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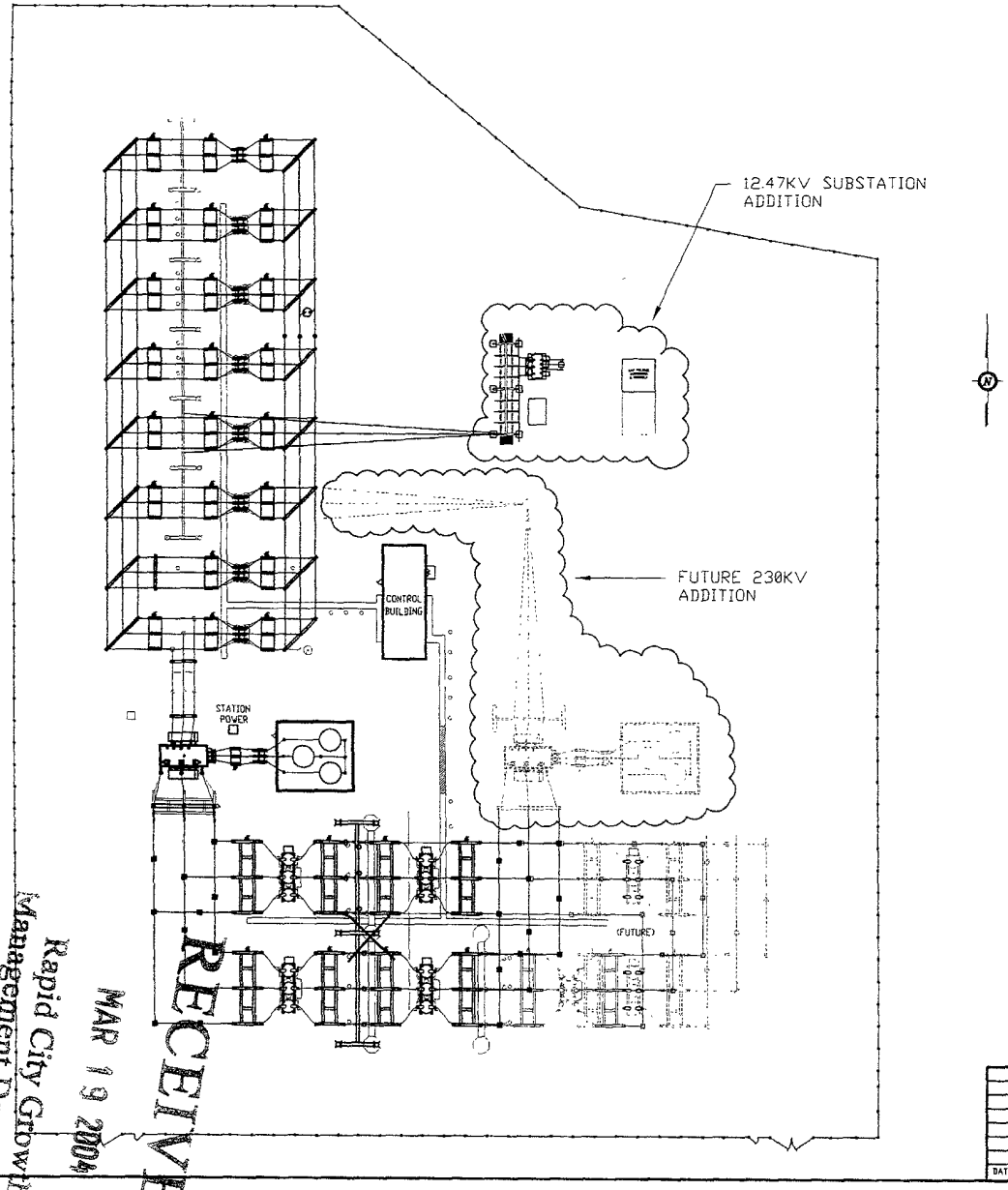

