B

Type

Plans

BLD12·0107

Permit Number

14701

Street Number

BODEGA HWY

Street Name

T W I

Community Code

026·120·006

APN

COUNTY OF SONOMA - PERMIT AND RESOURCE MANAGEMENT DEPARTMENT
2550 Ventura Avenue, Santa Rosa, CA 95403   (707) 565-1900   FAX (707) 565-1103

Please Print Your Name:	Sam Turner	Date Applied:	1-9-12

INFORMATION WITHIN HEAVY LINE TO BE COMPLETED BY APPLICANT
SITE LOCATION INFORMATION - PRINT CLEARLY

Site Address: 14701 Bodega Hwy   City: Bodega   ZIP:

Cross-Street: APN: 26-120-006   Project Phone #: 7079741890   Project Fax #: 7079221289

Directions: Email address: Sam@gccieconstruction.com   Unit: Lot #:

Describe Project: (N) Water Storage Tank 68,000 gal

Living Area: Garage: Decks:

Contract Price: 35,000

OWNER NAME AND ADDRESS
Name: Kistler Vineyards
Mailing Address: 4707 Vine Hill Rd
City: Sebastopol   State: CA   ZIP:
Day Ph: 707 823-8353   Fax: ( )

APPLICANT NAME AND ADDRESS
Name: Greccie Construction, Inc
Mailing Address: Box 1797
City: Sonoma   State: CA   ZIP: 95476
Day Ph: 707 9741890   Fax: 707 922 1289

CONTRACTOR INFORMATION
Company Name: Greccie Construction, Inc
Address: Box 1797
City: Sonoma   State: CA   ZIP: 95476
Day Ph: 707 974-1890   Fax: 707 922-1289

OTHER PERSONS (ARCHITECT, ENGINEER, ETC.)
Name:
Address:
City: State: ZIP:
Day Ph: ( )   Fax: ( )
License No:

WORKER'S 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 worker's 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 worker's compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My worker's compensation insurance carrier and policy number are:

Carrier: STATE COMP
Policy No.: 019696-06

(This section need not be completed if the permit is for 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 the worker's compensation laws of California, and agree that if I should become subject to the worker's compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

Exp. Date: 7/4/12   Applicant:

WARNING: FAILURE TO SECURE WORKER'S 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 ATTORNEY'S FEES.

OWNER-BUILDER DECLARATION
I hereby affirm under penalty of perjury that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractor's License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500).):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044 Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he or she did not build or improve for the purpose of sale.).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law.).

☐ I am exempt under Sec. _____, B & P.C. for this reason _____

By my signature below I acknowledge that, except for my personal residence in which I must have resided for at least one year prior to completion of the improvements covered by this permit, I cannot legally sell a structure that I have built as an owner-builder if it has not been constructed in its entirety by licensed contractors. I understand that a copy of the applicable law, Section 7044 of the Business and Professions Code, is available upon request when this application is submitted or at the following website: http://www.leginfo.ca.gov/calaw.html.

Date: _____   Signature of Property Owner or Authorized Agent: _____

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.

Lic. Class: B   Lic. No.: 806540
Exp. Date: 9/30/13   Contractor: GCI

ASBESTOS DECLARATION
Written asbestos notification pursuant to Part 61 of Title 40 of the Code of Federal Regulations is required when asbestos exists in buildings, or portions thereof, undergoing demolition. I hereby declare that demolition authorized by this permit is from construction that (☐ does) (☐ does not) contain asbestos, or that ☐ no demolition is authorized by this permit.

I certify that I have read this application and affirm under penalty of perjury that the above information is correct. I agree to comply with all local Ordinances and State laws relating to building construction. I hereby authorize representatives of the County of Sonoma to enter upon the above-mentioned property for inspection purposes. If, after making the Certificate of Exemption for the Worker's Compensation provision of the Labor Code I should become subject to such provisions, I will forthwith comply. In the event I do not comply with the Workman's Compensation law, this permit shall be deemed revoked.

PERMITTEE SIGNATURE: _____
ADDRESS: 1797   CITY: Sonoma   ZIP: 95476
☒ Contractor   ☐ Owner   ☐ Other Licensed Professional

CONSTRUCTION LENDING DECLARATION
I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued. (Sec. 3097, Civ. C.).

Lenders Name: None Known
Lenders Address: _____

FOR DEPARTMENT USE
Zoning: RRDWA B6-100 SR   File No.: PLP10-0050   Acres: 250.60
Existing Use/Structures: Vineyards
Proposed Use/Structures: New water tank
Zoning Min. Yard Requirements: Front 30   Left 10   Right 10   Back 30
NOTE: Fire Safe Standards require all parcels greater than 1 Acre to have a min. 30' setback unless mitigated. ☐ Mitigation Required ☐ Address subject to change
Approval for Permit Issuance: Approval for Occupancy:
By: _____   By: Scott J. Humphrey
Date: _____   Date: 1/9/12
Conditions: _____

Sewer Connection: ☐ Available   ☐ Fees Paid
Approved by: _____   Date: _____

Road Encroachment: ☐ Fees Paid
Approved by: _____   Date: _____

Septic System Permit/Clearance #: Water Tank Only
Approved by: _____   Date: 1/9/2012

Flood Zone: ☐ Yes ☐ No   100 Year Flood Elevation: _____
Site Review: BLD11-3956/57   GRD10-0037
Drainage Review: _____
Approved by: _____   Date: 1-9-12
Fire: _____
Approved by: _____   Date: 1-9-12
Code Enforcement Violation ☐ Yes ☒ No   Violation #: _____
This permit is limited to _____ days.

Work Authorized: 68,000 Gal Tank

☒ Plans Approved ☐ No Plans Subject to Field Inspection	☐ Post FIRM ☐ Alquist Priolo Report Available
	☐ Pre FIRM ☐ Geotechnical report Available
Plan Check Cleared By:	Date: 2/15/12
Permit Cleared for Issuance By:	Date: 2/17/12

Type of Construction	Occupancy	No. of Stories	No. of Bedrooms
VB	U		

Auto. Fire Sprinklers Req'd	No of Units	Certificate of Occupancy

Machine Space for Permit Fee

THIS PERMIT SHALL EXPIRE IN THREE (3) YEARS FROM DATE FEES ARE PAID UNLESS OTHERWISE NOTED BY CODE ENFORCEMENT

Distribution: White - File   Canary - Applicant   Blue - Assessor   Cardstock - Inspector

