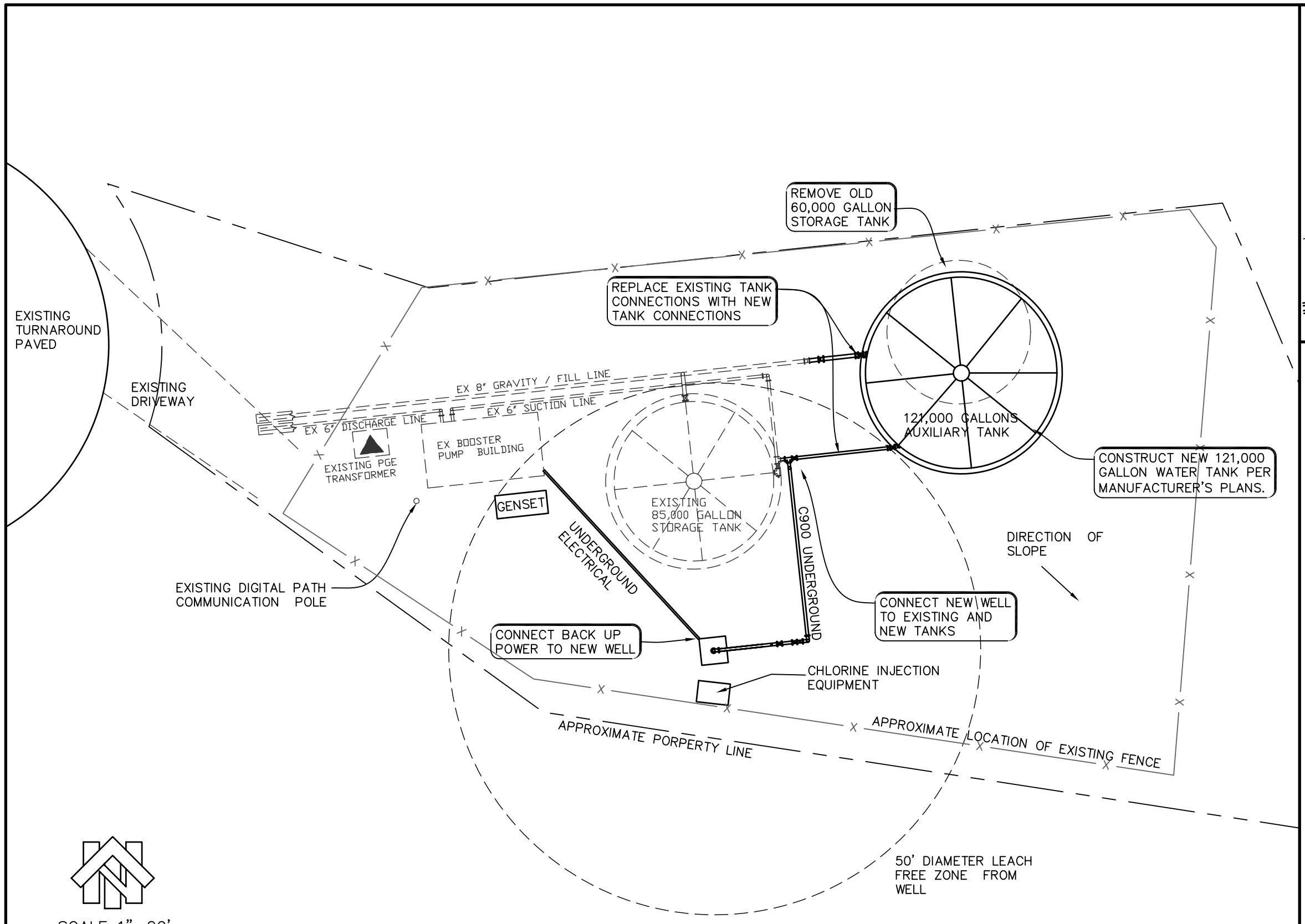
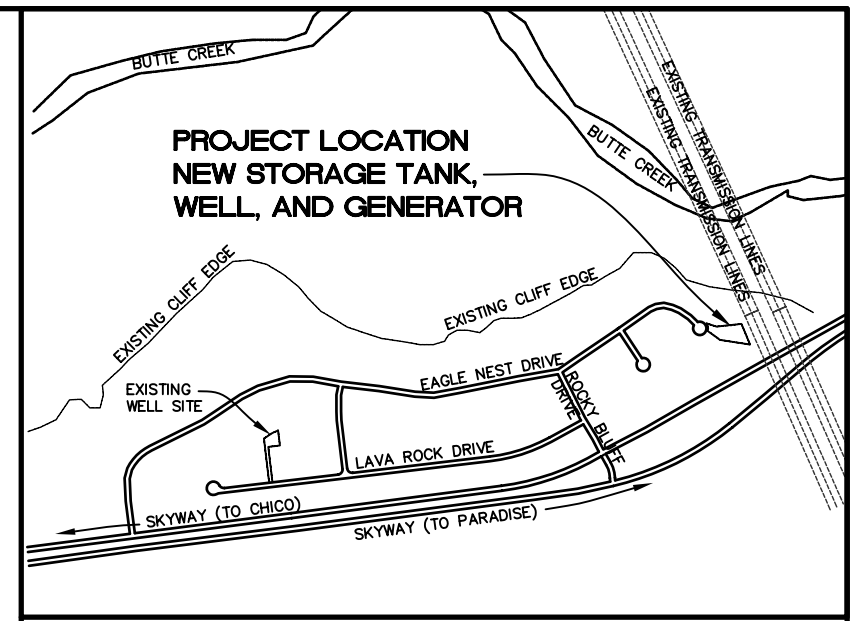


SCALE 1"=20'



LOCATION MAP

NTS

WATER SYSTEM GENERAL NOTES

1. CONTRACTOR TO CONTACT UNDERGROUND SERVICE ALERT AT 1-800-642-2444 AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF THIS PROJECT.

2. IT IS THE REPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXACT LOCATION AND DEPTH OF ALL EXISTING AND PROPOSED FACILITIES PRIOR TO WATER MAIN INSTALLATION.

3. DEVELOPER SHALL OBTAIN ALL PERMITS NECESSARY FOR THE INSTALLATION OF THE FACILITIES.

4. THRUST BLOCKS SHALL BE INSTALLED AT ALL HORIZONTAL AND VERTICAL BENDS, TEES, END CAPS, AND INTERSECTIONS.

5. WATER LINE CONSTRUCTION, INCLUDING FIRE HYDRANTS, SERVICES, VALVES AND MISCELLANEOUS APPURTENANCES SHALL CONFORM TO AWWA STANDARDS. THE LINES SHALL BE TESTED, DISINFECTED AND FLUSHED PRIOR TO PLACING IN SERVICE.

GRAN MUTUAL WATER COMPANY
PO BOX 1495 CHICO, CA 95927
530.342.0195

DURHAM PUMP CONTACT : KEVIN O'SHEA
530.521.6407 C/O DURHAM PUMP, INC.

REGISTERED PROFESSIONAL ENGINEER
MARK S ADAMS
No. 34257
Exp. 9/30/07
CIVIL
STATE OF CALIFORNIA

Designed: RMS	Revision	Date	By
Drawn By: RMS			
Approved			
Date 3-14-07			

NorthStar
Civil Engineers..Surveyors
Chico, California

111 Mission Ranch Blvd, Suite 100
Chico, California 95926
Phone: (530) 893-1600 Fax: (530) 893-2113
Web Site: www.northstareng.com

DURHAM PUMP

DURHAM DAYTON HIGHWAY

DURHAM, CALIFORNIA

APN 017-030-999 SEE BUTTE REC BOOK 126 PAGES 60/65

WATER SYSTEM EXPANSION

GRAN-MUTUAL WATER SYSTEM

Job Number 9471	Scale 1"=20' Horz. NA Vert.	Sheet 1 Of 1

MATERIAL SUBMITTAL

AZ #119975 • CA #333989 • NV #0038929

Spiess Construction Co., Inc.