DATE	DRAWN BY	NO.	APPROVED BY	REVISION DESCRIPTION

BLACK HILLS POWER BHP

SOUTH RAPID CITY 12.47KV SUBSTATION

230KV SUBSTATION LAYOUT WITH 12.47KV SUBSTATION

DRAWN BY CEL DATE 02/26/04 DWG NO. SRD-C-003 0

APPROVED BY D.S. DATE 02/26/04

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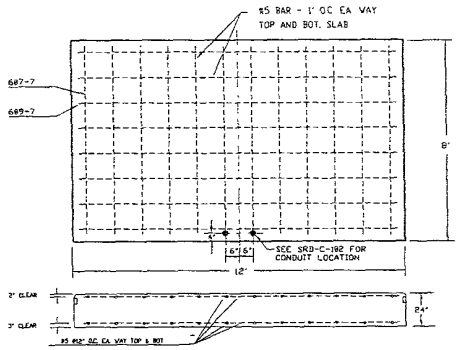
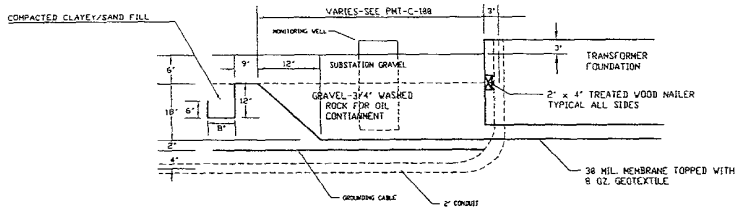


PAD "A"
TRANSFORMER
2 - REQ.
XFMR WEIGHT - 90,200#



OIL CONTAINMENT NOTES

1. MONITORING WELL TO BE 12" PVC PIPE (WHITE) WITH REMOVEABLE CAP. TOP TO BE 3' ABOVE FINISHED SURFACE GRADE, BOTTOM TO BE OPEN AND 2" ABOVE LINER. SEE VR-4 FOR LOCATION
2. CUT OR DRILL HOLES THRU WATER STOP FOR CONDUIT AND GROUND WIRES. SEAL WITH METHOD APPROVED BY MANUFACTURER
3. OIL PROOF MEMBRANE SHALL BE 30MIL CHLORINATED POLYETHYLENE (CPE) FROM WATERSAVER COMPANY INC. DENVER, COLORADO, OR APPROVED EQUIVALENT, FURNISHED WITHOUT ANY FIELD SEAMS (IF POSSIBLE).
4. 8 OZ. GEOTEXTILE SHALL BE PLACED ON TOP OF MEMBRANE BEFORE CONCRETE AND BACKFILL TO PROTEXT MEMBRANE FROM DAMAGE. SUBGRADE SHALL BE SMOOTH AND GREE OF ROCKS, STICKS OR OTHER SHARP OBJECTS PRIOR TO LAYING MEMBRANE.
5. ANCHOR TRENCH SHALL BE DUG PRIOR TO LAYING MEMBRANE TO MIMINUM DIMENSIONS SHOWN IMMEDIATELY AFTER INSTALLING MEMBRANE, ANCHOR TRENCH SHALL BE BACKFILLED WITH SANDY/CLAY FILL AND TAMPED.
6. EXTREME CARE SHALL BE TAKEN TO PREVENT MEMBRANE DAMAGE, ESPECIALLY DURING FORMWORK AND CONCRETE PLACING FOR TRANSFORMER PADS. FORMWORK SHALL BE DESIGNED AND BRACED SO THAT NO PENETRATION OF MEMBRANE OCCURS. SAND BAGS, TIRES OR OTHER SMOOTH WEIGHT MAY BE REQUIRED TO STABILIZE MEMBRANE PRIOR TO BACKFILL.
7. THE LINING MATERIAL SPECIFIED IS TOUGH AND DURABLE HOWEVER, SHOULD DAMAGE OCCUR, THE ENGINEER WILL DETERMINE WHETHER REPAIR OR REPLACEMENT IS REQUIRED. MINOR RIPS SHALL BE FIXED WITH REPAIR PATCHES AND SOLVENT ADHESIVE, OR OTHER METHOD APPROVED BY THE MANUFACTURER FOR MAJOR DAMAGE AS DETERMINED SOLELY BY ENGINEER, WILL REQUIRE REPLACEMENT AT THE CONTRACTORS EXPENSE.