JOB ADDRESS: 14701 Bodega Hwy (W) Tel

PERMIT NUMBER: BLD12-0107

INSPECTION AREA: 7

131)	SPECIAL INSPECTION REQUIRED		☐ YES	☐ NO	IF YES, SEE ADDITIONAL SHEET		
	INSPECTION RECORD	DATE	NAME		REMARKS		
101)	**ROUGH GRADING**			68,000 gal Steel Water			
103)	**FOUNDATION**			tank			
	FORMS/SETBACK						
	FOOTING						
	WALLS						
106)	**UFER GROUND #**						
104)	**CAISSONS/PIERS**						
105)	**SLAB**						
107)	**UNDERGROUND UTILITIES**						
110)	**MASONRY**						
109)	**RETAINING WALLS**						
113)	**FIREPLACE**						
	FOOTING						
	HEARTH/PROTECTION						
	THROAT						
114)	**CHIMNEY**						
120)	**UNDERFLOOR/UNDERSLAB**						
115)	**HYDRONICS**						
116)	**U/F ELECTRICAL**						
117)	**U/F MECHANICAL**						
118)	**U/F PLUMBING**						
119)	**U/F FRAMING**						
139)	**U/F INSULATION**						
126)	**SHEAR WALLS**						
	☐ INTERIOR ☐ EXTERIOR						
127)	**DIAPHRAGMS**						
	☐ ROOF ☐ FLOOR						
134)	**SIDING/SHEATHING**						
125)	**HOLD DOWNS**						
132)	**CLOSE-IN**						
122)	**ROUGH ELECTRICAL**						
123)	**ROUGH MECHANICAL**						
124)	**ROUGH PLUMBING**						
128)	**ROUGH FRAME**						
160)	**SMOKE DETECTORS**						
139)	**INSULATION**						
142)	**WALLBOARD**						
143)	**FIREWALLS**						
135)	**STUCCO/PLASTER**						
	☐ LATH ☐ SCRATCH						
137)	**ROOFING**						
130)	**TUB/SHOWER PAN**						
162)	**FIRE DAMPERS/DOORS**						
164)	**SUSPENDED CEILING**						
	☐ ROUGH ELEC. ☐ ROUGH MECH.						
165)	**EXITING - RAMPS/STAIRS**						
163)	HANDRAILS/GUARDRAILS						
	CORRIDORS/DOORS						
166)	**ACCESSIBILITY COMPLIANCE**			650)	**SUSMP INSPECTION**		
144)	**WATER TANKS**			651)	**NPDES EROSION COMPLIANCE**		
	☐ SLAB ☐ WALLS			652)	**NPDES SEDIMENT COMPLIANCE**		
170)	**TEMPORARY OCCUPANCY**			653)	**NPDES DOCS/SWPPP**		
171)	**TEMPORARY ELECTRICAL**			FIRE INSPECTION REQUIRED		DATE	NAME
172)	**TEMPORARY GAS**			☐ Yes ☐ No			
174)	**ELECTRIC METER AUTHORIZATION**			759)	**KNOX BOX**		
152)	**PANEL BOARDS/SERVICE**			760)	**PROPANE TANK HOLD DOWNS**		
189)	**SEPTIC ELECTRIC FINAL**			770)	**SPRINKLER FINAL**		
175)	**GAS METER AUTHORIZATION**			771)	**ABOVEGROUND HYDROSTATIC**		
153)	**GAS PRESSURE TEST**			772)	**UNDERGROUND HYDROSTATIC**		
	HOUSE YARD			773)	**UNDERGROUND FLUSH**		
190)	**MANUF. HOME FOUNDATION**			774)	**THRUST BLOCKS**		
191)	**MANUF. HOME INSTALLATION**			775)	**PIPE WELD**		
	CONTINUITY			776)	**HYDRANTS/APPLIANCES**		
	STAIRS/SKIRTS			777)	**PUMP ACCEPTANCE**		
	RIDGE BOLTING			778)	**WATER SUPPLY/TANK**		
193)	**MANUF. HOME COND. FINAL**			779)	**ALARM SYSTEM**		
	SWIMMING POOLS			780)	**HOOD & DUCT SYSTEM**		
194)	PRE-GUNITE			781)	**ABOVEGROUND TANK/DISPENSER**		
195)	PRE-DECK			198)	**FIRE FINAL**		
196)	PRE-PLASTER/FENCE			**CLEARANCES:**			
197)	VINYL/FIBERGLASS POOL EXCAVATION			FIRE ☐ Local ☐ County			
102)	**GRADING FINAL**			HEALTH DEPARTMENT			
176)	**ELECTRICAL FINAL**			ZONING			
177)	**MECHANICAL FINAL**			SANITATION			
178)	**PLUMBING FINAL**						
199)	**FINAL**	6/18/14					
	OCCUPANCY (OK TO OCCUPY)				PLAN RETENTION REQUIRED? ☐ Yes ☐ No		

PERMIT # Bld12-0107

sennis CIS-008.cdr Rev. 04/15/04

COUNTY OF SONOMA - PERMIT AND RESOURCE MANAGEMENT DEPARTMENT
2550 Ventura Avenue, Santa Rosa, CA 95403   (707) 565-1900   FAX (707) 565-1103

Please Print Your Name: _____

Date Applied: _____

INFORMATION WITHIN HEAVY LINE TO BE COMPLETED BY APPLICANT
SITE LOCATION INFORMATION - PRINT CLEARLY

Site Address: _____ City: _____ ZIP: _____

Cross-Street: _____ A.P.N.: _____

Directions: _____ Project Phone #: _____ Project Fax #: _____ Unit #: _____ Lot #: _____

Email address: _____

Describe Project: _____

Living Area _____ Garage _____ Decks _____ Contract Price: _____

OWNER NAME AND ADDRESS

Name: _____

Mailing Address: _____

City: _____ State: _____ ZIP: _____

Day Ph: ( ) _____ Fax: ( ) _____

APPLICANT NAME AND ADDRESS

Name: _____

Mailing Address: _____

City: _____ State: _____ ZIP: _____

Day Ph: ( ) _____ Fax: ( ) _____

CONTRACTOR INFORMATION

Company Name: _____

Address: _____

City: _____ State: _____ ZIP: _____

Day Ph: ( ) _____ Fax: ( ) _____

OTHER PERSONS (ARCHITECT, ENGINEER, ETC.)

Name: _____

Address: _____

City: _____ State: _____ ZIP: _____

Day Ph: ( ) _____ Fax: ( ) _____

License No: _____ Exp. Date: _____

WORKER'S 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 worker's 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 worker's compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My worker's compensation insurance carrier and policy number are:

Carrier _____

Policy No. _____

(This section need not be completed if the permit is for 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 the worker's compensation laws of California, and agree that if I should become subject to the worker's compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

Exp. Date: _____ Applicant: _____

WARNING: FAILURE TO SECURE WORKER'S 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 ATTORNEY'S FEES.

OWNER-BUILDER DECLARATION
I hereby affirm under penalty of perjury that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractor's License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500).):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044 Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he or she did not build or improve for the purpose of sale.).
☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law.).
☐ I am exempt under Sec. _____, B & P.C. for this reason _____

By my signature below I acknowledge that, except for my personal residence in which I must have resided for at least one year prior to completion of the improvements covered by this permit, I cannot legally sell a structure that I have built as an owner-builder if it has not been constructed in its entirety by licensed contractors. I understand that a copy of the applicable law, Section 7044 of the Business and Professions Code, is available upon request when this application is submitted or at the following website: http://www.leginfo.ca.gov/calaw.html.

Date _____ Signature of Property Owner or Authorized Agent _____

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.

Lic. Class _____ Lic. No. _____

Exp. Date _____ Contractor _____

ASBESTOS DECLARATION
Written asbestos notification pursuant to Part 61 of Title 40 of the Code of Federal Regulations is required when asbestos exists in buildings, or portions thereof, undergoing demolition. I hereby declare that demolition authorized by this permit is from construction that (☐ does) (☐ does not) contain asbestos, or that ☐ no demolition is authorized by this permit.