P. O. Box 2849
Santa Maria, CA. 93457
(805) 937-5859
Fax (805) 934-4432

Durham Pump Inc.
P.O. Box 60
Durham, CA 95938

Gran Mutual Water Company
Rocky Bluffs Estates
105,000 Gallon Water Tank
SCCI Job No. 2709

SUBMITTAL NO.: 002

SPEC. NO.:

[X] New [ ] Resubmit [ ] Supplemental

PREV. SUBMITTAL NO:

SUBMITTAL TITLE: Welded Steel Tank
Structural Calculations

CONTRACTOR: Brian L. Ward Structural Engineer, Inc
4800 Easton Dr. Ste 110
Bakersfield, CA 93309

This Submittal has been reviewed by the Contractor and the materials represented in this submittal are in conformance with the project requirements with exceptions noted below:

BY: _____
Barry L. Matchett, Project Manager

DATE: 23 March, 2007

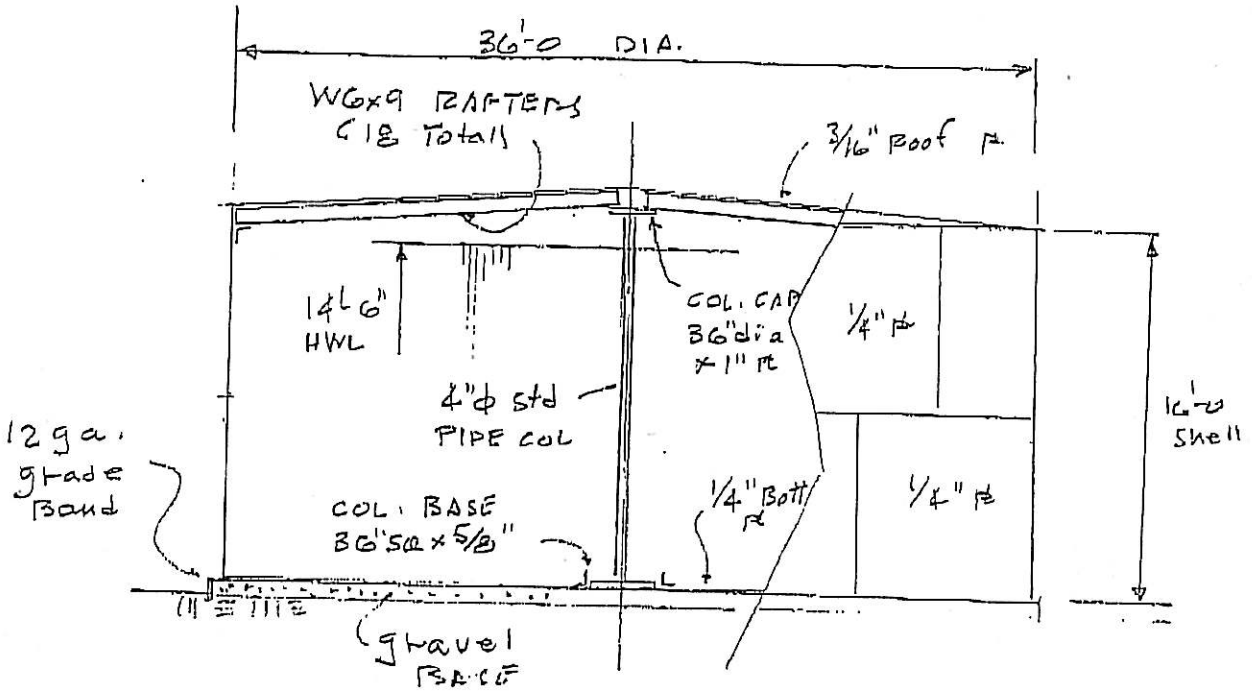
EXCEPTIONS TO PROJECT REQUIREMENTS: **NONE**

APPROVAL & COMMENTS

BUTTE COUNTY
APR 10 2007
DEVELOPMENT SERVICES

BRIAN L. WARD
STRUCTURAL ENGINEER, INC.
4800 EASTON DRIVE, SUITE 110
BAKERSFIELD, CA 93309
(661) 635-0121 FAX (661) 635-0122

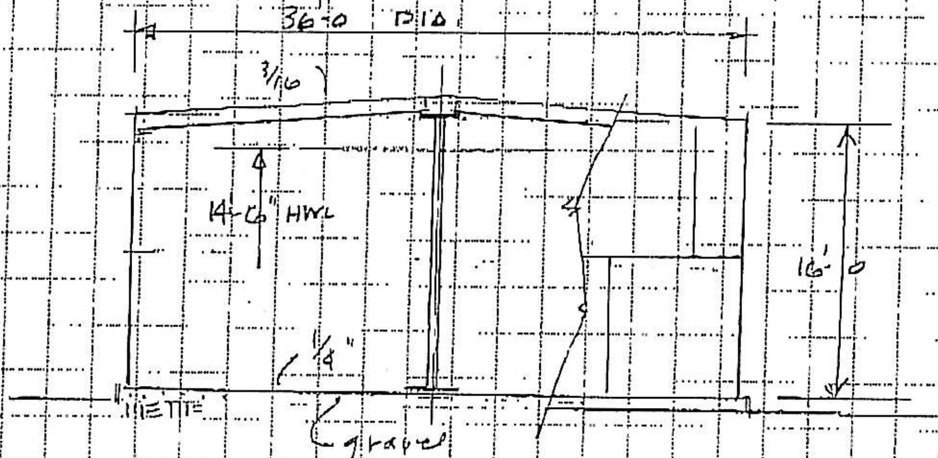
JOB Durham Pump - Chico
SHEET NO. Summary SK-1 OF 1
CALCULATED BY _____ DATE 3-7-07
CHECKED BY _____ DATE _____
SCALE: Spiral Conc. Tk.



REGISTERED PROFESSIONAL ENGINEER
BRIAN L. WARD
3-7-07
No. 1849
Exp. 9-30-07
STRUCTURAL
STATE OF CALIFORNIA

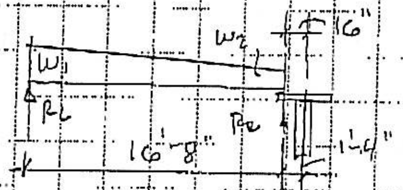
BRIAN L. WARD
STRUCTURAL ENGINEER, INC.
4800 EASTON DRIVE, SUITE 110
BAKERSFIELD, CA 93309
(661) 635-0121 FAX (661) 635-0122

JOB Durham Pump - SPIESS
SHEET NO. 1 OF 10
CALCULATED BY B Ward DATE 3-7-07
CHECKED BY DATE
SCALE Rocky Bluffs - Chico, CA



AWWA D100
SEIS. ZONE 3
I = 1.0
Soil pressure = 3000 psf
μ = 0.35

RAFTERS (18 total)



$w_1 = (7.7^D + 15^L)\frac{36\pi}{18} = 48^D + 94^L$

$w_2 = (7.7 + 15)\frac{2.67\pi}{18} = 4^D + 7^L$

$R_L = 353^D + 542^L$

$R_R = 230^D + 300^L$

USE W6x9 (18)

Center Colum ht = 17.0 max

Load = $(230^D + 300^L)\,18$
$+ (7.7^D + 15^L)\,2.67^2\ \#/\square$
$= 4183^D + 5484^L$
$= 9667$ T.L

4"Φ Std PIPE Col
good for 23,000# @ 18' ht
AISC Manual

REGISTERED PROFESSIONAL ENGINEER
BRIAN L. WARD
3-7-07
No. 1849
Exp. 9-30-07
STRUCTURAL
STATE OF CALIFORNIA

Brian L Ward Structural Engineer
4800 Easton Drive, Suite 110
Bakersfield, CA 93309
661-635-0121

Title : Durham Pump
Dsgnr:
Description :
Scope :

Job # (2)
Date: 2:11PM, 7 MAR 07

Steel Beam Design

Description Typical Rafter

General Information

Code Ref: AISC 9th ASD, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Steel Section : W6X9

Center Span	16.67 ft	Pinned-Pinned	Fy	36.00 ksi
Left Cant.	0.00 ft	Bm Wt. Added to Loads	Load Duration Factor	1.00
Right Cant	0.00 ft	LL & ST Act Together	Elastic Modulus	29,000.0 ksi
Lu : Unbraced Length	0.00 ft			

Trapezoidal Loads

Note! Short Term Loads Are WIND Loads.