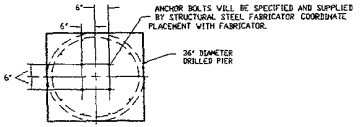
REINFORCING SCHEDULE

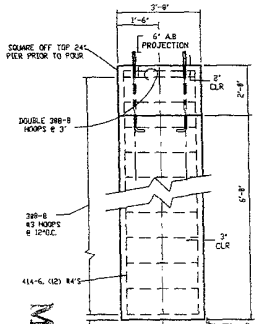
MARK	QTY	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
609-7	18	#5	11'-7"	STRAIGHT	11'-7"		
607-7	26	#5	7'-7"	STRAIGHT	7'-7"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 7.1 CU. YDS.
TOTAL REINFORCING: 425 lb.

TRANSFORMER & MOBILE SUBSTATION PAD "A"





REINFORCING SCHEDULE

MARK	QTY	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
288-8	18	#3	8'-8"	HOOP	2'-6"		
414-6	12	#4	7'-6"	STRAIGHT	7'-6"		

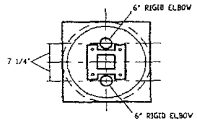
MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 21 CU. YDS
TOTAL REINFORCING: 938#

ANCHOR BOLTS:
ANCHOR BOLTS WILL BE SPECIFIED AND SUPPLIED BY STRUCTURAL STEEL FABRICATOR. COORDINATE PLACEMENT WITH FABRICATOR.

8,300# STR. WEIGHT
7500# MISC. EQUIP. WEIGHT
25,800# TOTAL WEIGHT

PIER "B" - 69kV STRUCTURE FOUNDATION (6 REQ'D)



NOTE: CONDUIT CAN EXIT IN ANY DIRECTION.

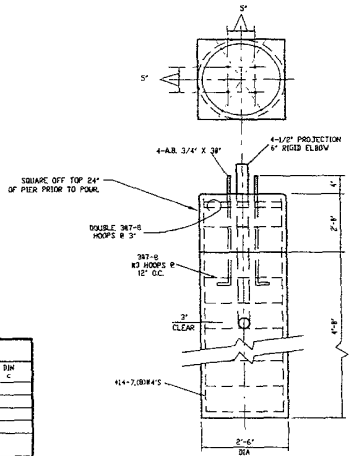
REINFORCING SCHEDULE

MARK	QTY	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
414-7	8	#4	5'-6"	STRAIGHT	5'-6"		
287-8	8	#3	7'-8"	HOOP	2'-8"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 12 CU. YDS.
TOTAL REINFORCING: 51 lb.

PIER "C" (1 REQ'D)



RISER SUPPORT
STR WEIGHT - 370#

PLOT SCALE: 1=24

LEGEND

STANDARD BAR TYPES

STRAIGHT	HOOK	STIRRUPS	HOOPS	SQ HOOPS	RECT TIE
a	a b	a b	a b	a b	a b

CONSTRUCTION NOTES & DETAILS

1. SEE WRITTEN SPECIFICATIONS FOR CONCRETE MIX AND PLACEMENT.
2. PROJECTION OF CONCRETE ABOVE GRADE AND FINISH GRAVEL WILL VARY DEPENDING UPON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION & FENCE PLAN.
3. ANCHOR BOLT SIZE & BOLT PATTERN ARE AS SPECIFIED BY THE STRUCTURAL STEEL FABRICATOR