I certify that I have read this application and affirm under penalty of perjury that the above information is correct. I agree to comply with all local Ordinances and State laws relating to building construction. I hereby authorize representatives of the County of Sonoma to enter upon the above-mentioned property for inspection purposes. If, after making the Certificate of Exemption for the Worker's Compensation provision of the Labor Code I should become subject to such provisions I will forthwith comply. In the event I do not comply with the Workman's Compensation law, this permit shall be deemed revoked.

PERMITTEE SIGNATURE _____

ADDRESS _____ CITY _____ ZIP _____

☐ Contractor   ☐ Owner   ☐ Other Licensed Professional

CONSTRUCTION LENDING DECLARATION
I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued. (Sec. 3097, Civ. C.).

Lender's Name _____

Lenders Address _____

FOR DEPARTMENT USE

Zoning _____ File No. _____ Acres 250.60

Existing Use/Structures _____

Proposed Use/Structures _____

Zoning Min. Yard Requirements: Front 3 Left 1 Right 1 Back 3

NOTE: Fire Safe Standards require all parcels greater than 1 Acre to have a min. 30' setback unless mitigated. ☐ Mitigation Required ☐ Address subject to change

Approval for Permit Issuance: _____

Approval for Occupancy: By: _____

Date: _____ Date: 1/9/12

Conditions: _____

Sewer Connection: ☐ Available ☐ Fees Paid

Approved by: _____ Date: _____

Road Encroachment: ☐ Fees Paid

Approved by: _____ Date: _____

Septic System Permit/Clearance # _____

Approved by: _____ Date: _____

Flood Zone: ☐ Yes ☐ No 100 Year Flood Elevation: _____

Site Review _____

Drainage Review: _____ Date: _____

Approved by: _____

Fire: _____ Date: _____

Approved by: _____

Code Enforcement Violation ☐ Yes ☐ No Violation # _____

This permit is limited to _____ days.

Work Authorized: _____

☐ Plans Approved		☐ Post FIRM	☐ Dust Priolo Report Available		
☐ No Plans Subject to Field Inspection		☐ Pre FIRM	☐ Geotechnical report Available		
Plancheck Cleared By:	Date:	Type of Construction	Occupancy	No. of Stories	No. of Bedrooms
Permit Issuance By	Date:	Auto. Fire Sprinklers Req'd		No of Units	Certificate of Occupancy

Machine Space for Permit Fee

THIS PERMIT SHALL EXPIRE IN THREE(3) YEARS FROM DATE FEES ARE PAID UNLESS OTHERWISE NOTED BY CODE ENFORCEMENT

Distribution: White - File   Canary - Applicant   Blue - Assessor   Cardstock - Inspector

JOB ADDRESS:

PERMIT NUMBER:

INSPECTION AREA:

Brunsing Associates, Inc.

February 6, 2012   11627.08

Mr. Richard Schuh
Nielsen – Schuh Architects
1346 Legs Lane
Sonoma, CA 95476

Dear Mr. Schuh:

Geotechnical Plan Review
Kistler Vineyards - Pozzi Ranch Winery
14701 Bodega Highway
Sonoma County, California

This letter presents the results of our geotechnical plan review for the planned 68,000 gallon water tank at Kistler Vineyards – Pozzi Ranch Winery. The project site is located at 14701 Bodega Highway, Sonoma County, California. BAI previously performed a Geotechnical Investigation for the project; the results presented in a report dated August 16, 2011.

We reviewed the geotechnical engineering related items on the following plans and calculations prepared by BlueScope Water: Sheet 1 of 1, and calculations, dated 10/17/11. Based on our review, we conclude that the geotechnical (soil) engineering related portions of these plans are in substantial conformance with the intent of our recommendations. Tank foundation support should conform to the recommendations presented in our August 16, 2011 report.

Please contact us at 707-838-3027 if you have any questions.

Sincerely yours,
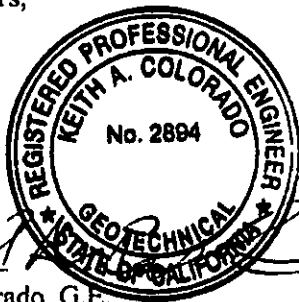
Keith A. Colorado, G.E.   J. Erich Rauber, G.E.
Geotechnical Engineer - 2894   Geotechnical Engineer - 2887

KAC/JER/kac

Two Copies Submitted
Cc: Sam Turner, Gracie Construction, Inc., sam@gracieconstruction.com
        John Schock, BlueScope Water, 601 Noble Street, Madera, CA 93637

111 West Ocean Boulevard, Suite 1370
Long Beach, CA 90802
Phone (562) 628-0110

DESIGN OF UNANCHORED 68,000 GALLON CORRUGATED STEEL WATER TANK

OWNER: KISTLER VINEYARDS POZZI RANCH WINERY
LOCATION: 14071 BODEGA HWY, SEBASTOPOL, CA 95465
SUPPLIER: BLUESCOPE WATER SOLUTIONS, INC.
MANUFACTURER: BLESCOPEWATER SOLUTIONS, INC.

I. MATERIAL SPECIFICATIONS:

STEEL SHEET- 2.5x.5 NOMINAL CORRUGATED SHEETS PER ASTM A-653-00 CS TYPE A W/ MIN $Fy=36$ KSI.
METAL JOISTS - ASTM A653 GR. 50 $Fy=55$ KSI MIN. GALVANIZED PER ASTM G60. (BY AEP SPAN CO.)
PIPE - ASTM A53
PLATES AND SHAPES - ASTM A36
FASTENERS - HUCKBOLT C6L PER ASTM A307 GR C, $Fy=36$ KSI
BOLTS - ASTM A307 GR B, ZINCED PER ASTM A384 or A385

II. CRITERIA

IN CONFORMANCE WITH THE 2010 CBC REFERENCE TO ASCE 7-05 SECTION 15.7.7 STATIC DESIGN
IS PER AWWA D103-97 'FACTORY COATED BOLTED STEEL TANKS FOR WATER STORAGE' AND
LATERAL DESIGN IS PER AWWA D100-05 'WELDED STEEL WATER TANKS':

SEISMIC USE GROUP II IMPORTANCE FACTOR	$Ie := 1.25$
DECK LOAD	$R_{LL} := 20$ PSF
WIND VELOCITY	$V := 100$ MPH
SNOW LOAD	$R_{SL} := 0$ PSF

PER "GEOTECHNICAL INVESTIGATION KISTELR VINEYARDS POZZI RANCH WINERY" BY BRUNSING
ASSOCIATES, INC, DATED AUGUST 16, 2011, PROJECT NO. 11627.08 THE ALLOWABLE SOIL BEARING
PRESSURE FOR STATIC AND TRANSIENT LOADING ARE:

$q_{allow} := 2500$ PSF $q_{seismic} := \frac{4}{3} \cdot q_{allow} = 3333$ PSF

III. TANK DIMENSIONS:

DIAMETER	$D := 27.75$ FT	COURSE HEIGHT	$Hc := 3.75$ FT
SHELL HEIGHT	$Ht := 15.0$ FT	FREEBOARD	$FB := 4$ FT
MAXIMUM WATER HEIGHT	$H := Ht - FB$		$H = 11$ FT

