The Holt Group, Inc.
Engineering
Planning
Surveying

DOCKET
02-AFC-1
DATE FEB 4 2005
RECD. JUL 14 2005

James G. Holt, P.E.
Robert K. Holt, P.E.

February 4, 2005

Mr. Mark Lindley, P.E.
PWA
720 California Street Suite 600
San Francisco, CA 94108

RE: Blythe Energy Project Phase II 02-AFC-1
THG Project 632.008

Dear Mark:

In accordance with our discussions on 01-26-05, enclosed please find a copy of the approved Supplementary Storm Water Drainage Calculations (Submittal GEN5/1004-R8-5R) dated 04/18/03 for the Blythe Energy Project Phase I. It is our understanding that this is the information required for you to complete your analysis for the BEPII FSA. Should any questions arise, or should you need additional information , please contact us. Your assistance in the expeditious resolution of this matter is much appreciated.

Sincerely,

Robert K Holt, P.E.

cc: Bill Pfanner
Tom Cameron
Robert Looper

321 W. Hobsonway ■ Suite A ■ Blythe, CA 92225 ■ 760-922-4658 ■ Fax 760-922-4660
1561 South 4th Street ■ El Centro, CA 92243 ■ 760-337-3883 ■ Fax 760-337-5997
425 E. Main Street ■ P. O. Box 2532 ■ Quartzsite, AZ 85346 ■ 928-927-8699 ■ Fax 928-927-8695

RE / AS BUILT COPY Gen 5 / 1004-R8-5

BLYTHE ENERGY PROJECT
Blythe, California

STORM WATER DRAINAGE CALCULATIONS

SUPPLEMENTARY

This Submittal Include:

1. Retention Basin Change in Side Slope from 2:1 to 3:1
2. Secondary swales and Gutter Drains
3. Switchyard Runoff to Blythe Energy Ditch

RECEIVED
APR 15 2003
Dick Pacific

APPROVED
BLYTHE ENERGY PROJECT CBO
SIGNATURE
4-18-03
DATE

Prepared By

BURNS AND ROE ENTERPRISES, INC
ORADELL, NEW JERSEY 07649

APPROVED
BLYTHE ENERGY PROJECT-R
Robert K. Holt 04/18

GEN-5/1004/R8-SR

RE / AS-BUILT COPY

BLYTHE ENERGY PROJECT
Blythe, California

STORM WATER DRAINAGE CALCULATIONS

SUPPLEMENTARY

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This Submittal Include:

1. Retention Basin Change in Side Slope from 2:1 to 3:1
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Prepared By

BURNS AND ROE ENTERPRISES, INC
ORADELL, NEW JERSEY 07649

174

BLYTHE ENERGY PROJECT

DRAINAGE CACULATIONS

RETENTION BASIN CHANGE IN SIDE SLOPE FROM 2:1 TO 3:1

Calculation Includes:

- Basin Resizing
- Basin Area at Various Elevations
- Allowable maximum Silt Level

4-12-03

REGISTERED PROFESSIONAL ENGINEER
JOHN V. LANTRY
No. 63391
EXPIRES
SEPT. 30, 2005
CIVIL
STATE OF CALIFORNIA

CALCULATIONS TO DETERMINE STORM WATER STORAGE CAPACITY OF RETENTION BASIN WITH REVISED SLOPES FROM 2:1 TO 3:1

Required Storage Volume = 53.20 Ac-Ft (See herein attached sheet 82 from Burns and Roe Hydrology Calculations).

During the completion of the Aquifer Test for BEP Water Well #2, water was pumped out at a 4,200 GPM rate for a 71 hr period and it was noted that water had completely been percolated into the ground in a period of 48hrs. Therefore, the percolation rate for the soil is:

Percolation Rate = 6.3 cfs (See herein enclosed sheet 72 from Burns and Roe Hydrology Calculations)

Calculate Volume of Water pumped out into the Retention Basin during the Aquifer Test:

Vpumped = (4,200gal/min)(cf/7.48gal)(60min/hr)(71hrs)= 2,391,978.61cf
= 54.91 Ac-Ft

Area of Bottom of Retention
Basin (el=317.00) using 2:1 slopes = 230,354 SF => 5.288 AC

Area of Bottom of Retention
Basin (el=317.00) using 3:1 slopes = 181,831 SF => ~~4.174~~ 4.15 AC

Since the bottom of the Retention Basin is being reduced due to the change of the slope rates, a tributary water volume will be reduced for percolation:

Vred = (54.91 Ac-Ft)-(4.~~174~~15Ac/5.288Ac)(54.91 Ac-Ft) = 11.~~568~~81 Ac-Ft

New required Water Storage Volume for Modified Retention Basin:

Vreq = 53.20 Ac-Ft + 11.568 Ac-Ft = ~~64.768~~ 65 Ac-Ft

Several iterations have been completed to calculate the Volume Retention Capacity of the Basin at different levels as noted on the following page and to determine the High Water Elevation (HWL) during a 100 yr Storm event, this HWL being 329.39 and providing a freeboard of 5.61 feet measured from the Top of the slope at the 335.00 contourline.

SHEET 84B

RETENTION BASIN'S STORAGE CAPACITY AT DIFFERENT LEVELS USING 3:1(H:V) SLOPES

New Proposed Area at Bottom of Retention Basin (El. 317.00)= 181,831 SF

ELEVATION CONTOURLINE	AREA (SF)	STORAGE VOLUME CAPACITY (CF)	STORAGE VOLUME CAPACITY (AC-FT)	COMMENTS
335	322,073.21	4,535,137.69	104.11	
334.5	318,096.08	4,374,361.91	100.42	
334	314,118.94	4,215,574.49	96.78	
333.5	310,170.08	4,059,008.87	93.18	
333	306,221.21	3,904,417.68	89.63	
332.5	302,300.63	3,752,020.09	86.13	
332	298,380.04	3,601,582.80	82.68	
331.5	294,487.73	3,453,310.79	79.28	
331	290,595.42	3,306,984.94	75.92	
330.5	286,731.38	3,162,796.07	72.61	
330	282,867.34	3,020,539.21	69.34	
329.5	279,031.58	2,880,391.13	66.12	
329.39	**275,209.96**	**2,831,368.72**	**65.00**	**Maximum High Water Level , Limits of Innundation will be contained within the 329.39 Contourline.**
329	275,195.82	2,742,160.92	62.95	
328.5	271,388.33	2,606,011.15	59.83	
328	267,580.84	2,471,765.12	56.74	
327.5	263,801.63	2,339,571.28	53.71	
327	260,022.41	2,209,267.05	50.72	
326.5	256,271.47	2,080,986.73	47.77	
326	252,520.53	1,954,581.89	44.87	
325.5	248,797.87	1,830,172.68	42.01	
325	245,075.20	1,707,624.80	39.20	
324.5	241,380.81	1,587,044.27	36.43	
324	237,686.41	1,468,310.94	33.71	
323.5	234,020.30	1,351,516.71	31.03	
323	230,354.18	1,236,555.54	28.39	
322.5	226,716.34	1,123,505.18	25.79	
322	223,078.50	1,012,273.74	23.24	
321.5	219,468.93	902,924.84	20.73	
321	215,859.36	795,380.72	18.26	
320.5	212,278.07	689,690.87	15.83	
320	208,696.77	585,791.66	13.45	
319.5	205,143.75	483,718.44	11.10	
319	201,590.73	383,421.73	8.80	
318.5	198,065.99	284,922.74	6.54	
318	194,541.24	188,186.12	4.32	
317.5	188,186.12	92,504.28	2.12	
317	181,831.00	0.00	0.00	

BURNS AND ROE ENTERPRISES, INC.

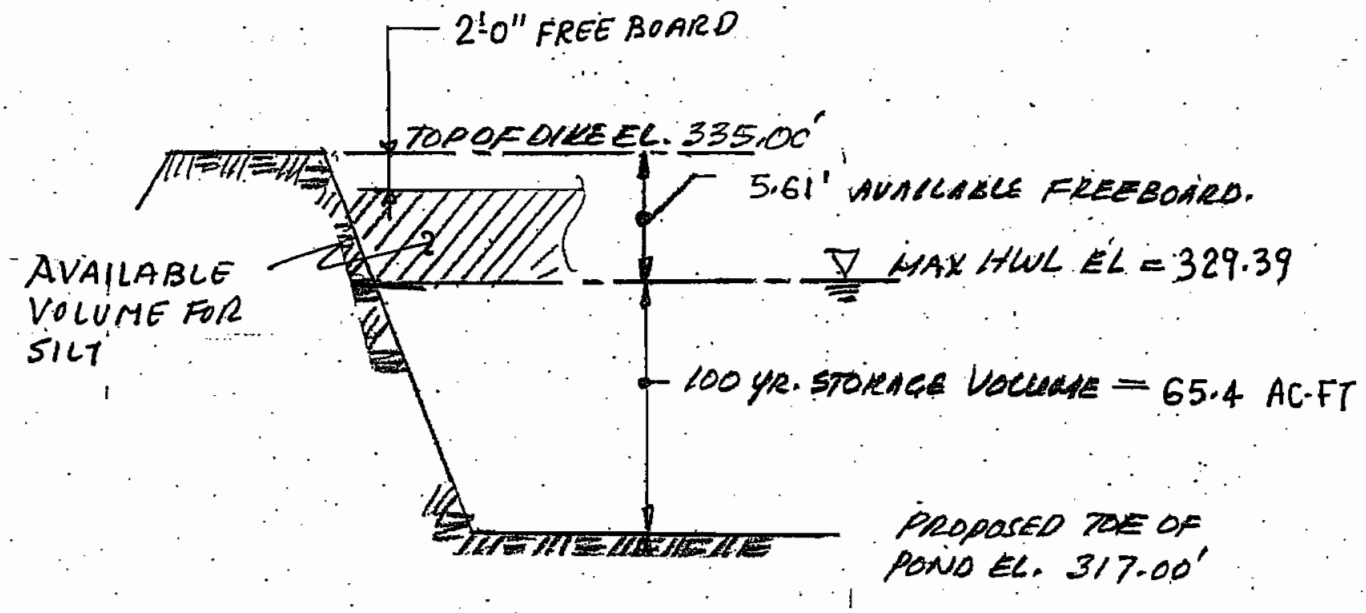
W.O. No: 02425-001 Calc. 02425-001-06-002 Sheet No: 86A Cont'd on 86
Prepared By: M. Pahl Date: 3/27/03 Checked By: Date:
Title: BLYTHE ENERGY PROJECT - STORM WATER RETENTION BASIN

STORM WATER RETENTION BASIN WILL REQUIRE PERIODIC REMOVAL OF THE SILT. SILT SHALL NOT BE ALLOWED TO ACCUMULATE ABOVE AVERAGE ELEVATION OF 320.5 FEET.

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 02425-001 Calc. 02425-001-06-002 Sheet No: 85 Cont'd on 86A
Prepared By: [illegible] Date: 3/21/03 Checked By: 3/22/03 MP Date: 3/22/03
Title: BLYTHE ENERGY PROJECT (~~REV 1~~) Rev. 2

PROPOSED REVISED POND ELEVATIONS: (RETENTION BASIN)



APPROXIMATE AREA AT T/O DIKE (EL. 335.00') = 7.40 ACRES

APPROXIMATE AREA AT 100 YR FLOOD (EL. 329.39') = 6.41 ACRES.

APPROXIMATE AREA AT BOTTOM OF POND (EL. 317.00') = 4.15 ACRES.

