATTS		
A	2	32-T8	SURFACE ENCLOSED & GASKETED	LITHONIA #DMW-2-T8-120-GEB10IS
B	1	100W MH	EXTERIOR WALL MOUNTED	LITHONIA #TWA-100M-120-SF-LPI

GENERAL ELECTRICAL NOTES:

- CONSTRUCT IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE AND OTHER APPLICABLE CODES AND STANDARDS.
- WHERE ANY DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL ELECTRICAL NOTES AND SPECIFICATIONS, THE GREATER REQUIREMENTS SHALL GOVERN.
- WHERE EQUIPMENT OR MATERIALS ARE NOTED ON THESE DRAWINGS AS A MANUFACTURER AND MODEL NUMBER, OTHER MANUFACTURERS PRODUCTS THAT ARE EQUAL OR BETTER MAY BE SUBSTITUTED UPON APPROVAL BY THE ENGINEER.
- CONTRACTOR SHALL SUPPLY ONE SET OF RED LINED RECORD DRAWING TO THE ENGINEER AFTER PROJECT CONSTRUCTION COMPLETED FOR PREPARATION OF PROJECT AS-BUILT DRAWINGS.
- ALL DEVICE BOXES SHALL BE INSTALLED FLUSH AND CONDUITS RUN CONCEALED IN FINISHED AREAS EXCEPT AS SPECIFICALLY SHOWN/NOTED OTHERWISE.
- INSTALL POWER AND CONTROL WIRING AND REQUIRED CONTROL COMPONENTS FOR HEATING AND AIR FLOW SYSTEMS AS SHOWN/NOTED ON THESE DRAWINGS AND EQUIPMENT MANUFACTURERS INSTRUCTIONS.
- WIRE SIZE SHALL BE #12 MIN., UNLESS OTHERWISE NOTED. WIRE SIZES SMALLER THAN #6 AWG SHALL BE THW/THWN, #6 AWG WIRE & LARGER SHALL BE THW, UNLESS NOTED OTHERWISE.
- WIRE (CONDUCTOR) COLORS SHALL BE AS PER APPLICABLE CODES.
- ALL CONDUCTORS SHALL BE COPPER.
- ALL CONDUCTORS SHALL BE RUN IN CONDUIT, EXCEPT LOW VOLTAGE CONTROL & COMM. CABLES.
- ALL MATERIALS SHALL BE UL APPROVED.
- ALL BRANCH CIRCUITS, EXCEPT INTERIOR LIGHTING, EXT. BLDG. SIGNS, TO HAVE A GREEN EQUIPMENT GROUNDING CONDUCTOR SIZED AS PER NEC 250-96.
- PVC (SCHEDULE 40) PERMITTED BELOW SLAB AND BELOW GRADE ONLY.
- IT IS INTENDED THAT AN EQUIPMENT GROUND CONDUCTOR (GREEN) SHALL BE RUN IN POWER CIRCUIT CONDUITS WHETHER OR NOT THE CONDUIT IS PVC.
- ALL EMPTY CONDUITS TO BE PROVIDED WITH NYLON PULL STRING.
- NEW TYPED WRITTEN PANEL DIRECTORY SHALL BE FURNISHED AFTER JOB IS COMPLETED REFLECTING ALL AS BUILT CONDITIONS.
- ALL BRANCH CIRCUITS SHALL BE PROPERLY PHASE BALANCED.
- ALL DATA EQUIPMENT TO BE FED BY A DEDICATED CIRCUIT WHICH CONSISTS OF A POWER CIRCUIT THAT FEEDS THIS TYPE OF EQUIPMENT ONLY WITH A SEPARATE GREEN GROUNDING CONDUCTOR CARRIED ALL THE WAY BACK TO THE PANEL TO BE CONNECTED TO THE GROUNDING SYSTEM.
- FUSES SHALL BE DUAL ELEMENT, TIME DELAY TYPE UNLESS OTHERWISE NOTED.
- CONTRACTOR TO COORDINATE ROUGHING-IN TO ALL EQUIPMENT W/ EQUIPMENT SUPPLIER PRIOR TO INSTALLING CONDUITS.
- PROVIDE "PARAGON" PHOTOCELL # CW201-00 MOUNTED ON ROOF FACING NORTH. MAKE ADJUSTMENT FOR ANY AMBIENT LIGHT SOURCE.
- MAINTAIN 12" CLEARANCE BETWEEN P.O.S. COMM. CONDUITS AND LIGHTING FIXTURES AS WELL AS POWER CONDUITS.