DISTANCE FROM BOTTOM TO VORTEX BREAKER PLATE $h := .5$ FT

USEABLE CAPACITY $NET := \pi \cdot D^2 \cdot .25 \cdot (H - h) \cdot 7.48 = 47501$ GALLONS

DECK PITCH $PITCH := \frac{2}{12} = 0.17$ SPECIFIC GRAVITY $G := 1.0$
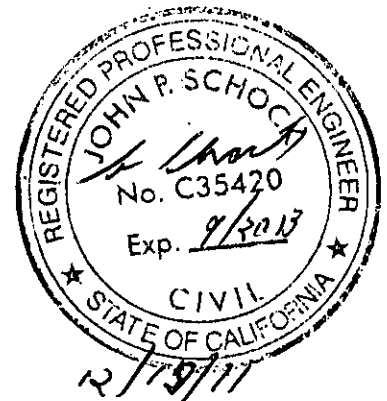
HEIGHT OF DECK $H_r := PITCH \cdot \dfrac{D}{2} = 2.31$ FT   DENSITY $\gamma_w := 62.4$ PCF

IV. DESIGN OF 14 GA. BOTTOM COURSE USING (5) 1/4" DIA. FASTENERS/PITCH:

HEIGHT $H1 := Ht - FB = 11$ FT   NO. OF FASTENERS $n1 := 5$

THICKNESS $t1 := .0747$ IN   AREA OF FASTENER = $a1 := .0491$ IN

RADIUS = $r := D \cdot .5 \cdot 12 = 166.5$ IN   DIA. OF FASTENER = $d1 := .25$ IN

YIELD STRENGTH OF FASTENERS = $Fy1 := 36000$ PSI

YIELD STRENGTH OF SHEETS = $Fy2 := 36000$ PSI

STATIC HEAD: $P1 := .433 \cdot H1 = 4.76$ PSI

MAXIMUM HOOP STRESS: $S1 := \dfrac{P1 \cdot r}{t1} = 10616$ PSI

LBS/PITCH: $F1 := S1 \cdot t1 \cdot 2.66 = 2109.49$ LBS

SHEAR CAPACITY OF FASTNERS/PITCH: $n1 \cdot .4 \cdot Fy1 \cdot a1 = 3535$ > $F1 = 2109$ LBS

NET SECTION CAPACITY OF 1ST ROW: $(2.66 - 2 \cdot d1) \cdot t1 \cdot .6 \cdot Fy2 = 3485$ > $F1 = 2109$ LBS

BEARING STRESS CAPACITY: $n1 \cdot t1 \cdot d1 \cdot .9 \cdot Fy2 = 3025$ > $F1 = 2109$ LBS

SHEAR TEAR-OUT EDGE SPACING: $\dfrac{F1 \cdot .5}{2 \cdot t1 \cdot .4 \cdot Fy2} = 0.49$ IN   <u>USE 3/4 INCH MIN.</u>

V. DESIGN OF 14 GA. SECOND COURSE USING (4) 1/4" DIA. FASTENERS/PITCH:

HEIGHT $H2 := Ht - Hc - FB = 7.25$ FT   NO. OF FASTENERS $n2 := 4$

THICKNESS $t2 := .0747$ IN   AREA OF FASTENER $a2 := .0491$ IN

RADIUS $r = 166.5$ IN   DIA. OF FASTENER $d2 := .25$ IN

STATIC HEAD: $P2 := .433 \cdot H2 = 3.14$ PSI

MAXIMUM HOOP STRESS: $S2 := \dfrac{P2 \cdot r}{t2} = 6997$ PSI

LBS/PITCH: $F2 := S2 \cdot t2 \cdot 2.66 = 1390$ LBS

SHEAR CAPACITY IN FASTENERS/PITCH: $n2 \cdot .4 \cdot Fy1 \cdot a2 = 2828$ > $F2 = 1390$ LBS

NET SECTION CAPACITY OF 1ST ROW: $(2.66 - 2 \cdot d2) \cdot t2 \cdot .6 \cdot Fy2 = 3485$ $>$ $F2 = 1390$ LBS

BEARING STRESS CAPACITY: $n2 \cdot t2 \cdot d2 \cdot .9 \cdot Fy2 = 2420$ $>$ $F2 = 1390$ LBS

SHEAR TEAR-OUT EDGE SPACING: $\dfrac{F2 \cdot .5}{2 \cdot t2 \cdot .4 \cdot Fy2} = 0.32$ IN   <u>USE 3/4 INCH MIN.</u>

VI. <u>DESIGN OF 16 GA. THIRD COURSE USING (3) 1/4" DIA. FASTENERS/PITCH:</u>

HEIGHT = $H3 := Ht - 2 \cdot Hc - FB = 3.5$ FT   NO. OF FASTENERS = $n3 := 3$

THICKNESS = $t3 := .0598$ IN   AREA OF FASTENER = $a3 := .0491$ IN

RADIUS = $r = 166.5$ IN   DIA. OF FASTENER = $d3 := .25$ IN

JOINT EFFICIENCY = $E := 1.0$

STATIC HEAD: $P3 := .433 \cdot H3 = 1.52$ PSI

MAXIMUM HOOP STRESS: $S3 := \dfrac{P3 \cdot r}{E \cdot t3} = 4219.58$ PSI

LBS/PITCH: $F3 := S3 \cdot t3 \cdot 2.66 = 671.2$ LBS

SHEAR CAPACITY OF FASTENERS/PITCH: $n3 \cdot .4 \cdot Fy1 \cdot a3 = 2121$ $>$ $F3 = 671$ LBS

NET SECTION CAPACITY OF 1ST ROW: $(2.66 - 2 \cdot d3) \cdot t3 \cdot .6 \cdot Fy2 = 2790$ $>$ $F3 = 671$ LBS

BEARING STRESS CAPACITY: $n3 \cdot t3 \cdot d3 \cdot .9 \cdot Fy2 = 1453$ $>$ $F3 = 671$ LBS

SHEAR TEAR-OUT EDGE SPACING: $\dfrac{F3 \cdot .5}{2 \cdot t3 \cdot .4 \cdot Fy2} = 0.19$ IN   <u>USE 3/4 INCH MIN.</u>

VII. <u>DESIGN OF 16 GA. FOURTH COURSE USING (2) 3/16" DIA. FASTENERS/PITCH:</u>

HEIGHT = $H4 := Ht - 3 \cdot Hc - FB = -0.25$ FT   NO. OF FASTENERS = $n4 := 2$

THICKNESS = $t4 := .0598$ IN   AREA OF FASTENER = $a4 := .0276$ IN

RADIUS = $r = 166.5$ IN   DIA. OF FASTENER = $d4 := .1875$ IN

JOINT EFFICIENCY = $E := 1.0$

STATIC HEAD: $P4 := .433 \cdot H4 = -0.11$ PSI

MAXIMUM HOOP STRESS: $S4 := \dfrac{P4 \cdot r}{E \cdot t4} = -301.4$ PSI

LBS/PITCH: $F4 := S4 \cdot t4 \cdot 2.66 = -47.94$ LBS

SHEAR CAPACITY OF FASTENERS/PITCH: $n4 \cdot .4 \cdot Fy1 \cdot a4 = 795$ $>$ $F4 = -48$ LBS

NET SECTION CAPACITY OF 1ST ROW: $(2.66 - 2 \cdot d4) \cdot t4 \cdot .6 \cdot Fy2 = 2951$ $>$ $F4 = -48$ LBS

BEARING STRESS CAPACITY: $n4 \cdot t4 \cdot d4 \cdot .9 \cdot Fy2 = 727$ $>$ $F4 = -48$ LBS

SHEAR TEAR-OUT EDGE SPACING: $\dfrac{F4 \cdot .5}{2 \cdot t4 \cdot .4 \cdot Fy2} = -0.01$ IN   <u>USE 3/4 INCH MIN.</u>

VIII. <u>DESIGN OF ROOF</u>

THICKNESS OF ROOF $tr := .0478$ 20-GA.