DATE	DRAWN BY	NO.	APPROVED BY	REVISION DESCRIPTION

BLACK HILLS POWER

SOUTH RAPID CITY 12.47KV SUBSTATION

FOUNDATION DETAILS

DRAWN BY: CEI DATE 02/28/94
APPROVED BY: B.S. DATE 02/28/94
DWG NO. SRD-C-100 REV 0

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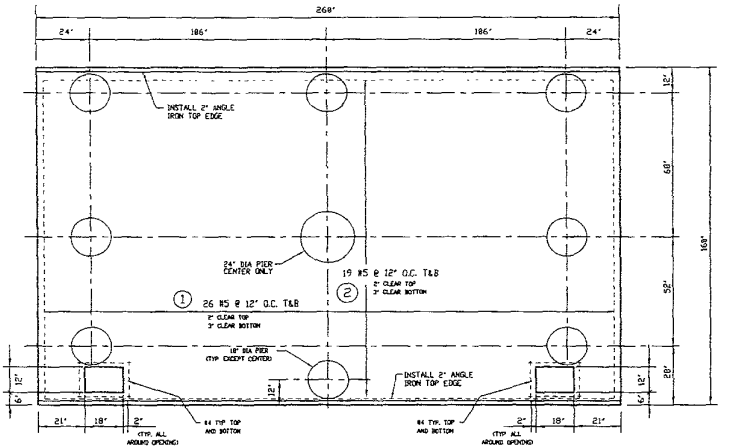
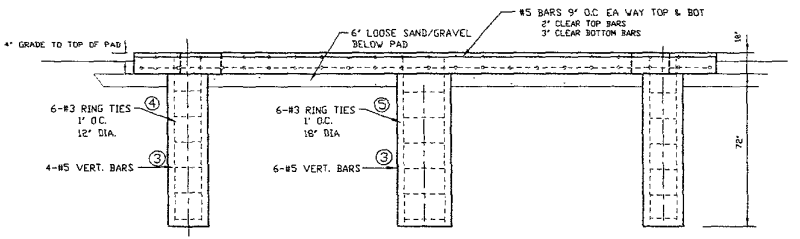
CABLE ENTRANCE AREA





PAD 'D'
SWITCHGEAR
1 - REQ.

BUILDING WEIGHT 20,000lbs

REINFORCING SCHEDULE

MARK	QTY.	SIZE	UNBENT LENGTH (L)	SHAPE	DIM a	DIM b	DIM c
1	28	#5	21'-6"	STRAIGHT	21'-6"		
2	46	#5	13'-2"	STRAIGHT	13'-2"		
3	38	#5	6'-3"	STRAIGHT	6'-3"		
4	48	#3	4'-6"	BENT			
5	6	#3	6'-8"	BENT			
6	4	#4	2'-8"	STRAIGHT	2'-8"		
7	4	#4	1'-6"	STRAIGHT	1'-6"		
8	8	#4	1'-7"	STRAIGHT	1'-7"		
9	8	#4	11"	STRAIGHT	11"		

MATERIAL SUMMARY (EACH)

TOTAL CONCRETE: 11.2 CU YARDS

TOTAL REINFORCING: 1526 lb

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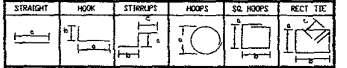
LEGEND

STANDARD BAR TYPES



CONSTRUCTION NOTES & DETAILS

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH, f'c' OF 3000 psi.
2. PROJECTION OF CONCRETE ABOVE GRADE AND FINISH GRAVEL WILL VARY DEPENDING UPON TOP OF CONCRETE ELEVATIONS ESTABLISHED ON THE FOUNDATION & FENCE PLAN.
3. SWITCHGEAR IS TO BE WELDED TO 2" ANGLE IRON FRONT AND BACK AFTER INSTALLATION.
4. PIER AND PAD TO BE POURED CONTINUOUSLY.