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NO.	DATE	REVISIONS

POWERHOUSE ELECTRICAL  
 PROJECT  
 PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
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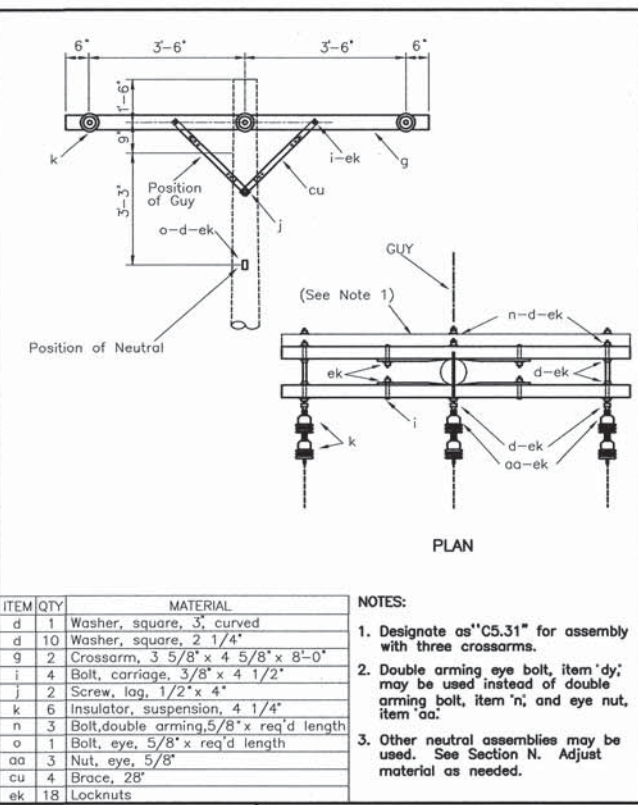
CONSTRUCTION SET

NO.	DATE	REVISIONS

OVERHEAD ELECTRIC DETAILS

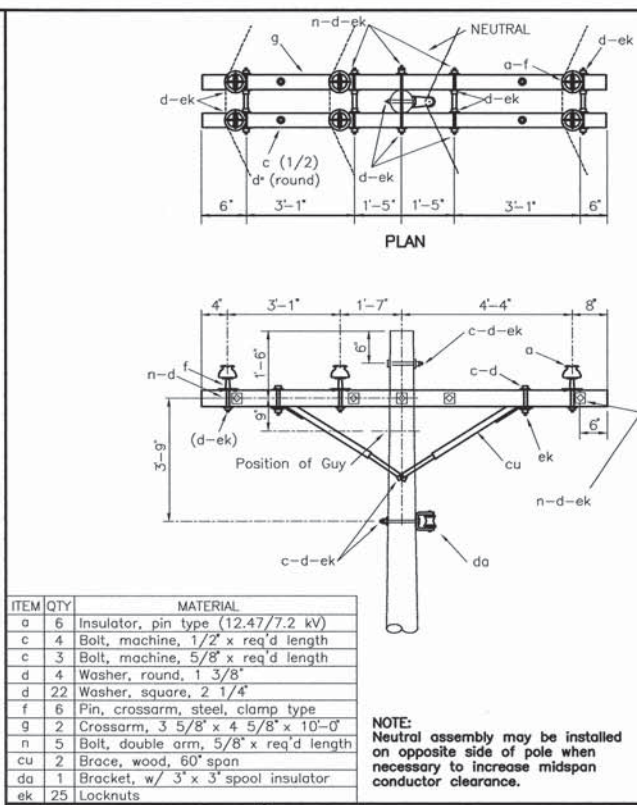
PACKERS CREEK HYDROELECTRIC PROJECT  
 CHIGNIK LAGOON POWER UTILITY  
 Chignik Lagoon, AK

DATE: 11/30/12  
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 CHECKED: \_\_\_\_\_  
 SCALE: NTS  
 FILE: ChignikLagoon-E4