NUMBER OF RAFTERS $Nr := 22$

RADIAL SPACING OF RAFTERS AT EDGE OF 40" DIAMETER SUPPORT DISK:

$d1 := 3.33$ FT

$s1 := \dfrac{\pi \cdot d1 \cdot 12}{Nr \cdot .5} = 11.41$ IN

RADIAL SPACING OF RAFTERS AT TANK WALL:

$s2 := \dfrac{\pi \cdot D \cdot 12}{Nr} = 47.55$ IN

ROOF LOADS:

20 GA DECKING	$R_{DL1} := 1.41$	PSF
C2.6 X 6-14 GA RAFTERS	$R_{DL2} := 2.9$	PSF
TOTAL ROOF DL	$R_{DL} := 1.41 + 2.90$	PSF
ROOF LIVE LOAD	$R_{LL} = 20$	PSF
TOTAL ROOF LOAD	$R_{TL} := R_{DL} + R_{LL}$ $R_{TL} = 24.31$	PSF

For a C2.6 x 6 -14 GA:

$Sx := 1.55$ $A := .866$

I = SPACING OF FASTENERS

$l := 12.0$ INCHES

$d := 6.0$ INCHES

$Af := .195$ SQ INCHES

$Aweb := .450$ SQ INCHES

TOTAL LOAD = $W := \dfrac{D - d1}{2} \cdot R_{TL} \cdot \dfrac{s2}{12} = 1176$ LBS

MAXIMUM MOMENT = $M := .1283 \cdot W \cdot \dfrac{D - d1}{2} = 1843$ FT-LBS

ALLOWABLE BENDING STRESS, lesser of:

$$Fb1 := \frac{12000 \cdot 1 \cdot 1000}{\dfrac{l \cdot d}{Af}}$$ or $Fb2 := .6 \cdot 50000$

$fb := \dfrac{M \cdot 12}{Sx}$ $fb = 14265$ <= $Fb1 = 32500$ PSI

$Fb2 = 30000$ PSI

SHEAR STRESS:

$fv := \dfrac{.67 \cdot W}{Aweb}$ $fv = 1751$ <= $Fv := .4 \cdot 50000 = 20000$ PSI

IX. DESIGN OF CENTER SUPPORT COLUMN, HSS 4" x 4" x 1/4":

$P := \dfrac{\pi \cdot D^2 \cdot R_{TL}}{4 \cdot 3}$ $P = 4901$ LBS

$r := 1.51$ INCHES
$A2 := 3.59$ SQ INCHES
$h := 17$ FEET

SLENDERNESS = $\dfrac{1 \cdot h \cdot 12}{r} = 135$ < 175 OK!

$fa := \dfrac{P}{A2}$ $fa = 1365$ < 8,190 PSI PER TABLE C-50 AISC MANUAL

X. 26" DIAMETER x (2) 1/4" THICK SUPPORT PLATES ON TOP OF COLUMN

USING ROARK'S FORMULA #2 FOR CIRCULAR FLAT PLATE, EDGES SUPPORTED WITH UNIFORM LOAD OVER CONCENTRIC AREA OF RADIUS Ro:

TOTAL APPLIED LOAD	$W := P = 4901$ LBS
LAMINATED PLATE THICKNESS	$t := .25 + .25 = 0.5$ IN
RADIUS OF WHERE STRESS IS COMPUTED	$r := 2.82$ IN
RADIUS OF RING LOAD	$Ro := 2.82$ IN
RADIUS OF PLATE	$a := 13$ IN
YOUNGS MODULUS	$E := 29000000$ PSI

POISSON'S RATIO $\qquad \upsilon := .3 \qquad m := \dfrac{1}{\upsilon} = 3.33$

FOR r >= Ro

RADIAL STRESS -

$$Sr := \frac{3 \cdot W}{\left(2 \cdot \pi \cdot m \cdot t^2\right)} \cdot \left[(m+1) \cdot \log\left(\frac{a}{r}\right) + (m-1) \cdot \frac{Ro^2}{\left(2 \cdot r^2\right)} - (m-1) \cdot \frac{Ro^2}{\left(2 \cdot a^2\right)}\right] = 11198 \quad \text{PSI}$$

TANGENTAL STRESS -

$$St := \frac{3 \cdot W}{\left(2 \cdot \pi \cdot m \cdot t^2\right)} \cdot \left[(m-1) + (m+1) \cdot \log\left(\frac{a}{r}\right) + (m-1) \cdot \frac{Ro^2}{\left(2 \cdot r^2\right)} - (m-1) \cdot \frac{Ro^2}{\left(2 \cdot a^2\right)}\right] = 17750 \quad \text{PSI}$$

ALLOWABLE STRESS $\qquad (.75) \cdot 36000 = 27000 \quad$ PSI

XI. SIZING OF CENTER POLE BEARING PLATE

WIDTH OF SQUARE PLATE REQUIRED = $\qquad \sqrt{\dfrac{P}{q_{allow}}} = 1.4 \qquad$ FT

THICKNESS REQUIRED FOR PLATES:

$w := 24$ IN $\qquad\qquad fc := \dfrac{P}{w^2} = 8.51 \quad$ PSI

$d1 := \dfrac{w - 4}{2} = 10 \qquad$ IN

$t := \sqrt{\dfrac{fc \cdot d1^2 \cdot 3}{.6 \cdot 36000}} \qquad t = 0.34 \quad$ INCHES $\qquad$ USE 24" SQ x 1/2" THICK PLATE

XII. SEISMIC FORCES

IMPULSIVE RESPONSE MODIFCATION FACTORS FOR GROUND SUPPORTED TANK;

UNANCHORED TANK $\qquad\qquad Ri := 2.5$

CONVECTIVE RESPONSE MODIFCATION FACTORS FOR GROUND SUPPORTED TANK;