REFERENCE DRAWINGS

BLACK HILLS POWER

SOUTH RAPID CITY 12.47KV SUBSTATION

FOUNDATION DETAILS

DRAWN BY CEI DATE 02/28/84 DWG NO. SRD-C-101 REV 0

APPROVED BY D.S. DATE 02/28/84

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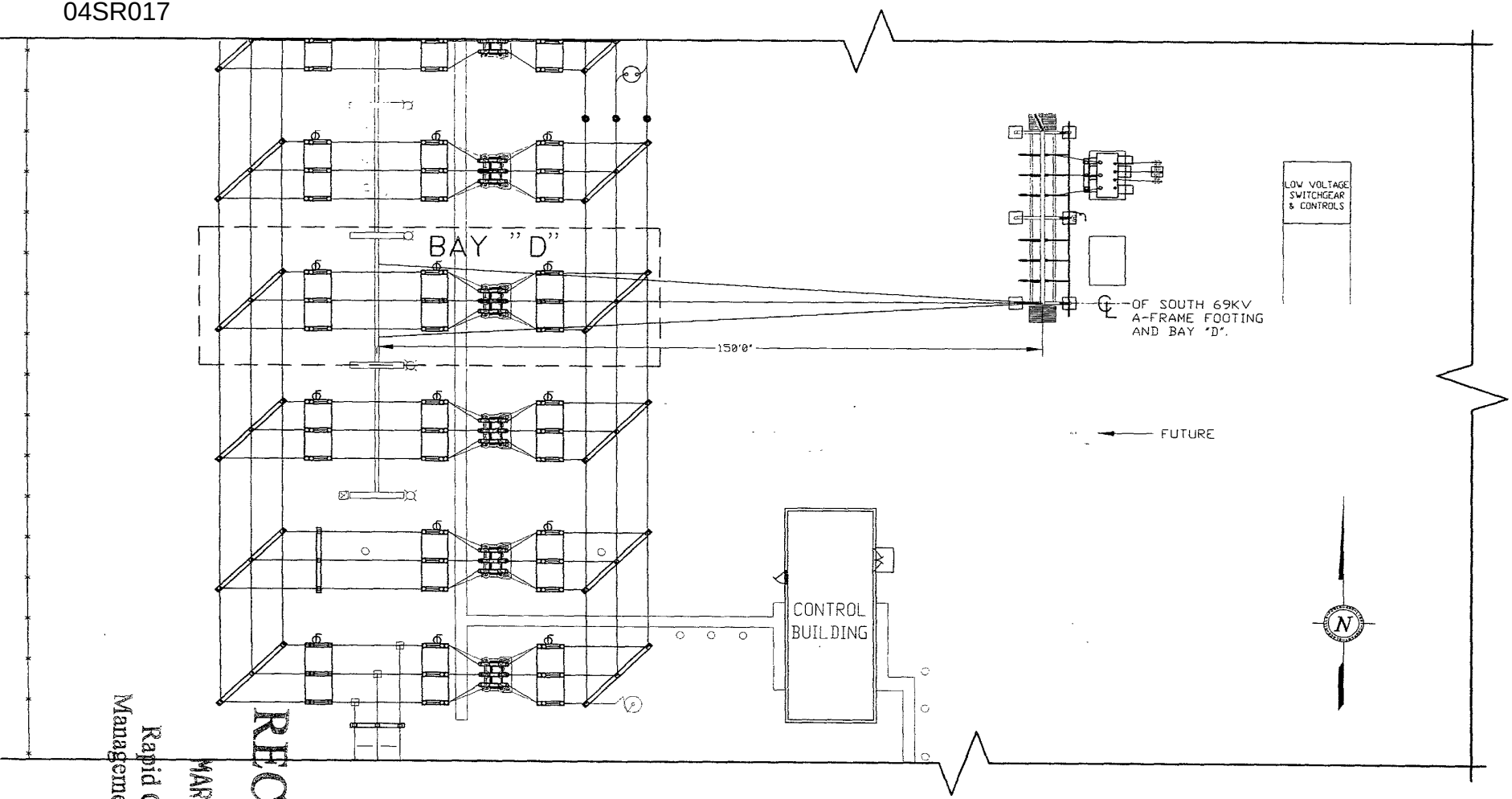

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SOUTH RAPID CITY 12.47KV SUBSTATION

FOOTINGS AND BAY "D" 69KV SUBSTATION

SHT. 1 of 2

DRAWN CEJ DATE 02/23/04 DWG NO.