100-YEAR FLOOD STORAGE VOLUME: $\left(\frac{6.41+4.15}{2}\right)(329.39-317.00)$

$= 5.28 \times 12.39$

$= 65.4$ ACRE-FEET > 64.76 REQ'D

VOLUME AVAILABLE FOR SILT $= \left(\frac{7.03+6.41}{2}\right)(333.0-329.39)$

$= 24.25$ ACRE-FEET

TOTAL TRIBUTARY AREA ≈ 1250 ACRE ; AVAILABLE SILT DEPTH PER ACRE $= 24.25/1250 \times 12 \approx 1/4''$/ACRE

BLYTHE ENERGY PROJECT

DRAINAGE CACULATIONS

SECONDARY SWALES AND GUTTER DRAINS

Calculation Includes:

- Swales and Gutters in Plant Island
- Gutter Drains in Evaporation Pond Area

4-12-03

REGISTERED PROFESSIONAL ENGINEER
JOHN V. LANTRY
No. 62391
EXPIRES
SEPT. 30, 2005
CIVIL
STATE OF CALIFORNIA

BURNS AND ROE ENTERPRI

W.O. No: 2425-01 Calc. 2425-01.06.01 Sheet No:

Prepared By: DM Date: 3.2003 Checked By:

Title: BLYTHE ENERGY PROJECT - PRESSES G

PLANT NORTH

TRUE NORTH

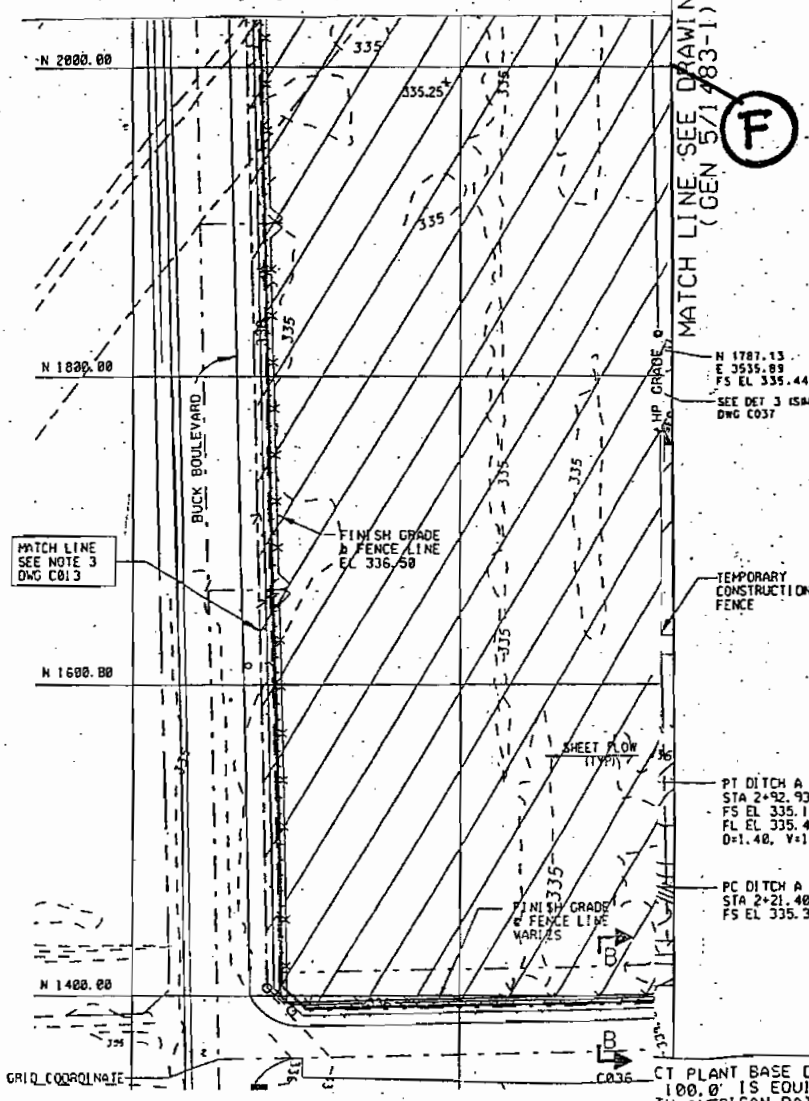
LEGEND

(A) TRIBUTARY DRAINAGE AREA

CONCRETE GUTTER DRAIN

TRIBUTARY AREA DRAINING

TRIBUTARY AREA DRAINE AND RIBBON DRAINS



NOTES

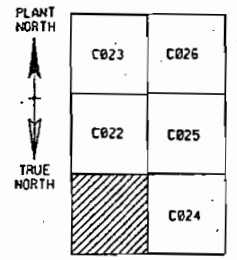
1. FOR SITE SURVEY, MONUMENT, TOPOGRAPHIC MAPPING AND PLANT COORDINATE SYSTEM INFORMATION SEE DWG. C012.
2. PRIOR TO THE START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON DRAWING C060, C061 AND C062. AREAS TO RECEIVE ASPHALT PAVEMENT SURFACING AND CRUSHED STONE SURFACING ARE INDENTIFIED ON DRAWING C012, C013 & C014.
3. ALL SIDE SLOPES SHALL BE MINIMUM 3H:1V UNLESS OTHERWISE NOTED (UON)
4. WHEN SPOT ELEVATIONS NOT SHOWN AT BUILDING AND EQUIPMENT FOUNDATIONS, THEY SHALL BE 337.00' (UON). SEE SECTION K-K, DWG C035.
5. FOR SECTIONS AND DETAILS SEE DWG C035.
6. ALL PAD ELEVATIONS NOT SHOWN SHALL BE EL 337.50'.
7. ALL "Q" VALUES FOR 100 YEAR 24 HOUR STORM.
8. REINFORCED CONCRETE PIPE SHALL BE TONGUE AND GROOVE, OR BELL AND SPIGOT, CONFORMING TO ASTM C76, CLASS IV: FURNISHED IN MAXIMUM STANDARD LENGTHS. PLANT LOAD-BEARING TEST SHALL BE INCLUDED AS A BASIS OF ACCEPTANCE OF THE PIPE, AS SPECIFIED IN ASTM C76. FOR PIPE BEDDING DETAILS SEE DRAWING C040.
9. FOR DITCH DETAILS, ELEVATIONS AND FLOWS, SEE DRAWING C047.
10. FINISH GRADES FROM BUILDINGS SHALL SLOPE DOWN 2% MINIMUM FOR A MINIMUM DISTANCE OF 5'-0" FROM FACE OF BUILDING (TYPICAL). SEE SECTION K-K ON DWG C035.

CONSTRUCTION NOTES

1. CONSTRUCT SIDEWALK PER SHEET C040.
2. INSTALL H/C STRIPING PER SHEET C040.
3. CONSTRUCT PAVED AREA PER SHEET C035.
4. CONSTRUCT V-DITCH PER SHEET C047.

LEGEND

335	EXISTING CONTOUR
336	NEW CONTOUR
	DRAINAGE DITCH / SWALE
	SLOTTED DRAIN PIPE (SDP)
*337.00	SPOT ELEVATION
FS	FINISHED SURFACE
FG	FINISHED GRADE
FL	FLOW LINE
Q	FLOW (CFS)
V	VELOCITY (FT/SEC)
S	SLOPE (PERCENT)
T/GRATE EL	TOP OF GRATE ELEVATION (TYP)
SDP	SLOTTED DRAIN PIPE
	CONCRETE GUTTER DRAIN



KEY PLAN

GRAPHIC SCALE

0 30 60 120 180

1" = 60.00'

CT PLANT BASE DATUM 100.0' IS EQUIVALENT TH AMERICAN DATUM 337.5'

SIEMENS Westinghouse — Siemens Westinghouse Power Corporation — A Siemens Company

DICK Pacific Construction Co. Ltd.

BLYTHE ENERGY PROJECT
TR. 14093 PARCELS 34 & 35
Blythe, California

DETAIL GRADING AND DRAINAGE PLAN

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ (201) 265-2000

Engineering Review		
Disc	Engr	Date
Mech	RHS	3/23/01
Elec	A SAGAR	3/23/01
Civil	M PATEL	3/23/01
Arch		
Instr		

Drawn	Designed	Checked
RHO	JP	JC

Lead Engineer — Date 3/23/01 — Scale 1"=60.00'

Approved for Construction: M ROTHSTEIN, Chief Civil Engineer

Work Order 2425 — Drawing No C021 — Sh — Rev 14

No	Revision	Date	Proj Engr	RAFP	CBO Approval	No
						12
						13
						14

REV. 6

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425.01.06.001 Sheet No: 96 Cont'd on 97
Prepared By: DM Date: 3/20/03 Checked By: [illegible] Date: 3/21/03
Title: BLYTHE ENERGY PROJECT – PRECISE GRADING & DRAINAGE PLAN

REVISION NO 6 – PLANT STORMWATER DRAINAGE PLAN

PURPOSE – PREPARE A "PRECISE GRADING PLAN" AND A "HYDRAULIC REPORT" AS REQUESTED BY THE ZBO IN A 3/12/03 SITE MEETING. FOR DETAILED COMMENTS, SEE REFERENCE 17.

DESIGN COMMENTS

1. RUNOFF COEFFICIENTS – SEE SHEET 3
2. GRADE AREAS WITH A MINIMUM SLOPE = 0.5%
3. MINIMUM DITCH SLOPES: CONCRETE – 0.2%
   EARTH – 0.5%
4. DESIGN ALL DITCHES & GUTTER DRAINS WITHIN THE PERIMETER PLANT ROADS FOR A t_c = 10 MIN, AND A CORRESPONDING I = 2.2 IN/HR (10 YR DESIGN STORM).

CONCLUSIONS

GUTTER DRAINS AND EARTH SWALES SHOWN ON DWG C021, REV. 14 ARE ADEQUATE TO CONVEY FLOWS RESULTING FROM THE 10 YR DESIGN STORM.

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01-06001 Sheet No: 98 Cont'd on 99
Prepared By: DM Date: 3/13/03 Checked By: [illegible] Date: 3/21/03
Title: BLYTHE ENERGY PROJECT — PRELIMS GRADING & DRAINAGE PLAN

GUTTER DRAIN @ HRSG AREAS

AREA (A) (SEE SH 97 (TYP))

PROVIDE 3 GUTTER DRAINS TO DRAIN EACH OF THE 3 HRSG AREAS. (FOR TRIB AREAS SEE SH 97.)

DESIGN THE "WORST CASE" DRAIN FOR THE LARGEST TRIBUTARY AREA → AREA SOUTHEAST UHA12.

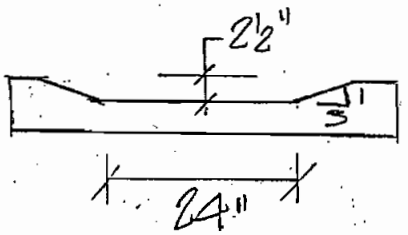
$$\text{MAX AREA DRAINED} = \frac{195(.95)+25(1.00)}{43560} = .48\text{ac}$$

WEIGHTED "C" VALUE FOR AREA W/ 60% ROOF & 40% CRUSHED STONE = .6(.95) + .4(.6) = .81

$$Q = CIA = .48(.81)(2.2) = .86\text{cfs}$$

TRY CONC GUTTER SECTION WITH 0.2% SLOPE AND 2½" DEPTH

CALC DEPTH OF WATER W/ Q = .86cfs



$$K' = \frac{Qn}{b^{8/3} S^{1/2}}$$ (REF TABLE 7-11, HDBK OF HYDRAULICS) REF:

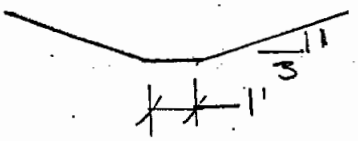
$$K' = \frac{.86(.012)}{(2)^{8/3}(.002)^{1/2}} = 0.0363 \rightarrow D/b = .10$$

MAX DEPTH OF WATER = .10(24") = 2.4" < 2½ DEPTH @ GUTTER DISCHARGE ∴ OK

GUTTER DRAIN NORTH OF COOLING TOWER (B)

STATION 0 → 2+00 (B1)

$$\text{AREA} = \frac{250(500)}{43560} = 0.29 \text{ AC}$$



ASSUME ALL AREA PAVED → C = 0.9 (CONSERVATIVE)

$$Q = (.9)(2.2)(0.29) = .57 \text{ cfs}$$

DETERMINE DEPTH OF FLOW FOR 1 FT WIDE GUTTER DRAIN W/ $\frac{1}{3}$' SIDESLOPES ; S = 0.2 %

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{.57(.012)}{1^{8/3}(.002)^{1/2}}$$

$$K' = .1529 \rightarrow D/b = .22$$

$$D = .22(12) = \underline{2.64''}$$ → GUTTER DEPTH AT END OF B1 ≈ 6" ∴ OK

STA 2+00 TO DITCH A (B2)

$$\text{AREA} \times C = \underbrace{.29 \text{ AC}(.9)}_{\text{STA 0} \to 2+00} + \underbrace{.30 \times \left[\left(\frac{240+120}{2}\right)(120)\left(\frac{1}{43560}\right)\right]}_{\text{STA 2+00} \to \text{DITCH A}}$$

$$\text{AREA} \times C = .29(.9) + .8(.30) = .50 \text{ AC}$$

$$Q = .500(2.2) = 1.1 \text{ cfs}$$

$$K' = \frac{1.1}{.57}(.1529) = .295 \rightarrow D/b = .31$$

$$D = .31(1)(12) = \underline{3.72''}$$ → GUTTER DEPTH @ END OF B2 ≈ 6" ∴ OK

REV. 6

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425.01.06.001 Sheet No: 100 Cont'd on 101

