ANACORTES PLANNING COMMISSION

Special Meeting

Site Visit: 4:00 PM on January 4, 2017. Meet onsite at the south side of Blue Heron Circle east of Whistle Lake Road prior to the hearing.

JANUARY 4, 2017

Municipal Building Council Chambers

6th Street and "Q" Avenue

AGENDA

6 p.m.

1. **Roll Call**

2. **Minutes of November 23, 2016 and November 30, 2016**

3. **Correspondence**

4. **Old Business**
   No Old Business

5. **New Business**
   CUP-2016-1002, Open-Record Public Hearing, Conditional Use Permit, Variance, & SEPA review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 3 million gallon water tank will be removed.

Planning Commission Meeting
Minutes for – November 23, 2016

Chair Laumbattus called the Meeting of November 23, 2016 to order at approximately 6 p.m.

Roll Call

Members Present: Commissioners Laumbattus, Oppel, Moffitt, Mount, Cleland McGrath, and Doll.

Minutes

Meeting minutes from October 26 and November 9, 2016 were approved as written.

Correspondence

The purpose of the public hearing was for staff to receive comments to aid in editing the proposed Title 19. The meeting will be continued to review the final draft.

Old Business

Public Hearing – Draft Unified Development Code, Title 19

Darcy Swetnam, City Attorney, provided a brief introduction to Title 19.

Gene Derig, 1302 K Avenue. Mr. Derig restated comments from previous hearings and does not support the use of a hearings examiner.

Tom Glade, 210 Mansfield Court. Mr. Glade is concerned with the costs of using a hearings examiner.

Carol O'Hearn, 11039 Post Drive. Ms. O'Hearn opposes paying a fee to file an appeal.

Patrick O'Hearn, 11039 Post Drive. Mr. O'Hearn criticized the lack of public notice and verbiage associated with accessory dwelling units. Mr. Glade agreed with Mr. O'Hearn's ADU concerns.

With no further comments, Chair Laumbattus closed the public hearing.

Chair Laumbattus reviewed comment from Tom Allen, who suggested retaining a 300-ft. boundary to appeal. Chair Laumbattus did not support this suggestion, but stated that he understands the City's desire to offset costs of an appeal with a fee. Commissioner Oppel suggested a study to ensure the required fees are not arbitrary and agreed with opening appeal opportunity to the entire City. Commissioner Cleland-McGrath requested clarification on determining fees. Ms. Swetnam stated that fees are based on surrounding jurisdictions. Commissioner Moffitt inquired on the average amount of appeals in a year. Mr. Measamer stated that staff would determine an approximate number. Commissioner Doll questioned fees

for different types of appeals to a hearings examiner. Ms. Swetnam stated that there will still be a fixed cost for certain appeal features.

Commissioner Oppel inquired about the purpose of a neighborhood comment period for building permit. Mr. Measamer clarified that it is actually a binding site plan used to identify lot use for commercial construction. Commissioner Oppel suggested a clear definition.

Chair Laumbattus continued the meeting to November 30, 2016, at approximately 6:45 p.m.

DRAFT

Planning Commission Meeting
Minutes for – November 30, 2016

Chair Laumbattus called the Meeting of November 30, 2016 to order at approximately 6 p.m.

Roll Call

Members Present: Commissioners Laumbattus, Moffitt, Oppel, McNett, Mount, Cleland-McGrath, and Doll.

Minutes

None

Correspondence

None

Old Business

Public Hearing – Draft Unified Development Code, Title 19

Darcy Swetnam, City Attorney, provided an overview of the legality in writing the update.

Patrick O'Hearn, 11039 Post Drive. Mr. O'Hearn commented on an inquiry from the previous Planning Commission meeting, stating that 4 projects have been appealed in the last year. Mr. Measamer clarified that 4 projects have been appealed, but one project filed up to 16 appeals.

William Valentine, 2402 Washington Court. Mr. Valentine disapproves of the effects of director discretion and the proposed hearings examiner.

Marilyn Derig, 1302 K Avenue. Ms. Derig disapproves of the lack of notice for Type 1 reviews.

Vernon Lauridsen, 2219 32nd Street. Mr. Lauridsen disapproves of the City's process for BLAs and LUPA, and stated that the City's interpretation of BLAs should be adjusted. Mr. Measamer commented that staff would like to adjust this in the new code updates.

Gene Derig, 1302 K Avenue. Mr. Derig suggested allowing projects to be viewed on the City website for members of the public.

Sara Holahan, 1511 38th Street. Ms. Holahan disapproves of fees and required standing to file an appeal. Ms. Holahan also supports requiring notice for Type 1 reviews.

Ryan Walters, 1803 10th Street. Mr. Walters stated his contribution towards writing the code update and explained the counterproductive nature of notice and appeals for Type 1 review, due to legal stature.

With no further comments, Chair Laumbattus closed the public hearing.

Planning Commission was provided the document *Land Use Permit Procedure Code Update Package – Title 19 Comment Summary*, from staff that summarizes public comments received as of November 28, 2016. Planning Commission discussed and made a recommendation on each issue.

Public Notice: A consensus was made to move Variances and Boundary Line Adjustments to Type 2 applications. Commissioner McNett made a motion to accept Accessory Dwelling Units as Type 1 applications, with existing criteria, except the requirement to turn in a certificate annually. It was seconded by Commissioner Cleland-McGrath. The motion carried, 6 to 1.

Type 4 Applications: Leave as proposed.

Short Plats 5-9 Lots: Leave as proposed.

Method to Request Administrative Interpretation: Consensus to add administrative interpretive process.

Commissioner Oppel requested that Commissioner Moffitt be excused from the rest of the meeting.

Permit Revisions: Leave as proposed.

Variances: Leave as proposed.

Hearing Examiner: Commissioner McNett made a motion to recommend the hearing examiner, as proposed. Commissioner Cleland-McGrath seconded. The motion carried, 5 to 1.

Standing to Appeal: A consensus was made to keep the definition of standing broad, to allow appeals from any aggrieved party, as parties of record.

Filing of Appeal: Leave as proposed.

Method of Service for Appeal: Leave as proposed.

Appeal Fee: Leave as proposed.

External Appeals: Leave as proposed.

Permissive Joinder: Leave as proposed.

Public Hearing Fee: Leave as proposed.

Preparation of Transcripts Paid for by Appellant: A motion was made by Commissioner McNett to recommend that City Council consider transcript handling when reviewing the unified fee schedule. Commissioner Oppel seconded. The motion passed unanimously.

Swearing in: Leave as proposed.

DRAFT

Director Obligation to Follow and Enforce Code: Leave as proposed.

Director Obligation to Respond to Complaints: Leave as proposed.

Accessory Dwelling Units, Home Occupations, and Bed & Breakfasts: Leave as proposed.

Notice of Decision: Leave as proposed.

Definition of Family: Leave as proposed.

Commissioner Mount made a motion to recommend approval of the draft to City Council. Commissioner Oppel seconded. The motion passed unanimously.

Chair Laumbattus called the meeting to a close at approximately 9:20 p.m.

DRAFT

Planning Commission Agenda Bill

Meeting Date: 1/4/2017 **Agenda Item**: 5A

Subject: Blue Heron Circle Water Tanks

Staff Contact: Kevin Cricchio, AICP, Associate Planner

Approved for Submittal to Commission by	
X	Don Measamer, Director

Action Type	
X	Public Hearing
X	Discussion
X	Possible Action

Summary & Background: The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs. Subject parcels involved are: P33173 & P33044. Per AMC 17.04.070(E), the subject applications are being reviewed via an integrated and consolidated permit review process. Please bring your packets with you to the January 4, 2017, hearing. Please note, that a **site visit** is scheduled for 4:00 PM on January 4, 2017. Meet onsite on the south side of Blue Heron Circle east of Whistle Lake Road.

Recommendation: The Department of Planning, Community, and Economic Development recommends that the Planning Commission make a motion to recommend approval to City Council regarding the subject Conditional Use Permit and Variance request subject to the staff's suggested conditions of approval.

Attachments: To view all documents, click here.

Staff Report with Draft Planning Commission's Findings of Fact, Conclusions of Law, & Recommendation

Exhibit #1, Master Permit Application, Narrative Cup & Variance Criteria, Title Report, Deeds, & SEPA Checklist

Exhibit #2, Assessor's Info & City GIS Map

Exhibit #3, NOA & NOH Using Optional SEPA DNS & Rescheduled NOH

Exhibit #4, Public Comments Received

Exhibit #5, Agency & Department Comments Received

Exhibit #6, Issued SEPA DNS

Exhibit #7, Cultural Resource Review & Inadvertent Discovery Plan

Exhibit #8, Geotechnical Report

Exhibit #9, Environmental Review Technical Memorandum

Exhibit #10, Site Plan & Cross Sections

Planning Commission Agenda Bill

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Subject: Blue Heron Circle Water Tanks

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Exhibit #10, Site Plan & Cross Sections

STAFF REPORT WITH PLANNING COMMISSION'S DRAFT FINDINGS OF FACT, CONCLUSIONS OF LAW, & RECOMMENDATION:

OPEN-RECORD PUBLIC HEARING DATE:	Wednesday, January 04, 2017, @ 6:00 PM
SITE VISIT:	Wednesday, January 04, 2017, @ 4:00 PM
FILE NUMBER:	CUP-2016-1002
PROJECT TITLE:	Blue Heron Circle Water Tanks
PROJECT LOCATION:	The subject property is addressed as 301 Blue Heron Circle, Anacortes, Washington. The project site is located on the south side of Blue Heron Circle and east of Whistle Lake Road within a portion of Section 30; Township 35 North; Range 02 East; Willamette Meridian.
LANDOWNER:	City of Anacortes P.O. Box 547 Anacortes, WA 98221
APPLICANT:	Matt Reynolds, PE, Assistant Director Public Works Department City of Anacortes P.O. Box 547 Anacortes, WA 98221
STAFF REPORT PREPARED BY:	Kevin Cricchio, AICP Associate Planner City of Anacortes 904 6th Street Anacortes, WA 98221
SUBJECT PROPOSAL:	The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental

review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The replacement is necessary due to structural deficiencies of the existing reservoir. The project also includes new piping and associated equipment. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs.

SUBJECT PARCELS: P33173 & P33044

CUT & FILL PROPOSED: Approximately 2,500 cubic yards of excavation and 500 cubic yards of fill are proposed.

EXISTING LAND USE: A three million gallon water tank /reservoir currently sits on the subject property. The project involves the demolition of this reservoir and construction of two new 1.5 million gallon water tanks /reservoirs onsite.

CURRENT ZONING & COMP. PLAN DESIGNATION: Public Use Zoning District

SURROUNDING ZONING & LAND USES:

Direction:	Zoning:	Present Land-Use:
North:	Public Use (P)	Vacant & Treed Property
South:	Residential 1 (R1) Zoning District	Single-family residences
East:	Residential 2 (R2) Zoning District	Condominiums / Multi-family
West:	Residential 1 (R1) Zoning District	Single-family residences

SITE ACREAGE: 1.6 ± acres in area.

DRAFT FINDINGS OF FACT:

I. GENERAL BACKGROUND:

1. On August 9, 2016, a pre-application conference (DRG Meeting) was conducted with the applicant concerning the subject proposal.
2. At 7:00 PM on October 18, 2016, a neighborhood meeting was conducted at the City's Senior Center. Notice of the neighborhood meeting was posted onsite in two different locations. Neighboring landowner's located within 300 feet of the subject property were also mailed notice of the neighborhood meeting.
3. The project site is located in the City of Anacortes' Public Use (P) Zoning District.

4. Within the Public Use (P) Zoning District, "Public Utility Facilities" including water reservoirs are permitted via an approved Conditional Use Permit per AMC § 17.26.040(C).
5. Accordingly, the applicant has applied for a Conditional Use Permit (CUP) to permit two water tanks/reservoirs in the Public Use Zoning District.
6. The applicant has also applied for a Variance request to exceed the maximum permitted height of thirty-five feet above grade in the Public Use Zone. The height at the center of the new reservoirs will be increased from approximately 47 feet to approximately 50 feet for the new water tanks /reservoirs.
7. Variance requests are typically heard before the Board of Adjustment. However, in this case the applicant has submitted both a Variance request and Conditional Use Permit. Conditional Use Permit go before both the Planning Commission for a recommendation followed by City Council for a decision of approval or denial. The subject applications however are being reviewed and processed via an integrated and consolidated permit review process per AMC 17.04.070(E).
8. On September 30, 2016, the City of Anacortes' Planning, Community, & Economic Development Department received the subject applications from the applicant.
9. The subject application was reviewed and deemed incomplete on October 07, 2016.
10. Shortly thereafter, revisions were submitted to PCED for review. PCED completed its review of the revisions submitted and deemed the subject application complete on November 16, 2016.
11. Since the subject application(s) was deemed complete on November 16, 2016, it is subject to Ordinance 2794 in effect at that time. Notwithstanding, the subject application(s) would be subject to Ordinance 2992 going into effect on January 1, 2017.
12. A fourteen (14) day comment period for both the Conditional Use Permit, Variance request, and SEPA environmental review is required per city code. However at the applicant's request due to Health Department requirements, a thirty (30) day comment period was required associated with the subject applications. The 30-day comment period ended at 5:00 PM on December 16, 2016, but comments were accepted up until the close of the of the open-record public hearing.
13. The source of the funding for the subject proposal is from the State of Washington Department of Health's Drinking Water State Revolving Fund construction loans. The project is anticipated to cost approximately $4,974.755.
14. A closed-record public hearing before the City Council is scheduled for 6:00 PM on January 17, 2017, with a 4:00 PM site visit prior to the hearing.

II. NOTICE OF APPLICATION (NOA) & NOTICE OF HEARING (NOH):

1. Notice of Application and Hearing Using Optional SEPA DNS process was published in the Anacortes American Newspaper on November 16, 2016.
2. The subject property was posted by staff in two (2) different locations on November 14, 2016.
3. Neighboring landowners within 300 feet of the subject property were mailed notice of the subject proposal and hearing on November 15, 2016.
4. Agencies and departments of jurisdiction were solicited for comment on November 14, 2016.
5. Notice was posted at city hall, the library, and the local USPS office on November 14, 2016.
6. Due to a lack of a quorum at the Planning Commission's open-record public hearing scheduled for December 28, 2016, the hearing was rescheduled for January 4, 2017. A "Rescheduled Notice of Hearing" was published in the Anacortes American Newspaper on December 21, 2016, and posted by staff in two (2) different locations on December 14, 2016. Neighboring landowners were mailed the rescheduled notice of hearing on December 14, 2016. Agencies and departments of jurisdiction were emailed the rescheduled notice of hearing on December 14, 2016. Lastly, the rescheduled notice of hearing was posted at city hall, the library, and the local USPS office on December 14, 2016.

III. STATE ENVIRONMENTAL POLICY ACT:

1. The subject proposal is not exempt from SEPA environmental review per WAC 197.11.800(2)(h) as the proposed impervious above ground tanks (i.e., water tanks /reservoirs) total capacity exceeds 10,000 gallons.
2. The Notice of Application and Hearing Using Optional SEPA DNS process was published in the Anacortes American Newspaper on November 16, 2016. The subject property was posted by staff in two (2) different locations on November 14, 2016. Neighboring landowners were mailed notice of the subject proposal and hearing on November 15, 2016. Agencies and departments of jurisdiction were solicited for comment on November 14, 2016. Notice was posted at city hall, the library, and the local USPS office on November 14, 2016.
3. The Notice of Application and Hearing Using Optional SEPA DNS and associated application material was emailed to the Department of Ecology for posting on to the SEPA Register on November 14, 2016.
4. Due to a lack of a quorum at the Planning Commission's open-record public hearing scheduled for December 28, 2016, the hearing was rescheduled for January 4, 2017. A "Rescheduled Notice of Hearing" was published in the Anacortes American Newspaper on December 21, 2016, and posted by staff in two (2) different locations on December 14, 2016. Neighboring landowners were mailed the rescheduled notice of hearing on December 14, 2016. Agencies and departments of jurisdiction were emailed the rescheduled notice of hearing on

December 14, 2016. Lastly, the rescheduled notice of hearing was posted at city hall, the library, and the local USPS office on December 14, 2016.