APPROVED B.S DATE 02/23/04 **SRD-C-102A** 0

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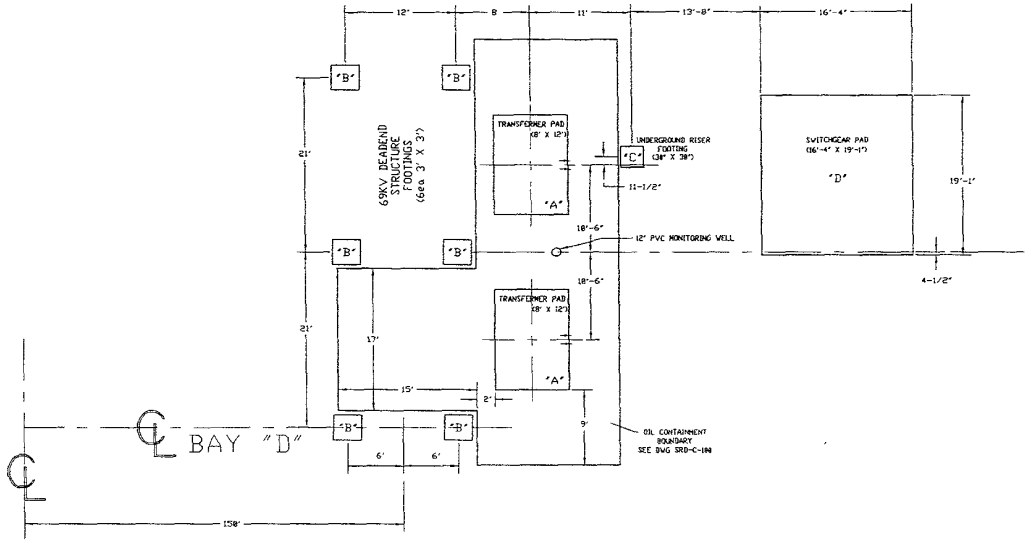

69KV A-FRAME

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BLACK HILLS POWER

SOUTH RAPID CITY 12.47KV SUBSTATION

FOOTING LOCATIONS

SHT. 2 of 2

DRAWN BY CEI DATE 02/23/94

APPROVED BY ES DATE 02/23/94

DWG NO. SRD-C-102B 0

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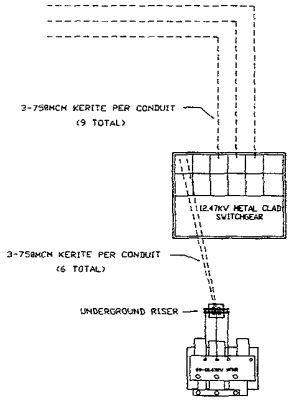
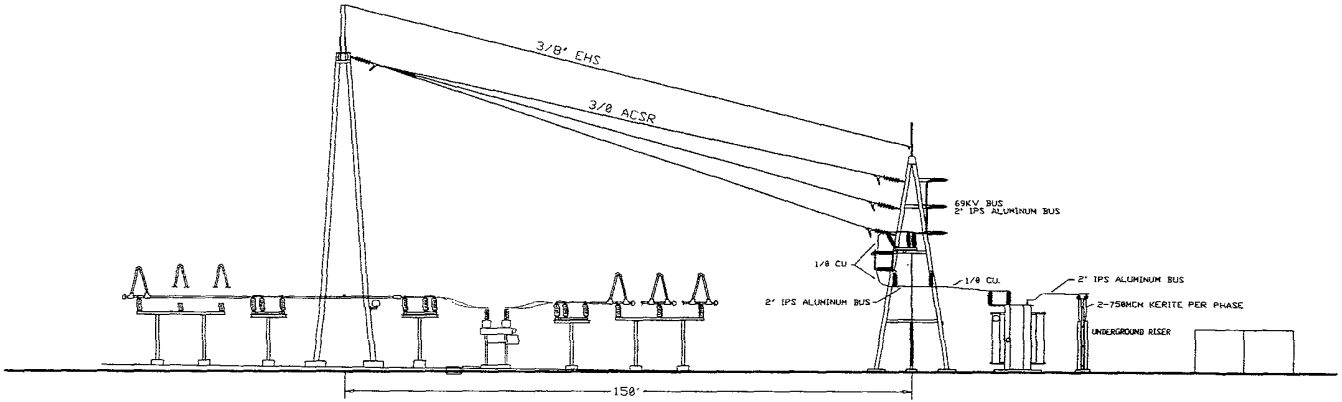
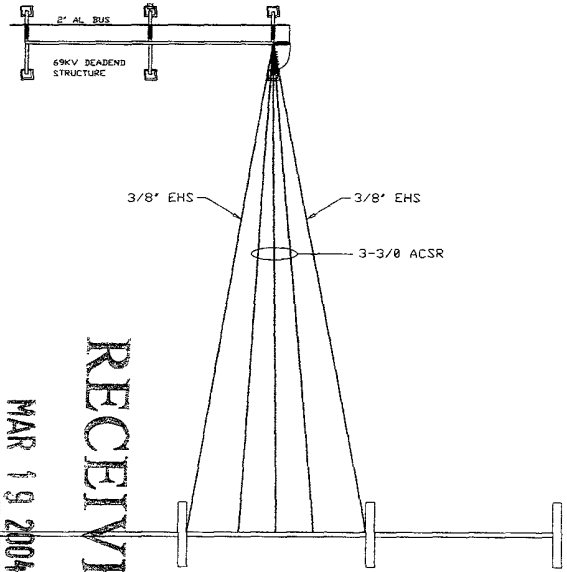