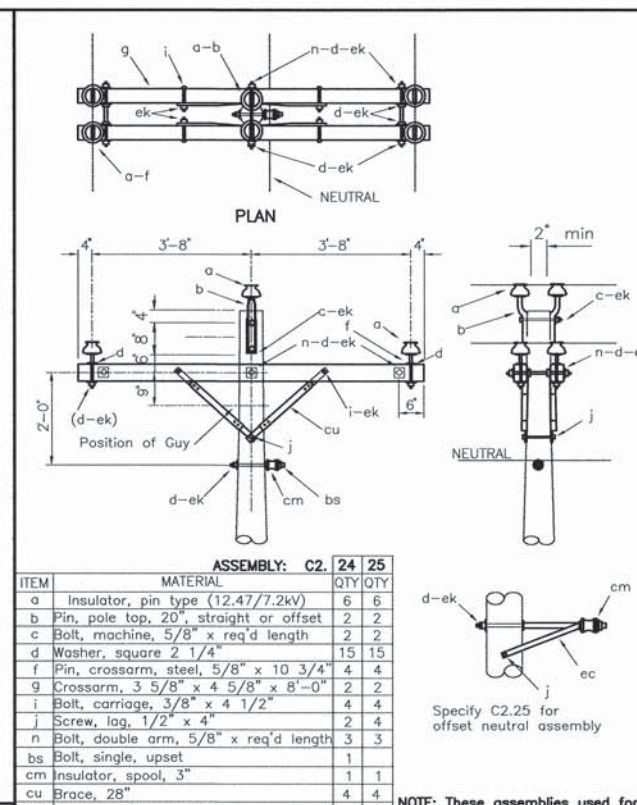
ITEM	QTY	MATERIAL
d	1	Washer, square, 3", curved
d	10	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	6	Insulator, suspension, 4 1/4"
n	3	Bolt, double arming, 5/8" x req'd length
o	1	Bolt, eye, 5/8" x req'd length
aa	3	Nut, eye, 5/8"
cu	4	Brace, 28"
ek	18	Locknuts

NOTES:  
 1. Designate as "C5.31" for assembly with three crossarms.  
 2. Double arming eye bolt, item 'dy', may be used instead of double arming bolt, item 'n', and eye nut, item 'oa'.  
 3. Other neutral assemblies may be used. See Section N. Adjust material as needed.



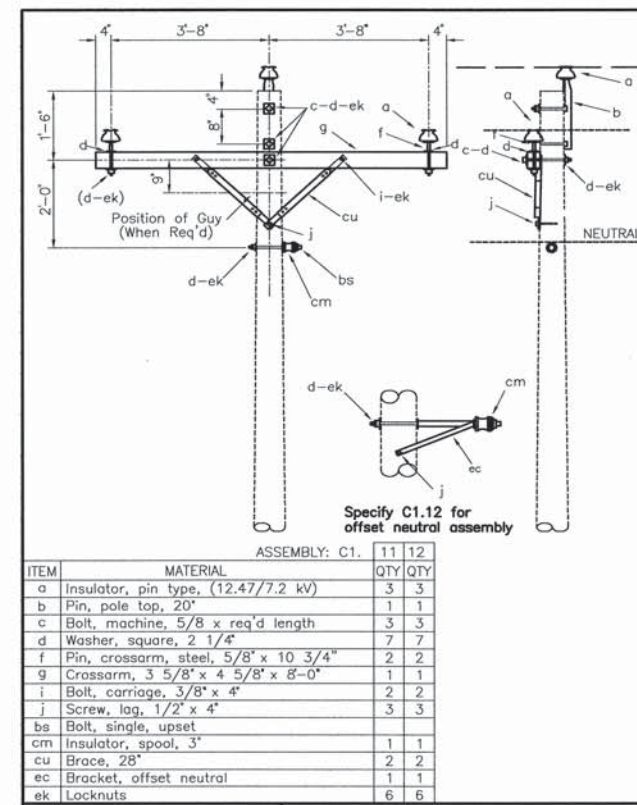
ITEM	QTY	MATERIAL
a	6	Insulator, pin type (12.47/7.2 kV)
c	4	Bolt, machine, 1/2" x req'd length
c	3	Bolt, machine, 5/8" x req'd length
d	4	Washer, square, 2 1/4"
d	22	Washer, square, 1 3/8"
f	6	Pin, crossarm, steel, clamp type
g	2	Crossarm, 3 5/8" x 4 5/8" x 10'-0"
n	5	Bolt, double arm, 5/8" x req'd length
cu	2	Brace, wood, 60" span
da	1	Bracket, w/ 3" x 3" spool insulator
ek	25	Locknuts

NOTE: Neutral assembly may be installed on opposite side of pole when necessary to increase midspan conductor clearance.