#1	DL @ Left	0.048	LL @ Left	0.094	ST @ Left	k/ft	Start	ft
	DL @ Right	0.004	LL @ Right	0.007	ST @ Right	k/ft	End	16.670 ft

Summary

Beam OK
Static Load Case Governs Stress

Using: W6X9 section, Span = 16.67ft, Fy = 36.0ksi
End Fixity = Pinned-Pinned, Lu = 0.00ft, LDF = 1.000

	Actual	Allowable		
Moment	3.020 k-ft	11.009 k-ft		
fb : Bending Stress	6.519 ksi	23.760 ksi	Max. Deflection	-0.313 in
fb / Fb	**0.274 : 1**		Length/DL Defl	1,656.8 : 1
Shear	0.895 k	14.443 k	Length/(DL+LL Defl)	639.0 : 1
fv : Shear Stress	0.893 ksi	14.400 ksi		
fv / Fv	**0.062 : 1**			

Force & Stress Summary

<<– These columns are Dead + Live Load placed as noted –>>

	Maximum	DL Only	LL @ Center	LL+ST @ Center	LL @ Cants	LL+ST @ Cants	
Max. M +	3.02 k-ft	1.23	3.02				k-ft
Max. M -							k-ft
Max. M @ Left							k-ft
Max. M @ Right							k-ft
Shear @ Left	0.90 k	0.35	0.90				k
Shear @ Right	0.53 k	0.23	0.53				k
Center Defl.	-0.313 in	-0.128	-0.313	-0.313	0.000	0.000	in
Left Cant Defl	0.000 in	0.000	0.000	0.000	0.000	0.000	in
Right Cant Defl	0.000 in	0.000	0.000	0.000	0.000	0.000	in
...Query Defl @	0.000 ft	0.000	0.000	0.000	0.000	0.000	in
Reaction @ Left	0.90	0.35	0.90	0.90			k
Reaction @ Rt	0.53	0.23	0.53	0.53			k

Fa calc'd per Eq. E2-1, K*L/r < Cc
I Beam Passes Table B5.1, Fb per Eq. F1-1. Fb = 0.66 Fy

Section Properties W6X9

Depth	5.900 in	Weight	9.10 #/ft
Web Thick	0.170 in	Ixx	16.400 in4
Width	3.940 in	Iyy	2.200 in4
Flange Thick	0.215 in	Sxx	5.560 in3
Area	2.68 in2	Syy	1.110 in3
Rt	1.030 in	R-xx	2.470 in
Values for LRFD Design....		R-yy	0.905 in
J	0.040 in4	Zx	6.230 in3
Cw	17.70 in6	Zy	1.720 in3
		K	0.465 in

Brian L Ward Structural Engineer
4800 Easton Drive, Suite 110
Bakersfield, CA 93309
661-635-0121

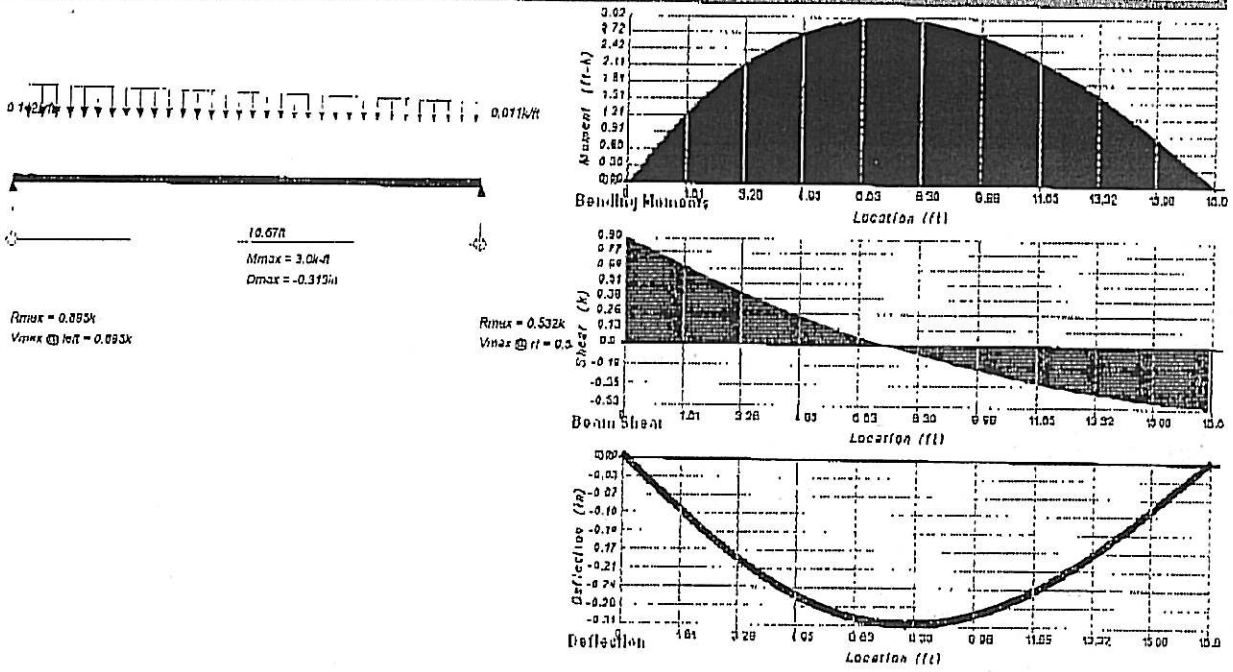
Title : Durham
Dsgnr: PUMP
Description :
Scope :

Job # 3
Date: 2:11PM, 7 MAR 07

Steel Beam Design

Description Typical Rafter

Sketch & Diagram



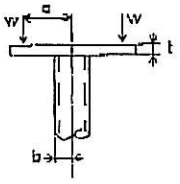
BRIAN L. WARD
STRUCTURAL ENGINEER, INC.
4800 EASTON DRIVE, SUITE 110
BAKERSFIELD, CA 93309
(661) 635-0121 FAX (661) 635-0122

JOB Durham Pump
SHEET NO. 4 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

Col Cap

USE 36" dia x 1" PL

Column Cap



P = Column Load = 9667 lbs
a = 16 inches
b = 2.25 inches
w = P / 2aπ = 96 lb/inch

C_a = 0.2034
C_B = 0.6569
M = $\frac{wa^2}{b} \times \frac{C_a}{C_B}$ = 3382 in-lbs
$t_{min} = \left[\frac{6M}{24000}\right]^{1/2}$ = 0.9195 "Use" 1 inches

Col BASE

P = 9667 + 289 + 193 = 10,149 lb (cap, col)
Area req'd = 10,149 / 3.0 = 3.38 SF
use 36" sq
f_p = 7.83 psi < 127 psf
$t = 2m\sqrt{\frac{f_p}{F_y}} = 2 \times 16" \sqrt{\frac{7.83}{36000}} = 0.47"$
use 5/8" PL

USE 36" SQ x 5/8" PL

Durham Pump (5)

Customer : Spiess Construction

Job No.
Date: January 10, 200
Location: Rocky Bluffs
Durham Pump

Specifications: A.W.W.A. D100-96

Tank Diameter	=	36.0000 Ft
Tank Height	=	16.0000 Ft
Overflow Height	=	14.5000 Ft
Wind Velocity	=	100 Mph
Seismic	=	Zone 4
Z	=	0.33 (2)
S	=	1.2
R_w	=	3.5
I	=	1.0000
Roof Live Load	=	15 Psf
Roof Dead Load	=	7.65 Psf
Soil Bearing	=	3,000 Psf
Liquid Wt	=	62.4 Lbs/Cf
Spec. Gravity	=	1.0 (1)
Horiz. Accel.	=	24 Percent
Vertical Accel.	=	16 Percent = $(24)^{2/3}$
Plate & Struct. Mat'l	=	ASTM A-36
Fy	=	36,000 Psi
Pipe Material	=	ASTM A-53-B
Height of Fifth Ring	=	0 FT
Height of Fourth Ring	=	0 FT
Height of Third Ring	=	0 FT
Height of Second Ring	=	8 FT
Height of Bottom Ring	=	8 FT

Check AWWA Seis. Acc vs Max Site Acc = .837g (From specs)

Design Acc = $\frac{0.837g}{2.5 \times 1.4}$ = 0.24g (1)
RF ASD

AWWA Acc / Zone 3 (unanchored) = $\frac{18 \times .30 \times 1.0}{3.5} \times .14 = 0.22g$

Increase Z = 0.30 to $(0.30)\frac{0.24}{0.22} = 0.33$ (2)

(6)

SHELL THICKNESS

$t = 2.6H_pDG/sE$

H_p =	14.5	Feet	
D =	36	Feet	
G =	1.00	Spc.Grav.	
s =	15,000	Psi	
E =	0.8500		
	0.0000	use	0.0000 Inches
	0.0000	use	0.0000 Inches
Third Ring :	0.0000	use	0.0000 Inches
Second Ring:	0.0477	use	0.2500 Inches
Bottom Ring:	0.1064	use	0.2500 Inches

INTERMEDIATE WINDGIRDER CHECK

$h = 10.625 \times 10^6 \times T_{avg}/P_w(D/T_{avg})^{1.50}$

P_w =	18	Psf (100 mph)
T_{avg} =	0.2500	Inches

h = 85.40 > 16.00 No Windgirder Req'd!