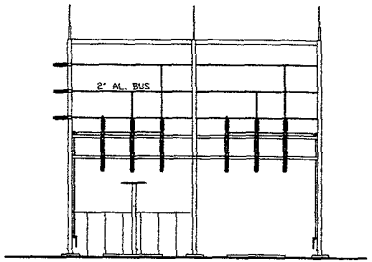
SIDE VIEW
69KV SUBSTATION
(TO NORTH)

SIDE VIEW
12.47KV SUBSTATION
(TO NORTH)



69KV A-FRAME

THIS DRAWING IS NOT TO SCALE



FRONT VIEW
(TO EAST)

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BLACK HILLS POWER

SOUTH RAPID CITY 12.47KV SUBSTATION

CONDUCTOR LAYOUT

DRAWN BY CEI DATE 02/25/04 SHEET NO.

APPROVED BY D.E. DATE 02/25/04

SRD-C-300 0

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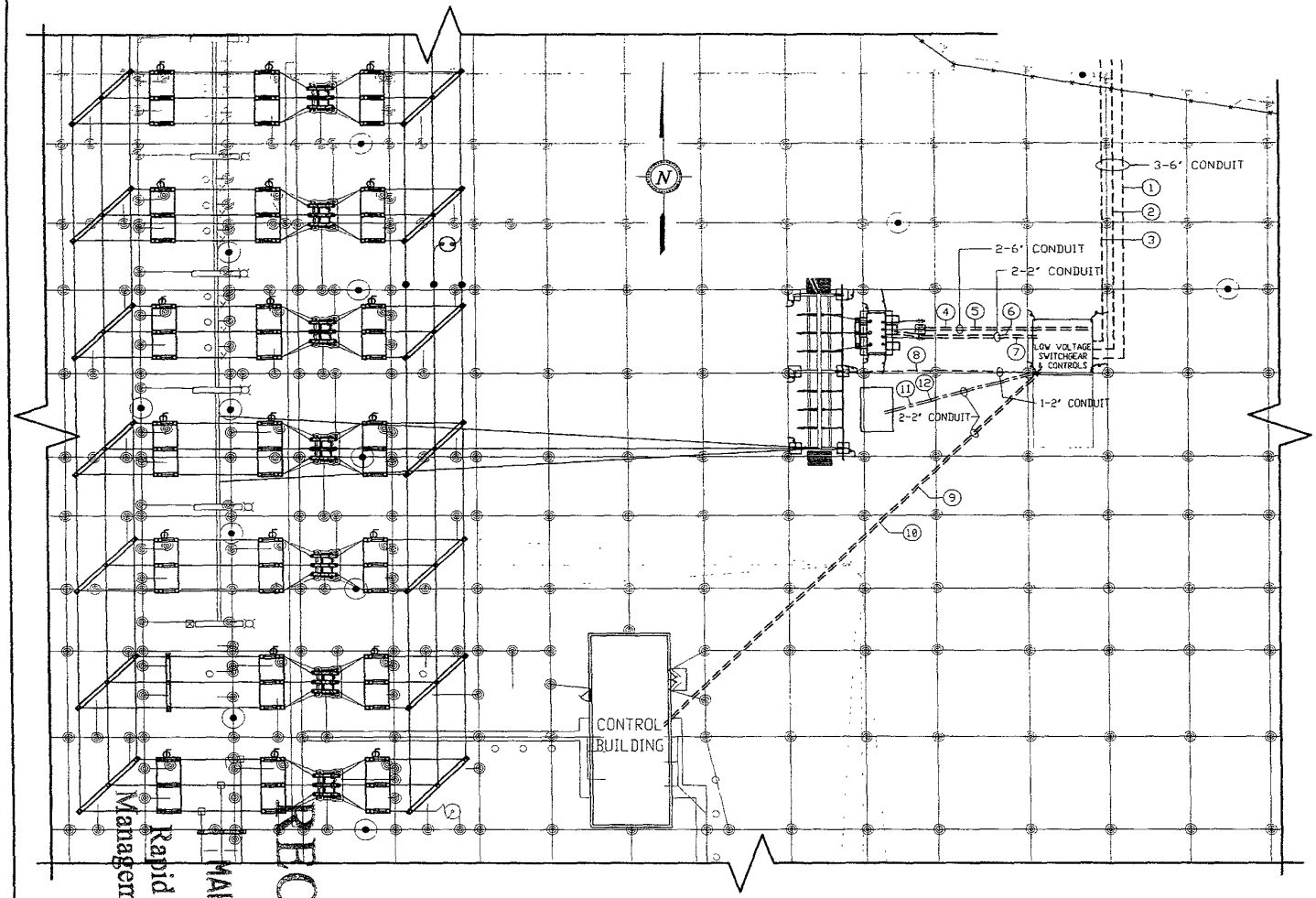