Prepared By: DM Date: 3/19/03 Checked By: MP Date: 3/21/03

Title: BUY THE ENERGY PROJECT - PRECISE GRADING & DRAINAGE PLAN

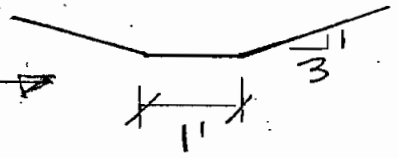
GUTTER DRAIN NORTH OF RD @ N1675 (C)

AREA → PVMT = 81(37) + 225(12) = 5697 SF
CRUSHED SBONE = 225(25) = 5625 SF

$$A \times C = \frac{5697(.9) + 5625(.6)}{43560} = 0.195$$

$$Q = ACI = .195(2.2) = .43 \text{ cfs}$$

DETERMINE DEPTH OF FLOW FOR 1 FT WIDE GUTTER →



$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{.43(.012)}{1^{8/3}(.002)^{1/2}} = .1154 \rightarrow D/b = .19$$

DEPTH OF WATER = .19(1)(12) = 2.28"

PROVIDE GUTTER W/ MIN DEPTH = 2½"

Form C015104G4 (1/1/2000)

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425.01.001.06 Sheet No: 101 Cont'd on 102
Prepared By: DM Date: 3/20/03 Checked By: MP Date: 3/21/03
Title: BLYTHE ENERGY PROJECT - PRELIMINARY GRADING & DRAINAGE PLAN

GUTTER DRAINS @ ACCESS ROADS (USE N1826.60RD)

D

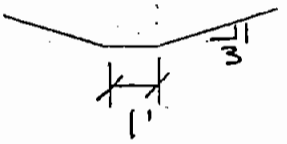
AREA = 130(40) + 25(30) + 40(22)
= 6830 SF

ASSUME AVG C = .90 FOR ROOF/CS

$Q = \left(\frac{6830}{43560}\right)(.9)(2.2) = .31\ cfs$

$S = \frac{337.45 - 335.85}{165} = .0097$ (S = 0.97%)

TRY 1FT WIDE GUTTER DRAIN



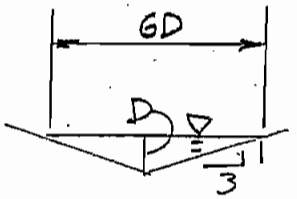
$K' = \frac{Qn}{D^{8/3}S^{1/2}} = \frac{.31(.012)}{1^{8/3}(.0097)^{1/2}}$

$K' = .0378 \rightarrow D/D = .10$

MIN DEPTH OF WATER @ DISCHARGE = .10(1)(12) = 1.2" ✓

$V = \frac{Q}{A} = \frac{.31\ cfs}{\left(\frac{1.2(12) + 3(1.2)(12)}{144}\right)} = 2.4\ FT/SEC$ (18.72 IN²)

TRY A V SHAPE CHANNEL



AREA OF TRAP CHANNEL → 18.72 IN²

DETERMINE DEPTH FOR EQUIVALENT AREA

$18.72\ IN^2 = (3D)(D)$
$3D^2 = 18.72\ IN^2 \longrightarrow D = 2.5\ IN$

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01.001.026 Sheet No: 102 Cont'd on 103
Prepared By: DM Date: 3/20/03 Checked By: MMP Date: 3/21/03
Title: BLYTHE ENERGY PROJECT - PRELIMINARY GRADING AND DRAINAGE PLAN

VERIFY Q IN ∨ CHANNEL

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.012}\left(\frac{18.72 \text{ IN}^2}{144}\right)\left(\frac{18.72''/144}{15.81/12}\right)^{2/3}(.0097)^{1/2}$$

$$= 123.83(.13)\left(\frac{.13}{1.3175}\right)^{2/3}(.0097)^{1/2}$$

$$Q = 0.34 \text{ cfs} \approx 0.31 \text{ cfs} \therefore \text{OK}$$

THEREFORE DEPTH OF WATER IN A ∨ TRENCH = 2.5"

USE A TRAPAZOIDAL TRENCH WITH A 1FT WIDE BOTTOM TO REDUCE FLOW DEPTH, WITH MINIMUM DEPTH = 2"

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425.001.01.026 Sheet No: 163 Cont'd on 164
Prepared By: DM Date: 3/19/03 Checked By: JMP Date: 3/21/03
Title: BLYTHE ENERGY PROJECT - PRELIMINARY GRADING & DRAINAGE PLAN.

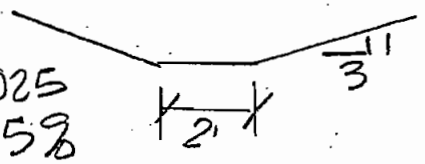
EARTH DITCH WEST OF COOLING TOWER (E)

$$C \times \text{AREA} = \overset{\text{PVMT}}{(7100\ \text{SF})(.90)} + \overset{\text{DESERT}}{(22800)(.3)}$$

$$= \frac{6390 + 6840}{43560} = .30\ \text{AC} \quad (.67\ \text{AC w/o } C \text{ PATCH})$$

$$Q = .30(2.2) = .66\ \text{cfs}$$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}}$$



$N = .025$
$S = .5\%$

$$K' = \frac{.66(.025)}{(2^{8/3})(.005)^{1/2}}$$

$$K' = .0367 \rightarrow D/b = .10$$

$$D = .1(2)(12) = \underline{\underline{2.4\ \text{IN}}} \rightarrow V = \frac{.66}{\frac{24(2.4) + 3.2(2.4)}{144}} = 1.27\ \text{FT/SEC}$$

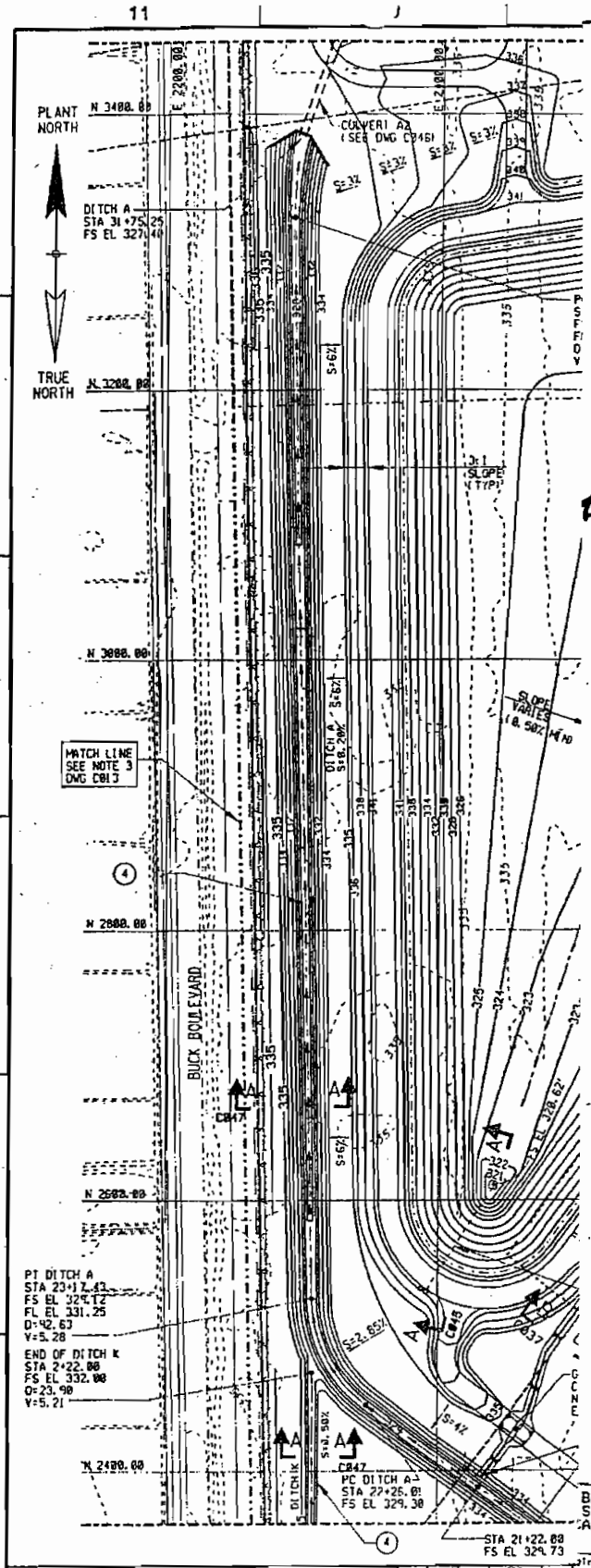
< 3.5 FT/SEC FOR EROSION SO OK

EARTH DITCH EAST OF RAW WATER TANKS (F)

AREA = 20,100 FT² → .46 AC

SLIGHTLY SMALL THAN AREA WEST OF COOLING TOWER W/ SIMILAR SURFACE "C" DISTRIBUTION

USE 2' WIDE EARTH DITCH W/ $\frac{1}{3}$ SIDESLOPES



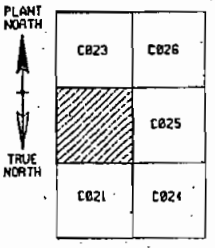
TER DRAIN

NOTES

1. FOR NOTES SEE DRAWING C021.
2. FOR DITCH DETAILS, ELEVATIONS AND FLOWS, SEE DRAWING C047.
3. ALL SWALES SLOPED LESS THAN 0.5% SHALL BE PAVED WITH MINIMUM OF 4" FIBER REINFORCED CONCRETE. SEE NOTE 4, DWG C047.
4. FOR POND DETAILS, SEE DRAWING C045.

LEGEND

SEE DWG C021



KEY PLAN

GRAPHIC SCALE

0 30 60 120 180

1"=60.00'

BASE DATUM
S EQUIVALENT
AN DATUM

No	Revision	Date	Proj Engr	RAPP	CBO Approval	No

Engineering Review

Engr	Date
RHO	3-23-01
A SAGAR	3-23-01
M PATEL	3-23-01

Designed	Checked
JP	JC

Date 3-23-01

Scale 1"=60.00'

PATEL

SIEMENS Westinghouse — Siemens Westinghouse Power Corporation
A Siemens Company

Dick Pacific Construction Co. Ltd.
Contractors & Construction Managers

BLYTHE ENERGY PROJECT
TR 14093 PARCELS 34 & 35
Blythe, California

PRECISE GRADING AND DRAINAGE PLAN

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ (201) 265-2000

Approved for Construction: M ROSENSTEIN, Chief Civil Engineer

Work Order	Drawing No	Sh	Rev
2425	C022		16

Printed by hudg@DCOW021 on Saturday April 12 2003 at 12:55:56 PM EDT. Filename: c022.m.