5. On December 14, 2016, the rescheduled notice of hearing was emailed to the Department of Ecology for posting on to the SEPA Register.
6. On December 21, 2016, a SEPA Determination of Non-Significance (DNS) was issued (**See Exhibit 06).**
7. On December 21, 2016, the issued DNS was emailed to the Department of Ecology for posting on to the SEPA register.

IV. CRITICAL AREA REVIEW:

WETLANDS:

No wetlands have been determined to be located either onsite or within 300 feet of the subject properties.

STREAMS:

According to the City's Geographic Information Systems, Happy Valley Stream is located on the west side of Whistle Lake Road. Whistle Lake Road physically separates the subject property from those properties located west of the roadway and the stream located therein. Happy Valley Stream is 100 plus feet away from the western edge of the subject property. Anacortes Municipal Code 17.70.540(7)(b), requires a fifty (50) foot buffer from each edge of Happy Valley Stream. Since the subject property is greater than 100 feet from Happy Valley Stream, this requirement has been met.

PRIORITY HABITAT & SPECIES:

According Washington State Department of Fish and Wildlife's website, no Priority Habitat or Species are located on the subject property. This is reiterated in the Environmental Review Technical Memorandum prepared by HDR dated September 30, 2016 (**See Exhibit 09**). Furthermore, both Washington State's Department of Fish & Wildlife and the United States Fish and Wildlife Service were solicited for comment concerning the subject proposal. No comments were received.

GEOTECHNICAL REPORT:

The project site is relatively flat with slopes less than five percent. Shannon & Wilson of Seattle, Washington prepared a Geotechnical Design Report (**See Exhibit 08**) dated October 25, 2016. A total of six (6) test pits and one (1) boring were excavated /drilled to characterize the subsurface conditions at the project site. The report concludes that the test pit and boring explorations indicate competent bearing soils on the project site for construction of the water tanks.

CULTURAL RESOURCE REPORT:

Drayton Archaeology of Bellingham, Washington, prepared a Cultural Resource Review (**See Exhibit 07**) dated August 16, 2016. According to the report, the project site does not appear to have the potential to affect any cultural resources and therefore no professional archaeological oversight appears warranted. An Inadvertent Discovery Plan (IDP) was prepared in the event that cultural resources are discovered onsite during construction activities (**See Exhibit 07**).

VI. PUBLIC COMMENT:

No public comment has been received to date regarding the subject proposal (**See Exhibit 04).**

VII. AGENCY & DEPARTMENT COMMENT:

Comments received from both agencies and departments of jurisdiction can be found in **Exhibit 05.**

VIII. ZONING ORDINANCE/CODE:

1. The City's Zoning Map establishes zoning district boundaries and the City Zoning Ordinance establishes (1) the permitted use of land in the various zones, and (2) development standards.
2. The subject property is located in the Public Use (P) Zoning District.
3. According to AMC 17.26.060, there is no minimum setback required. The subject proposal involves two subject parcels. The water tank/reservoir currently located onsite slated for demolition straddles the interior lot line. As conditioned below, a Boundary Line Adjustment shall be submitted to PCED for review and approval and recorded with Skagit County Auditor's Office or the new water tanks shall not be located on or over the property lines.
4. According to AMC 17.26.080, there is no maximum permitted land coverage.
5. There is no minimum percentage of landscaping required in the Public Use Zone per AMC 17.41.020(G).
6. According to AMC 17.41.040(B) in the Public Use Zone, there is no requirement to screen adjacent uses.
7. Although, the proposed development is not exempt from Concurrency review per AMC 17.05.050, the proposed demolition and construction of water tanks /reservoirs results in no additional impact on concurrency facilities or services as the existing 3 million gallon water tank will be replaced with two 1.5 million gallon water tanks which cumulatively hold 3 million gallons of potable water.

8. A Tree Preservation Plan is not required per AMC 16.50.050 as a subdivision is not proposed. Nonetheless, the applicant proposes to retain all trees onsite predominantly located on the eastern side of the subject property.

9. Within the Public Use (P) Zoning District, "Public Utility Facilities" are permitted via an approved Conditional Use Permit per AMC § 17.26.040(C). Accordingly, the applicant has applied for a Conditional Use Permit (CUP) to permit the construction of two water tanks/reservoirs on the subject property.

10. According to AMC § 17.26.040(C), Conditional Use Permits shall be granted by the city only if the applicant can demonstrate the following:

A) The conditional use is designed in a manner which is compatible with the character and appearance of the existing, or proposed, development in the vicinity of the subject property and is consistent with the purpose of the zone in which the subject property is located.

STAFF ANALYSIS:

The existing water was constructed in approximately the 1970s and is painted green in color. The two proposed reservoirs will replace the existing reservoir located on the site. The first reservoir to be placed on the property will be located as far north as possible in order to avoid adverse impacts to the neighboring property located to the south. Once the first reservoir is placed onsite and is operational, the existing reservoir will be removed. Once removed from the site, the second reservoir will be placed on site utilizing the existing reservoirs foundation. The proposed color for the new water tanks/reservoirs is "grey" as it both blends well with its surroundings and reduces energy gains due to solar radiation.

B) The location, size and height of buildings, structures, walls and fences, and screening vegetation for the conditional use shall not hinder neighborhood circulation or discourage the permitted development or use of neighboring properties.

STAFF ANALYSIS:

Neighborhood circulation or use will not be adversely impacted by the construction of two water tanks/reservoirs onsite. The present use of the site is a 3 million gallon water tank/reservoir that is slated for removal should the subject Conditional Use Permit and Variance be approved.

C) The conditional use is designed in a manner that is compatible with the physical characteristics of the subject property.

STAFF ANALYSIS:

The physical characteristics of the site as well as the physical needs of the public potable water system dictate the design of the improvements associated with the location and construction of water tanks/reservoirs on the subject property.

Additionally, no tree removal of any kind is proposed. Since the project is relatively flat, minimal grading is also proposed as part of this project.

D) Requested modifications to standards are limited to those which mitigate impacts in a manner equal to or greater than the standards of this title or will not be detrimental to the surrounding neighborhood.

STAFF ANALYSIS:

The present use of the subject property is the same as that proposed –a water tank /reservoir that provide potable water to residents of the City of Anacortes.

A Variance however is also proposed to exceed the maximum permitted height of 35 feet above grade in the underlying Public Use Zoning District in order to provide adequate water system pressure and to comply with seismic standards. The height of the center of the existing water tank is approximately 47 feet above grade. The proposed height of the center of the two new water tanks would be approximately 50 feet above grade to the new for seismic code upgrades.

E) The conditional use is not in conflict with the health and safety of the Community.

STAFF ANALYSIS:

The construction of the two proposed water tanks/reservoirs will actually improve the health and safety of the community by safeguarding the City's potable water system.

F) The conditional use is such that pedestrian and vehicular traffic associated with the use will not be hazardous or conflict with existing and anticipated traffic in the neighborhood, and adequate pedestrian and vehicular connections to the arterials and adjacent areas as well as appropriate circulation within the project are provided consistent with city policies and standards for circulation patterns in the area.

STAFF ANALYSIS:

Following construction and demolition activities associated with the project, vehicular traffic will return to what it is today. As conditioned below, completion of the project will improve neighborhood pedestrian circulation by the construction of a 6 foot wide paved path that will front the subject property and

traverse north to Blue Heron Road and beyond to the southerly boundary of 4019 Whistle Lake Road.

G) The conditional use will be supported by adequate public facilities or services and will not adversely affect public services to the surrounding area or conditions can be established to mitigate adverse impacts on such facilities.

STAFF ANALYSIS:

The subject proposal will be supported by adequate public facilities and will not change the current need for public facilities or services.

H) The conditional use is in compliance with the comprehensive plan.

STAFF ANALYSIS:

The operation of a public water system including the provision of adequate storage of potable water as part of the City's water system is consistent with the Comprehensive Plan.

I) The conditional use is designed in a manner which is compatible with the character and appearance of the existing, or proposed, development in the vicinity of the subject property and is consistent with the purpose of the zones in which the subject property is located.

STAFF ANALYSIS:

Public utility facilities including but not limited to water tanks/reservoirs are permitted in the underlying Public Use Zoning District via an approved Conditional Use Permit. Additionally, the proposed water tanks/ reservoirs will be compatible with the character and appearance of the existing 3 million gallon water tank /reservoir that currently sits on the subject property slated for removal.

11. In addition to a CUP, the applicant has applied for a Variance to permit a height in excess of what is permitted in the underlying Public Use Zoning District. According to AMC § 17.26.090, the maximum permitted building height in the Public Use Zoning District is thirty-five (35) feet above original grade. The applicant however has requested a Variance to exceed this maximum height requirement. The existing water tank is approximately 47 feet as measured from the center of the respective water tank. The proposed water tanks however would measure approximately 50 feet as measured from the center of the water tanks (**See Exhibit 01**). The proposed increase the height is attributed to the need for seismic code upgrades. Variances shall be granted by the city only if the applicant can demonstrate the following:

A) That special conditions and circumstances exist which are peculiar to the land, structures, or buildings involved and which are not applicable to other lands, structure, or buildings in the same district.

STAFF ANALYSIS:
Special circumstances do exist which include the elevation of the site together with the public water system pressure requirements resulting in the necessary water tank elevation to be approximately 40 feet above existing grade. Due to seismic code requirements, the outer edge of the new reservoirs need to be approximately 45 feet high to provide 5 feet of freeboard. Additionally, due to the domed top, the height of the tank at its center will be approximately 50 feet above grade.

B) That literal interpretation of the provisions of this title would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this title.

STAFF ANALYSIS:
The City of Anacortes is the only public water system purveyor in the district. Therefore, no other property in the district has the need or obligation to construct a reservoir over 35 feet in height. The proposed height of the reservoir is dictated by water system pressure need and seismic code. A reservoir limited to 35 feet in height would not meet the needs of the public water system.

C) That the special conditions and circumstances do not result from the actions of the applicant.

STAFF ANALYSIS:
The special conditions and circumstances do not result from the actions of the applicant but rather are dictated by the water system pressure needs and physical laws of nature.

D) That granting the variance requested will not confer on the applicant any special privilege that is denied by this title to other lands, structures, or buildings in the same district.

STAFF ANALYSIS:
There are no other water districts that provide potable water to the residents of Anacortes besides the City of Anacortes. Since no other property in the district has the obligation to construct and maintain such a reservoir, the subject variance request does not confer to the City any special privilege denied to other lands.

12. The subject proposal **is, is not** consistent with the above development regulations and the proposed land use is permitted in the underlying zoning districts.

IX. CONCLUSIONS OF LAW:

1. The public notice requirements of the Conditional-Use Permit, Variance request, and SEPA environmental review have been complied with.
2. The project **is, is not** consistent with the general purposes of the City's Comprehensive Plan, the city's planning standards and specifications of the zoning ordinance, and other ordinances applicable to the proposal.
3. The Planning Commission bases its Findings of Fact, Conclusions of Law & Recommendation on the entire record, including all testimony and exhibits. Any finding which would be deemed a Conclusion of Law, and any Conclusion of Law which should be deemed a finding is hereby adopted as such.

X. STAFF RECOMMENDATION:

The Department of Planning, Community, and Economic Development recommends that the Planning Commission make a recommendation of approval to City Council regarding the subject Conditional Use Permit & Variance request subject to the staff suggested conditions of approval listed below.

XI. RECOMMENDATION:

Based on the foregoing information and analysis, the environmental documents submitted by the applicant, and the City regulatory authority to implement the policies, standards, and the regulations of the Anacortes Municipal Code (AMC), the Planning Commission **recommends approval, approval with conditions, or denial** to City Council concerning the subject Conditional Use Permit (CUP), & Variance request subject to staff's suggested conditions of approval listed below.

XII. CONDITIONS OF APPROVAL:

1. As conditioned below, a Boundary Line Adjustment shall be submitted to PCED for review and approval and recorded with Skagit County Auditor's Office or the new water tanks shall not be located on or over any property lines.
2. The applicant shall be responsible for reimbursement to the City for the cost of posting, mailing and publication of the public hearing for this proposal. Payment shall be made prior to building permit submittal or issuance.
3. A demolition permit shall be secured from both PCED and the Northwest Clean Air Agency prior to proposed demolition activities.
4. A Large Parcel Storm Water Plan and Water Quality Control Plan consistent with City requirements shall be submitted by the applicant for review and approval by the Planning\Building and Public Works Departments prior to any construction activities taking place on or off-site.

5. Storm water conveyance both on-site and off-site shall comply with City Storm drainage requirements.
6. Prior to any clearing\fill\grade work beginning, construction civil plans consistent with the City of Anacortes Engineering Development Standards, including but not limited to, Clearing and Grading Plan, Erosion Control Plan, Site utility\Infrastructure improvements Plan, Roadway Improvements Plan, Signage Plan, Street Lighting Plan and other plans and\or information required by the City Planning\Building and Public Works Departments shall be submitted for review and approval.
7. Security or construction fencing shall be installed at the project boundary's demarcating construction /clearing limits as required by the Planning and Public Works Departments.
8. All applicable permits shall be secured before any construction /grading activities begin onsite.
9. Best management practices (BMPs) shall be implemented during both demolition and construction activities.
10. The landowner /applicant shall obtain a National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharge as required by the State of Washington's Department of Ecology where required.
11. If any artifacts or human remains are found upon excavation, the Samish Indian Nation; the City of Anacortes' Department of Planning, Community, & Economic Development; the City of Anacortes' Police Department; and the State of Washington's Department of Archaeology and Historic Preservation (DAHP) shall be immediately notified and the work in the immediate area cease. Pursuant to RCW § 27.53.060 it is unlawful to destroy any historic or prehistoric archaeological resources. RCW 27.44 and § 27.53.060 require that a person obtain a permit from the Washington State Department of Archaeology and Historic Preservations before excavating, removing, or altering Native American human remains or archaeological resources in Washington.
12. At all times, a copy of the Inadvertent Discovery Plan (IDP) shall be kept onsite by the contractor.
13. Development shall comply with the Public Works Department requirements including but not limited to:
    A) Prior to the completion of the project, the applicant shall construct a 6 foot wide paved path across frontage of water tower property.
    B) Prior to the completion of the project, the applicant shall construct a 6 foot wide paved path approximately 660 lineal feet north from Blue Heron Circle to southerly boundary of 4019 Whistle Lake Rod and improve the crossing to the cemetery.

These Findings of Fact, Conclusions of Law, and Recommendation were adopted by the City of Anacortes' Planning Commission on **January 04, 2017**.

CITY OF ANACORTES, WASHINGTON
PLANNING COMMISSION

By _____
Marty Laumbattus, Planning Commission Chair

APPEALS:
Appeals shall be filed in accordance with AMC § 17.10.060 & § 17.10.100

EXHIBITS:

EXHIBIT NUMBER:	NAME OF EXHIBIT:
Exhibit #01	Master Permit Application, Narrative, CUP & Variance Criteria, Title Report, Deeds, and SEPA checklist
Exhibit #02	Assessor's Info & City GIS Map
Exhibit #03	NOA & NOH Using Optional SEPA DNS & Rescheduled NOH
Exhibit #04	Public Comments Received
Exhibit #05	Agency & Department Comments Received
Exhibit #06	Issued SEPA DNS
Exhibit #07	Cultural Resource Review and Inadvertent Discovery Plan
Exhibit #08	Geotechnical Report
Exhibit #09	Environmental Review Technical Memorandum
Exhibit #10	Site Plan & Cross Sections

EXHIBIT #1:

MASTER PERMIT APPLICATION, NARRATIVE, CUP & VARIANCE CRITERIA, TITLE REPORT, DEEDS, & SEPA CHECKLIST

City of Anacortes – Planning, Community, and Economic Development
906 – 6th Street, P.O. Box 547, Anacortes, WA 98221-0547

MASTER PERMIT APPLICATION

1.