(7)

SEISMIC CONSIDERATION

Shell - Fifth Ring Wt.	=	0 Lbs
Shell - Fourth Ring Wt.	=	0 Lbs
Shell - Third Ring Wt.	=	0 Lbs
Shell - Second Ring Wt.	=	9,229 Lbs
Shell - Bottom Ring Wt.	=	9,229 Lbs
Roof Wt.	=	7,787 Lbs
Total Rafter Wt. + Misc.	=	3,000 Lbs
Therefore, Total Shell Wt.	=	18,458 Lbs
Total Roof & Rafter Wt.	=	10,787 Lbs

$M = (18ZI/R_w)[.14(W_sX_s+W_rHt+W_1X_1)+C_1SW_2X_2]$

D/H	=	2.48		t_b init =	0.25
Z	=	0.33			
R_w	=	3.5		M =	**974,848**
W_s	=	18,458	Lbs		
I	=	1.0000			
X_s	=	8.00	Ft	$w_{L\ init}$ =	1,426.93
W_r	=	10,787	Lbs		
Ht	=	16.0000	Ft	$w_{L\ max}$ =	668.16
Wt	=	920,976	Lbs		
* W_1	=	416,869	0.4526	w_{rs} =	$^2/_3(W_r) + 1/2(W_{rfr})$
* W_2	=	469,153	0.5094	w_{rs} =	6,693.9300
* X_1	=	5.4375	0.3750		
* X_2	=	8.339	0.5751		
* K_p Factor(Fig 7) =		0.624		w_t =	$(W_s+w_{rs})/(Pi \times D$
T_w	=	3.744			
C_1	=	0.045		w_t =	222.39
S	=	1.2			

CHECKING UPLIFT

Less Than .785, No Uplift Occurs
Greater Than .785, But Less Than 1.54, Uplift Occurs, No Anchorage Req'd!
Greater Than 1.54, Anchorage Required!

$M/(D^2(w_t-w_L))$ = **0.845 Uplift Occurs, No Anchorage Required!**

(8)

HYDRODYNAMIC SEISMIC HOOP TENSILE STRESS

Bottom Ring:

t = 0.25 Inches
Y = 14.5 Feet

When Vertical Acceleration is specified:

$\sigma_s = (N_i^2 + N_c^2 + (N_h \times a_v)^2)^{0.5}/t$ = **1,588 Psi**

D/H >= 1.333

$N_i = (11.35(ZI/R_w)(GDH)(Y/H - .5((Y/H)^2))(TANH(.866 \times (D/H)))$

N_i = 271.8300 Lbs/Inch

$N_c = 17.55(ZI/R_w)C_1SGD^2 \times (\cosh(3.68 \times (H-Y)/D)/COSH(3.68 \times (H/D)))$

N_c = 50.0 Lbs/Inch

$N_h = 2.6YDG$

N_h = 1,357.2 Lbs/Inch

a_v = Vertical Acceleration

a_v = 21.0 Percent

$F_{hs} = N_h/t$ = Hydrostatic = 5,429 Psi

σ_s = Hydrodynamic = 1,588 Psi

$F_{comb} = F_{hs} + \sigma_s$ = 7,017 Psi

$F_{allow} = 1.333sE$ = 16,996 Psi

Therefore, 16,996 > 7,017 Okay!

(9)

HYDRODYNAMIC SEISMIC HOOP TENSILE STRESS

Second Ring:

t = 0.25 Inches
Y = 6.5 Feet

When Vertical Accelerationis specified:

$\sigma_s = (N_i^2 + N_c^2 + (N_h \times a_v)^2)^{0.5}/t$ = **952 Psi**

D/H >= 1.333

$N_i = (11.35(ZI/R_w)(GDH)(Y/H-.5((Y/H)^2))(TANH(.866 \times (D/H)))$

N_i = 189.0900 Lbs/Inch

$N_c = 17.55(ZI/R_w)C_1SGD^2 \times (\cosh(3.68 \times (H-Y)/D)/COSH(3.68 \times (H/D)))$

N_c = 67.7100 Lbs/Inch

$N_h = 2.6YDG$

N_h = 608.4 Lbs/Inch

a_v = Vertical Acceleration

a_v = 21.0 Percent

$F_{hs} = N_h/t$ = Hydrostatic = 2,434 Psi

σ_s = Hydrodynamic = 952 Psi

$F_{comb} = F_{hs} + \sigma_s$ = 3,386 Psi

$F_{allow} = 1.333sE$ = 16,996 Psi

Therefore, 16,996 > 3,386 Okay!

BRIAN L. WARD
STRUCTURAL ENGINEER, INC.
4800 EASTON DRIVE, SUITE 110
BAKERSFIELD, CA 93309
(661) 635-0121 FAX (661) 635-0122

JOB: Rocky Bluffs - Durham Pump
SHEET NO. 10 OF 10
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

Check Shell Buckling:

$$f_c = \left[\frac{w_t + w_L}{0.607 - 0.1867 \left[\frac{M}{D^2 (w_t + w_L)} \right]^{2.3}} - w_L \right] \frac{1}{12 t_s}$$

$$= \left[\frac{222 + 668}{0.607 - 0.1867 \, (0.845)^{2.3}} - 668 \right] \frac{1}{12 \times .25} = 395 \text{ psi}$$

F_c = MAX allowable shell comp. stress From Table 11

$t/R = 0.0012$

$F_c = 2251 \times 1.33 = 2994 \text{ psi} \gg 395$

∴ 1/4 shell OK!

P. O Box 5364
411 Main Street
Chico, CA 95927
(916) 891-2727
FAX (916) 895-6512

BUTTE COUNTY DEPARTMENT OF PUBLIC HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

7 County Center Drive
Oroville, CA 95965
(916) 538-7281
FAX (916) 538-2140

APPLICATION AND PERMIT TO CONSTRUCT A LARGE DIAMETER WELL
WITH A CASING DIAMETER OF GREATER THAN EIGHT (8) INCHES

Application for : ☐ Irrigation ☐ Industrial ☒ Other Municipal 017-306-099

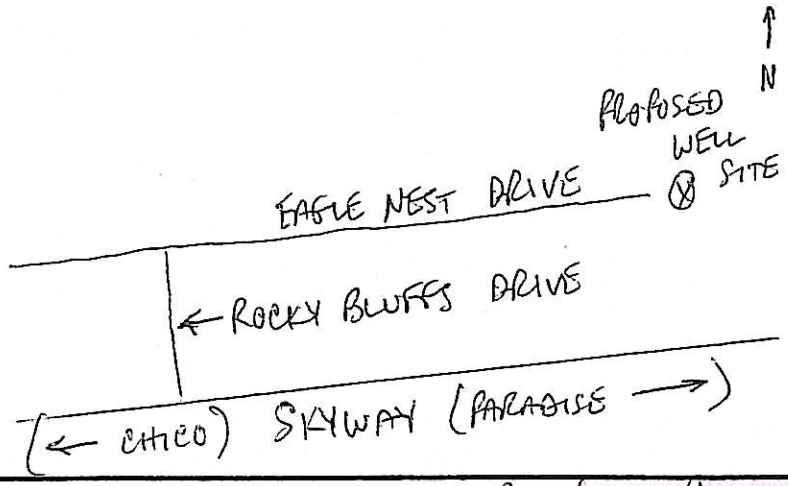
Owner Name: Gran Mutual Water Company Assessor Parcel No 920-001-025

Applicant Name: Gran Mutual Water Company Telephone No.