DESIGN OF CONCRETE SWALE AT EXTERIOR TOE OF EVAP POND DIKE

AREA:

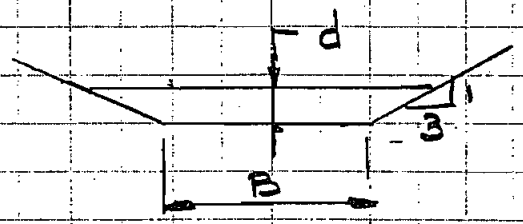
$A_{CRUSHED\ STONE} = 15 \times 1100 = 0.38\ AC$ $C = 0.6$

$A_{GRASS} = \frac{210}{2} \times 1100 = 2.65\ AC$, $C = 0.3$

$C_{AVG} = 0.34$

$I = 2.2$ in/hr

$Q = 0.34 \times 2.2 \times 3.03 = 2.26$ cfs



AREA $A = d(B + 3d)$

WETTED PERIMETER $= B + 2d\sqrt{10}$

VELOCITY $V = \frac{1.486}{n} \times R^{2/3} \times S^{\frac{1}{2}}$

$K_{CONSTANT} = \frac{1.486}{n} \times S^{\frac{1}{2}}$, $V = K R^{2/3}$

$S = 0.2\%$

$n = 0.015$

$\therefore K = \frac{1.486}{0.015} \times 0.002^{\frac{1}{2}} = 4.43$

TRY $d = 4\frac{1}{2}'' \approx 0.38'$

$A = 0.38(2 + 3 \times 0.38) = 1.19\ ft^2$

$WP = 2 + 2 \times 0.38 \times \sqrt{10} = 4.4\ ft$

$R = 0.27$

$R^{2/3} = 0.418$

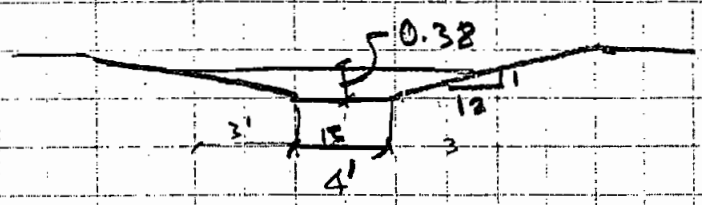
$V = 4.43 \times 0.418 = 1.85\ ft/sec$

$Q = 1.19 \times 1.85 = 2.2\ cfs$

∴ USE 2' WIDE SWALE W/3 TO 1 SLOPE
MAX WATER DEPTH = 4½"

WIDE SWALE AT ROAD CROSSING

USE 12 TO 1 SLOPE



$A = 0.38(4 + 12 \times 0.38) = 3.25\ ft^2$

$WP = 4 + 2 \times 0.38\sqrt{145} = 13.15\ ft^2$

$R = 0.247$

$R^{2/3} = 0.394$

$V = 1.75\ ft/sec$

$Q = 5.67\ CFS$ OK

SWALE BETWEEN EVAPORATION POND #2 AND PROPERTY LINE

AREA SEE SH. 28
$A_{CRUSHED\ STONE} = 0.33\ AC$
$A_{VEG} = 0.2.82\ AC$

$C_W = 0.33$
$\Sigma A = 3.15\ AC$
$Q = 0.33 \times 2.2 \times 3.15 = 2.28\ cfs$

USE SAME SWALE AS SWALE AT OUTER TOE OF EVAP POND

BLYTHE ENERGY PROJECT

DRAINAGE CACULATIONS

CALCULATIONS TO SHOW THAT BLYTHE ENERGY DITCHES AND RETENTION POND ARE DESIGNED FOR RUNOFF FROM SWITCHYARD

-BLYTHE ENERGY DITCHES 4 & A ARE DESIGNED TO ACCOMOADTE RUNOFF FROM ONE-HLF OF THE SWITCHYARD

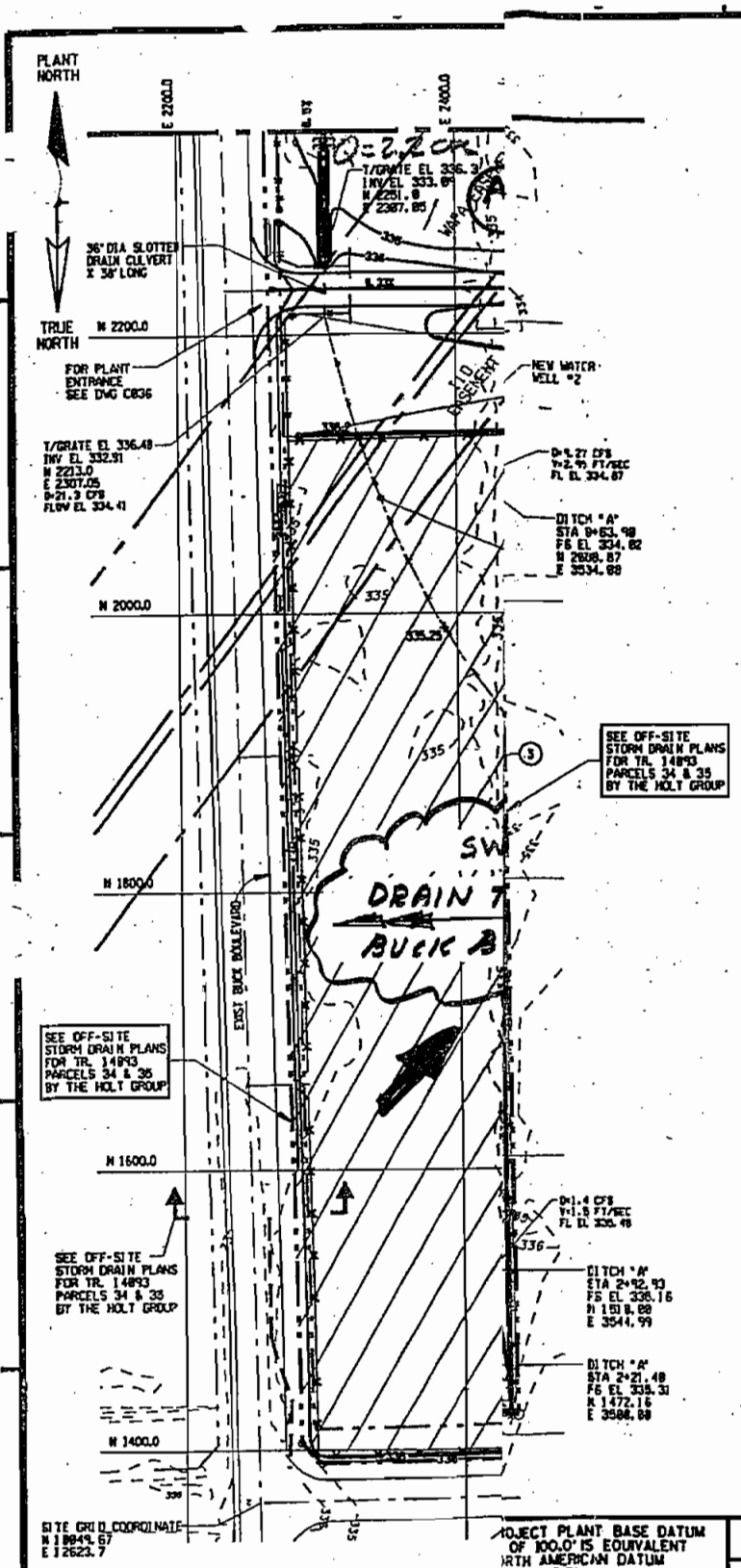
-BLYTHE ENERGY RETENTION POND IS DESIGNED TO ACCOMMODATE THE RUNOFF FROM THE ENTIER SWITCHYARD

Calculations Include:

- **DITCH 4 – RUNNING ALONG PLANT EAST EDGE OF THE SWITCHYARD**
- **DITCH A – TO STORM WATER RETENTION POND**
- **TRIBUTARY AREA FOR THE STORM WATER DETENTION POND SIZING**

4.12.03

REGISTERED PROFESSIONAL ENGINEER
JOHN V. LANTRY
No. 62391
EXPIRES
SEPT. 30, 2005
CIVIL
STATE OF CALIFORNIA



NOTES

1. FOR SITE SURVEY, MONUMENT, TOPOGRAPHIC MAPPING AND PLANT COORDINATE SYSTEM INFORMATION SEE DWG. C012.
2. PRIOR TO THE START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON DRAWING C060, C061 AND C062. AREAS TO RECEIVE ASPHALT PAVEMENT SURFACING AND CRUSHED STONE SURFACING ARE INDENTIFIED ON DRAWING C012, C013 & C014.
3. ALL SIDE SLOPES SHALL BE MINIMUM 3H:1V UNLESS OTHERWISE NOTED (UON)
4. WHEN SPOT ELEVATIONS NOT SHOWN AT BUILDING AND EQUIPMENT FOUNDATIONS, THEY SHALL BE 337.0' (UON). SEE SECTION K-K, DWG C035.
5. FOR SECTIONS AND DETAILS SEE DWG C035.
6. ALL PAD ELEVATIONS NOT SHOWN SHALL BE EL 337.5'.
7. ALL "D" VALUES FOR 100 YEAR 24 HOUR STORM.
8. REINFORCED CONCRETE PIPE SHALL BE TONGUE AND GROOVE, OR BELL AND SPIGOT, CONFORMING TO ASTM C76, CLASS IV; FURNISHED IN MAXIMUM STANDARD LENGTHS. PLANT LOAD-BEARING TEST SHALL BE INCLUDED AS A BASIS OF ACCEPTANCE OF THE PIPE, AS SPECIFIED IN ASTM C76. FOR PIPE BEDDING DETAILS SEE DRAWING C040.

CONSTRUCTION NOTES

1. CONSTRUCT SIDEWALK PER SHEET C040.
2. INSTALL H/C STRIPING PER SHEET C040.
3. CONSTRUCT PAVED AREA PER SHEET C035.
4. CONSTRUCT ◡-DITCH PER SHEET C035.

LEGEND

	PROPERTY LINE
	SETBACK LINE
	NEW WATER WELL
	NEW FENCE
	NEW FACILITY
	NEW ASPHALT PAVEMENT
	NEW CRUSHED STONE SURFACE
	NEW CONCRETE SURFACE
335	EXISTING CONTOUR
336	NEW CONTOUR
	DRAINAGE DITCH / SWALE
	SLOTTED DRAIN PIPE
* 337.0	SPOT ELEVATION
FS	FINISHED SURFACE
FG	FINISHED GRADE
FL	FLOW LINE

CAL NO 02425-001-06-001
SH. 21 CONT SH. 22

FOR AREA (A3) SEE SHEET 8A, 25 TO 30A.

FOR DISCHARGE Q SEE SHEET 8A, 36 & 37

GRAPHIC SCALE

0 30 60 120 180

1"=60.0'

PROJECT PLANT BASE DATUM OF 100.0' IS EQUIVALENT NORTH AMERICAN DATUM OF 337.5'

No	Revision	Date	Proj Engr

Engineering Review		
Disc	Engr	Date
Mech	RHG	3/23/01
Elec	A SAGAR	3/23/01
Civil	M PATEL	3/23/01
Arch		
Instr		

Drawn	Designed	Checked
RHO	JP	JC

Lead Engineer — Date 3/23/01 — Scale 1"=60.0'

No. 62391

SIEMENS Westinghouse — Siemens Westinghouse Power Corporation — A Siemens Company

DICK — Dick Pacific Construction Co. Ltd.