	Applicant	Contact Person (if different)
Name:	City of Anacortes	G. Matt Reynolds
Mailing Address:	P.O. Box 547	
City, State, Zip:	Anacortes WA 97221	
Phone#:	360-299-1951	
Fax#:	360-293-1938	
E-mail:	mattr@cityofanacortes.org	

2. Applicant's Interest to Property (check one)
☒ Owner ☐ Contract Purchaser ☐Lessee ☐ Other (specify)_____

3. All Persons/Firms having an ownership interest in the property:
Name: City of Anacortes Phone# 360-293-1920
Address: P.O. Box 547
Name: _____ Phone# _____
Address: _____
Name: _____ Phone# _____
Address: _____

4. Property Address 301 Blue Heron Circle, Anacortes Washington
General location of property (including nearest intersection): SEC: 30 TWP: T35N RNG: 2E
At the southeast corner of the intersection of Whistle Lake Road and Blue Heron Circle in the City of Anacortes
*By submittal of this application, the property owner/applicant grants permission for public officials at the City of Anacortes to enter the subject property, if necessary, for the purpose of site inspection.

5. Attach legal description of property. (If recording of legal description is required, the format MUST comply with Recording Requirements.)

6. List all Property Tax Account Numbers involved in this application (Attach separate pages if necessary):
P33044, P33173

7. Approximate acreage: 1.59 8. Present zoning: P (Public)

9. Present use of property: Municipal potable water storage and pumping

10. Source of water supply and sewer supply: City of Anacortes

11. Permits requested from City:

- ☐ Annexation
- ☐ Boundary Line Adjustment
- ☐ Binding Site Plan
- ☒ Conditional Use Permit
- ☐ Comprehensive Plan Amendment
- ☐ Planned Unit Development
- ☐ Plat Modification
- ☐ Preliminary Plat
- ☐ Rezone
- ☐ Shoreline Exemption
- ☐ Shoreline Management Conditional Use Permit
- ☐ Shoreline Management Substantial Development
- ☐ Shoreline Variance
- ☐ Short Plat
- ☐ Special Use
- ☒ Variance
- ☐ Other: _____

12. Explain your request and ALL proposed uses included in this proposal: This project will construct two new 1.5 million gallon potable water reservoirs to replace an existing 3 million gallon reservoir. Due to seismic code requirements, the height at the center of the new reservoirs will be increased from approximately 47 feet (existing) to approximately 50 feet (new). The overall use of the site for municipal potable water storage and pumping will not change.

PLEASE FILL IN ALL APPLICABLE SECTIONS

FOR REZONES:

13. Requested zoning: _____

14. Comprehensive Plan designation: _____

15. Has anyone applied for a rezone of this property within the last five years? _____
If yes, who? _____ Year? _____

FOR SUBDIVISIONS (PLATS):

16. Plat Name: _____ 17. Number of Lots: _____

FOR SHORT SUBDIVISIONS (SHORT PLATS):

18. Number of Lots: _____ 19. Duplex Lots Proposed: _____

FOR SHORELINE MANAGEMENT SUBSTANTIAL DEVELOPMENT OR CONDITIONAL USE:

20. Total cost or fair market value (whichever is higher) of project (please state total value of all construction finishing work for which the permit will be issued, including all permanent equipment to be installed on the premises): $ $5,000,000

21. Construction dates for which permit is requested (month & year): Begin: January/2017
End: April/2018

22. Does the project require a Shoreline/Floodplain location? If yes, please explain why: No

23. Water Body:_____ 24. Shoreline Environment Designation:_____

FOR VARIANCE (ZONING AND SHORELINE):

25. Code sections involved: AMC 17.26.100 Maximum Building Height

26. Description of variance requested: Height of new reservoirs will be approximately 50 feet at the center of the reservoir; 45 feet at the outer edge

A notarized affidavit is required to be completed by all persons having an ownership interest in the subject property and the applicant, if different from the property owner(s). If the signatory is not listed as the owner in the title report, or if the signatory is signing on behalf of an entity, documentation authorizing the signatory to sign the affidavit on behalf of the individual or entity shall provided.

STATE OF WASHINGTON)
Skagit County, WA.) ss

I (we) G. Matt Reynolds, Assistant Public Works Director for the City of Anacortes, being duly sworn, depose and say that I am (we are) the **OWNER**(s) of the property involved in this application, and that I (we) have familiarized myself (ourselves) with the rules and regulations with respect to preparing and filing this application and that the statements and information submitted herewith are in all respects true and correct to the best of my (out) knowledge and belief.

Signed: _____
Property Owner

Subscribed and sworn to before me this 22 day of Sept., 20 16

Mary Ellen Zell
Notary Public in and for the State of WA
residing at ANACORTES

STATE OF WASHINGTON)
Skagit County, WA.) ss

I (we) G. Matt Reynolds, Assistant Public Works Director for the City of Anacortes, being duly sworn, depose and say that I am (we are) the **APPLICANT**(s) for this application, and that I (we) have familiarized myself (ourselves) with the rules and regulations with respect to preparing and filing this application and that the statements and information submitted herewith are in all respects true and correct to the best of my (out) knowledge and belief.

Signed: _____
Applicant

Subscribed and sworn to before me this 22 day of Sept, 20 16

Mary Ellen Zell
Notary Public in and for the State of WA
residing at ANACORTES

Blue Heron Circle 3MG Reservoir Replacement Project

Project Narrative

The City of Anacortes owns and operates a steel potable water reservoir located on City property at 301 Blue Heron Circle, in Anacortes. The volume of the reservoir is 3 million gallons and its height is approximately 40 feet above the ground at its outer edge and 47 feet at its center (dome top). The operating height of water in the reservoir is approximately 40 feet, which is necessary to maintain system pressures.

Also on site but not a part of this project is a pump station that maintains system pressures in the upper pressure zones in the city.

The reservoir provides emergency storage, fire storage, and operational storage for Anacortes. Analysis has shown that 3 million gallons serves the needs of Anacortes for the foreseeable future. Anacortes is located essentially at the end of the water system's transmission lines that run from the City's water treatment plant (WTP) near Mt. Vernon, with several users between the WTP and Anacortes. The system could not be run for any extended period of time without the reservoir because the reservoir serves the function of absorbing fluctuations in flows. Not having that function would have a high probability of one of two possible unacceptable results: either the system would overflow into open drainage or pumps would be starved.

Routine inspection of the reservoir's interior revealed structural degradation needing attention. A subsequent evaluation not only identified specific necessary structural repairs and upgrades to the reservoir, but found issues with the reservoir coating that will require both the interior and exterior coating to be removed and replaced.

An engineering predesign effort has determined that the best approach is to first build a new 1.5 million gallon on site adjacent to the existing reservoir to serve the operational storage needs, then raze the existing reservoir and replace it with a second new 1.5 million gallon steel reservoir within the footprint of the razed reservoir.

While the system operating level in the new reservoir will remain approximately 40, current seismic code requires a freeboard between the top of the water and the reservoir top of approximately 5 feet. This is necessary to provide room for 'sloshing' in an earthquake. This requires that the new reservoirs be approximately 45 feet tall at the outer edge and approximately 50 at the center of the reservoir, due its domed top.

<u>Regarding the Conditional Use Permit</u>: Responses to specific conditions are as follows:

a. The two new steel reservoirs will replace an existing steel reservoir on the site, therefore, the appearance and purpose of the proposed use is consistent with the existing use on the site.
b. The proposed improvements are consistent with the existing use and as such, will not change neighborhood circulation or neighboring property development potential.

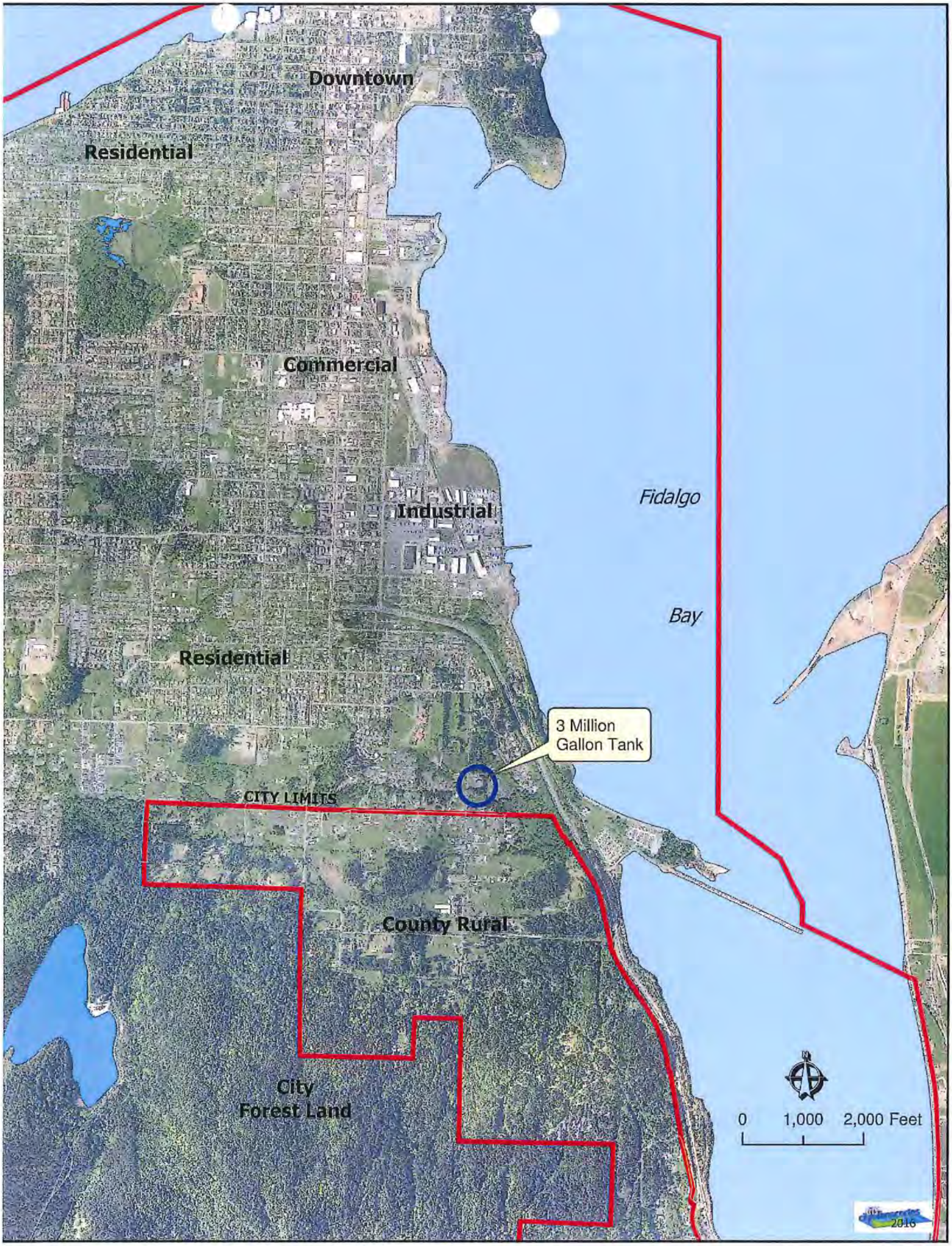
c. The physical characteristics of the site as well as the physical needs of the public potable water system dictate the design of the improvements. That is, the size of the reservoirs is governed by the volume of water necessary for adequate fire, emergency, and operational storage; by the fact that one reservoir must be in operation before the existing reservoir can be taking off line and razed; and by what will fit on the property. The height of the reservoirs is dictated by the water elevation necessary to maintain the required system pressure, the elevation of the site, and seismic code.
d. The existing use of the site, for potable water storage and pumping, will not change.
e. The reservoirs will not conflict with the health and safety of the community. Rather, as a necessary component of the City's potable water system, they will help safeguard the health and safety of the community.
f. Other than traffic during construction, the project will not change traffic in the neighborhood. The use of the site will not change. The number and location of vehicular access to the site will not change. And the number of trips to and from the site will not change as a result of the project.
g. The project will not change the current need for public facilities or services, which are adequate.
h. Adequate storage of potable at this site as part of the City's water system is consistent with the comprehensive plan.

Regarding the need for a variance: The special circumstances that exist are the elevation of the site, together with the public water system pressure requirements, result in the necessary water elevation in the tank to be approximately 40 feet above the existing ground elevation. Because of seismic code requirements, the outer edge of the new reservoirs need to be approximately 45 feet high to provide 5 feet of freeboard. And due to the domed top, the height of the tank at its center will be approximately 50 feet. The project is not materially detrimental to the public welfare. Rather, it is beneficial to the public welfare by helping provide adequate potable water system fire, emergency, and operational storage as well as adequate water system pressure.

Regarding the tree preservation plan: As shown on the attached site plan, there are several mature fir trees located on the eastern edge and the northeast and southeast corners of the property. No activity is anticipated near any of those trees and, therefore, no damage is expected. As shown on the site plan, anticipated yard piping work will occur on the western side of the property and the new Reservoir #1 will be constructed in the southwest corner of the property. Both activities are well away from the existing trees on site. The new Reservoir #2 will be constructed within the footprint of the existing reservoir, and may, in fact, be constructed on the existing foundation. Again, no damage to the existing trees on site is expected.

As shown on the site plan, there are also trees located on neighboring property along the fence line at the northwest corner of the neighboring parcel P33172 (the southwest corner of the project site). The plan is to stay as far away from those trees as possible while fitting the new reservoir into the site. The new reservoir will have a 25-foot setback from the southern property line, and so, 25-feet will be the closest the project will come to the main trunk of neighboring trees.

Regarding the landscape plan: Other than mature fir trees located on the eastern edge and southeast and northeast corners of the project site which will remain, existing landscaping on site consists of mowed lawn. This openness provides a benefit in terms of security as there are few locations to "hide" on site. Being in full public view reduces the possibility of unwanted clandestine activities by those who may have bad intent. Therefore, the intention is to restore disturbed areas on site with mowed lawn. The reservoirs will likely be surrounded by an approximately 10-foot wide graveled surface for access.


Downtown
Residential
Commercial
Industrial
Fidalgo
Bay
Residential
3 Million
Gallon Tank
CITY LIMITS
County Rural
City
Forest Land
0
1,000
2,000 Feet

30-35-2 GL6

WARRANTY DEED

S57918

8164

The Grantor, JOAN ELAINE GRANVILLE, of 4315 Whistle Lake Road, Anacortes, Skagit County, Washington, owning the property hereinafter described as her separate property, for and in consideration of the sum of SIXTEEN THOUSAND DOLLARS ($16,000.00) in hand paid, receipt of which is hereby acknowledged, hereby conveys and warrants unto the CITY OF ANACORTES, a municipal corporation, in Skagit County, Washington, the following described real estate, situated in the County of Skagit, State of Washington, to-wit:

That portion of Government Lot 6, Section 30, Township 35 North, Range 2, East, W.M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the Southwest corner of said Government Lot 6; thence East 315 feet; thence North 355 feet more or less, to the Southeast corner of that certain tract conveyed to William D. Stitt, etux, by deed recorded September 22, 1976, as Auditor's File No. 843086, and the TRUE POINT OF BEGINNING; thence West 165 feet more or less, to the East line of a tract of land conveyed to the City of Anacortes by deed recorded November 15, 1928 as Auditor's File No. 218072; thence South along said East line, West and said East line extended, 220 feet; thence ~~East~~ 165 feet to a point ~~South~~ North of the Point of Beginning; thence ~~North~~ South to the Point of Beginning;

together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in any wise appertaining.

Dated this 26th day of May, 1977.