Applicant Mailing Address: 309 Wall Street, Chico, CA Zip 95928

Site Location: Eagle Nest Drive, Chico, CA T.R.S. 22 n./ 2 E./ 20 Zone

SKETCH HOW TO LOCATE PROPERTY



WELL INFORMATION

Proposed Depth	700'
Acreage of Parcel(s) to be Served	3/4 ACRE
Diameter Well Casing	12"
Engineered Pump Capacity in GPM	500

Other Wells Serving Above Parcel(s)

	AP#	Horse Power	GPM
1.	920-001-026	50	300
2.			
3.			

Type Construction Steel Cased

Note: Maximum pump capacity is 50 GPM/acre served

Well Driller David M. Storey Durham Pump

LICENSED CONTRACTOR'S DECLARATION

I hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

License Class C57 Lic. No. 583153

Date 3-30-06 Contractor David M. Storey

WORKERS' COMPENSATION DECLARATION

I hereby affirm under penalty of perjury one of the following declarations:

☐ I have and will maintain a certificate of consent to self-insure for workers' compensation as provided for by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued.

☐ I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of work for which this permit is issued. My workers' compensation insurance carrier and policy number are:

Carrier SAIF Corporation

Policy Number 479340

(This section need not be completed if the permit is for work of a valuation of one hundred dollars ($100) or less).

☐ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to workers' compensation laws of California, and agree that if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

X _____ Date 3/31/06

Signature of Applicant ☐ Owner ☒ Contractor ☐ Agent

WARNING: FAILURE TO SECURE WORKERS' COMPENSATION COVERAGE IS UNLAWFUL AND SHALL SUBJECT AN EMPLOYER TO CRIMINAL PENALTIES AND CIVIL FINES UP TO ONE HUNDRED THOUSAND DOLLARS ($100,000), IN ADDITION TO THE COST OF COMPENSATION, DAMAGES AS PROVIDED FOR IN SECTION 3706 OF THE LABOR CODE, INTEREST, AND ATTORNEYS FEES.

PERMIT
(EXPIRES ONE (1) YEAR FROM DATE ISSUED)

Fee Received	444.00 CK 8975
Receipt No.	451092 5-9-06
Date Issued	5-2-06
Approved By	

Special Conditions: Maintain 100' setback from any septic lines & 50' from septic tank.

RECEIVED MAY 10 2006 BUTTE COUNTY Environmental Health

NOTE:

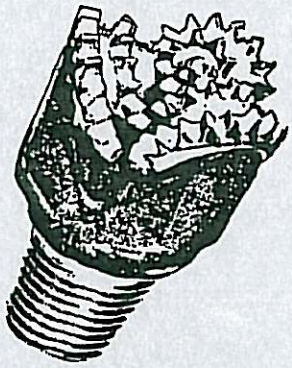
1. Provide a minimum twenty-four (24) hour notice prior to installing or placing sanitary seal or drilling a well expected to be completed in less than twenty-four (24) hours.

2. A satisfactory inspection by the Health Department and receipt by the Health Department of a Driller's Report or a satisfactory abandonment report and a disinfection statement is required for final approval of work.

STOREY DRILLING SERVICES

P.O. BOX 98 • MIDLAND, OREGON 97634
(541) 884-3990 • (800) 245-8122
Fax #: (530) 528-2562

CONTRACTOR'S LICENSES:
OR #601 • CA #583153 • NV #38199



Durham Pump, Inc.
P. O. Box 60
Durham, California 95938

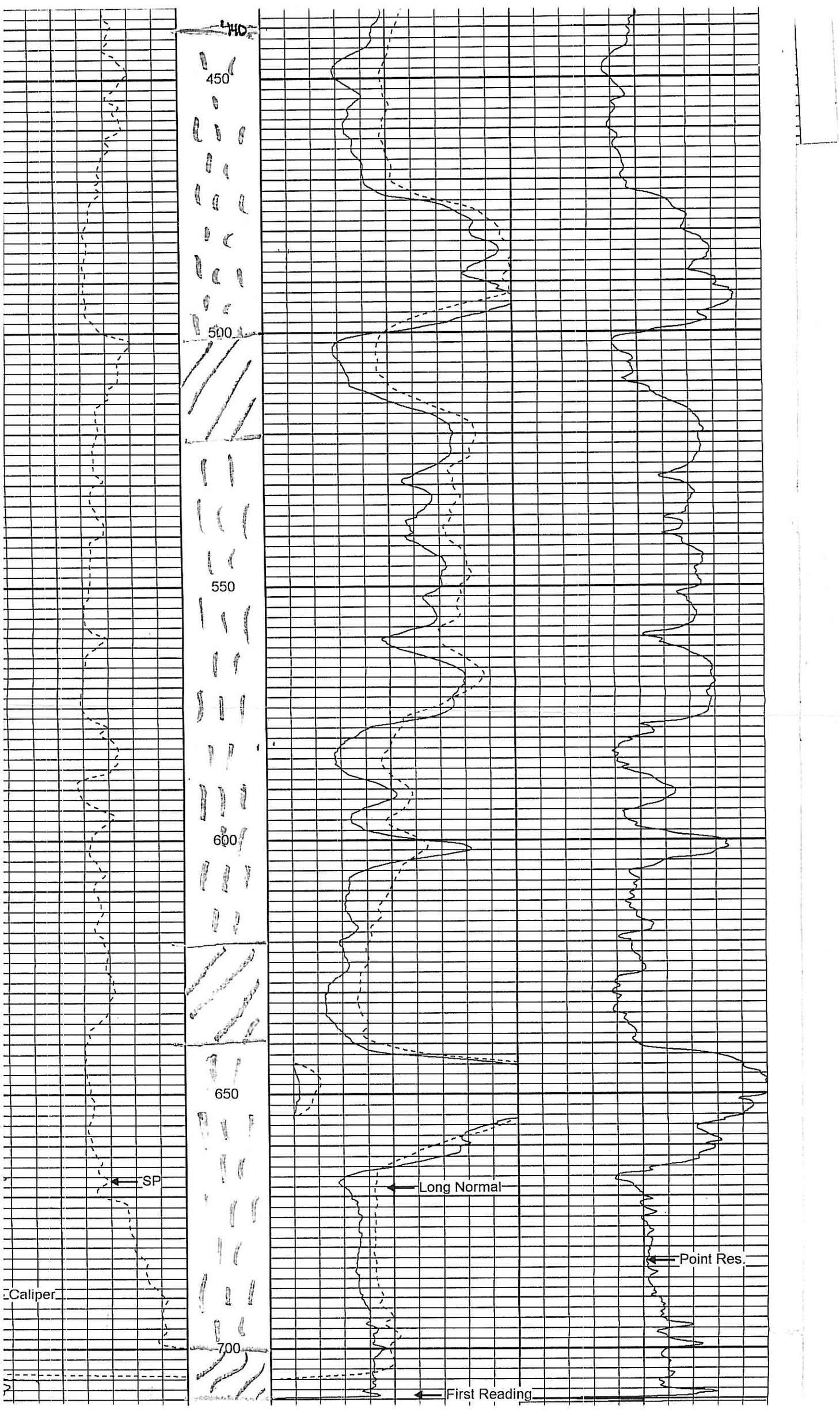
START: August 29, 2006
Test hole completed: September 18, 2006

WELL LOCATION: GRAN MUTUAL WATER CO. - COMMUNITY SUPPLY WATER WELL
North side of Skyway between Chico, CA & Paradise, CA in Rocky Bluffs Subdivision at the east end of Eagle Nest Drive. NW¼ SW¼ S4 T21N R2E