BLYTHE ENERGY PROJECT
TR. 14093 PARCELS 34 & 35
Blythe, California

DETAIL GRADING AND DRAINAGE PLAN

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ (201) 265-2000

Approved for Construction: M ROTHSTEIN — Chief Civil Engineer

Work Order	Drawing No	Sh	Rev
2425	C021		5

2/13/2002 2:21 hultj N2_210_8830 C:\pw_oradell_05012001\dms01577\c0

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 02425-001 Calc. 02425-001-06-00 Sheet No: 3 Cont'd on

Prepared By: Date: 4-11-03 Checked By: Date: 4-12-03

Title: BLYTHE ENERGY PROJECT

REV 8

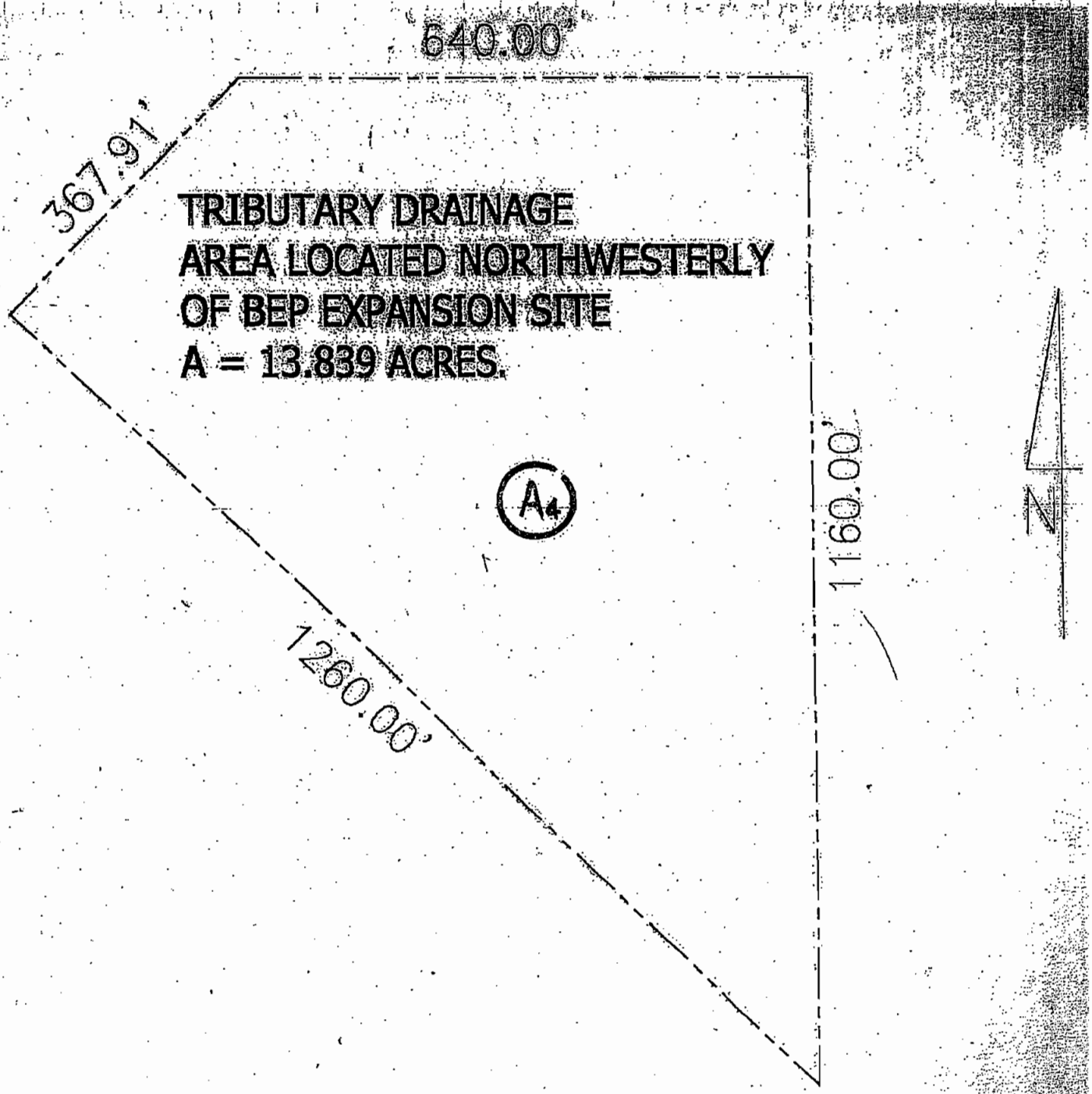
STORM DRAINAGE DESIGN DATA (SITE - POWER ISLAND SIDE)

Area No.	Area (A) (acres)	A (accum.) (acres)	Ditch Station From - To	Cavg	Q (cfs)	Q (accum.) (cfs)	At Ditch Station	Ditch Width (ft)	Water Flow Depth	Velocity (fps)
A2	0.78		A - B	0.39	1.35		B	2.00	0.32	1.74
A3	2.52	3.30	B - D	0.66	7.40	8.75	D	2.00	0.85	2.95
A4	3.15	6.45	D - E	0.33	4.62	13.37	E	3.00	0.90	3.20
A1p	3.70	10.15	P - E1	0.75	12.34	25.71	E1	3.00	1.28	3.82
A5	1.89	12.04	E1 - F	0.37	3.10	28.81	F	3.00	1.32	3.93
A2p	2.90	14.94	Q - F1	0.73	9.40	38.21	F1	3.00	1.52	4.24
A1	2.00		A - C	0.49	4.44		C	2.00	0.58	2.40
A6	6.05	8.05	C - G	0.53	14.48	18.92	G	2.00	1.21	3.56
		22.99	F1 - G1			57.13	G1	4.00	1.68	4.65
A7+ A5a	1.72	24.71	G1 - H	0.36	2.90	60.03	H	4.00	1.71	4.69
A8+SYD	14.58	39.29	H - J	0.50	32.60	92.63	J	4.00	2.13	5.28
A9	1.67	40.96	J - K	0.34	3.00	95.63	K	4.00	2.16	5.32
A10+Blvd	2.67	43.63	J - L	0.34	5.85	101.48	L	4.00	2.22	5.40

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01-06-001 Sheet No: 55 Cont'd on 56
Prepared By: [illegible] Date: 11/14/02 Checked By: JP Date: 11/16/02
Title: WASTEWATER POND AREA SITEWORK

(Ref #12)

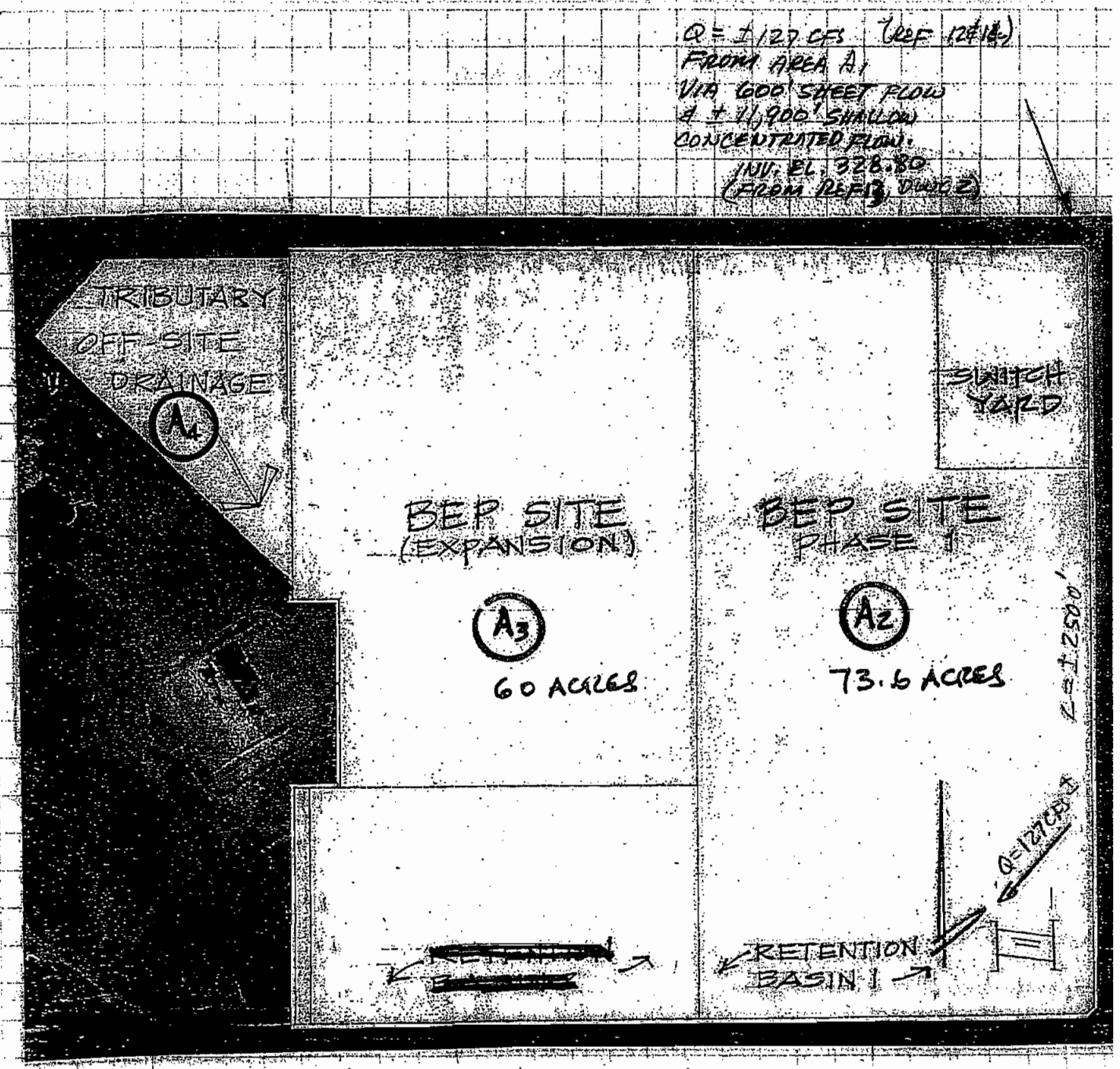


BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-01 Calc. 2425-01-06-001 Sheet No: 54 Cont'd on 55

Prepared By: [illegible] Date: 1/14/02 Checked By: JP Date: 1/12/02

Title: WASTEWATER POND AREA SITEWORK



Form C015104G4 (1/1/2000)

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01-06-001 Sheet No: 57 Cont'd on 58
Prepared By: [illegible] Date: 1/14/02 Checked By: [illegible] Date: 1/16/02
Title: WASTEWATER POND AREA SITEWORK

DEFINITION OF AREAS:

A_1 = UPLAND AREA NORTH OF SITE (REF 12
TRIBUTORY AREA = 1.75 SQ. MI (= 48,787,200 SF)
(= 1120 ACRES)

A_2 = BLYTHE ENERGY PROJECT (PHASE I)
(1783.02' + 747.72') × 1267.25' = 3,207,080 SF
(= 73.6 ACRES) (REF 1

A_3 = BLYTHE ENERGY PROJECT (EXPANSION AREA)

GROSS PROPERTY (FROM CADD) = 3,308,191 SF.
(= 75.95 ACRES)

LESS 2 EVAP PONDS = < 16.0 ACRES > (REF
@ 8.0 ACRES EACH

A_3 = 75.95 − 16 = 59.95 ACRES
(= 2,611,422 SF)

Form C015104G4 (1/1/2000)

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01-06-00 Sheet No: 58 Cont'd on 59

Prepared By: [illegible] Date: 1/14/02 Checked By: JP Date: 1/16/02

Title: WASTEWATER POND AREA SITEWORK

DEFINITION OF AREAS (CONT'D)

A_4 = AREA OF ADDITIONAL TRIBUTARY EXTERIOR AREA LOCATED NORTH-WEST OF BEP EXPANSION SITE = 13.84 ACRES (REF 12)
(= 602,870 SF)

A_5 = AREA CONTRIBUTION FROM RUNOFF FROM 1/2 OF RIVERSIDE AVE, BUCK BLVD & HOBSONWAY
(0.9073 + 0.715 + 0.7312 + 0.4565 + 1.0566) + 1.11 (HOBSONWAY PARCELS) = 4.98 AC (REF 1)
(= 217,800 SF)

TOTAL AREA: (SUBJECTED TO RAINFALL RUNOFF)

$A_g = A_1 + A_2 + A_3 + A_4 + A_5$

$= 1120 + 73.6 + 60.0 + 13.8 + 5.0 \triangleq$ 1273 ACRES.

Form C015104G4 (1/1/2000)

The Holt Group

James G. Holt, P.E.
Robert K. Holt, P.E.
Kenneth G. Skillman, III, P.E., L.S.

Engineering ■ Planning ■ Surveying

4/15/03

BLYTHE ENERGY PROJECT
DRAINAGE CALCULATIONS

Calculations to show that the Blythe Energy Project's Storm Drain can properly covey storm water from the 4 acre easterly half of the switchyard area (See exhibit A) and the 1120 acre area located North of the Blythe Energy Project (See exhibit B).

Flow from area North of the site (See exhibit C):
Q = +/- 127 cfs.

Flow from easterly switchyard area:
C = 0.6
Q = 0.6 x 4 x 4.44 = 10.65 cfs.

Total Flow:
Q = 127 + 10.65 = 137.65 cfs.

Design flow for each pipe:
Q_d = 137.65/2 = 68.83 cfs.