Joan E. Granville (SEAL)

STATE OF WASHINGTON)
:SS
COUNTY OF SKAGIT)

On this day personally appeared before me JOAN ELAINE GRANVILLE, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that she signed and sealed the same as her free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this 26th day of May,

NOTARY PUBLIC NOV. 11, 19

Notary Public in and for the State of Washington, residing at Anacortes

Received for record at June 7 1977, 4:09 P.M. SET
at request of Skagit Co. Title
Lucia Neely, Auditor Skagit Co., Washington

Official Records

S57918

VOL. 269 PAGE 205

Blue Heron Circle 3MG Reservoir Replacement Project

Project Narrative

RECEIVED
OCT 25 2016

The City of Anacortes owns and operates a steel potable water reservoir located on City property at 301 Blue Heron Circle, in Anacortes. The volume of the reservoir is 3 million gallons and its height is approximately 40 feet above the ground at its outer edge and 47 feet at its center (dome top). The operating height of water in the reservoir is approximately 40 feet, which is necessary to maintain system pressures.

Also on site but not a part of this project is a pump station that maintains system pressures in the upper pressure zones in the city.

The reservoir provides emergency storage, fire storage, and operational storage for Anacortes. Analysis has shown that 3 million gallons serves the needs of Anacortes for the foreseeable future. Anacortes is located essentially at the end of the water system's transmission lines that run from the City's water treatment plant (WTP) near Mt. Vernon, with several users between the WTP and Anacortes. The system could not be run for any extended period of time without the reservoir because the reservoir serves the function of absorbing fluctuations in flows. Not having that function would have a high probability of one of two possible unacceptable results: either the system would overflow into open drainage or pumps would be starved.

Routine inspection of the reservoir's interior revealed structural degradation needing attention. A subsequent evaluation not only identified specific necessary structural repairs and upgrades to the reservoir, but found issues with the reservoir coating that will require both the interior and exterior coating to be removed and replaced.

An engineering predesign effort has determined that the best approach is to first build a new 1.5 million gallon on site adjacent to the existing reservoir to serve the operational storage needs, then raze the existing reservoir and replace it with a second new 1.5 million gallon steel reservoir within the footprint of the razed reservoir.

While the system operating level in the new reservoir will remain approximately 40 feet, current seismic code requires a freeboard between the top of the water and the reservoir top of approximately 5 feet. This is necessary to provide room for 'sloshing' in an earthquake. This requires that the new reservoirs be approximately 45 feet tall at the outer edge and approximately 50 at the center of the reservoir, due its domed top.

A neighborhood meeting was held on October 18, 2016 to inform neighbors of the project and to obtain feedback on the proposal so that potential impacts and concerns could be identified early on in the process. Two concerns were expressed:

- Concern: Are you going to remove trees?
  Answer: No trees are planned to be removed.

- Concern: What color will the new tanks be? The preference of the person who asked was green.
  Answer: The final color selection has not yet been made but will likely be a light (overcast sky) gray. The green that exists now is relatively dark, resulting in increased heat absorption causing an undesirable warming of the water. A light gray reduces that problem.

Regarding the Conditional Use Permit: Responses to specific conditions are as follows:

a. Condition: The conditional use is designed in a manner which is compatible with the character and appearance of the existing, or proposed, development in the vicinity of the subject property and is consistent with the purpose of the zone in which the subject property is located.
   Response: The two new steel reservoirs will replace an existing steel reservoir on the site, therefore, the appearance and purpose of the proposed use is consistent with the existing use on the site. The position of the first new reservoir has been pushed as far as possible to the north to avoid tree roots on the neighboring property to the south. The closest the reservoir will be to those existing trees, which provide screening between the site and adjacent residential use, is approximately 25 feet. The second new reservoir will utilize the existing reservoir foundation.

b. Condition: The location, size and height of buildings, structures, walls and fences, and screening vegetation for the conditional use shall not hinder neighborhood circulation or discourage the permitted development or use of neighboring properties.
   Response: The proposed improvements are consistent with the existing use and as such, will not change neighborhood circulation or neighboring property development potential.

c. Condition: The conditional use is designed in a manner that is compatible with the physical characteristics of the subject property.
   Response: The physical characteristics of the site as well as the physical needs of the public potable water system dictate the design of the improvements. That is, the size of the reservoirs is governed by the volume of water necessary for adequate fire, emergency, and operational storage; by the fact that one reservoir must be in operation before the existing reservoir can be taking off line and razed; and by what will fit on the property. The height of the reservoirs is dictated by the water elevation necessary to maintain the required system pressure, the elevation of the site, and seismic code. The site is relatively flat which will reduce the need for significant grading.

d. Condition: Requested modifications to standards are limited to those which will mitigate impacts in a manner equal to or greater than the standards of this title or will not be detrimental to the surrounding neighborhood.
   Response: The existing use of the site, for potable water storage and pumping, will not change. A variance to the maximum height requirement is required and described below. The additional height is needed to provide adequate water system pressure and to comply with seismic standards which are intended to protect neighboring properties.

e. Condition: The conditional use is not in conflict with the health and safety of the community.
Response: The reservoirs will not conflict with the health and safety of the community. Rather, as a necessary component of the City's potable water system, they will help safeguard the health and safety of the community.

f. Condition: The conditional use is such that pedestrian and vehicular traffic associated with the use will not be hazardous or conflict with existing and anticipated traffic in the neighborhood, and adequate pedestrian and vehicular connections to the arterials and adjacent areas as well as appropriate circulation within the project are provided consistent with city policies and standards for circulation pattern in the area.
Response: Other than traffic during construction, the project will not change traffic in the neighborhood. The use of the site will not change. The number and location of vehicular access to the site will not change. And the number of trips to and from the site will not change as a result of the project.

g. Condition: The conditional use will be supported by adequate public facilities or services and will not adversely affect public services to the surrounding area or conditions can be established to mitigate adverse impacts on such facilities.
Response: The project will not change the current need for public facilities or services, which are adequate.

h. Condition: The conditional use is in compliance with the comprehensive plan.
Response: The operation of a public water system, including the provision of adequate storage of potable water at this site as part of the City's water system, is consistent with the comprehensive plan.

Regarding the need for a variance: Responses to Variance criteria are as follows:

A variance from the terms of this title shall not be granted by the board of adjustment unless and until a written application for a variance is submitted demonstrating all of the following:

a) Criteria: That the special conditions and circumstances exist which are peculiar to the land, structures, or buildings involved and which are not applicable to other lands, structure or buildings in the same district.
Response: The special circumstances that exist are the elevation of the site, together with the public water system pressure requirements, result in the necessary water elevation in the tank to be approximately 40 feet above the existing ground elevation. Because of seismic code requirements, the outer edge of the new reservoirs need to be approximately 45 feet high to provide 5 feet of freeboard. And due to the domed top, the height of the tank at its center will be approximately 50 feet. A reservoir at this height is beneficial to the public welfare by helping provide adequate potable water system fire, emergency, and operational storage as well as adequate water system pressure.

b) Criteria: That literal interpretation of the provisions of this title would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this title.
Response: The City of Anacortes is the only public water system purveyor in the district, and so, no other property in the district has the need or obligation to construct a reservoir over 35 feet in height. The height of the reservoir is dictated by water system pressure needs

and seismic code. A reservoir limited to 35-foot in height would not meet the needs of the public water system.

c) Criteria: That the special conditions and circumstances do not result from the actions of the applicant.
   Response: The height requirement of the reservoir is not a result the actions of the City but are dictated by water system pressure needs and physical laws of nature.

d) Criteria: That granting the variance requested will not confer on the applicant any special privilege that is denied by this title to other lands, structures, or buildings in the same district.
   Response: The City of Anacortes is the only public water system purveyor in the district, and so, no other property in the district has the need or obligation to construct a reservoir over 35 feet in height. Since no other property in the district has the obligation to own and maintain such a reservoir, this variance does not confer to the City any special privilege that is denied to other lands.

Regarding the tree preservation plan: As shown on the attached site plan, there are several mature fir trees located on the eastern edge and the northeast and southeast corners of the property. No activity is anticipated near any of those trees and, therefore, no damage is expected. As shown on the site plan, anticipated yard piping work will occur on the western side of the property and the new Reservoir #1 will be constructed in the southwest corner of the property. Both activities are well away from the existing trees on site. The new Reservoir #2 will be constructed within the footprint of the existing reservoir, and may, in fact, be constructed on the existing foundation. Again, no damage to the existing trees on site is expected.

As shown on the site plan, there are also trees located on neighboring property along the fence line at the northwest corner of the neighboring parcel P33172 (the southwest corner of the project site). The plan is to stay as far away from those trees as possible while fitting the new reservoir into the site. The new reservoir will have a 25-foot setback from the southern property line, and so, 25-feet will be the closest the project will come to the main trunk of neighboring trees.

Regarding the landscape plan: Other than mature fir trees located on the eastern edge and southeast and northeast corners of the project site which will remain, existing landscaping on site consists of mowed lawn. This openness provides a benefit in terms of security as there are few locations to "hide" on site. Being in full public view reduces the possibility of unwanted clandestine activities by those who may have bad intent. Therefore, the intention is to restore disturbed areas on site with mowed lawn. The reservoirs will likely be surrounded by an approximately 10-foot wide graveled surface for access.

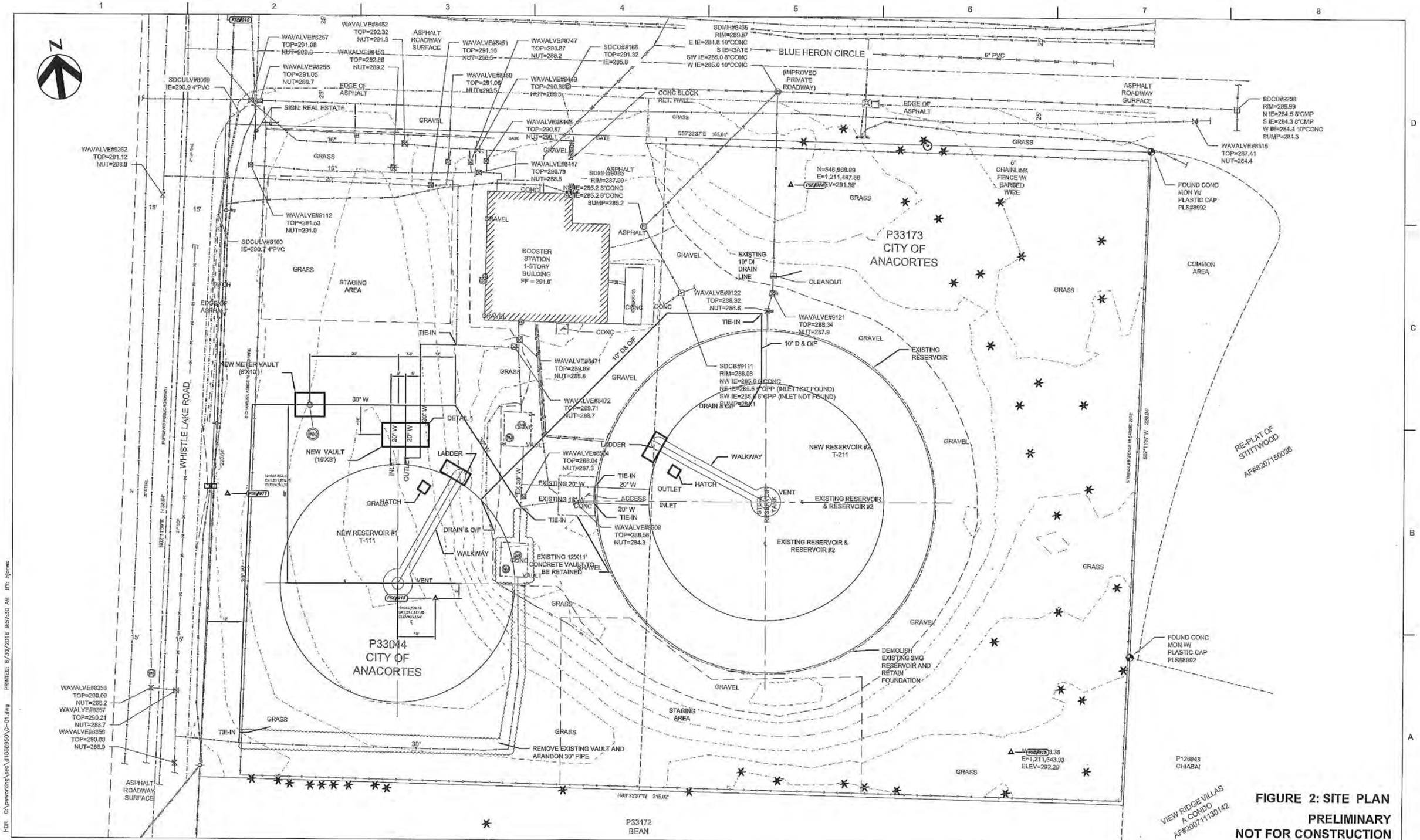


FIGURE 2: SITE PLAN

PRELIMINARY

NOT FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER:
DESIGNED BY:
CHECKED BY:
CAD:
PROJECT NUMBER: -

ANACORTES BLUE HERON CIRCLE RESERVOIR
PROPOSED LOCATIONS FOR NEW RESERVOIRS
AND ASSOCIATED WATER PIPE

0 1" 2"

FILENAME C-01.dwg
SCALE 1" = 30'
SHEET: - OF -

SUBDIVISION GUARANTEE

SCHEDULE A

Liability: $ 10,000.00

Policy No.: SGW08002275

Dated: November 3, 2016 at 8:00 A.M.

Order No.: 01-160157-O
Fee: $300.00
Tax: $25.50

Name of Assured:

CITY OF ANACORTES

The assurances referred to on the face page are:

That, according to those public records which, under the recording laws, impart constructive notice of matters relative to the following described real property:

(See Schedule "A-1," attached.)

Title to said real property is vested in:

THE CITY OF ANACORTES, a municipal corporation

subject to the matters shown below under Exceptions, which Exceptions are not necessarily shown in the order of their priority.

EXCEPTIONS:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records.

2. Unpatented mining claims; reservations or exceptions in the United States Patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.

3. Title to any property beyond the lines of the real property expressly described herein, or title to streets, roads, avenues, lanes, ways or waterways on which such real property abuts, or the right to maintain therein vaults, tunnels, ramps, or any other structure or improvement; or any rights or easements therein unless such property, rights or easements are expressly and specifically set forth in said description.

4. Municipal assessments and impact fees, if any, levied by the City of Anacortes.

5. Easements, restrictions, and other matters shown on Schedule "B-1" attached are also excepted from coverage. The easements, restrictions and other matters shown as lettered exceptions on Schedule "B-1" are excepted from policy coverage to the same extent that the numbered Schedule "B" Special Exceptions shown herein are excepted from policy coverage.

SUBDIVISION GUARANTEE

Order No.: 01-160157-O
Policy No. SGW08002275

SCHEDULE A

EXCEPTIONS CONTINUED:

NOTE #1: Liability for exempt taxes in the event of sale of the property to a taxpayer not entitled to an exempt status. Said taxes may become taxable from the date of execution of a conveyance to a taxable entity and subject to the lien of real property taxes for the balance of year 2016 from the date, and may be further liable for supplemental assessments for general taxes for prior years.

Tax Account Nos.:

350230-0-014-0005 (P33044) ($7,027.28, without exemption)
350230-0-198-0201 (P33173) ($757.70, without exemption)

NOTE #2: EFFECTIVE JANUARY 1, 1997, AND PURSUANT TO AMENDMENT OF WASHINGTON STATE STATUTES RELATING TO STANDARDIZATION OF RECORDED DOCUMENTS, THE FOLLOWING FORMAT AND CONTENT REQUIREMENTS MUST BE MET. FAILURE TO COMPLY MAY RESULT IN REJECTION OF THE DOCUMENTS BY THE RECORDER.

Margins to be 3" on top of first page and 1" on sides and bottom, 1" on top, sides and bottom of each succeeding page. Font size of 8 points or larger, paper size of no more than 8 1/2" by 14". No attachments on pages such as stapled or taped notary seals, pressure seals must be smudged.

INFORMATION WHICH MUST APPEAR ON THE FIRST PAGE

Title or titles of documents. If assignment or reconveyance, reference to auditor's file number of subject deed of trust must be included. Names of grantor(s) and grantee(s) with reference to additional names on following pages, if any. Abbreviated legal description (lot, block, volume/page of plat or section/township/range and quarter section or government lot for unplatted). Assessor's tax parcel number(s). Return address which may appear in the upper left hand 3" top margin.