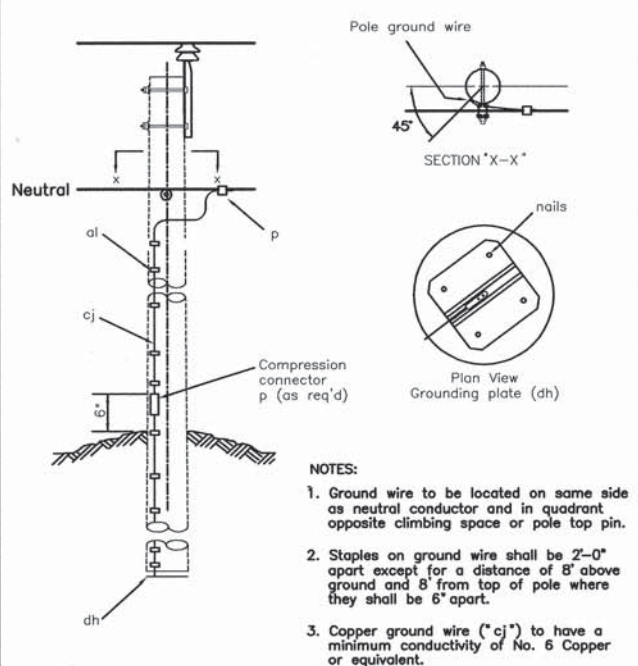
ITEM	QTY	MATERIAL
a	6	Insulator, pin type (12.47/7.2kV)
b	2	Pin, pole top, 20", straight or offset
c	2	Bolt, machine, 5/8" x req'd length
d	15	Washer, square 2 1/4"
f	4	Pin, crossarm, steel, 5/8" x 10 3/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	4	Screw, lag, 1/2" x 4"
n	2	Bolt, double arm, 5/8" x req'd length
bs	1	Bolt, single, upset
cm	1	Insulator, spool, 3"
cu	4	Brace, 28"
ec	1	Bracket, offset neutral
ek	17	Locknuts

NOTE: These assemblies used for NESC Grade B construction.



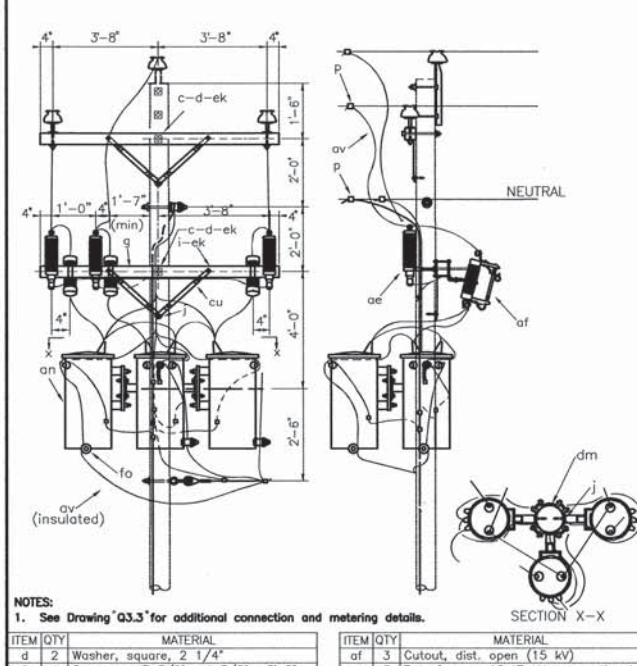
ITEM	QTY	MATERIAL
a	3	Insulator, pin type, (12.47/7.2 kV)
b	1	Pin, pole top, 20"
c	3	Bolt, machine, 5/8" x req'd length
d	7	Washer, square, 2 1/4"
f	2	Pin, crossarm, steel, 5/8" x 10 3/4"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4"
j	3	Screw, lag, 1/2" x 4"
bs	1	Bolt, single, upset
cm	1	Insulator, spool, 3"
cu	2	Brace, 28"
ec	1	Bracket, offset neutral
ek	6	Locknuts