REGISTERED PROFESSIONAL ENGINEER
ROBERT K. HOLT
No. 27943
EXPIRES
03-31-06
CIVIL
STATE OF CALIFORNIA

Robert K. Holt
04/15/03

HYDRAULICS CALCULATOR FOR CIRCULAR PIPES

Design By: **Mauricio Lam, P.E.** Date: 4/15/2003
Project: **Blythe Energy Project**
Description: **Hydraulic Calculations for 42" diameter Storm Drain**

Qdesign=	68.83	Wet Area=	10.03208
Depth "D"(feet)=	3	Wet Perimeter=	8.282397
Pipe Radius(feet)=	1.75	Hidraulic Radius=	1.211247
Circular Angle=	4.73	Vel(fps)=	8.465349
Mannings "n" value=	0.012	Channel Flow (cfs)=	84.92466
Proposed Slope=	0.0036		

Comments: Each pipe's capacity (84.92 cfs.) exceeds required flow of (68.83cfs.)

321 W. Hobsonway ■ Suite A ■ Blythe, CA 92225 ■ 760-922-4658 ■ Fax 760-922-4660
1561 S. 4th Street ■ El Centro, CA 92243 ■ 760-337-3883 ■ Fax 760-337-5997

W.O. No: 247 1 Calc. 125-001-06-001 Sheet No: 43 Cont'd on 43A

Prepared By: [illegible] Date: 6-9-01 Checked By: JP Date: 6/11/01

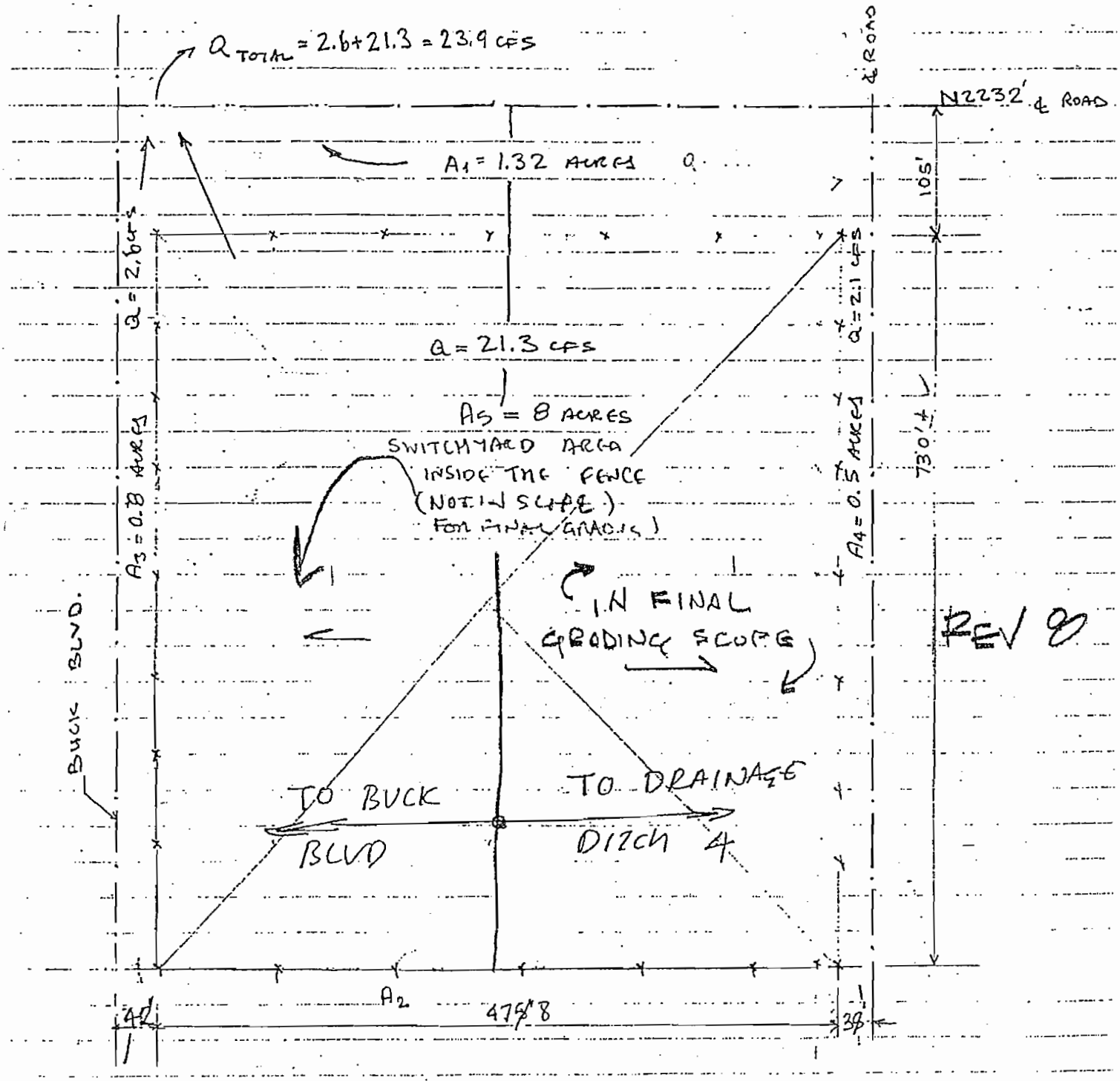
Title:

A

SECTION 7)

SWITCHYARD AREA DRAINAGE

(ONLY AT CONSTRUCTION STAGE)



REV 0

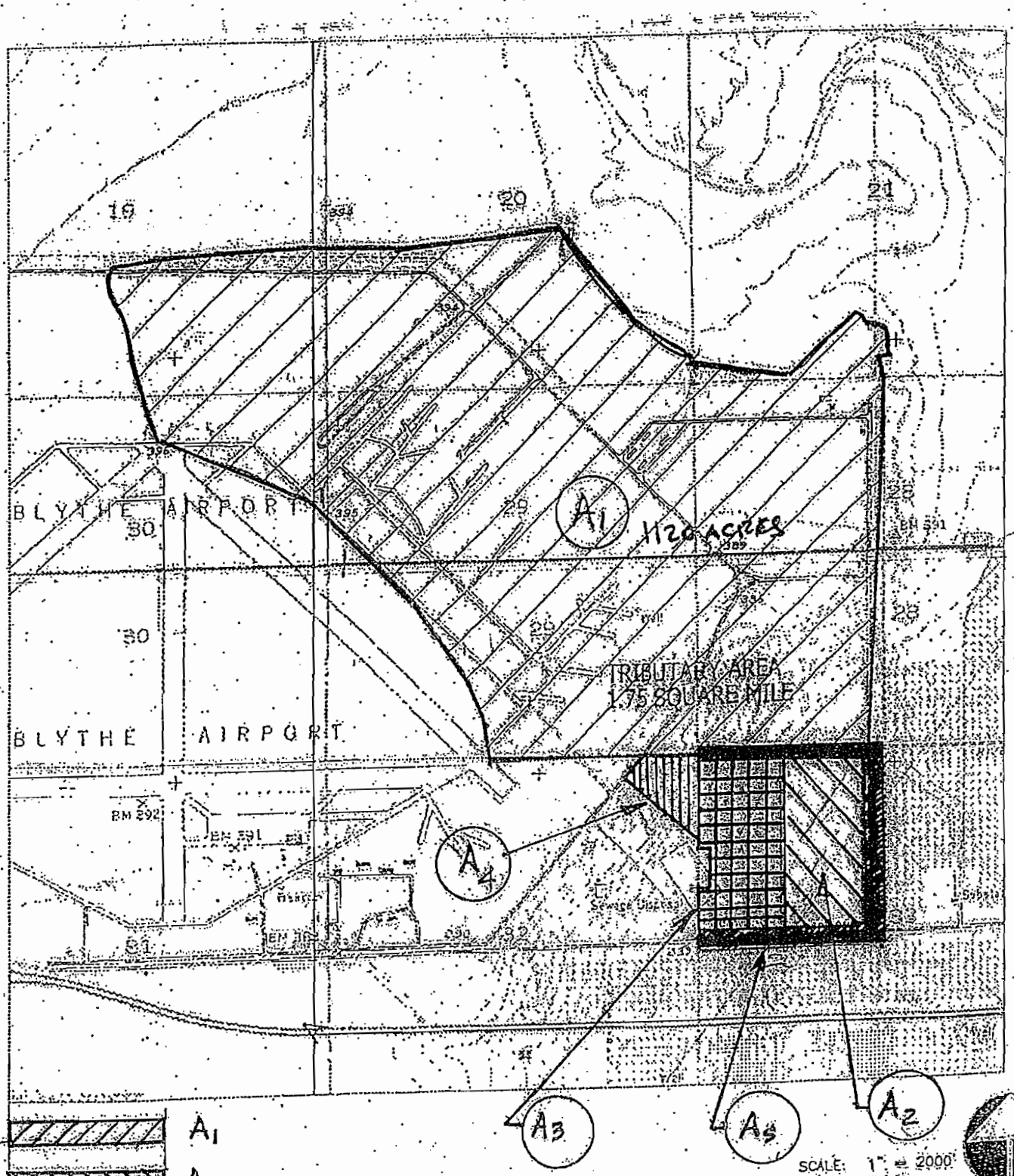
Form C015104G4 (1/1/2000)

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. 2425-01-06-001 Sheet No: 53 Cont'd on 54

Prepared By: [illegible] Date: 1/14/02 Checked By: [illegible] Date: 1/16/02

Title: WASTEWATER POND AREA SITEWORK



A1

A2

A3

A4

A5

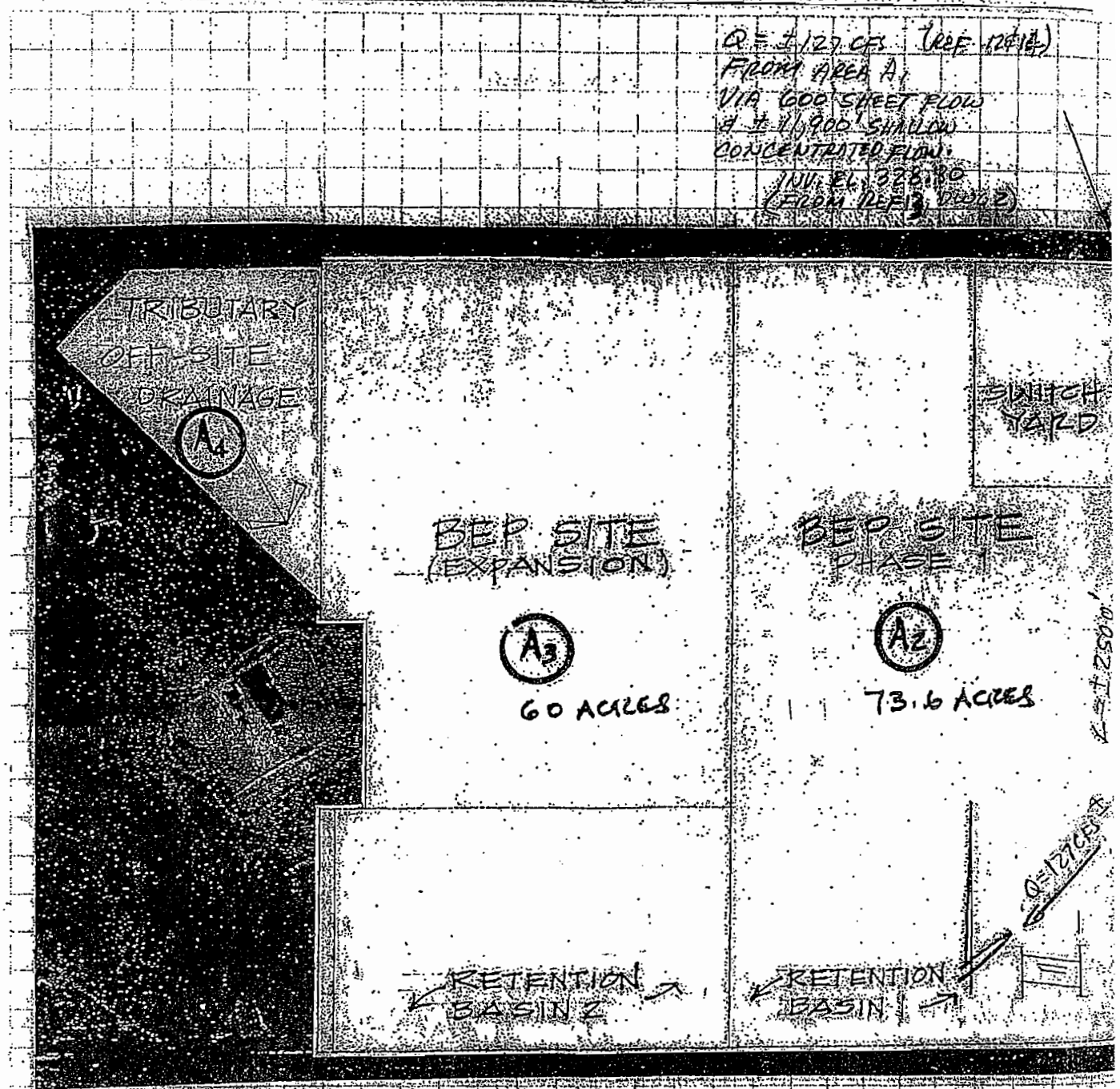
Form (2013-104G4 (1/1/2000)

BURNS AND ROE ENTERPRISES, INC.