Pursuant to item c.) above, the abbreviated legal description for the subject property is as follows:

Ptn Gov. Lot 6, 30-35-2 E W.M.

NOTE #3: According to records in the office of the Skagit County Treasurer, the address of the subject property is:

NHN Whistle Lake Road
Anacortes, WA 98221.

NOTE #4: Unless otherwise specified, this Company has assigned this file to the following Underwriter for the policy to issue: Old Republic National Title Insurance Company.

Schedule "A-1"

Order No.: 01-160157-O
Policy No.: SGW08002275

DESCRIPTION:

That portion of Government Lot 6, Section 30, Township 35 North, Range 2 East, W.M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the Southwest corner of said Government Lot 6;
thence East 315 feet;
thence North 355 feet, more or less, to the Southeast corner of that certain tract conveyed to William D. Stitt, et ux, by deed recorded September 22, 1976, under Auditor's File No. 843086, and the true point of beginning;
thence West 165 feet, more or less, to the East line of a tract of land conveyed to the City of Anacortes by deed recorded November 15, 1928, under Auditor's File No. 218072;
thence South along said East line, and said East line extended, 220 feet;
thence East 165 feet to a point South of the point of beginning;
thence North to the point of beginning.

TOGETHER WITH the following Tract:

Beginning at a point 660 feet North of the South ¼ corner of Section 30 and 15 feet East of the center line of said Section 30, Township 35 North, Range 2 East, W.M.;
thence East 150 feet;
thence South 200 feet;
thence West 150 feet;
thence North 200 feet to the point of beginning.

Situate in the County of Skagit, State of Washington.

Schedule "B-1"

Order No.: 01-160157-O
Policy No.: SGW08002275

EXCEPTIONS:

A. MATTERS DISCLOSED BY RECORD OF SURVEY:

Recorded:	November 20, 2003
Auditor's File No.:	200311200096

(Affects a portion of subject property and other lands)

Land Title & Escrow Company

Of Skagit County & Island County

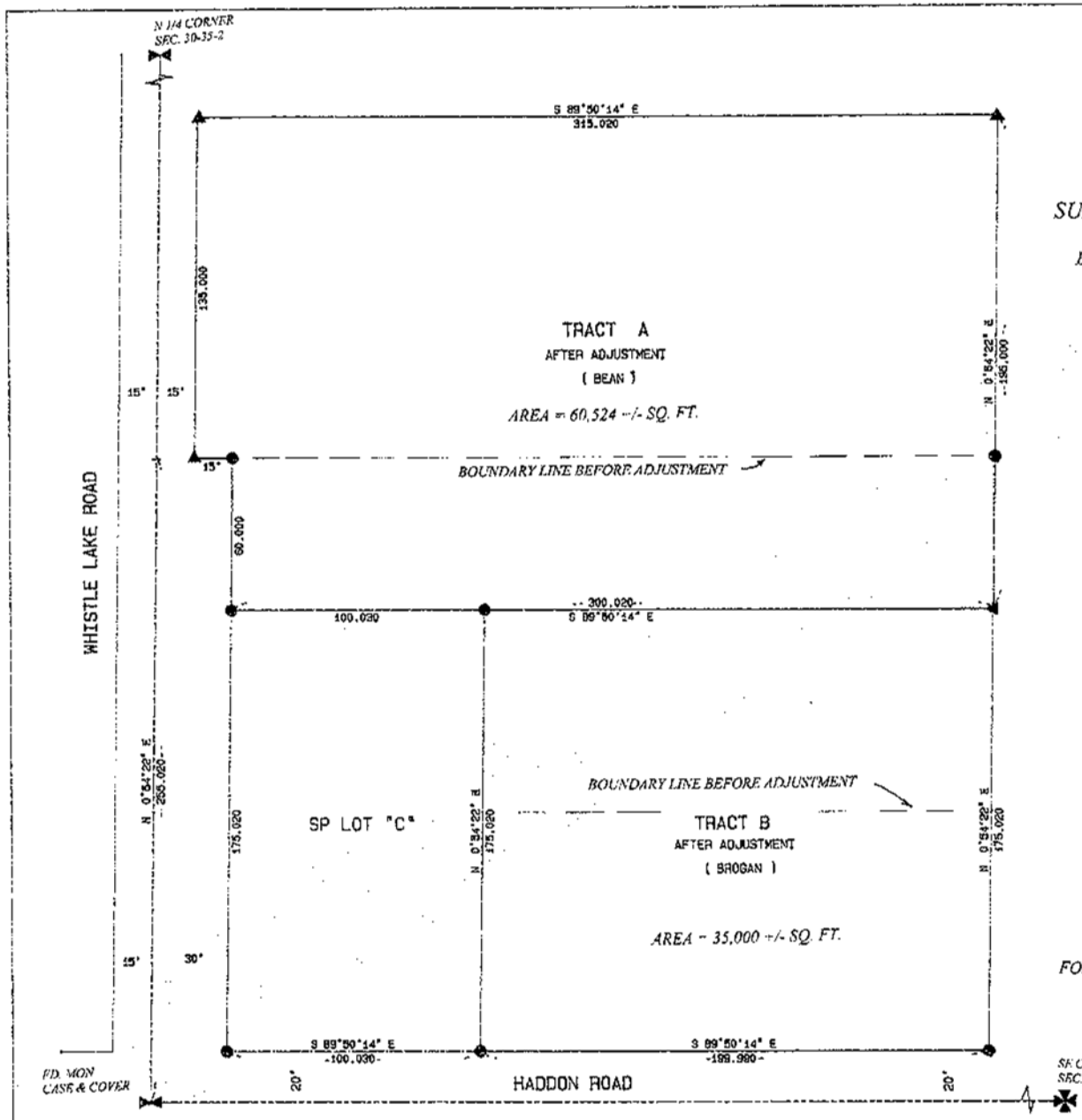
"We deliver results...not just promises"

Order No. 01-160157

This sketch is a courtesy of LAND TITLE AND ESCROW COMPANY to assist in locating the premises. It is not based on a survey, and the Company assumes no liability for variations, if any, in dimensions and locations.

This map does NOT purport to show all highways, roads, or easements affecting the property.

2003 200096
Skagit County Auditor
11/20/2003 Page 1 of 2 10:19AM



SURVEY IN SEC. 30, TWP., 35 N., RNG., 2 E., W. M.

BOUNDARY LINE ADJUSTMENT, ANACORTES, WA.

NOTES:

1. ▲ SET RE-BAR WITH YELLOW CAP # 9569.
2. ● FOUND RE-BAR WITH CAP # 8092.
3. BASIS OF BEARINGS: PLAT OF STITTWOOD
4. SURVEY METHOD: STANDARD FIELD TRAVERSE.
5. EQUIPMENT USED: 5" TOPCON GTS-303 TOTAL STATION.
6. ERROR OF CLOSURE MEETS WASHINGTON STATE STANDARDS.
7. SECTION SUBDIVISION: SEE PLAT OF STITTWOOD DIV. # 2 FILED IN VOLUME 13 ON PAGE 71.
8. THIS SURVEY DOES NOT PURPORT TO SHOW ALL ENCUMBRANCES OR EASEMENTS OTHER THAN THOSE SHOWN ON THIS DRAWING.

SCALE 1" = 30'

0 30' 60' 90'

FOR LEGAL DESCRIPTIONS SEE SHEET # 2

CLAIR A. CROSSMAN
STATE OF WASHINGTON
9569
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES: 12-31-2003

9-02-03

RECORDER'S CERTIFICATE

Filed for record this 20th day of NOV 2003 at 10:19AM
In book - of O/R at page - at the request of:
CLAIR A. CROSSMAN
Surveyor's Name
RECORDS OF SKAGIT CO. AUD.
N. Bonnett Aud. Jane Fraser Dep. Aud.

SURVEYORS CERTIFICATE

This map correctly represents a survey made by me or under my direction in conformance with the requirements of the Survey Recording Act at the request of: BROGAN & BEAN
In AUG 2003
Clair A. Crossman
Certificate No: 9569

CROSSMAN & ASSOC.

LAND SURVEYORS
16146 MCLEAN RD. MT. VERNON, WA.
PHONE (360) 424-7359

B. L. A. SURVEY FOR BROGAN & BEAN

SCALE:	DATE:	JOB NO:
1" = 30'	9-02-03	2003-32
DRAWN BY: SAH	CHKD BY: CAC	SHEET: 1 OF: 2

BOUNDARY LINE ADJUSTMENT
IN THE S. E. 1/4. OF SECTION 30, TWP. 35 N., RNG. 2 EAST, W. M.
ANACORTES, WASHINGTON

TRACT A

LEGAL DESCRIPTIONS AFTER BOUNDARY LINE ADJUSTMENT

That portion of Government Lot 6, Section 30, Township 35 North, Range 2 East, W. M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the southwest corner of said Government Lot 6;
Thence East 315 feet;
Thence north 135 feet more of less to the South line of that certain tract conveyed to the City of Anacortes by deed recorded June 8, 1977, under auditor's file No. 857918, records of Skagit County, Washington;
Thence West along said South line and said South line extended 315 feet;
Thence south 135 feet to the point of beginning.

Together with the North 60 feet of Lot B of Short Plat No. An-83-003, approved August 16, 1983 and recorded in Volume 6 of Short Plats, page 80, records of Skagit County, Washington;

Being a portion of Government Lot 6, Section 30, Township 35 North, range 2 East, W.M.

Situate in the County of Skagit, Washington

TRACT B

Lot A and the the South 80.01 feet of Lot B of Short Plat No. An-83-003, approved August 16, 1983, and recorded in Volume 6 of Short Plats page 80, records of Skagit County Washington.

Being a portion of Government Lot 6, section 30, Township 35 North, Range 2 East, W. M.

Situate in Skagit County, Washington.

CLAIR A. CROSSMAN
STATE OF WASHINGTON
9569
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES: 12-31-2003

9-02-03

TRACT A

LEGAL DESCRIPTIONS BEFORE BOUNDARY LINE ADJUSTMENT

That portion of Government Lot 6, Section 30, Township 35 North, Range 2 East, W. M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the southwest corner of said Government Lot 6;
Thence East 315 feet;
Thence north 135 feet more of less to the South line of that certain tract conveyed to the City of Anacortes by deed recorded June 8, 1977, under auditor's file No. 857918, records of Skagit County, Washington;
Thence West along said South line and said South line extended 315 feet;
Thence south 135 feet to the point of beginning.
Situate in the Skagit County, Washington

TRACT B

Lot A of Short Plat No. An-83-003, approved August 16, 1983, and recorded in Volume 6 of Short Plats page 80, records of Skagit County Washington.

Being a portion of Government Lot 6, section 30, Township 35 North, Range 2 East, W. M.
Situate in Skagit County, Washington

CONSENT:
Know all persons by these presents, that we the undersigned, owners hereby certify that the boundary line adjustment is made as our free and voluntary act and deed.

Harold W. Bean — Rebecca E. Bean
Harold W. Bean — *Rebecca E. Bean*

Jeanneen Brogan
Jeanneen Brogan

Erwin Knapp — Andrine Knapp
Erwin Knapp — *Andrine Knapp*

ACCEPTANCE:
This boundary line adjustment is hereby examined and approved for acceptance this 19 day of November, 2003

Gary Barnett
City Engineer

Tom S. Munce
Subdivision Administrator

STATE OF WASHINGTON
COUNTY OF SKAGIT
On this 14 day of Nov 2003, Before me, the undersigned, a notary public In and for the state of Washington, duly commissioned and sworn, personally appeared.
Harold W. Bean — Rebecca E. Bean
To me known to be the individual (s) described in and who executed the within instrument and acknowledged that they signed and sealed the same as their free and voluntary act and deed for the purposes therein mentioned. Witness my hand and seal hereto affixed the day and year written above.
JoAnn K. Hoover
Notary public residing at: Oak Harbor WA 98277

JOANN L. HOOVER
COMMISSION EXPIRES
NOTARY
PUBLIC
10-9-05
STATE OF WASHINGTON

STATE OF WASHINGTON
COUNTY OF SKAGIT
On this 14 day of Nov 2003, Before me, the undersigned, a notary public In and for the state of Washington, duly commissioned and sworn, personally appeared.
Jeanneen Brogan
To me known to be the individual (s) described in and who executed the within instrument and acknowledged that they signed and sealed the same as their free and voluntary act and deed for the purposes therein mentioned. Witness my hand and seal hereto affixed the day and year written above.
JoAnn K. Hoover
Notary public residing at: Oak Harbor WA 98277

JOANN L. HOOVER
COMMISSION EXPIRES
NOTARY
PUBLIC
10-9-05
STATE OF WASHINGTON

STATE OF WASHINGTON
COUNTY OF SKAGIT
On this 14 day of Nov 2003, Before me, the undersigned, a notary public In and for the state of Washington, duly commissioned and sworn, personally appeared.
Erwin Knapp — Andrine Knapp
To me known to be the individual (s) described in and who executed the within instrument and acknowledged that they signed and sealed the same as their free and voluntary act and deed for the purposes therein mentioned. Witness my hand and seal hereto affixed the day and year written above.
JoAnn L. Hoover
Notary public residing at. Oak Harbor WA 98277

JOANN L. HOOVER
COMMISSION EXPIRES
NOTARY
PUBLIC
10-9-05
STATE OF WASHINGTON

RECORDER'S CERTIFICATE	SURVEYORS CERTIFICATE	CROSSMAN & ASSOC.	B. L. A. SURVEY FOR BROGAN & BEAN
Filed for record this ___ day of ___ 20__ at ___ M in book ___ of ___ at page ___ at the request of: CLAIR A. CROSSMAN (Surveyor's name) RECORDS OF SKAGIT CO. AUD. ___ AUD. ___ DEP. AUD.	This map correctly represents a survey made by me or under my direction in conformance with the requirements of the Survey Recording Act at the request of: BEAN & BROGAN In SEPT. 2003. Clair A. Crossman. Certificate No: 9569	LAND SURVEYORS 16146 MCLEAN RD. MT. VERNON, WA. PHONE (360) 424-7359	SCALE: 1" = 30' DATE: 9-02-03 JOB NO: 2003-32 DRAWN BY: SAM CHKD BY: CAC SHEET: 2 OF: 2

WARRANTY DEED

857918 8164

The Grantor, JOAN ELAINE GRANVILLE, of 4315 Whistle Lake Road, Anacortes, Skagit County, Washington, owning the property hereinafter described as her separate property, for and in consideration of the sum of SIXTEEN THOUSAND DOLLARS ($16,000.00) in hand paid, receipt of which is hereby acknowledged, hereby conveys and warrants unto the CITY OF ANACORTES, a municipal corporation, in Skagit County, Washington, the following described real estate, situated in the County of Skagit, State of Washington, to-wit:

That portion of Government Lot 6, Section 30, Township 35 North, Range 2, East. W.M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the Southwest corner of said Government Lot 6; thence East 315 feet; thence North 355 feet more or less, to the Southeast corner of that certain tract conveyed to William D. Stitt, etux, by deed recorded September 22, 1976, as Auditor's File No. 843086, and the TRUE POINT OF BEGINNING; thence West 165 feet more or less, to the East line of a tract of land conveyed to the City of Anacortes by deed recorded November 15, 1928 as Auditor's File No. 218072; thence South along said East line, and said East line extended, 220 feet; thence East 165 feet to a point South of the Point of Beginning; thence North to the Point of Beginning;

together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in any wise appertaining.

Dated this 26th day of May, 1977.