NOTE: Specify C1.12 for offset neutral assembly



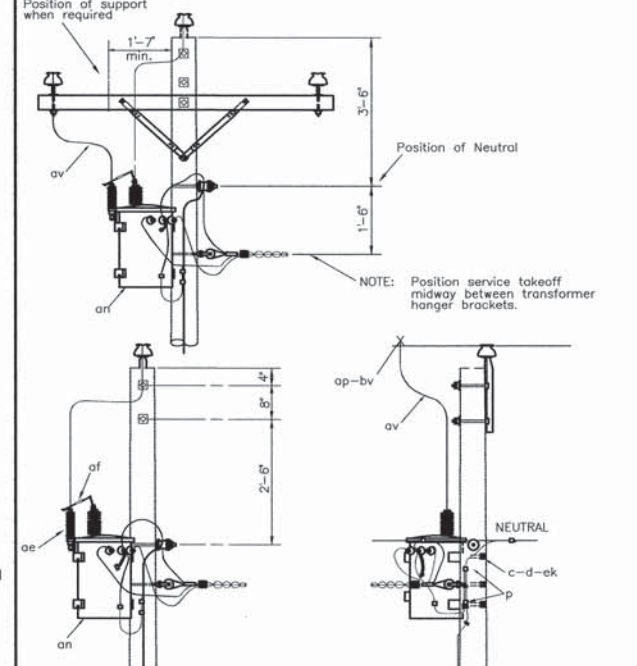
ITEM	QTY	MATERIAL
d	2	Washer, square, 2 1/4"
af	3	Cutout, dist. open (15 kV)
an	3	Transformer, 12.47 kV, conventional
av	2	Jumpers, bare, stranded
av	2	Jumpers, service, as req'd
cu	2	Brace, 28"
dm	1	Bracket, transformer, cluster with adaptor plates as req'd
ek	5	Locknuts
fo	3	Bracket, transformer, insulated
p	1	Connector, compression, as req'd
al	1	Staple, ground wire, as req'd
cj	1	Wire, pole ground, as req'd
dh	1	Plate, grounding, butt type
4	4	Nails, 1", galvanized, roofing

NOTES:  
 1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.  
 2. Staples on ground wire shall be 2'-0" apart except for a distance of 8' above ground and 8' from top of pole where they shall be 6" apart.  
 3. Copper ground wire ("cj") to have a minimum conductivity of No. 6 Copper or equivalent.



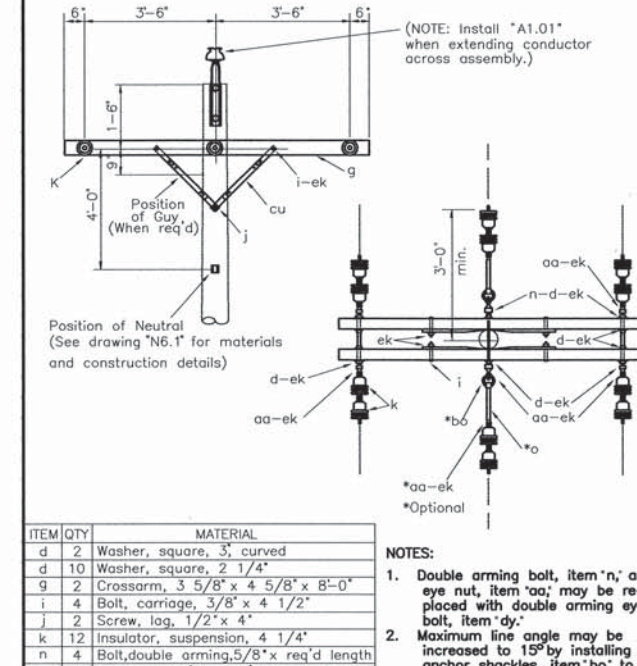
ITEM	QTY	MATERIAL
d	2	Washer, square, 2 1/4"
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j	1	Screw, lag, 1/2" x 4", as req'd
n	1	Bolt, double arm, 5/8" x req'd length
p	1	Connectors, as req'd
p	1	Connectors, compression, as req'd
ek	3	Locknuts
fo	3	Bracket, transformer, insulated
af	1	Cutout, fuse, open link
ap	1	Clamp, hot line
av	1	Jumpers, stranded, as req'd
bv	1	Red, armor (as req'd)
ek	2	Locknuts

NOTE: See Drawing "G3.3" for additional connection and metering details.



ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
p	2	Connectors, compression type, as req'd
an	1	Transformer, 12.47 kV, conventional
oe	1	Arrester, surge (9 kV)

NOTE: Position service takeoff midway between transformer hanger brackets.



ITEM	QTY	MATERIAL
d	2	Washer, square, 3", curved
d	10	Washer, square, 2 1/4"
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j	2	Screw, lag, 1/2" x 4"
k	12	Insulator, suspension, 4 1/4"
n	4	Bolt, double arming, 5/8" x req'd length
o	2	Bolt, eye, 5/8" x req'd length
p	2	Connectors, as req'd
aa	8	Nut, eye, 5/8"
av	2	Jumpers, as req'd
bo	2	Shackle, anchor
cu	4	Brace, 28"
ek	26	Locknuts

NOTES:  
 1. Double arming bolt, item 'n', and eye nut, item 'oa', may be replaced with double arming eye bolt, item 'dy'.  
 2. Maximum line angle may be increased to 15° by installing anchor shackles, item 'bo', to (horizontal) eye nuts and installing side guys as req'd. Designate as C6.31 for assembly with three crossarms.