WELL LOG

0 - 1	Gravel & red clay topsoil
1 - 17	Weathered basalt
17 - 39	Brown basalt
39 - 54	Lava ash rock
54 - 56	Gray basalt
56 - 64	Broken black basalt
64 - 77	Black basalt
77 - 86	Broken black basalt
86 - 98	Gray basalt
98 - 105	Black lava with streaks clay ash
105 - 134	Hard broken black basalt
134 - 139	Gray basalt
139 - 152	Black basalt
152 - 171	Black ash rock with black lava
171 - 175	Black basalt
175 - 201	Soft black lava
201 - 241	Brown clay with streaks fine gravel
241 - 338	Yellow shale with brown clay and lava rock
338 - 353	Black basalt
353 - 366	Yellow shale with lava rock
366 - 406	Yellow shale
406 - 409	Yellow shale with lava rock
409 - 473	Yellow shale
473 - 487	Yellow shale with lava rock
487 - 500	Broken black basalt
500 - 518	Yellow shale with lava rock
518 - 560	Gray sandstone with sandy gray clay
560 - 590	Yellow shale with streaks sand
590 - 639	Sandy yellow clay
639 - 665	Semi-cemented gravel
665 - 681	Hard broken gray basalt
681 - 685	Black basalt with yellow clay
685 - 710	Semi-cemented gravel
710 - 741	Brown shale with black basalt
741 - 756	Brown shale
756 - 770	Brown shale & clay with black basalt
770 - 784	Yellow clay & shale
784 - 800	Green clay

12¼ inch diameter hole from 0 to 800 feet; well electric logged from 0 to 710 feet.


440
450
500
550
600
650
700
SP
Caliper
Long Normal
Point Res.
First Reading

QUADRUPLICATE
For Local Requirements

Page 1 of 3

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 414091

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. #2
Date Work Began AUG 29, 06, Ended OCT 26, 06
Local Permit Agency BUTTE COUNTY
Permit No. 07-300-099 Permit Date 5/2/06

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 450 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
		SEE ATTACHED LOG

TOTAL DEPTH OF BORING 900 (Feet)
TOTAL DEPTH OF COMPLETED WELL 704 (Feet)

WELL OWNER

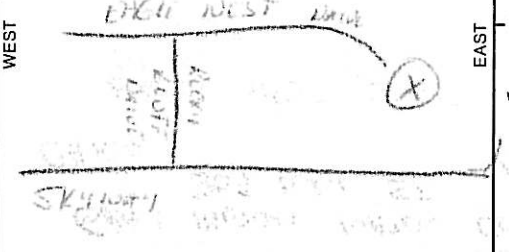
Name CHICO MUTUAL WATER COMPANY
Mailing Address 309 HOWE ST.
CITY CHICO STATE CA ZIP 95928

WELL LOCATION

Address EAGLE NEST DRIVE
City CHICO, CA
County BUTTE
APN Book 920 Page 001 Parcel 025
or Township 21N Range 2E Section 4
or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
✓ OTHER (Specify) MUNICIPAL

DRILLING METHOD ROTARY FLUID MUD

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 498 (Ft.) & DATE MEASURED 10/26/06
ESTIMATED YIELD* 320 (GPM) & TEST TYPE PUMP
TEST LENGTH 12 (Hrs.) TOTAL DRAWDOWN 7 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
							SEE ATTACHED SHEET			

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	✓			

ATTACHMENTS (✓)

✓ Geologic Log
✓ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME DAVID M. STOUT / STOUT DRILLING SERVICES
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS PO BOX 96 CITY ORLAND STATE CA ZIP 95963
Signed ___ (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 11/30/06 C-57 LICENSE NUMBER 583153

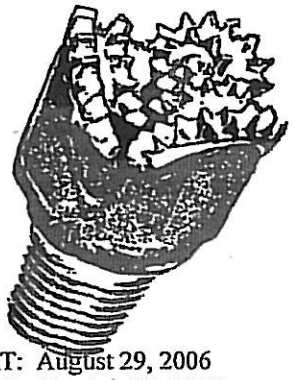
DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STOREY DRILLING SERVICES

P.O. BOX 98 • MIDLAND, OREGON 97634
(541) 884-3990 • (800) 245-8122
Fax #: (530) 528-2562

CONTRACTOR'S LICENSES:
OR #601 • CA #583153 • NV #38199



START: August 29, 2006
FINISH: October 26, 2006

Durham Pump, Inc.
P. O. Box 60
Durham, California 95938

WELL LOCATION: GRAN MUTUAL WATER CO. - COMMUNITY SUPPLY WATER WELL
North side of Skyway between Chico, CA & Paradise, CA in Rocky Bluffs Subdivision at the east end of Eagle Nest Drive. NW¼ SW¼ S4 T21N R2E

WELL LOG

0 - 1	Gravel & red clay topsoil
1 - 17	Weathered basalt
17 - 39	Brown basalt
39 - 54	Lava ash rock
54 - 56	Gray basalt
56 - 64	Broken black basalt
64 - 77	Black basalt
77 - 86	Broken black basalt
86 - 98	Gray basalt
98 - 105	Black lava with streaks clay ash
105 - 134	Hard broken black basalt
134 - 139	Gray basalt
139 - 152	Black basalt
152 - 171	Black ash rock with black lava
171 - 175	Black basalt
175 - 201	Soft black lava
201 - 241	Brown clay with streaks fine gravel
241 - 338	Yellow shale with brown clay and lava rock
338 - 353	Black basalt
353 - 366	Yellow shale with lava rock
366 - 406	Yellow shale
406 - 409	Yellow shale with lava rock
409 - 473	Yellow shale
473 - 487	Yellow shale with lava rock
487 - 500	Broken black basalt
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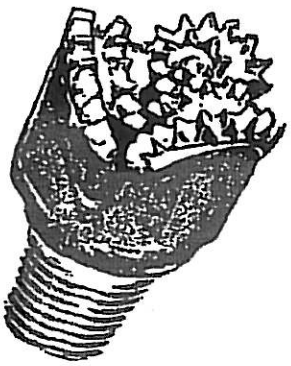

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WELL LOG
(Continued)

22 inch diameter hole from 0 to 711feet and 12¼ inch diameter hole from 711 to 800 feet;
Well electric logged from 0 to 710 feet.
Well gravel packed with 1/8 by 3/8 inch pea gravel from 58 to 711 feet.
705.5 feet of 12¾ inch O.D. x .250 wall steel casing set at 704.5 feet with 220 feet of 12 inch diameter mild steel Johnson Ag Screen 0.050 slot – Solid casing and screen set as follows:

+1 foot to 339 feet solid steel casing
339 feet to 499 feet Ag Screen
449 feet to 519 feet solid steel casing
519 feet to 619 feet Ag Screen
619 feet to 639 feet solid steel casing
639 feet to 699 feet Ag screen
699 feet to 704.5 feet solid steel casing
At 704.5 feet a 12¾ inch diameter schedule 40 domed steel cap welded on casing

Weatherford/Gemaco casing centralizers attached around casing at 330 feet, 520 feet, and 700 feet.
Sanitary seal from 0 to 58 feet with 120 sacks cement
Well airlifted to develop aquifers
Static water level: 428 feet

Test pumped 330 GPM at 436 feet. (By Durham Pump, Inc.)
41 GPM /FT SPEC CAPACITY

Well Development & Testing Log

Customer: Gran Mutual Water **Date:** 11/7/2006

Location: Eagle Nest Drive **Start Time:** 1:00 PM

Pump Set: 672 ft. **Water Level Ref. Pt:** Top of Sounding Tube

SWL: 429' **Stop:** 4:00 PM **Operator:** Phil Guffy

TIME	Engine/ Pump RPM	Q (GPM)	PWL (ft.)	Totalizer	Sand (cc)	Surges	Discharge Description
		Start Test Pumping					
PM				302728			Dark
1:00	3450	150	429'				
1:15	3450	150	430'				
1:30	3450	150	431' 6"				
2:00	3450	150	432'				
2:20	3450	150	432' 8"				
2:30	3450	325	436'		2" 10 min		Dirty/Stained After
							10 min.
3:00	3450	325	436'				
	Sand Test At 325 6PM						
0	3:30	325	435'		-		Dirty
5	3:35	325	435' 8"		0.32		Stained
10	3:40	325	435' 10"		0.5		Stained
20	3:50	325	436'		0.65		VLC
30	4:00	325	436'		0.73		Clear
	5 min. Return 429' 6"						