Joan E. Granville (SEAL)

STATE OF WASHINGTON)
:SS
COUNTY OF SKAGIT)

On this day personally appeared before me JOAN ELAINE GRANVILLE, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that she signed and sealed the same as her free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this 26th day of May,

NOTARY PUBLIC STATE OF WASHINGTON NOV. 11, 19

Notary Public in and for the State of Washington, residing at Anacortes

Received for record at June 1 1977 4:00 P M
at request of Skagit Co. Title
Luella Hosey, Auditor Skagit Co., Washington

SCT

Official Records

857918

VOL 269 PAGE 205

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
OFFICE OF DRINKING WATER
PO Box 47822 • Olympia, Washington 98504-7822
Tel: (360) 236-3100 • Fax: (360) 236-2253 • *TDD Relay Service: 1-800-833-6388*

September 12, 2016

Matt Reynolds
City of Anacortes
904 6th Street
Anacortes, Washington 98221

Re: Determination: No Historic Properties Affected and Area of Potential Effect Identified
Section 106 Cultural Review Process and/or SERP Environmental Review Process
City of Anacortes; Blue Herron Circle 3MG Reservoir Rehabilitation
DWSRF Project # 2015-020
DWSRF Appl. # DM16-952-025
Next Steps: Complete Inadvertent Discovery Plan and Complete SERP

Dear Mr. Reynolds:

The Drinking Water State Revolving Fund (DWSRF) construction loan project must meet all the requirements of the Section 106 of the National Historic Preservation Act and the State Environmental Review Process (SERP). The Department of Health, Office of Drinking Water (the department) has initiated the consultation with Department of Archaeology and Historic Preservation (DAHP) and the tribes.

In order for the City of Anacortes to start any construction activities and receive reimbursement for construction expenditures, the following steps are required:

- The department seeks concurrence from DAHP.
- The department seeks concurrence from tribes.
- The City of Anacortes submits an Inadvertent Discovery Plan (IDP) to the department for approval. The IDP is required and must be on site during all construction activities. Template available upon request.
- The City of Anacortes publishes the determination for a thirty day public comment period. The department will send instructions following the completion of consultation.
- The City of Anacortes submits an Affidavit of Public Notice, a copy of the newspaper clipping, and any public comments received.
- The department issues a Final Completion/Compliance Letter following the completion of the cultural (Section 106) and environmental (SERP) review.

Enclosed are copies of the Determination Letters sent to the DAHP and the Tribal Governments near the project area seeking concurrence of the department's determination of "No Historic Properties Affected."

The tribal governments and DAHP have thirty days to identify and evaluate the possibility of historical and cultural significant sites near the project area prior to moving forward with the public comment period. However, they may enter into consultation at any time during the project.

In order for the City of Anacortes to complete the SERP environmental review, the following steps are required:

- The City of Anacortes completes the State Environmental Policy Act (SEPA) process and submits determination and supporting documentation to the department for review.
- The City of Anacortes publishes the SEPA determination in the local newspaper for a thirty day public comment period.
- The City of Anacortes submits an Affidavit of Public Notice, a copy of the newspaper clipping, and all comments received.
- The department issues a Final Completion/Compliance Letter following the completion of the cultural (Section 106) and environmental (SERP) review.

As a reminder, you are not allowed to go to construction, bid, or receive reimbursement for any construction expenditures until you complete the cultural and environmental reviews. Upon completion you will be notified with a final completion letter from our office. If any construction occurs prior to receiving the final completion letter, all federal and state funds may be in jeopardy.

If you have any questions regarding the above process, please do not hesitate to contact me at 360-236-3106 or via e-mail at DWSRF@doh.wa.gov. Thank you for your attention to this matter.

Sincerely,

Heather Walker
Cultural Resources Coordinator

Enclosures (10)

LAND USE

OCT 25 2016

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants: [help]

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision- making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals: [help]

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. BACKGROUND

1. Name of proposed project, if applicable:

Blue Heron Reservoir Replacement Project

2. Name of applicant:

City of Anacortes Public Works Department

3. Address and phone number of applicant and contact person:

Address:	City of Anacortes Public Works Department 904 6th Street Anacortes, WA 98221
Contact:	Matt Reynolds
Phone:	(360) 299-1951
Email:	mattr@cityofanacortes.org

4. Date checklist prepared:

October 14, 2016

5. Agency requesting checklist:

City of Anacortes

6. Proposed timing or schedule (including phasing, if applicable):

Construction of the project would begin in February 2017 and be completed in June 2018. The project would be constructed in three phases. During the first phase, a new 1.5-million-gallon (MG) reservoir would be constructed to the west of the existing reservoir along with supporting piping and vaults and be put into service. Then, during the second phase, the existing 3.0 MG reservoir would be demolished. The third phase includes construction of a second 1.5 MG reservoir at the location of the existing reservoir, along with revegetation and other activities.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No future plans or additions are anticipated for this proposal in the near future.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

The following environmental information has been prepared:

- Environmental Review Technical Memorandum (HDR 2016)
- Cultural Resources Review (Drayton Archaeology 2016)
- Structural Inspection, Analysis, and Recommendations Report (Gray & Osborne, Inc. 2011)

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No governmental approvals are currently pending for this property.

10. List any government approvals or permits that will be needed for your proposal, if known.

The following government approvals or permits are anticipated for this proposal:

City of Anacortes:

- SEPA Threshold Determination
- Conditional Use Permit
- Variance (height)
- Grade & Fill Permit
- Demolition Permit
- Building Permit

Washington State Department of Health (DOH):

- Section 106 Compliance (DOH is lead agency)
- Construction Documents (90%) approval

Washington State Department of Labor & Industries:

- Electrical Permit

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Project Description

This project would replace the City of Anacortes' existing Blue Heron Circle drinking water reservoir (3.0 MG, 115-foot-diameter water storage tank) with two new steel reservoirs, each 80-feet-diameter holding 1.5 MG. This replacement is necessary due to structural deficiencies of the existing reservoir. The project would also include new piping and associated equipment. The project site is approximately 1.6 acres.

First, a new 1.5 MG reservoir would be constructed to the west of the existing reservoir along with supporting piping and vaults and be put into service. Then, the existing 3.0 MG reservoir would be demolished. Lastly, a second 1.5 MG reservoir would be constructed at the location of the existing reservoir.

Work activities include site preparation, material storage and staging, site grading, gravel and foundation installation, construction of the reservoirs, installation of approximately 500 linear feet of new yard piping and valving, and associated telemetry and controls. After construction, the site would be restored with finished grading and re-vegetated with grass. Changes to existing fencing, booster station building, and generator are not anticipated.

Overview of City Water System
The City of Anacortes (City) operates four finished drinking water reservoirs that serve the City's distribution system. The existing 3.0 MG water storage reservoir located at Blue Heron Circle in Anacortes is one of the City's key water distribution system assets. The City's transmission mains terminate at this reservoir, which provides for operational, emergency, and fire storage and also provides critical pressure buffering to prevent surges from flow variations to the City's wholesale customers that have connections upstream of the reservoir. Finished water from the 3.0 MG reservoir also supplies two 2.0 MG reservoirs, one at 29th Street and the other at Skyline, which provide operational, emergency and fire storage for higher pressure zones. The fourth distribution reservoir is a 30,000-gallon tank that serves the Fidalgo Bay Estates area. Almost all finished water entering the City's distribution system passes through the Blue Heron Circle reservoir and the entire water supply system cannot be easily operated without a reservoir at the terminus of the transmission mains.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The proposed project is located at 301 Blue Heron Circle in Anacortes, WA (Parcel P33044). The site is located in Section 30, Township 35 North, Range 02 East. See Figure 1 for a vicinity map. Legal description: (0.9400 ac) TR 150X270 IN S1/2 OF W 20RDS LOT 6-93A C

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site
(circle one): (Flat,) rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)?

The steepest slope on the site is at the existing berm in the south-central portion of the site (approximately 5 percent slope).

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

According to the Natural Resources Conservation Service[1], soils in the project area have been mapped as Keystone loamy sand 0 to 8 percent slopes. The Keystone series consists of very deep, somewhat excessively drained soils. There are no agricultural soils or lands of long-term commercial significance on-site.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Based on a site visit by HDR in September 2016, there are no surface indications or history of unstable soils in the immediate vicinity.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Approximately 2,500 cubic yards of excavation and approximately 500 cubic yards of fill are proposed for the project. The source of fill would be from on-site excavated materials and approved borrow pits, as applicable. Excess excavated materials would be disposed of at an approved location.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Minor surface erosion could occur as a result of construction activities and vegetation removal in the project area. Applicable best management practices (BMPs) and temporary erosion and sediment control measures (see Item B.1.h) would be implemented.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 38 percent of the site would be covered with impervious surfaces after project construction, an increase of approximately 14 percent from current levels due to installation of a new gravel access pad.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Temporary erosion and sediment control measures would be employed during construction, following the guidance and requirements in the *Stormwater Management Manual for*

[1] Available online at http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Western Washington (Ecology 2012). An Erosion and Sedimentation Control (ESC) Plan would be implemented to address erosion control during and after construction. The ESC Plan would include directing runoff away from unstabilized soils, slowing runoff with structures, and installing silt fencing to catch particulates.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe approximate quantities if known.

Short term, temporary air emissions such as vehicle exhaust and fugitive dust may occur during construction from equipment.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odor that may affect this proposal.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

BMPs such as requiring proper maintenance of equipment, avoiding prolonged idling of vehicles, and spraying water to minimize dust would be used as needed to reduce or control emissions during construction.

3. **Water**

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There are no surface water bodies on or near the proposed project site.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Not applicable; there are no surface water bodies on or near the site.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Not applicable; there are no surface water bodies on or near the site.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Not applicable; there are no surface water bodies on or near the site.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Per FEMA Map Panel[2] 5303170080A, effective 09/17/2003, no part of the proposed project area lies within a 100-year floodplain.

6) **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No discharge of waste materials to surface waters is proposed as part of this project.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No groundwater would be withdrawn as part of the proposed project.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material would be discharged into the ground from septic tanks or other sources.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

The main source of runoff during and after construction would be rainfall. On-site infiltration is poor.

2) Could waste materials enter ground or surface waters? If so, generally describe.

There are no known sources of waste materials that would occur as a result of this project that may enter ground or surface waters.

[2] Available online at https://msc.fema.gov/portal

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

While the overall project footprint is larger than existing, it is not anticipated to alter or otherwise affect drainage patterns in the vicinity of the site.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

A new tie-in is proposed to the existing drainage pipe in Blue Heron Circle. On-site stormwater improvements are planned, including pipes and drainage swales to collect runoff from impervious surfaces. This would provide detention prior to stormwater entering the drainage pipe.

4. **Plants**

a. Check the types of vegetation found on the site:

_____deciduous tree: alder, maple, aspen, other
_x_____evergreen tree: fir, cedar, pine, other
_____shrubs
_x_____grass
_____pasture
_____crop or grain
_____Orchards, vineyards or other permanent crops.
_____wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
_____water plants: water lily, eelgrass, milfoil, other
_____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Some grass/lawn would be removed for construction of the new 1.5 MG reservoir. No trees would be removed.

c. List threatened and endangered species known to be on or near the site.

No endangered or threatened plant species are known to occur on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Disturbed areas would be reseeded with grass/lawn.

e. List all noxious weeds and invasive species known to be on or near the site.

No noxious weeds or invasive species are known to be on or near the proposed site.

5. **Animals**

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other _____

b. List any threatened and endangered species known to be on or near the site.

No endangered species are known to occur on or near the site.

c. Is the site part of a migration route? If so, explain.

The project area lies within the Pacific Flyway, an avian migratory corridor of western coastal areas of South, Central and North America.

d. Proposed measures to preserve or enhance wildlife, if any:

No measures to preserve wildlife are proposed.

e. List any invasive animal species known to be on or near the site.

No invasive animal species are known to be on or near the project site.

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The existing site power supply would continue to be used for electricity. The power supply is used to power the existing booster station building and for lighting, heating, and plant controls.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The proposed project would not affect the potential use of solar energy by adjacent properties. Height of the proposed reservoirs would be similar to that of the existing reservoir.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

No energy conservation features are proposed.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

The existing reservoir coating contains lead.

1) Describe any known or possible contamination at the site from present or past uses.

There is an oiled sand layer under the bottom of the existing 3.0 MG reservoir which would be removed during demolition and disposed of at an acceptable off-site location.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

There are no existing hazardous chemicals or conditions that might affect project development and design. According to the Washington Utilities and Transportation Commission Pipeline Safety Map Viewer[3], there are no underground pipelines within the project area or vicinity.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

No toxic or hazardous chemicals may be stored, used, or produced during construction or operations.

4) Describe special emergency services that might be required.

No special emergency services are anticipated for the proposed project.

5) Proposed measures to reduce or control environmental health hazards, if any:

Demolition workers would have Lead Awareness Training. Materials would be disposed of and/or recycled in an appropriate manner.

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

There are no known existing noises in the area that may affect the proposed project.

[3] Available online at http://www.utc.wa.gov/regulatedIndustries/transportation/pipeline/Pages/pipelineMaps.aspx

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short-term construction noise impacts would occur from construction equipment and vehicles in the project area. Construction would occur during allowable construction hours, generally from 7 a.m. to 5 p.m.

3) Proposed measures to reduce or control noise impacts, if any:

Per the City's Municipal Code 17.54.010 Noise Ordinance[4], construction noise levels would not exceed standards established by the State in Chapter 173-60 Washington Administrative Code[5].

8. **Land and shoreline use**

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

The current use of the site is water system/reservoir. Land uses adjacent to the proposed project site include residential and cemetery.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The proposed project site is not a working farm or forest land. It is unlikely that the land was historically a working farm.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

The proposed project would not affect or be affected by surrounding working farm or forest land normal business operations.

c. Describe any structures on the site.

The site currently contains a 46-foot-tall, 3.0 MG reservoir, a booster station building, and perimeter fence.

[4] Available online at https://www.municode.com/library/wa/anacortes/codes/code_of_ordinances?nodeId=TIT17ZO_CH17.54STEN_17.54.010NO
[5] Available online at http://apps.leg.wa.gov/WAC/default.aspx?cite=173-60&full=true

d. Will any structures be demolished? If so, what?

The current 3.0 MG reservoir would be demolished and replaced with two 1.5 MG reservoirs as the existing tank no longer meets current seismic construction standards.

e. What is the current zoning classification of the site?

Per the City of Anacortes' Zoning Map[6], the site is zoned Public.

f. What is the current comprehensive plan designation of the site?

The comprehensive plan designation of the site is also Public.

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable; the site is not regulated under the Shoreline Master Program.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

There are no critical areas on-site.

i. Approximately how many people would reside or work in the completed project?

Occasionally there would be workers on-site for maintenance and operation activities. No one would reside in the completed project.

j. Approximately how many people would the completed project displace?

No one would be displaced by this project.

k. Proposed measures to avoid or reduce displacement impacts, if any:

As displacement would not occur, mitigation measures are not proposed.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Public use (water system/reservoir) of the site would continue and is compatible with surrounding land uses. Public utility facilities are allowed in the Public zone as a Conditional Use.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

Not applicable; there are no nearby agricultural or forest lands of significance.

[6] Available online at http://www.cityofanacortes.org/Maps/2016%20Zoning%20Map%20GIS.pdf

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

No housing units would be provided by the proposed project.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

No housing units would be eliminated by the proposed project.

c. Proposed measures to reduce or control housing impacts, if any:

As housing impacts would not occur, mitigation measures are not proposed.

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The tallest structures would be the two reservoirs, at approximately 50 feet tall. A Variance is required as the maximum building height in the Public zone is 35 feet.

The reservoirs would be made of steel. The reservoir would be painted with a suitable color to blend in with the surroundings.

b. What views in the immediate vicinity would be altered or obstructed?

No views would be altered or obstructed.

c. Proposed measures to reduce or control aesthetic impacts, if any:

As aesthetic impacts are not anticipated, mitigation measures are not proposed.

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Existing lighting, necessary for safety, would continue after project completion.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Light or glare would not be a safety hazard or interfere with views. On-site lighting is directed downward. Low output safety lighting would be installed near the ground level of each reservoir.

c. What existing off-site sources of light or glare may affect your proposal?

No off-site light or glare sources would affect this project.

d. Proposed measures to reduce or control light and glare impacts, if any:

As light and glare impacts are not anticipated, mitigation measures are not proposed.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

There are no recreational opportunities in the immediate project vicinity.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The proposed project would not displace any existing recreational uses.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

As impacts on recreation would not occur, mitigation measures are not proposed.