CONDUIT SCHEDULE

CONDUIT RUN #	CONDUIT SIZE	FROM	TO	CABLES
1	6"	SWITCHGEAR	OUTSIDE STATION FENCE	750 MCM KERITE
2	6"	SWITCHGEAR	OUTSIDE STATION FENCE	750 MCM KERITE
3	6"	SWITCHGEAR	OUTSIDE STATION FENCE	750 MCM KERITE
4	6"	SWITCHGEAR	XFMR RISER	750 MCM KERITE
5	6"	SWITCHGEAR	XFMR RISER	750 MCM KERITE
6	2"	SWITCHGEAR	NORTH XFMR PAD	FIBER
7	2"	SWITCHGEAR	NORTH XFMR PAD	600V CONTROL WIRE
8	2"	SWITCHGEAR	STATION LIGHTS	600V CONTROL WIRE
9	2"	SWITCHGEAR	CONTROL BUILDING	FIBER
10	2"	SWITCHGEAR	CONTROL BUILDING	600V CONTROL LINE

CONDUIT SCHEDULE FOR FUTURE USE

CONDUIT RUN #	CONDUIT SIZE	FROM	TO	CABLES
11	2"	SWITCHGEAR	SOUTH XFMR PAD	NONE
12	2"	SWITCHGEAR	SOUTH XFMR PAD	NONE

ALL CONDUITS TO BE PROVIDED WITH PULLING STRING

NOTE:

1) CONDUITS 12, 13 GO TO FUTURE SWITCHGEAR BURY 6" GRC ELBOWS BELOW GROUND. MEASURE OVER 188 1/4" FROM CENTER OF EXISTING SWITCHGEAR (NORTH BAY).
2) CONDUIT 16, TIE TO FUTURE SWITCHGEAR. BURY 6" GRC ELBOW WITH TOP ABOVE SURFACE. TURN TO FACE FUTURE SWITCHGEAR.
3) SEE PMH-9 DETAIL FOR CONDUIT POSITION

LEGEND:

4/0 S.D.CU MAIN GROUND WIRE
4/0 S.D.CU TAPS TO EQUIPMENT STEEL
ALL GRID TO GRID TIES AND GRID TO GROUND TIES TO BE BLOTED AND BRAZED
GROUND GRID TO BE 18" BELOW GRADE

----- CONDUIT SIZE SHOWN
6" CONDUIT-48" COVER
OTHER CONDUIT-24" COVER

DATE	DRAWN BY	NO	APPROVED BY	REVISION DESCRIPTION

BLACK HILLS POWER

SOUTH RAPID CITY 12.47KV SUBSTATION

CONDUIT & GROUNDING GRID

DRAWN CEI DATE 02/23/04 DWG NO SRD-E-800 REV 0

APPROVED DS DATE 02/23/04

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