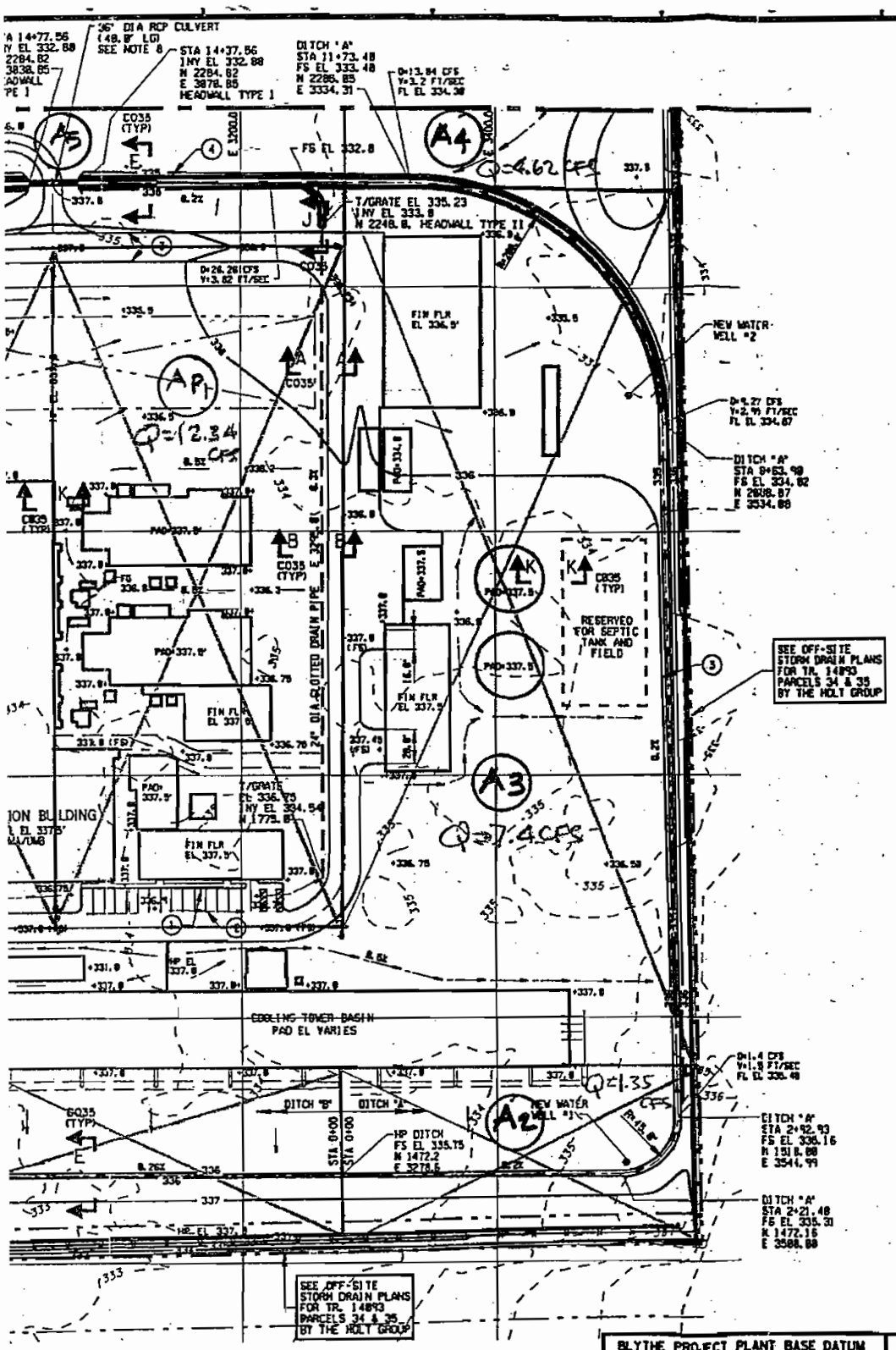
W.O. No: 2425-01 Calc. 2425-01-06-001 Sheet No: 54 Cont'd on 55

Prepared By: [illegible] Date: 1/14/02 Checked By: JP Date: 1/16/02

Title: WASTEWATER POND AREA SITEWORK



Form C015104G4 (1/1/2000)



NOTES

1. FOR SITE SURVEY, MONUMENT, TOPOGRAPHIC MAPPING AND PLANT COORDINATE SYSTEM INFORMATION SEE DWG. C012.
2. PRIOR TO THE START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON DRAWING C060, C061 AND C062. AREAS TO RECEIVE ASPHALT PAVEMENT SURFACING AND CRUSHED STONE SURFACING ARE INDENTIFIED ON DRAWING C012, C013 & C014.
3. ALL SIDE SLOPES SHALL BE MINIMUM 3H:1V UNLESS OTHERWISE NOTED @OND
4. WHEN SPOT ELEVATIONS NOT SHOWN AT BUILDING AND EQUIPMENT FOUNDATIONS, THEY SHALL BE 337.0' @OND. SEE SECTION X-X, DWG C035.
5. FOR SECTIONS AND DETAILS SEE DWG C035.
6. ALL PAD ELEVATIONS NOT SHOWN SHALL BE EL 337.5'.
7. ALL "Q" VALUES FOR 100 YEAR 24 HOUR STORM.
8. REINFORCED CONCRETE PIPE SHALL BE TONGUE AND GROOVE, OR BELL AND SPIGOT, CONFORMING TO ASTM C76, CLASS IV; FURNISHED IN MAXIMUM STANDARD LENGTHS. PLANT LOAD-BEARING TEST SHALL BE INCLUDED AS A BASIS OF ACCEPTANCE OF THE PIPE, AS SPECIFIED IN ASTM C76. FOR PIPE BEDDING DETAILS SEE DRAWING C040.

CONSTRUCTION NOTES

1. CONSTRUCT SIDEWALK PER SHEET C040.
2. INSTALL H/C STRIPING PER SHEET C040.
3. CONSTRUCT PAVED AREA PER SHEET C035.
4. CONSTRUCT ◡-DITCH PER SHEET C035.

LEGEND

— · — · —	PROPERTY LINE
— · — · —	SETBACK LINE
·●	NEW WATER WELL
—x—x—x—	NEW FENCE
	NEW FACILITY
	NEW ASPHALT PAVEMENT
	NEW CRUSHED STONE SURFACE
	NEW CONCRETE SURFACE
335	EXISTING CONTOUR
336	NEW CONTOUR
	DRAINAGE DITCH / SWALE
	SLOTTED DRAIN PIPE
* 337.8	SPOT ELEVATION
FS	FINISHED SURFACE
FG	FINISHED GRADE
FL	FLOW LINE

CAL NO 02426-0U1-0.6-001
SH. 21 CONT SH. 22

FOR AREA (A1) SEE SHEET 8A, 25 TO 30A.
FOR DISCHARGE Q SEE SHEET 8A, 36 & 37

GRAPHIC SCALE

0 30 60 120 180
1"=60.0'

BLYTHE PROJECT PLANT BASE DATUM ELEVATION OF 100.0' IS EQUIVALENT TO 1921 NORTH AMERICAN DATUM ELEVATION OF 337.5'

JOHN V. LANTRY
CALIFORNIA P.E. No. 62391

Amendment	Date	Dwn	Chkd	Approved Chief Engr
AND NOTE 5 AND HYDROCARBON	5/24/01	A M B	JP	M PATEL
ELEASED PARTIAL D HOLD C7003.				
ELEASED HOLD *C7887	6/14/01	R H D	JP	M PATEL
, *C7882, *C7884 AND *C7885. EVATIONS	7/19/01	R H D	JP	M PATEL
T ELEVATIONS & REVISED ES AND TITLE BLOCK	8/8/01	SB	AK	M PATEL

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

Engineering Review		
Disc	Engr	Date
Mech	RKG	3/23/01
Elec	A SAGAR	3/23/01
Civil	M PATEL	3/23/01
Arch		
Instr		
Drawn	Designed	Checked
RKG	JP	JC
Lead Engineer	Date 3/23/01	Scale 1"=60.0'

SIEMENS Westinghouse — Siemens Westinghouse Power Corporation — A Siemens Company

DICK — Dick Pacific Construction Co. Ltd.

BLYTHE ENERGY PROJECT
TR. 14093 PARCELS 34 & 35
Blythe, California

DETAIL GRADING AND DRAINAGE PLAN

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ (201) 265-2000

Approved for Construction: N ROTHSTEIN, Chief Civil Engineer

Work Order: 2425

Drawing No: C021

Sh. Rev: 5

RECEIVED
MAR 28 2003

RE / AS-BUILT COPY

Blythe Energy Project

Plancheck Transmittal

PC#: GEN-5/1004 R8-(5-1)

DATE: 2/28/03
CBO AND RE ONLY

To: CBO. ☒ **(4 COPY)**

To: BERRYMAN & HENINGAR ☐ **(0 COPIES)**

To: BOB GAVAHAN. HARZA ☐ **(0 COPIES)**

To: MAURICIO LAM. RE ☒ **(1 COPY)**

Component of project application being submitted for plancheck:

- ☐ Full submittal **X**
- ☐ Partial

DESCRIBE COMPONENT:

Additional information as requested by RE and CBO.
Ref: Please include this information in submittal 1004R8-5.

1. **Dr. C041 rev0.**
2. **Revised side slope of retention basin and . Calc. #02425-001-06-001. Revised sheets 84A, 84B and 86A.**

Type of plancheck:

- ☐ *Civil XX*
- ☐ *Architectural*
- ☐ *Structural*
- ☐ *Electrical*
- ☐ *Mechanical.*
- ☐ *Other.*

II. Number of sheets:

III. Other related documents:

IV. Contact person: 1). ANWAR SHAH 760-922-3660

Return approved submittals to : ANWAR SHAH . Dick Pacific Construction. (Call for pickup-CBO NLY)

V. Note: all submittals shall be under conformance with 1998 CBC

When the Engineer of records finds a condition which can not conform to the CBC an alternate methods of Design & construction will be filed and approved prior to entering into plancheck containing the following: (approved form to follow)

1. Identify the condition which cannot conform to the CBC
2. Justify the need for the modification
3. Propose the alternate method of compliance and submit attached related documentation, i.e. calculations and other related pertinent information to approval.
4. Alternate must first be proposed to the RE for approval
5. The final approved alternate method of approval must be signed by:
   a. RE, Planchecker in specialty category, CBO, CPM

REQUIRED SIGNATURES:

☐ Resident Engineer: APPROVED BLYTHE ENERGY PROJECT-R.E.
Date: 3-28-03
(Signature)
Comments:

☐ Chief Building Official: APPROVED BLYTHE ENERGY PROJECT CBO
Date:
(Signature) SIGNATURE 3-28-03 DATE
Comments:

☐ CC: Compliance Project Manager From CBO: Date:

Dick Pacific Construction.101 E Hobsonway Suite C, Blythe, CA.92225
Phone: 760-922-9950, Fax: 760-922-0986

1700

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425-001 Calc. No: 2425-01-06-001 Sheet No: 1 Cont'd on Sht: ~~2~~ 1A | Rev. 2

Prepared By: JP Date: 2/6/01 Checked By: A. Ketin Date: 3/16/01

Title: SWPC – BLYTHE ENERGY PROJECTBLYTHE, CA
PLANT STORMWATER DRAINAGE SYSTEM

COVER SHEET
TABLE OF CONTENTS

- LEAD SHEETS — SHEET NO.