Well Development & Testing Log

Durham Pump

Customer: Gran Mutual Water **Date:** 11/8/2006

Location: Eagle Nest Drive **Start Time:** 8:15 am

Pump Set: 672 ft. **Water Level Ref. Pt:** Top of Sounding Tube

SWL: 428' **Stop:** 3:00 PM **Operator:** Phil Guffy

TIME	Engine/ Pump RPM	Q (GPM)	PWL (ft.)	Totalizer	Sand (cc)	Surges	Discharge Description
		Start Test Pumping					
8:15	3450	325	435'		.3 in 10 min		Dirty for 5 to 10 min
8:30	3450	325	435'				
8:45	3450	325	435'				
9:00	3450	325	435'				
9:15	3450	325	435'				
9:30	3450	325	435'				
9:45	3450	325	435'				
10:00	3450	325	435'		Light		
10:30	3450	325	435'		Light		
10:40	3450	325	435'		.2 in 15 min		Stained
Off							
12:50	Start	140	431'		Light		Clear*
1:20		206	432' 2"		Light		Clear*
1:50		325	435'		.2 in 30 min		Clear*
2:20		325	435'		0.2		Clear*
3:00	Stop	325	435'		0.2		Clear*
	5 min. Return 429'						

PROJECT SCOPE

Project Name: **Gran Mutual Water Company**

Project Manager: **Kevin Taylor**

Version History (*insert rows as needed*):

Version	*Date* (MM/DD/YYYY)	*Comments*
1.0	02/10/2006	Original
1.1	02/15/2006	Additions & corrections

Executive Summary

Established in 1952, Durham Pump Inc. is a full service, design build contracting company. For over 50 years we have supplied and serviced agricultural, commercial, and municipal pump users in California. Durham Pump provides innovative systems.

In January of 2004 I received a request from the board to attend a meeting with them. At that time they informed me that they felt the water company was not receiving adequate service from Durham Pump. I informed the board that they were not receiving any service from Durham Pump since the water company did not have a service contract with us. We have in the past only responded when we were called to repair an existing problem. I highly recommended that the water company contract us to perform the regular pump system service and maintenance. At that time the board was concerned about the water system and wanted to know more information about the system. Since Durham Pump installed and has provided repair service for much of the water delivery system for 20+ years we have extensive records about the system. Also I have done repairs to the system over the last 14 years and have a very good understanding of how the system was constructed and the current condition of the equipment.

Working with the board we started by taking a “snapshot” of the water system to analyze the current condition and deficiencies that exist in the system. Then we discussed what would need to be done to complete repairs and upgrades to the system to prevent a future catastrophic failure. I will try to keep this summary in terms that would be easy to understand for someone who has no idea what it takes to deliver water to your home.

A basic overview of the existing equipment is as follows. There is a 12” diameter well located in the Rocky Bluffs subdivision that was drilled in the summer of 1972. The well was drilled to a depth of 629 feet. The well has a 50 horsepower submersible pump rated to deliver about 300 gallons per minute. The pump is hanging on 400 feet of 6” diameter steel pipe. The discharge line of the pump is connected to a common pipeline that is located in the Skansen Estates and Spanish Gardens subdivisions. That common pipeline terminates on one end at the top of the hill in Rocky Bluffs subdivision at two steel water storage tanks. One of the storage tanks holds about 67,000 gallons of water. It is the older of the two tanks. The second holding tank holds about 85,000 gallons of water. In one of the tanks is a float switch (switch inside a plastic ball). This switch is connected to the well pump control circuit by a hard wire that is in the ground running from the tank site to the well site. When the water level in the tanks gets low the switch turns the well pump on and when the tanks are full it turns the well pump off. Located at the water tank site is a building that has three above ground pumps that draw water from the tanks and pressurize the water into a separate pipeline that serves only the Rocky Bluffs Subdivision. The Skansen Estates and Spanish Gardens subdivisions, because of the lower elevation from the water tanks, receive water from the common pipeline that the well pump and water tanks are connected to. The Skansen Estates and Spanish Gardens subdivisions have 2-1/2” fire hydrants that are connected to the common pipeline. The Rocky Bluffs subdivision has 4-1/2” fire hydrants that are connected to the pipeline from the booster pump station. The pipelines through all the subdivisions are made out of ductile iron, pvc, and from what I have heard some transite.

The system was installed by the developer to meet State and County standards at the time that each phase of the subdivisions were built. It is standard practice that a developer will only install a basic water delivery system to meet current standards. After the water delivery system has been turned over to the homeowners and a community service district or mutual water company has been formed it is up to the water company to take it from that point and continue to maintain and improve

Executive Summary

the water delivery system. I have researched the installation of the water delivery system that serves the Skansen Estates, Spanish Gardens, and Rocky Bluffs subdivisions. I have found that the developer working with an engineering firm took all the proper steps and installed a water delivery system that met the current standards at the time each phase was installed. It is my conclusion that after the water company was formed it did a good job of keeping the system repaired but lacked the foresight to continue to build upon the basic water delivery system. Please keep in mind that the system was installed with good quality materials and has served the homes for 30+ years with very few problems. I feel that the previous board members did a very good job of keeping the homes in water for all these years and the homeowners enjoyed a very low cost for their water. It is not an easy task to operate a water delivery system and I commend the previous board members for keeping the system intact and operating for all these years.

Times are changing and the state is stepping in. The clean water act has created more responsibility for water companies. The current board is aware of the responsibilities that they now have and also have a good understanding of the current condition of the water delivery system. Here are the most critical system deficiencies that we have determined.

- The existing well is 30+ years old and is nearing the end of it's expected normal service life
- The existing well pump has had new motors replaced but the pump itself is 15+ years old.
- The older 67,000 gallon water tank is leaking and is not repairable.
- The newer 85,000 gallon tank has not been inspected, cleaned, or repainted since it was installed. The exterior coating is chalking which indicates it is breaking down and exposing the undercoating. The tank does not have a lockable ladder gate on the tank ladder. The tank does not have an interior ladder.
- The system has only 1 well and when the pump fails the homes are out of water once the water storage tanks are empty.
- The 300 gallons per minute of water delivery of the existing well pump barely keeps up with the 24 hour period of water usage by the homes in the summer months. Last July the water level in the storage tanks was dipping below the fire reserve level and tripping the tanks low water level alarm every morning.
- The water delivery system has no backup power source.
- The fire hydrants in Skansen Estates and Spanish Gardens are 2-1/2". Standard 4-1/2" x 2-1/2" hydrants are recommended and each subdivision needs an additional hydrant installed.
- The water delivery system has no water meters. Water meters allow the water company to distribute the water delivery system costs based on actual water usage.
- The water delivery system has no sterilization equipment.
- The well site and tank site fencing needs to be upgraded for higher security.
- The booster pump building has storage shed grade doors. One door is broken.
- The well site and booster site should have landscaping to improve the appearance of the sites.

The current board has already addressed some immediate concerns. They have contracted Durham Pump to provide scheduled service and maintenance on the water system. It has been

Executive Summary

proven that scheduled maintenance saves money in the long run. Also they contracted Durham Pump to install a monitoring system so that we can keep a close watch on the water delivery system and try to prevent any catastrophic failure. The monitoring system also maintains data that will be valuable for the water company in the future. The main booster pump has a new variable speed drive which softens the start and stops of the pump as well as maximizes power consumption. Trees that were hanging over the old storage tank have been removed. The damaged pressure reducing valves that served Spanish Gardens have been replaced and the old main valve has been rebuilt to serve as a back up unit. The current board has the foresight to look ahead to the future of the water delivery system. The current board has done the research and has developed a plan of action to address the current system deficiencies and bring the water system up to a level of where it needs to be to meet the current and future demands of the system. Durham Pump would like to be the general contractor to assist the board to achieve its objective. We feel our knowledge of the water delivery system and close location of our company to the water delivery system provides the water company with an asset not available to many water companies.

Kevin C. O'Shea

Account Manager

Durham Pump Inc.