UNANCHORED TANK $\qquad\qquad Rc := 1.5$

MAPPED ACCELERATION PARAMETERS

FROM ASCE 7-05 AT: $\qquad$ LADITUDE $\quad$ 38.357119N

LONGITUDE -122.928122W

FOR 5% DAMPED, AT 0.2 SEC PERIOD FOR SITE CLASS B $Ss := 1.500$

   SHORT-PERIOD SITE COEFFICIENT (TABLE 26) $Fa := 1.0$ FOR SITE CLASS D

FOR 5% DAMPED, AT 1.0 SEC PERIOD FOR SITE CLASS B $S1 := 0.693$

   LONG-PERIOD SITE COEFFICIENT (TABLE 26) $Fv := 1.5$ FOR SITE CLASS D

MAXIMUM CONSIDERED EARTHQUAKE SPECTRAL RESPONSE
ACCELERATION AS A MULTIPLE OF GRAVITY

   $SMS := Fa \cdot Ss = 1.5$

   $SM1 := Fv \cdot S1 = 1.04$

SCALING FACTOR FROM MAXIMUM CONSIDERED EARTHQUAKE SPECTRAL RESPONSE
ACCELERATION TO DESIGN EARTHQUAKE SPECTRAL RESPONSE ACCELERATION

   $U := \dfrac{2}{3} = 0.67$

DESIGN REPONSE SPECTRA

   $SDS := U \cdot SMS = 1$

   $SD1 := U \cdot SM1 = 0.693$

NATURAL PERIOD OF STRUCTURE (VERY SMALL) BECAUSE GROUND SUPPORTED $Ti := 0$

  THERFORE, THE DESIGN SPECTRAL RESPONSE ACCELERATION FOR IMPULSIVE COMPONENT

   $Sai := SDS = 1$

REGION-DEPENDENT TRANSITION PERIOD FOR LONGER PERIOD GROUND MOTION

   $TL := 12$ SEC   PER MAPPED ASCE 7 (SHOWN IN FIGURE 19 IN AWWA D100-05)

SLOSHING PERIOD COEFFICIENT $Ks := \dfrac{0.578}{\sqrt{\tanh\left[\dfrac{(3.68 \cdot H)}{D}\right]}} = 0.61$

NATURAL PERIOD OF SHELL-FLUID SYSTEM $Tc := Ks \cdot \sqrt{D} = 3.21$ SEC
CONVECTIVE (SLOSHING) PERIOD

   DAMPING SCALING FACTOR $K := 1.5$

$Tc = 3.21$ < $TL = 12$ SEC

THEREFORE, DESIGN SPECTRAL RESPONSE ACCELERATION FOR THE CONVECTIVE COMPONENT

$$Sac := \frac{K \cdot SD1}{Tc} = 0.32 \qquad <= \qquad SDS = 1$$

IMPULSIVE DESIGN ACCELERATION OF g

$$Ai := \frac{Sai \cdot Ie}{1.4 \cdot Ri} = 0.36 \qquad >= \qquad \frac{0.36 \cdot S1 \cdot Ie}{Ri} = 0.12$$

CONVECTIVE DESIGN ACCELERATION OF g

$$Ac := \frac{Sac \cdot Ie}{1.4 \cdot Rc} = 0.19$$

WEIGHT OF TANK CONTENTS

$$WT := 62.4 \cdot G \cdot H \cdot \left(\frac{\pi \cdot D^2}{4} \right) = 415139 \qquad \text{LBS}$$

WEIGHT OF ROOF SYSTEM

$$Wr := R_{DL} \cdot \pi \cdot (D)^2 \cdot .25 = 2607 \qquad \text{LBS}$$

WEIGHT OF SHELL

FOURTH COURSE (16 GA)	$Ws4 := 3.75 \cdot \pi \cdot D \cdot 3.52 = 1151$	LBS
THIRD COURSE (16 GA)	$Ws3 := 3.75 \cdot \pi \cdot D \cdot 3.52 = 1151$	LBS
SECOND COURSE (14 GA)	$Ws2 := 3.75 \cdot \pi \cdot D \cdot 4.36 = 1425$	LBS
BOTTOM COURSE (14 GA)	$Ws1 := 3.75 \cdot \pi \cdot D \cdot 4.36 = 1425$	LBS
APPURTENANCES	$Wsa := 300$	LBS
TOTAL SHELL WEIGHT	$Ws := Wsa + Ws1 + Ws2 + Ws3 + Ws4 = 5452$	LBS

WEIGHT OF TANK BOTTOM (14 GA)

$$Wf := \pi \cdot \frac{D^2}{4} \cdot 3.28 = 1984 \qquad \text{LBS}$$

EFFECTIVE IMPULSIVE WEIGHT OF TANK CONTENTS

$$\text{TANK ASPECT RATIO} \qquad \frac{D}{H} = 2.523$$

FOR D/H < 1.333

$$Wi := \left(1.0 - 0.218 \cdot \frac{D}{H}\right) \cdot WT = \blacksquare \qquad LBS$$

FOR D/H > 1.333

$$Wi := \frac{\tanh\left(0.866 \cdot \frac{D}{H}\right)}{0.866 \cdot \frac{D}{H}} \cdot WT = 185272 \qquad LBS$$

EFFECTIVE CONVECTIVE WEIGHT OF TANK CONTENTS FOR ANY VALUE OF D/H

$$Wc := 0.230 \cdot \frac{D}{H} \cdot \tanh\left(\frac{3.67 \cdot H}{D}\right) \cdot WT = 215976 \qquad LBS$$

CENTROIDAL HEIGHTS OF LATERAL FORCES APPLIED TO EFFECTIVE WEIGHTS

FOR D/H < 1.333
$$Xi := \left(0.5 - 0.094 \cdot \frac{D}{H}\right) \cdot H = \blacksquare \qquad FT$$

FOR D/H > 1.333 THE HEIGHT FOR IMPULSIVE FORCE <u>EXISTING CASE</u>

$$Xi := 0.375 \cdot H = 4.13 \qquad FT$$

·FOR ALL PRPORTIONS OF D/H THE HEIGHT FOR CONVECTIVE FORCE

$$Xc := \left[1.0 - \frac{\left(\cosh\left(\frac{3.67 \cdot H}{D}\right) - 1\right)}{\left(\frac{3.67 \cdot H}{D} \cdot \sinh\left(\frac{3.67 \cdot H}{D}\right)\right)}\right] \cdot H = 6.3 \qquad FT$$

SHELL CENTROID $Xs := Ht \cdot .5 = 7.5 \qquad FT$

XIII. <u>DESIGN FORCES</u>

DESIGN BASE SHEAR

$$Vf := \sqrt{[Ai \cdot (Ws + Wr + Wf + Wi)]^2 + (Ac \cdot Wc)^2} = 81206 \qquad LBS$$

DESIGN OVERTURNING MOMENT FOR RINGWALL FOUNDATION OR GROUND SUPPORTED
<u>EXISTING CASE</u>

$$Ms := \sqrt{[Ai \cdot (Ws \cdot Xs + Wr \cdot Ht + Wi \cdot Xi)]^2 + (Ac \cdot Wc \cdot Xc)^2} = 399426 \qquad FT - LBS$$

DESIGN OVERTURNING MOMENT FOR PAD FOUNDATION

$$\frac{D}{H} = 2.52$$

FOR D/H < 1.333

$$Ximf := \left(0.50 + 0.06 \cdot \frac{D}{H}\right) \cdot H = \blacksquare \qquad FT$$

FOR D/H > 1.333

$$Ximf := 0.375 \cdot \left[1.0 + 1.333 \cdot \left(\frac{0.866 \cdot \dfrac{D}{H}}{\tanh\left(0.866 \cdot \dfrac{D}{H}\right)} - 1.0\right)\right] \cdot H = 10.95 \quad FT$$