13. **Historic and cultural preservation**

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe.

No buildings, structures or sites 45 years old in or eligible for listing in national, state or local preservation registers are located on the project site.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

Drayton Archaeology conducted a cultural resources assessment for this project (Drayton 2016). No evidence of pre-contact or historic archaeological deposits was encountered.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Determining the probability for historic properties to be present within the project area was based largely upon review and analysis of past environmental and cultural contexts and previous cultural resources studies and sites recorded within one-mile of the project area. Consulted sources included reviewing local geologic data to better understand the depositional environment; archaeological, historic and ethnographic records on file on the Washington Information System for Architectural and Archaeological Records Data (WISAARD) database; and selected published local historic records.

Field investigation included pedestrian survey and subsurface testing.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

As proposed the project does not appear to have the potential to affect any cultural resources, additional professional archeological oversight is not recommended by Drayton Archaeology.

14. **Transportation**

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The site is located at the southeastern corner of the intersection of Whistle Lake Road and Blue Heron Circle (see Figures 1 and 2). The site is accessed via Blue Heron Circle.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

The site and surrounding area is not currently served by public transit. The closest transit station is R Avenue/33rd Street bus stop (approximately 1/3-mile from the site).

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

The proposed project would not create nor eliminate any parking spaces.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

The proposed project site would not require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The proposed site would not use or occur near water, rail, or air transportation.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

No additional vehicular trips would be generated from this project.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

It is not anticipated that the proposed project would affect or be affected by the movement of agricultural and forest products on roads or streets in the area.

h. Proposed measures to reduce or control transportation impacts, if any:

As transportation impacts are not anticipated, mitigation measures are not proposed.

15. **Public services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

The project would not increase the need for public services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

As impacts on public services would not occur, mitigation measures are not proposed.

16. **Utilities**

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

Electricity would be provided by the existing site power supply. Other existing utilities would continue to be used.

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

C. SIGNATURE

I certify (or declare) under penalty of perjury under laws of the State of Washington that the above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make a decision.

Signature: _____

Name of signee G. MATT REYNOLDS

Position and Agency/Organization Assistant Public Works Director / City of Anacortes

Date Submitted: 10/18/16

HDR

FIGURE 1
PROJECT VICINITY

PATH: G:\PROJECTS\WASHINGTON\CITY_OF_ANACORTES_0077041\BLUE_HERON_CIRCLE_RESERVOIR_1003007117.2_WP\MAP_DOCS\VICINITY.MXD - USER: MDALZELL - DATE: 9/16/2016

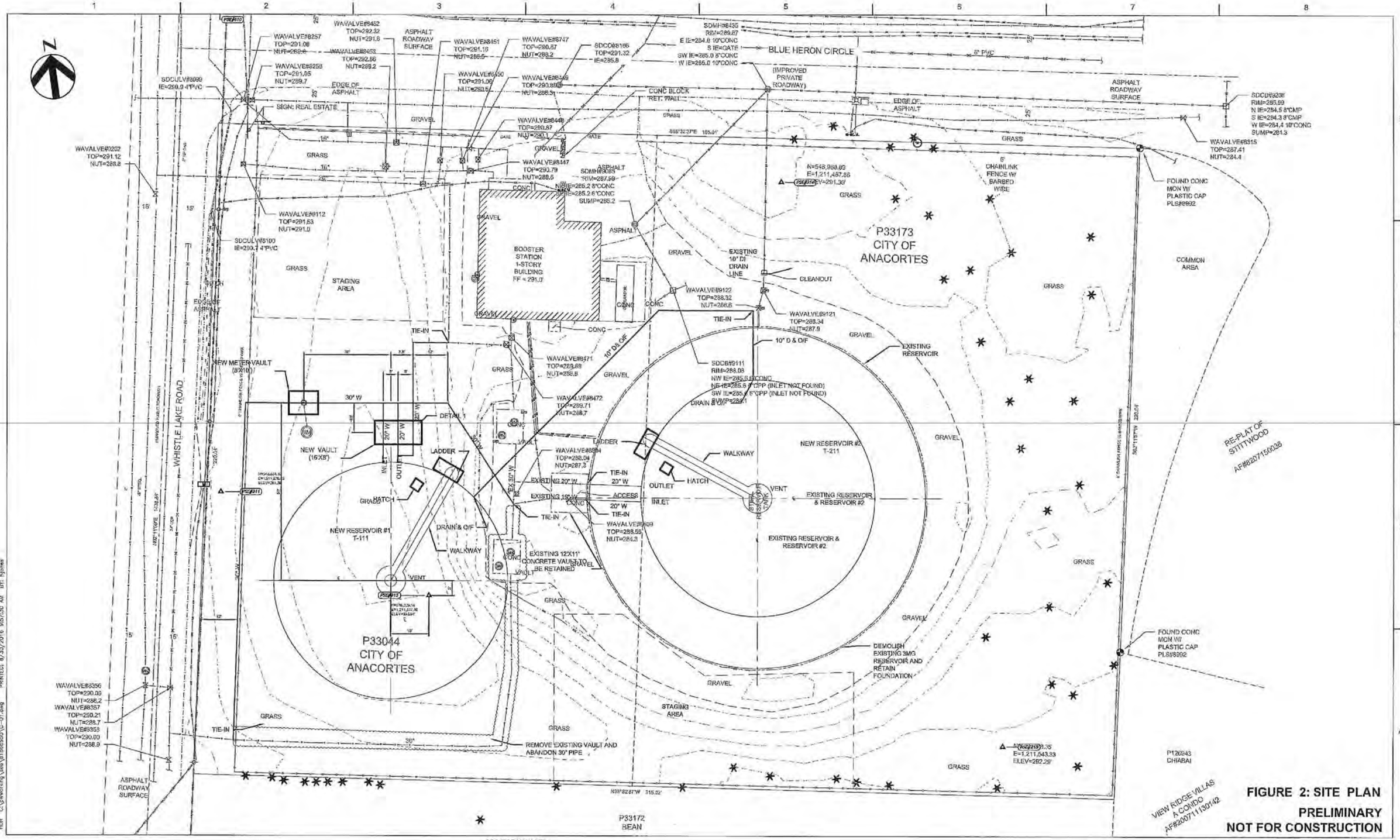


FIGURE 2: SITE PLAN

PRELIMINARY

NOT FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER:	
DESIGNED BY:	
CHECKED BY:	
CAD:	
PROJECT NUMBER:	-

ANACORTES BLUE HERON CIRCLE RESERVOIR
PROPOSED LOCATIONS FOR NEW RESERVOIRS AND ASSOCIATED WATER PIPE

0 1" 2"

FILENAME C-01.dwg

SCALE 1" = 30'

SHEET: - OF -

ANACORTES PUBLIC WORKS DEPARTMENT

P.O. BOX 547, ANACORTES, WA 98221
FRED BUCKENMEYER, P.L.S., DIRECTOR

PH (360) 293-1919
FAX (360) 293-1938
E-MAIL: fredb@cityofanacortes.org

October 18, 2016

RECEIVED
OCT 25 2016

City of Anacortes
Don Measamer, Director
Planning and Community Development

RE: Conditional Use Permit Application - 3mg Water Tank

Dear Mr. Measamer,

Please accept the attached warranty deeds for 4315 Whistle Lake Road and the abutting parcel as evidence of the cities ownership of both parcels where the City of Anacortes 3mg water tank is situated.

As you are aware, the city has maintained ownership of these parcels for a number of years. Per your request, we will be pursuing a boundary line adjustment for both of the referenced parcels in the future.

Sincerely,

CITY OF ANACORTES

Fred Buckenmeyer
Public Works Director

WARRANTY DEED

857918

8164

The Grantor, JOAN ELAINE GRANVILLE, of 4315 Whistle Lake Road, Anacortes, Skagit County, Washington, owning the property hereinafter described as her separate property, for and in consideration of the sum of SIXTEEN THOUSAND DOLLARS ($16,000.00) in hand paid, receipt of which is hereby acknowledged, hereby conveys and warrants unto the CITY OF ANACORTES, a municipal corporation, in Skagit County, Washington, the following described real estate, situated in the County of Skagit, State of Washington, to-wit:

That portion of Government Lot 6, Section 30, Township 35 North, Range 2, East, W.M., described as follows:

Beginning at a point 15 feet East and 255 feet North of the Southwest corner of said Government Lot 6; thence East 315 feet; thence North 355 feet more or less, to the Southeast corner of that certain tract conveyed to William D. Stitt, etux, by deed recorded September 22, 1976, as Auditor's File No. 843086, and the TRUE POINT OF BEGINNING; thence West 165 feet more or less, to the East line of a tract of land conveyed to the City of Anacortes by deed recorded November 15, 1928 as Auditor's File No. 218072; thence South along said East line, and said East line extended, 220 feet; thence ~~East~~ West 165 feet to a point South of the Point of Beginning; thence ~~North~~ South to the Point of Beginning;

together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in any wise appertaining.

Dated this 26th day of May, 1977.

Joan E. Granville (SEAL)

STATE OF WASHINGTON)
ss
COUNTY OF SKAGIT)

On this day personally appeared before me JOAN ELAINE GRANVILLE, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that she signed and sealed the same as her free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this 26th day of May, 1977.

NOTARY PUBLIC

Notary Public in and for the State of Washington, residing at Anacortes

RECEIVED THIS 7th DAY OF June 1977 AT 11:09 AM
AT REQUEST OF Skagit Co. Title
LUCIA OWEN, AUDITOR SKAGIT CO. WASHINGTON

SCT

Official Records

857918

VOL. 269 PAGE 205

218072

WARRANTY DEED.

THE GRANTOR, Ernest L. Knapp and M. J. Knapp, his wife, for a valuable consideration in hand paid, receipt whereof is hereby acknowledged, by these presents convey and warrant to the City of Anacortes a municipal co poration of Anacortes, Washington, the following described parcel of land, situated in Skagit County, State of Washington to-wit:

> Beginning at a point 660 feet north of the south quarter corner of Section 30 and 15 feet east of the center line of said Section 30, Township 35 North, Range two east of W.M. thence east 150 feet; thence south 200 feet; thence west 150 feet; thence north 200 feet to place of beginning, containing .69 of an acre.

This conveyance is made for the purpose of correcting a description contained in a former conveyance by the Grantors herein to the Grantee herein, which former deed is dated October 20th, 1924, and recorded in the Volume 139 of deeds at page 611 records of Skagit County, Washington, and in which said former deed an error occured in the description.

Dated this 5th day of ~~July~~ August, 1928.

Ernest L Knapp

Martha J. Knapp

STATE OF WASHINGTON)
ss
County of Skagit)

This is to certify that on this 5th day of ~~July~~ August, 1928, before me, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared Ernest L. Knapp and M. J. Knapp, his wife to me known to be the individuals described in and who executed the within instrument, and acknowledged to me that they signed and sealed the same as their voluntary act and deed for the uses and purposes therein mentioned.

WITNESS my hand and official seal this 5th day of August 1928.

Bert Dittmer

Notary Public in and for the State of Washington, residing at Anacortes

CITY OF ANACORTES

SKAGIT COUNTY, WASHINGTON

3 MG RESERVOIR AT 301 BLUE HERON CIRCLE INSPECTION, ANALYSIS, AND RECOMMENDATIONS REPORT

RUSSELL L. PORTER
STATE OF WASHINGTON
35688
REGISTERED
PROFESSIONAL ENGINEER
11/28/11

MYRON J. BASDEN
STATE OF WASHINGTON
46334
REGISTERED
PROFESSIONAL ENGINEER
11/28/11

G&O #11548
NOVEMBER 2011

Gray & Osborne, Inc.
CONSULTING ENGINEERS

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
Inspection Findings 1
Structural Analysis 1
Recommendations for Repair and Recoating 1
Cost and Schedule Estimates 2
INTRODUCTION 3
RESERVOIR INSPECTION 3
Overview 3
Corrosion Definitions 3
Columns 4
Girders 4
W8 Beams 5
W10 Beams 6
Angle and Bar 7
Roof Plate 7
STRUCTURAL ANALYSIS 8
General Description 8
Summarized Results 8
Discussion and Recommendations – Roof Members 8
Discussion and Recommendations – Shell Plates 9
Discussion and Recommendations – Angle and Bar Members Spanning Between Roof Beams 10
RECOMMENDATIONS FOR REPAIR AND RECOATING 11
Overview 11
Replacement of corroded bolts 11
Repair of Roof Beams 11
Seal Welding 12
Improved Reservoir Access and Ventilation 12
Reservoir Coating 13
COST AND SCHEDULE ESTIMATES 15

LIST OF TABLES

No.	Tables	Page
1	Summary of Results	8
2	Analysis Summary for Shell Plates Subjected to Full Reservoir and Earthquake Forces Required by AWWA D100-11	9
3	Schedule Estimate	15

LIST OF FIGURES

No.	Figures	
1	Top of Center Column	Appendix B, pg. 1
2	Top of an Intermediate Column and Bearing Point of W16 Girders	Appendix B, pg. 1
3	Connection at Top of W16 Girders	Appendix B, pg. 2
4	Wide View of W16 Girders	Appendix B, pg. 2
5	Top of W16 Girder Near a W8 Connection	Appendix B, pg. 3
6	W8 Beams	Appendix B, pg. 3
7	W8 Beams	Appendix B, pg. 4
8	W8 Beams	Appendix B, pg. 4
9	W8 Beam	Appendix B, pg. 5
10	W8 Beam at W16 Support Girder	Appendix B, pg. 5
11	W8 Connection to W16	Appendix B, pg. 6
12	W8 Connection to W16	Appendix B, pg. 6
13	W10 Beams	Appendix B, pg. 7
14	Bottom Flange of a W10 Beam	Appendix B, pg. 7
15	Bottom Flange of a W10 Beam	Appendix B, pg. 8
16	Bottom Flange of a W10 Beam with Rust "Laminations"	Appendix B, pg. 8
17	Web and Flange Corrosion in a W10 Beam	Appendix B, pg. 9
18	W10 Beam Near Perimeter of Tank	Appendix B, pg. 9
19	W10 Beam Near Perimeter of Tank	Appendix B, pg. 10
20	W10 Connection to Tank Shell	Appendix B, pg. 10
21	Significant Corrosion at a W10 Beam	Appendix B, pg. 11
22	Significant Corrosion at a W10 Beam	Appendix B, pg. 11
23	Significant Corrosion at a W10 Beam	Appendix B, pg. 12
24	Significant Corrosion at a W10 Beam	Appendix B, pg. 12
25	Significant Corrosion at a W10 Beam	Appendix B, pg. 13
26	Underside of Bottom Flange of a W10 Beam	Appendix B, pg. 13
27	Significant Bottom Flange Corrosion of a W10 Beam	Appendix B, pg. 14
28	Steel Bar Running Between W8 Beams	Appendix B, pg. 14
29	Steel Angle Running Between W10 Beams	Appendix B, pg. 15

No.	Figures

30 Example of Gap Between Top of Beam and Underside of Roof Plate ..... Appendix B, pg. 15
31 Typical Roof Plate Condition Near Center of Reservoir ..... Appendix B, pg. 16
32 Typical Roof Plate Condition Near Center of Reservoir ..... Appendix B, pg. 16
33 Typical Roof Plate Condition Near Perimeter of Reservoir ..... Appendix B, pg. 17
34 Typical Roof Plate Condition Near Perimeter of Reservoir ..... Appendix B, pg. 17
35 Typical Roof Plate Condition Near Perimeter of Reservoir ..... Appendix B, pg. 18
36 Example of Pitting on Underside of Roof Plate ..... Appendix B, pg. 18
37 Reservoir with Spiral Access Stairway ..... Appendix B, pg. 19
38 Existing Roof Framing Plan ..... Appendix B, pg. 20
39 Recommended Repair at Top of W8 and W10 Roof Support Beams (Section) ..... Appendix B, pg. 21
40 Recommended Repair at Bottom Flange of W10 Roof Support Beams (Section) ..... Appendix B, pg. 22

APPENDICES

Appendix A – Cost Estimate
Appendix B – Figures 1 through 40
Appendix C – Structural Calculations
Appendix D – Paint Lead Test Results

EXECUTIVE SUMMARY

In September 2011, an inspection of interior surfaces of the roof was completed for the City of Anacortes Blue Heron Circle Reservoir. This report includes findings from the inspection, results of structural analysis of the tank, and recommendations for repair and recoating.