PURPOSE	2
REFERENCES	2
DESIGN REQUIREMENTS	2
UNCONFIRMED ASSUMPTIONS	2
DESIGN PROCEDURES	3

Concurrence with above lead sheet information

Print/sign/ Manu Patel

date Manu Patel 3/23/01

COMPUTER INPUT/OUTPUT	3
CONCLUSIONS	3
BODY OF CALCULATIONS (FOR INDEX SEE SHEET 8F)	~~4 to 29~~ | Rev. 1
	4 - ~~46~~ | Rev. 2
	~~50~~ | Rev. 3
	~~85~~ | Rev. 4
	A1 - ~~A38~~ | Rev. 1
	~~-95~~ | Rev. 5
	-103. | Rev 6
	| Rev 7

APPENDICES

APPENDIX A : REFERENCE MATERIALS

REVISION RECORD

Revision	Status	Description of Revision	Preparer print/sign/date	Checker print/sign/date	Approver print/sign/date
0	Final		J. Patel/A. Ketin J. Patel/A. Ketin 3/23/01/ 3/23/01	J. Patel/A. Ketin J. Patel/A. Ketin 3/23/01/ 3/23/01	M. Patel 3/23/01
1	Final	INCORPORATED CBO COMMENTS	J. Patel/A. Ketin J. Patel/A. Ketin 5/11/01 5/11/01	J. Patel/A. Ketin J. Patel/A. Ketin 5/11/01 5/11/01	M. Patel 5/24/01

Revision record continued on sheet ____

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2425.001 Calc. 02425-001-06-00 Sheet No: 1A Cont'd on 2
Prepared By: A. KETIN Date: 6/8/01 Checked By: Date:
Title:

REVISION RECORD

Revision	Status	Description of Revision	Preparer print/sign/date	Checker print/sign/date	Approver print/sign/date
2	FINAL	INCORPORATED ADOT COMMENT OF CBO DATED 6/1/01	ALAN KETIN 6/8/01	J. Patel 6/15/01	MANU PATEL 6/15/01
3	FINAL	RELEASED EVAP POND, REVISED DITCH SLOPE TO 0.20%. ADDED CULVERT DESIGN	J. PATEL 02/05/02	M. PATEL 3/15/02	MANU PATEL 6/15/02
4	FINAL	ADDED RETENTION POND CALCULATION	FRED ORTMANN 3/20/02	J PATEL 3/20/02	MANU PATEL 3/20/02
5	FINAL	ADDED CULVERT DESIGN ALONG DITCH "A" CROSSING EASEMENT TO STORM POND. (SEE SHEETS 86 - 95)	FRED ORTMANN 7/30/02	RICH MOITOZA 7/31/02	MANU PATEL 7/31/02
6	FINAL	PREPARED A "PRELIMINARY GRADING & DRAINAGE PLAN PER CBO REQUIREMENTS (REF: 17) - SEE SHEETS 96 TO 103	D. MORRISSEY 3/21/03	Manu Patel 3/21/02	MHM 3/21/03
7	FINAL	REVISED SIDE SLOPE OF RETENTION BASIN. REV SHEET 85, ADDED SHEETS 84A, 84B & 86A	J. Patel 3/26/03	M. PATEL 3/27/03	M. PATEL 3/27/03
4		3-28-03 REGISTERED PROFESSIONAL ENGINEER JOHN V. LANTRY No. 62391 EXPIRES SEPT. 30, 2005 CIVIL STATE OF CALIFORNIA			

Revision Record continued on Sheet ___

CALCULATIONS TO DETERMINE STORM WATER STORAGE CAPACITY OF RETENTION BASIN WITH REVISED SLOPES FROM 2:1 TO 3:1

Required Storage Volume = 53.20 Ac-Ft (See herein attached sheet 82 from Burns and Roe Hydrology Calculations).

During the completion of the Aquifer Test for BEP Water Well #2, water was pumped out at a 4,200 GPM rate for a 71 hr period and it was noted that water had completely been percolated into the ground in a period of 48hrs. Therefore, the percolation rate for the soil is:

Percolation Rate = 6.3 cfs (See herein enclosed sheet 72 from Burns and Roe Hydrology Calculations)

Calculate Volume of Water pumped out into the Retention Basin during the Aquifer Test:

Vpumped = (4,200gal/min)(cf/7.48gal)(60min/hr)(71hrs)= 2,391,978.61cf
= 54.91 Ac-Ft

Area of Bottom of Retention
Basin (el=317.00) using 2:1 slopes = 230,354 SF => 5.288 AC

Area of Bottom of Retention
Basin (el=317.00) using 3:1 slopes = 181,831 SF => ~~4.174~~ 4.15 AC

Since the bottom of the Retention Basin is being reduced due to the change of the slope rates, a tributary water volume will be reduced for percolation:

Vred = (54.91 Ac-Ft)-(4.~~174~~15Ac/5.288Ac)(54.91 Ac-Ft) = 11.~~568~~81 Ac-Ft

New required Water Storage Volume for Modified Retention Basin:

Vreq = 53.20 Ac-Ft + 11.568 Ac-Ft = 6~~4.768~~5 Ac-Ft

Several iterations have been completed to calculate the Volume Retention Capacity of the Basin at different levels as noted on the following page and to determine the High Water Elevation (HWL) during a 100 yr Storm event, this HWL being 329.39 and providing a freeboard of 5.61 feet measured from the Top of the slope at the 335.00 contourline.

SHEET 84B

RETENTION BASIN'S STORAGE CAPACITY AT DIFFERENT LEVELS USING 3:1(H:V) SLOPES

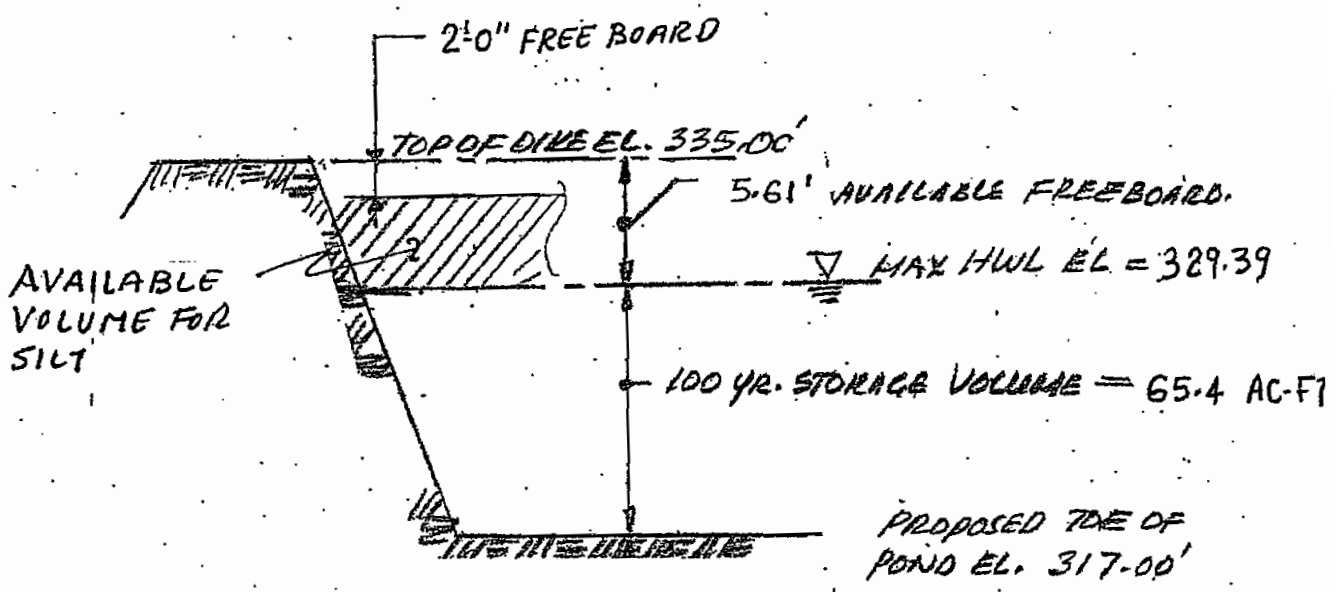
New Proposed Area at Bottom of Retention Basin (El. 317.00)= 181,831 SF

ELEVATION CONTOURLINE	AREA (SF)	STORAGE VOLUME CAPACITY (CF)	STORAGE VOLUME CAPACITY (AC-FT)	COMMENTS
335	322,073.21	4,535,137.89	104.11	
334.5	318,096.08	4,374,361.91	100.42	
334	314,118.94	4,215,574.49	96.78	
333.5	310,170.08	4,059,008.87	93.18	
333	306,221.21	3,904,417.68	89.63	
332.5	302,300.63	3,752,020.09	86.13	
332	298,380.04	3,601,582.80	82.68	
331.5	294,487.73	3,453,310.79	79.28	
331	290,595.42	3,306,984.94	75.92	
330.5	286,731.38	3,162,796.07	72.61	
330	282,867.34	3,020,539.21	69.34	
329.5	279,031.58	2,880,391.13	66.12	
329.39	**275,209.96**	**2,831,368.72**	**65.00**	**Maximum High Water Level, Limits of Innundation will be contained within the 329.39 Contourline.**
329	275,195.82	2,742,160.92	62.95	
328.5	271,388.33	2,606,011.16	59.83	
328	267,580.84	2,471,765.12	56.74	
327.5	263,801.63	2,339,571.28	53.71	
327	260,022.41	2,209,267.05	50.72	
326.5	256,271.47	2,080,986.73	47.77	
326	252,520.53	1,954,581.89	44.87	
325.5	248,797.87	1,830,172.68	42.01	
325	245,075.20	1,707,624.80	39.20	
324.5	241,380.81	1,587,044.27	36.43	
324	237,686.41	1,468,310.94	33.71	
323.5	234,020.30	1,351,516.71	31.03	
323	230,354.18	1,236,555.54	28.39	
322.5	226,716.34	1,123,505.18	25.79	
322	223,078.50	1,012,273.74	23.24	
321.5	219,468.93	902,924.84	20.73	
321	215,859.36	795,380.72	18.26	
320.5	212,278.07	689,690.87	15.83	
320	208,695.77	585,791.66	13.45	
319.5	205,143.75	483,718.44	11.10	
319	201,590.73	383,421.73	8.80	
318.5	198,065.99	284,922.74	6.54	
318	194,541.24	188,186.12	4.32	
317.5	188,186.12	92,504.28	2.12	
317	181,831.00	0.00	0.00	

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 02425-001 Calc. 02425-001-06-002 Sheet No: 85 Cont'd on 86A
Prepared By: [illegible] Date: 3/21/03 Checked By: 3/22/03 MP Date: 3/22/03
Title: BLYTHE ENERGY PROJECT (REV 1) Rev. 2

PROPOSED REVISED POND ELEVATIONS: (RETENTION BASIN)



APPROXIMATE AREA AT T/O DIKE (EL. 335.00') = 7.40 ACRES.

APPROXIMATE AREA AT 100 YR FLOOD (EL. 329.39') = 6.41 ACRES.

APPROXIMATE AREA AT BOTTOM OF POND (EL. 317.00') = 4.15 ACRES.

100-YEAR FLOOD STORAGE VOLUME = $\left(\frac{6.41+4.15}{2}\right)(329.39-317.00)$

$= 5.28 \times 12.39$

$= 65.4$ ACRE-FEET > 64.76 REQ'D

VOLUME AVAILABLE FOR SILT = $\left(\frac{7.03+6.41}{2}\right)(333.0-329.39)$

$= 24.25$ ACRE-FEET

TOTAL TRIBUTARY AREA ≈ 1250 ACRE ; AVAILABLE SILT DEPTH PER ACRE $= 24.25/1250 \times 12 \approx 1\frac{1}{4}''$/ACRE

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 02425-001 Calc. 02425-001-06-002 Sheet No: 86A Cont'd on 86
Prepared By: M. Pali Date: 3/27/03 Checked By: Date:
Title: BLYTHE ENERGY PROJECT - STORM WATER RETENTION BASIN

STORM WATER RETENTION BASIN WILL REQUIRE PERIODIC REMOVAL OF THE SILT. SILT SHALL NOT BE ALLOWED TO ACCUMULATE ABOVE AVERAGE ELEVATION OF 320.5 FEET.