Objectives

Solution:

- Install a new well and pump system to be located at the water storage tank site.
- Install a new water storage tank at the existing tank site to replace the failing tank. Remove the failing tank from the system once the new tank is online.
- Install a minimum of one backup power generator at the water storage tank site to operate the new well pump and the existing booster pumps. Add a secondary generator at the existing well site.
- Add monitoring system equipment to the new well pump and generators. Add monitoring equipment for chlorine monitoring and control.

Objectives

- Replace the existing 2-1/2" fire hydrants and install 2 new fire hydrants.
- Add water meters to all the lot water connections.
- Replace the residential grade fence fabric and add razor wire to the existing fencing at the existing well and water storage tank sites.
- Add chlorine injection equipment at the existing well site and the proposed new well site.
- Replace the storage shed grade doors on the booster pump building with higher grade doors.
- Landscape around the perimeter of the fence at the existing well site and water storage tank site.
- Replace the existing well pump after the new well pump system is online. Have the newer 85,000 gallon tank inspected, cleaned, and the exterior repainted. Have a lockable ladder gate installed on the tank ladder. Install a ladder on the interior of the tank. Recoat the interior of the tank within the next few years.

Objectives:

- By installing a new well and pump system the existing well pump system can be repaired and serviced while maintaining water to the homes. Also if one system fails there will be a backup system available to maintain water delivery to the homes. By installing the new well and pump system at the water storage tank site one backup power source will allow the capability to keep the complete water delivery system active to all the homes. Having a second water source will also increase the water production capability of the system to meet high demand periods.
- The failing tank needs to be replaced. Even with the addition of a new well the system needs additional storage to maintain a required fire protection reserve. The storage tanks also allow a buffer during peak demands and will allow the system to take advantage of reduced off peak power pricing from PG&E.
- The system has to have a backup power source in order to maintain water delivery to all the homes during a power outage. A second generator would allow both well pumps the capability to run if a power outage occurred during peak demand periods.
- Monitoring equipment allows the system to be monitored and controlled from offsite. Monitoring equipment is also a valuable tool for data recording and chlorine injection control. The existing monitoring equipment has replaced the hard wire connection for the existing well pump control.
- By replacing the existing 2-1/2" fire hydrants and adding 2 new hydrants the system can provide improved fire protection for all the homes. This will help to reduce fire insurance costs and increase the property values of all the homes that are currently served by the 2-1/2" hydrants.
- Adding water meters will allow the water company to distribute the cost of the water delivery system to the homes that use the most water. Water meters also remind people to conserve the resource. With the water meter installations there would

Objectives

also be a lockable valve installed to allow the water company to terminate the water service to homeowners that will not pay their water bill.

- After 911 the government has asked that all water companies increase the security of their water systems. The board has seen signs that intruders have been at the holding tank site. By upgrading the fencing around the sites it will detour unwanted entry into the sites. One could imagine the results of a contaminant being introduced into the water storage tanks. Also there is the lesser concern of property damage and liability.
- Water quality and safety is not only prudent it is the law. If one occurrence of bacteria is found in the water delivery system the system would need to be sterilized. By adding chlorine injection equipment to the system the water company will be able to quickly respond to a bacterial contamination. The water company is now being required to sample water in several locations within the water delivery system. It is not uncommon to have water clear of bacteria coming from the well and yet find bacteria in the pipelines. I foresee that like other larger water companies Gran Mutual may have to chlorinate the water at all times to insure safe water delivery to the homes.
- The booster pump building doors are storage shed grade doors. With increased attention being placed on the pumping equipment the doors need to be replaced with a grade of door designed for increased usage. One of the doors is already in need of repair.
- By landscaping around the equipment sites it will improve the visual quality for the homeowners that boarder the sites. It will also improve the value of all the homes.
- The existing well pump is 15+ years old. Average life of a pump in the quality and usage range of the existing pump is 10 years. The existing drop pipe check valve has failed and allows the water to drain from the drop pipe when the pump shuts off. It is a critical problem but in order to replace the pump the homeowners would be out of water.
- The existing 85,000 gallon water storage tanks needs to be cleaned and inspected to determine if there are any intrusions to the interior tank coating. Once the interior tank coating has broken down the water attacks the steel and the tank will immediately start to corrode. The result is the tank will rust through and start leaking just as the 67,000 gallon tank has done. If a break in the interior coating can be detected early before the steel is too badly corroded the interior coating can be repaired. The bottom steel plate of the tank is the most vulnerable. In order to properly inspect the interior coating on the bottom of the tank the silt needs to be cleaned out of the tank. It is recommended that the interior of the tank be recoated every 7 years. The exterior coating of the tank is chalking and starting to expose the undercoating. This leaves the undercoating exposed to UV rays. Once the undercoating breaks down the steel will be exposed to the elements. It is recommended the exterior of the tank be repainted every 10 years. The ladder cage on the tank does not have a lockable ladder gate. This leaves the tank vulnerable to unwanted access to the tank hatch at the top of the tank. Also again is the lesser concern of property damage and liability. The tank does not have an interior ladder. This is an OSHA requirement for the capability to properly maintain the tank. The overflow pipe needs to have a screen installed to prevent rodents and insects from

Objectives

entering the tank.

Operator Roles and Responsibilities

Schedule "A"

Task Schedule		**Responsible Party**
Daily	*Via Watchman or phone response*	
✓	7/24/365 On Call Service	WSM
✓	Respond to ALL System Alarms	WSM
✓	Schedule Service Calls as required	WSM
✓	Monitor treatment effectiveness	WSM
Weekly	*On-Site Inspections Visit*	
✓	Check System for leaks and inspect Fire Hydrants	WST
✓	Check Site Security	WST
✓	Run (Exercise) all Pump using the Watchman System	WST
✓	Inspect Chlorine Injection system	WST
✓	Check Chlorine tank levels (Notify TO as required)	WST
✓	Read Meters, Gauges, check against PumpMaster Readings	WST
✓	Check and review all logs at pumps etc.	WST
✓	Check insulation and heat tape	WST
✓	Check "Local" Watchman Readings as necessary.	WST
✓	Inspect Landscaping and site/facility maintenance	WST
Monthly	*Service Checks as per Attached Service Check Sheet*	
✓	Prepare report for Monthly Board Meeting	WSM
	○ Inform Board of Key findings, technical needs and maintenance requirements	WSM
✓	Log monthly Alarm Reports	WSM
✓	Monitor, Log, and respond to customer complaints	WSM
Quarterly		
✓	Collect or Oversee collection of water samples	WSM
✓	Report analytical results to regulators as required	WSM
✓	Resolve any compliance problems, consult with regulators and other resources	WSM
✓	Grounds Maintenance - Brush / Debris / Landscaping - Schedule	WSM
✓	Conduct preventive and routine maintenance on facilities and equipment	WST

Bi-Annual

✓	Distribution System Flushing - Hydrants and blow-off valves	WST
✓	NPDES Permit, Maintain regulatory compliance w/ permit.	WSM
✓	Complete and delivery to WSB Consumer Confidence Reports	WSM
✓	Education: State Requirements / Staff Training	WSM
	○ Maintain State Required contact hours training	WSM
	○ Train staff and technicians on Water System Procedures	WSM

Annual

✓	Schedule Generator Service	WSM
✓	Schedule Electrical Inspection	WSM
✓	Schedule Back Flow Prevention Inspection	WSM
✓	Replace Diesel Fuel in Generator	WSM
✓	Conduct Annual Inspection with Butte County Environmental Health	WSM
✓	Prepare the Annual Water Quality Report to shareholders for WSB	WSM
✓	Update Maintenance plan with WSB	AM
✓	Update System Maps / Drawings	WSM
✓	Update Standard Operating Procedures with WSB	AM/WSB
✓	Conduct Annual Inventory Assessment	AM/WSB
✓	Update and review Emergency Action Plan with WSB	AM/WSB
✓	Inform DHS of System Improvements	AM/WSB
✓	Update Homeowner Contact List	WSM

Glossary

WSM	Water System Manager (Distribution Operator)
WST	Water System Technician (Service Tech.)
WSB	Water System Board
AM	Account Manager
TO	Treatment Operator
Watchman	Remote Monitoring/Control System
Treatment	Chlorine injection to treat Coliform Bacteria
NPDES	Discharge Permit