FOR ALL PROPORTIONS OF D/H THE HEIGHT FOR THE CONVECTIVE FORCE

$$Xcmf := \left[1.0 - \frac{\left(\cosh\left(\dfrac{3.67 \cdot H}{D}\right) - 1.937\right)}{\left(\dfrac{3.67 \cdot H}{D} \cdot \sinh\left(\dfrac{3.67 \cdot H}{D}\right)\right)}\right] \cdot H = 9.8 \qquad FT$$

DESIGN OVERTURNING MOMENT AT TOP OF PAD FOUNDATION

$$Mmf := \sqrt{[Ai \cdot (Ws \cdot Xs + Wr \cdot Ht + Wi \cdot Ximf)]^2 + (Ac \cdot Wc \cdot Xcmf)^2} = 856099 \qquad FT - LBS$$

XIV CHECK OF WIND OVERTURNING

VELOCITY EXPOSURE COEFFICIENT FOR EXPOSURE "C"	$K_z := 1.09$
GUST FACTOR	$G_F := 1.0$
FORCE COEFICIENT FOR TANK SHELL	$Cf_{shell} := 0.60$
FORCE COEFFICIENT FOR TANK DECK	$Cf_{deck} := 0.50$
WIND IMPORTANCE FACTOR	$I := 1.15$
VELOCITY PRESSURE	$q_z := 0.00256 \cdot K_z \cdot I \cdot V^2 = 32.09$ PSF
WIND PRESSURE ON SHELL	$P_{Wshell} := q_z \cdot G_F \cdot Cf_{shell} = 19.25$ PSF

WIND PRESSURE ON DECK $\quad\quad P_{Wdeck} := q_z \cdot G_F \cdot Cf_{deck} = 16.04 \quad\quad$ PSF

MOMENT FROM SHELL $\quad\quad M_{shell} := \dfrac{D \cdot Ht^2}{2} \cdot P_{Wshell} = 60108 \quad\quad$ FT-LBS

MOMENT FROM DECK $\quad\quad M_{deck} := \dfrac{D \cdot H_r}{2} \cdot \left(H + \dfrac{H_r}{3}\right) \cdot P_{Wdeck} = 6060 \quad\quad$ FT-LBS

$M_{wind} := M_{shell} + M_{deck} = 66168 \quad\quad < \quad\quad Ms = 399426 \quad$ FT-LBS $\quad$ - <u>SEISMIC GOVERNS</u>

WATER DEPTH NEEDED IN TANK TO PREVENT WIND OVERTURNING

FACTOR OF SAFETY $\quad\quad$ FOS := 1.5

$d := \dfrac{FOS \cdot M_{wind}}{\gamma_w \cdot \left(\pi \cdot .125 \cdot D^3\right)} = 0.19 \quad\quad < \quad$ TANK DRAIN INVERT = .33 FT

XV. <u>COUNTERACTING FORCES</u>

THICKNESS OF TANK BOTTOM $\quad\quad$ tb := .0747 INCHES

PORTION OF TANK CONTENTS RESISTING OVERTURNING FOR TANK
TO BE LESSER OF:

$wL := 1.28 \cdot H \cdot G \cdot D \quad\quad wL = 391 \quad\quad$ LBS/FOOT OF SHELL CIRCUMFERENCE

$wL := 7.9 \cdot tb \cdot \sqrt{Fy2 \cdot H \cdot G} \quad\quad wL = 371 \quad\quad$ LBS/FOOT OF SHELL CIRCUMFERENCE

WEIGHT OF TANK SHELL AND PORTION OF ROOF

ROOF FACTOR (n=1.0 FOR FREE STANDING, n=0.66 WITH CENTERPOLE)

n := 0.66

$wt := \dfrac{Ws + n \cdot Wr}{\pi \cdot D} = 82 \quad\quad$ LBS/FOOT OF SHELL CIRCUMFERENCE

XVI. <u>SEISMIC OVERTURNING RATIO</u>

VERTICAL DESIGN ACCELERATION $\quad\quad Av := 0.14 \cdot SDS = 0.14$

$J := \dfrac{Ms}{D^2 \cdot [wt \cdot (1 - 0.4 \cdot Av) + wL]} = 1.16$

WHEN:

J < 0.785   THERE IS NO SHELL UPLIFT

0.785 < J < 1.54   THERE IS SHELL UPLIFT, BUT TANK IS STABLE
CHECK SHELL COMPRESSION

J > 1.54   ANCHOR TANK or THICKEN BOTTOM ANNULUS

XVII. <u>HYDRODYNAMIC SEISMIC HOOP TENSILE STRESS AT BOTTOM OF SHELL</u>

IMPULSIVE HOOP TENSILE FORCE

$$\frac{D}{H} = 2.52 \qquad\qquad Y := H = 11 \qquad FT \qquad\qquad .75 \cdot D = 20.81 \quad FT$$

FOR D/H < 1.333 and Y<0.75D

$$Ni := 2.77 \cdot Ai \cdot G \cdot D^2 \cdot \left[\frac{Y}{0.75 \cdot D} - 0.5 \cdot \left(\frac{Y}{0.75D} \right)^2 \right] = 296 \qquad PSI$$

FOR D/H < 1.333 and Y>0.75D

$$Ni := 1.39 \cdot Ai \cdot G \cdot D^2 = 382 \qquad PSI$$

FOR D/H > 1.333 <u>EXISTING CONDITION</u>

$$Ni := 4.5 \cdot Ai \cdot G \cdot D \cdot H \cdot \left[\frac{Y}{H} - 0.5 \cdot \left(\frac{Y}{H} \right)^2 \right] \cdot \tanh\left(0.866 \cdot \frac{D}{H} \right) = 239 \qquad PSI$$

CONVECTIVE HOOP TENSILE FORCE FOR ALL PROPORTIONS OF D/H:

$$Nc := \frac{0.98 \cdot Ac \cdot G \cdot D^2 \cdot \left[\cosh\left[\frac{3.68 \cdot (H - Y)}{D} \right] \right]}{\cosh\left(\frac{3.68 \cdot H}{D} \right)} = 64 \qquad PSI$$

HYDROSTATIC HOOP TENSILE FORCE

$$Nh := 2.6 \cdot G \cdot Y \cdot D = 794 \qquad PSI$$

$$\sigma s := \frac{\sqrt{Ni^2 + Nc^2 + (Nh \cdot Av)^2}}{t1} \qquad\qquad \sigma s = 3633 \qquad PSI$$

$$\sigma := \frac{Nh}{t1} = 10624 \qquad PSI$$

TOTAL STRESS

$$\sigma t := \sigma + \sigma s = 14258 \qquad PSI$$

ALLOWABLE TENSILE STRESS

$$\sigma a := \frac{4}{3} \cdot .4 \cdot Fy2 = 19200 \quad > \quad \sigma t = 14258 \quad \text{PSI OK!}$$

XVIII. LONGITUDINAL SHELL COMPRESSION FROM SEISMIC FOR UNANCHORED TANK

FOR CLASS 2 STEEL $R := D \cdot 6 = 166.5$ IN

$$0 < \quad \frac{tl}{R} = 0.00045 \quad < 0.0035372 \quad \text{THEREFORE, ELASTIC BUCKLING CONTROLS}$$

ALLOWABLE COMPRESSIVE STRESS:

$$\sigma_a := 17.5 \cdot 10^5 \cdot \frac{tl}{R} \left[1 + 50000 \cdot \left(\frac{tl}{R} \right)^2 \right] = 793.04 \qquad \text{PSI}$$

PRESSURE STABLIZING BUCKLING COEFFICIENT

$P := P1 = 4.76$ **PSI** $tl = 0.0747$ IN $E := 29000000$. PSI

FOR $\frac{P}{E} \cdot \left(\frac{R}{tl} \right)^2 = 0.82 \quad > 0.064$

$$\Delta C_c := 0.045 \cdot \ln \left[\frac{P}{E} \cdot \left(\frac{R}{tl} \right)^2 + 0.0018 \right] + 0.194 = 0.18 \quad \text{BUT NO MORE THAN 0.22}$$

CRITICAL BUCKLING STRESS

$$\Delta \sigma_{cr} := \frac{\Delta C_c \cdot E \cdot tl}{R} = 2406 \quad \text{PSI}$$

SEISMIC ALLOWABLE LONGITUDINAL SHELL COMPRESSION STRESS:

$$\sigma_e := 1.333 \cdot \left(\sigma_a + \frac{\Delta \sigma_{cr}}{2} \right) = 2661 \qquad \text{PSI}$$

MAXIMUM LONGITUDINAL SHELL COMPRESSION STRESS

WHEN $J = 1.16 \quad <= 0.7785$

$$\sigma c := \left[(wt) \cdot (1 + 0.4 \cdot Av) + \frac{1.273 \cdot Ms}{D^2} \right] \cdot \frac{1}{12 \cdot tl} = 834 \quad < \quad \sigma_e = 2661 \qquad \text{PSI}$$

OR WHEN $0.785 < J = 1.16 \quad <= 1.54$

$$\sigma c := \left[\frac{wt \cdot (1 + 0.4 \cdot Av) + wL}{\left(0.607 - 0.18667 \cdot J^{2.3} \right)} - wL \right] \cdot \frac{1}{12 \cdot t1} = 1059 \quad < \quad \sigma_e = 2661 \quad \text{PSI}$$

XIX. CHECK SLIDING FROM SEISMIC

COEFFICIENT OF FRICTION $\quad\quad \phi := 30$

$$Vallow := \tan\left(\phi \cdot \frac{\pi}{180} \right) \cdot (Ws + Wr + Wi + Wc)(1 - 0.4 \cdot Av)$$

$Vallow = 223080 \quad > \quad Vf = 81206 \quad$ LBS $\quad\quad$ THEREFORE, TANK DOES NOT SLIDE.

XX. SLOSHING WAVE-HEIGHT FROM SEISMIC

$Tc = 3.21 \quad < 4 \quad$ CONVECTIVE DESIGN ACCELERATION FOR SLOSHING IS -

$$A_f := \frac{K \cdot SD1 \cdot Ie}{Tc} = 0.4$$

FOR SEISMIC USE GROUP II WITH SDS>= 0.33g FREEBOARD REQUIREMENT IS -

$d := 0.7 \cdot 0.5 \cdot D \cdot A_f = 3.93 \quad < \quad FB = 4 \quad$ FT

XXI. SOIL BEARING PRESSURE BENEATH TANK

METHOD FROM US NAVY - NAVFAC DM-7.1 (Page 7.2-134) -

ECCENTRICITY $\quad\quad\quad e := \dfrac{Ms}{(WT + Ws + Wr)} = 0.94 \quad\quad\quad$ FT

RADIUS $\quad\quad\quad\quad R := D \cdot 0.5$

EFFFECTIVE AREA $\quad\quad Ae := \pi \cdot R^2 - \left(e \cdot \sqrt{R^2 - e^2} + R^2 \cdot asin\left(\dfrac{e}{R} \right) \right) \quad\quad Ae = 579 \quad$ SQFT

SOIL BEARING $\quad\quad q := \dfrac{(WT + Ws + Wr)}{Ae} = 731 \quad < \quad q_{seismic} = 3333 \quad$ PSF

SITE EVALUATION SHEET

Address 14701 BODEGA HWY TWI PC# BLD12-0107

Inspector REX PETERSON   **Date** 1-10-12

The proposed construction appears to be located in: 026-120-006

Flood Hazard:	[ ] FIRM Flood Zone (ASFH) BFE = _____ ft. NAVD.	[ ] Portions of property in flood zone but project site not in flood zone.
	Lowest finish floor at 12 above BFE = _____ ft. NAVD.	[ ] Building is in FIRM Floodway.
	[ ] Design for moving water is recommended	[ ] Main building on site is Post-FIRM.
	Section _____ is _____ Ft/sec	[ ] Sensitive drainage area, review by drainage section recommended.
	Section _____ is _____ Ft/sec	[ ] Appears to be a "substantial improvement" (40%), therefore flood regulations apply.
	[ ] Area subject to flooding (not on adopted FIRM).	[ ] Located inside the *Laguna de Santa Rosa* below elevation of 75 ft (Ordinance #4906).
	[ ] Project is on flood zone major damage list.	
	[ ] Flood Prone Urban Area defined by Ordinance #4906.	
Geo-technical:	[ ] Area of suspected slides, slumps, earth flow, or soil creep. (a)	[ ] Area without recommended setback from stream (Drainage Division recommendations).
	[ ] Area of previous fill placement. (g)	[ ] Area of high moisture content in soil. (f)
	[ ] Area of suspected expansive soil. (c)	[ ] Area subject to high erosion (water or wind).
	[ ] Area without sufficient slope setback as set forth in UBC Section 1806. (b)	[ ] Area of soft soil due to past deep ripping or cultivation below minimum foundation depth. (h)
	[ ] Area subject to possible liquefaction. (e)	[ ] Area within 1000 feet of a solid waste disposal site.
	[ ] Area of suspected soft, compressible, or organic soil with low bearing capacity. **Soils Investigation:**	[ ] Non exempt structure per tech bulletin B-28. Required [ ] Included [ ] Available [ ] Not Required [ ]
Geologic:	[ ] Located in the Alquist-Priolo Special Studies Zone.	[ ] Geologic report required (see CGS Publication 42).
Seismic:	Seismic Design Category (SDC) D [ ] E [ ]	[ ] Pictures available in S Drive
General:	[ ] Building addition will affect the required light and ventilation in an existing room.	[ ] Indications of existing substandard conditions that are not addressed by the proposed construction.
	[ ] Existing electric meter must be replaced.	[ ] Indications of past work done without a permit.
	[ ] Existing gas meter must be replaced.	[ ] Grading permit required for road, driveway, or site preparation.
	Slope is _____	[ ] Site is likely to be acceptable for conventional construction methods.
Wind:	Exposure "B" Exposure "C" Exposure "D"	N.S.C. Air Pollution Control District..........[ ] Yes [ ] No

Acres. 250.6

Fire State

Liq Very Low

Landslide - Few, Mostly

OK to plancheck

Tank - engineered