This executive summary presents an overview of findings in this report. Full details including inspection documentation, calculations, analysis, cost estimates, and other data are found in the report and appendices.

INSPECTION FINDINGS

Many areas were found to have minor corrosion that has not impacted the strength of steel members and can be remedied by proper preparation and recoating. However, some steel beams have significant bottom flange corrosion which has diminished their structural strength and will require repair. Some bolts are heavily corroded and will require replacement. In addition, the inspection confirmed that the beam to roof plate joint and the bottom of roof plate lap joints were not seal welded and are corroding.

STRUCTURAL ANALYSIS

Structural calculations were performed to check the compliance of the existing reservoir with AWWA D100-11. Shell plates of the reservoir were found to be overstressed when subjected to earthquake loads required by the current code. The report provides three options for addressing this issue. Roof plate and roof beams were found to be acceptable. Steel bars and angles spanning between roof beams were found to be unnecessary and may be have been used to facilitate beam layout during original construction of the reservoir.

RECOMMENDATIONS FOR REPAIR AND RECOATING

Recommended repairs are intended to restore the full strength of elements damaged by corrosion and to protect the reservoir from future corrosion damage. Corroded bolts should be replaced, and corroded bottom flanges of some beams should be repaired as necessary. Seal welding is recommended at the underside of all lap joints of roof plate, and at the gap between roof plates and supporting roof beams. Seal welding protects those hidden surfaces where one steel member is in contact with another. Steel bars and angles spanning between roof beams should be removed to decrease the gap between roof plates and supporting roof beams. There are several reservoir access and ventilation upgrades that could be implemented as part of the repair and recoating project, depending on City preference. Both the interior and exterior of the reservoir should be sandblasted to bare metal and recoated. The existing coating systems have been found to contain lead so sandblasting methods and the disposal of debris will need to be in accordance with state regulations.

COST AND SCHEDULE ESTIMATES

The estimated construction cost for recommended work is $1.72 million, not including the seismic upgrades. An alternative to repairing and seal welding the existing roof would be to remove and replace the roof. Based on our discussions with reservoir erection contractors, we have found it is less expensive to repair the existing reservoir roof rather than replace it. The total required time for repairs and recoating is estimated to be 22 weeks. The interior repair and recoating may be completed separately and prior to the exterior recoating if needed to accommodate keeping the reservoir in service during the high-demand summer months.

INTRODUCTION

On September 16, 2011, Gray & Osborne entered the existing 3 MG Reservoir at 301 Blue Heron Circle and performed an inspection of the roof structure. A previous inspection was performed by Liquivision Technology Diving Services in 2009. This inspection found the floor, walls and column of the reservoir to be good condition, but revealed significant corrosion of roof members. The goal of our inspection on September 16, 2011, was to better understand the extent and severity of the corrosion of the roof members so that we can provide the City with specific recommendations regarding repair of the roof structure.

This report includes the following, as mentioned in our Scope of Work for this project:

- Detailed observations and photos from the reservoir inspection.
- Structural analysis of all significant structural members for compliance with AWWW D100-11.
- Specific recommendations for repair, recoating, and modifications.
- Cost estimates for repair, recoating, and modifications.
- Technical appendices providing structural calculations.

This inspection was limited to steel members above the waterline. The inspection focused on roof members.

RESERVOIR INSPECTION

OVERVIEW

In general, we observed greater frequency and severity of corrosion at the perimeter of the reservoir than at the center of the reservoir. The corrosion ranged from minor surface scaling to localized pitting to partial loss of bottom flange material in "I" beams. However, we did not observe any significant risk of imminent collapse. Even in the most heavily corroded areas it appeared the primary support beams retained at least a majority of their structural capacity, and could be repaired to restore their full capacity. We observed heavy condensation on all above-water surfaces in the tank.

More detail of our observations is included in the following sections.

CORROSION DEFINITIONS

The following terms are used in this report to describe observed corrosion:

Surface Rust – A superficial layer of rusting not causing any practical loss of steel material. This level of rust requires only sandblasting prior to recoating.

Moderate Corrosion – Discrete areas of corrosion with rust growths that can be removed by hand. The thickness of the steel member has been slightly reduced by the corrosion. In some cases, removal of rust growths reveals small irregular pits in the steel member. A structural repair of the steel member may be required at some locations.

Severe Corrosion – Continuous or nearly continuous large rust growths along a member. Rust growths can be easily removed by hand, and reveal significant loss of steel material. Pitting of the steel is commonly found under rust growths. Structural repair of the steel member is likely required.

COLUMNS

We observed one steel pipe column at the center of the reservoir and a ring of six steel pipe columns evenly spaced at a radius of approximately 30-feet from the center of the reservoir. This matches the layout shown in the shop drawings. See Figure 38 for a plan drawing of the roof members in the reservoir, including the pipe columns.

Representative photographs of the columns are shown in Figures 1 and 2. Our observations included the following:

- The visible portion of the center column protruding above the water line appeared to be in good condition with no visible corrosion. This included the flared out section at the top of the column which supports the radial beams (Figure 1).
- The 6 evenly spaced steel pipe columns protruded above the waterline and appeared to be in good condition (Figure 2).
- The bearing plate at the top of the columns showed surface rusting, but appeared to maintain virtually all of its structural integrity (Figure 2).

GIRDERS

We observed six 16-inch-deep steel "I" girders spanning to the tops of the six evenly spaced pipe columns. These are the W16 x 40 girders shown in the shop drawings, and they are called out in the plan drawing in Figure 38. These girders form a circle at a radius roughly equal to 30 feet and they provide support for the roof beams running in the radial direction.

The W16 girders appeared to be in overall good condition with minor surface rusting at some locations. Figures 2 through 5 show the typical condition of the W16 girders. Our observations included the following:

- The bearing points of the W16 girders at the top plate of the supporting column showed surface rust, but there did not appear to be any loss of structural integrity (Figure 2).

- Bolted plates connecting the tops of the ends of the W16 girders showed surface rusting. They were otherwise in good condition (Figure 3).
- Bolts at the end connections were often moderately corroded.
- Generally W16 girders had only minor surface rust (Figure 4).
- Occasionally moderate corrosion was observed on the top flange of a W16 girder near a beam connection (Figure 5).

W8 BEAMS

Near the center of the reservoir roof we observed 24 8-inch-deep steel "I" beams evenly spaced, radiating from the center of the reservoir. These are the W8 x 10 beams shown in the shop drawings, and they are called out in the plan drawing in Figure 38. The W8 beams support the roof plate, and are supported at one end by the center column and at the other end by the W16 girders.

Near the center of the reservoir, the W8 beams appeared to be in overall good condition with surface rusting in isolated locations. Figures 6 through 9 show the typical condition of the W8 beams near the center of the reservoir. Our observations included the following:

- Rust spots were at an irregular spacing along the outer edges of the bottom flange. The spots do not appear to have resulted in significant loss of flange area.
- The top flange showed less corrosion than the bottom flange.
- The webs were mostly free of corrosion.
- The connection of the W8 beams to the flared top of the center column appeared to be in good condition.

More corrosion was noted, however, at the outer end of the W8s supported by the W16 girders. Figures 10 through 12 show the typical condition of the W8 beams near this end. Our observations included the following:

- The connection of the W8 to the W16 consists of a steel angle and stiffener plate welded to the top of the supporting W16 beam, with a bolted connection between the W8 and the steel angle.
- We observed the steel angle and stiffener plate to be in good condition with only surface rusting.
- We observed the bolts to have corrosion varying from moderate to severe.
- The bottom flange corrosion in the W8 beams varied from isolated surface rusting to isolated moderate corrosion.
- Many of the W8 beams had a short cantilever extension beyond the W16 support with a pair of unused bolt holes in the bottom flange. These bolt holes were often moderately corroded.

W10 BEAMS

At the outer edges of the reservoir roof we observed 48 10-inch-deep steel "I" beams evenly spaced, radiating from the W16 girders to the edge of the reservoir. These are the W10 x 11.5 beams shown in the shop drawings, and they are called out in the plan drawing in Figure 38. These W10 beams support the roof plate, and are supported at one end by the W16 girder and at the other end by a bolted connection to the exterior shell of the reservoir. The W10 beam is fabricated with an angle at the outer end to accommodate a connection to the shell plates below the knuckle at the perimeter of the roof.

The ends of the W10s supported by the W16 girders have corrosion similar to that of the ends of the W8s supported by the W16 girder. See the "W8 Beams" section for more info.

Moving down the length of the W10s toward the outside of the tank, we observed an increasing frequency and severity of corrosion. Typical levels of corrosion are shown in Figures 13 through 20. Our observations included the following:

- Moderate corrosion was observed along the bottom flange, and occasionally on the top flange and webs.
- Corrosion of the underside of the bottom flange was limited to the edges (Figures 14 and 15).
- Often the thickness of bottom flange remaining intact could be seen below the laminations of rust (Figure 16).
- Based on measurements made during inspection, we observed a typical loss of bottom flange thickness of about 1/16 inch+/-. Some locations had more loss of material while others had less.
- Occasionally localized pitting was observed (Figure 17).
- Occasionally corrosion on the web of the W10s was observed (Figure 19).
- The connections of the W10 beams to the shell were underwater and were observed to be in good condition (Figure 20).

While corrosion levels in many of the W10 were similar to that shown in Figures 11 through 17, some areas had severe corrosion, as shown in Figures 21 through 27. Our observations in these areas included:

- In these areas there appeared to be more significant loss of material in the bottom flange.
- Despite the increased corrosion, it was often still limited to the edges of the flange (Figures 26 and 27).
- Even in the worst cases of bottom-flange corrosion, the web of the beam was relatively corrosion free and appeared to have not lost significant material.

- We observed that the amount of steel lost to corrosion did not necessarily correspond intuitively to the size of the rust growths. In some locations with large rust growths, only minor steel thickness was found to be lost. In other locations with inconspicuous rust growths, inspection revealed significant pitting and loss of steel.

ANGLE AND BAR

The shop drawings for the existing reservoir show steel bars running perpendicular to the W8 and W10 roof beams at the mid-span of those beams. These are called out as "EQ Bar" in Figure 38. During the inspection we observed the bars at the W8 beams, running over the top flange of the beams (Figure 28). At the W10 beams we observed steel angles instead of bars, placed so the horizontal leg was resting on the top flange of the W10 beams (Figure 29). Corrosion of these bars and angles ranged from surface rusting to severe corrosion, ranging from the center to the perimeter of the reservoir, respectively. We understand a corroded steel angle was found on the floor of the reservoir in 2009 during inspection by a diving team—that piece was likely one of these that spanned between W10 beams.

Note that because the angle and bar members rested on the top flange of roof beams, a vertical gap was present between the top flange and the roof plate. As shown in Figure 30, this gap was up to 1-inch tall. The gap decreased at locations far from the angle and bar members.

ROOF PLATE

Generally, roof plates were in good condition aside from occasional moderate corrosion at lap splices of roof plate. As was seen in the W8 and W10 beams, we observed a greater frequency and severity of corrosion in roof plates at the perimeter of the reservoir than at the center of the reservoir.

Figures 31 and 32 show the typical condition of roof plate near the center of the reservoir roof. There appears to be no corrosion on the underside of the roof plates, and only surface rust at the exposed edges of roof plates.

Figures 33 through 35 show the typical condition of roof plate near the perimeter of the reservoir roof. There is still no corrosion on the underside of the roof plate, but the edges show moderate corrosion. Also, the roof plates showed more corrosion at welds to beams and angles. The underside of roof plate laps did not appear to be welded. Only the top of the roof plate splices are welded, as allowed by AWWA D100. Pitting was occasionally observed on the underside of roof plate, as shown in Figure 36.

STRUCTURAL ANALYSIS

GENERAL DESCRIPTION

Gray & Osborne has performed structural calculations to check the adequacy of the structural design of the reservoir according to the current specification, AWWA D100-11. The original PDM shop drawings for the reservoir indicate the design complied with "the customer's specifications" and AWWA D100-73.

Member sizes and shell thicknesses used in the calculations were based those shown in a copy of the original PDM shop drawings. During our reservoir inspection, we found that the actual size and spacing of the wide flange beams supporting the roof matched those shown in the PDM shop drawings. It is therefore reasonable to assume that the actual shell thicknesses also match those shown in the PDM shop drawings.

SUMMARIZED RESULTS

A summary of the findings of our calculations are shown in Table 1 below. A copy of detailed structural calculations is included in Appendix C.

TABLE 1

Summary of Results

Structural Member	Findings from Structural Calculations
3/16-inch-thick roof plate	In some locations stresses in the roof plate and deflection of the roof plate exceed that allowed by AWWA D100-11.
W8 x 10 roof beam	Strength meets AWWA D100-11
W10 x 11.5 roof beam	Strength meets AWWA D100-11
W16 x 40 girder	Strength meets AWWA D100-11
Shell plates (thickness varies) – Hydrostatic Loading with top of water at 40 feet	Strength meets AWWA D100-11
Shell plates (thickness varies) – Hydrostatic Plus Earthquake Loading with top of water at 40 feet	Shell plates are overstressed 27 percent due to the design loads required by AWWA D100-11.
Steel Angles and Bar Members Spanning Between Roof Beams	Not required if roof beams are seal welded to roof plate.

DISCUSSION AND RECOMMENDATIONS – ROOF MEMBERS

As required by AWWA D100-11, the roof structure was checked for the worst-case loads due to the self weight of the structure plus a snow load of 25 psf. AWWA D100-11 also

requires the structure to support a live load of 15 psf, which is intended to address the weight applied by maintenance activities.

As shown in Table 1, all roof members except the roof plate were found meet the requirements of AWWA D100-11. The stresses induced into the roof plate by the worst-case design loads exceed the stress levels allowed by AWWA D100-11. The likely reason for the non-compliant stresses is a change in AWWA D100 that occurred since 1973. AWWA D100-73 allowed for the roof plating to deflect between structural supports in order to support imposed loads (D100-73, Section 3.2.3). This allowance no longer exists in the current code.

In short, our calculations show the roof plate has adequate strength to support the design loads, but it may have to deflect in order to support the loads. Because the roof plate has adequate strength, we recommend no upgrade to the roof plate.

DISCUSSION AND RECOMMENDATIONS – SHELL PLATES

As shown in Table 1, shell plates were found to meet AWWA D100-11 for the case of water filled to a height of 40-feet. However, our calculations show the shell plates overstressed in tension when the full reservoir (water filled to height of 40-feet) is subjected to the earthquake forces required by AWWA D100-11. See Table 2 for detailed results of our analysis.

TABLE 2

Analysis Summary for Shell Plates Subjected to Full Reservoir and Earthquake Forces Required by AWWA D100-11

Shell Course No.	Shell Thickness (in)	Capacity Stress (kips per sq. in.)	Demand Stress (kips per sq. in.)	Calculated Overstress %
4 (top)	0.250	25.78	28.65	11%
3	0.329	25.78	32.69	27%
2	0.474	25.78	29.60	15%
1 (base)	0.625	25.78	27.18	5%

There are two likely reasons for the calculated overstress. First, the magnitude of earthquake loads used in the original design are less than those required today by AWWA D100-11. Second, since AWWA D100-73, the code has added minimum freeboard requirements to accommodate sloshing expected to occur during an earthquake. If minimum freeboard is not met, the current code requires the earthquake loads to be increased due to the containment of the sloshing wave by the roof structure. Our calculations included this increased earthquake load.

Following are recommended options for addressing the shell plates:

1. Maintain the water level below a target elevation to provide adequate freeboard for seismic sloshing and reduce the stresses that would be experienced by the shell plates during an earthquake. According to our calculations, maintaining a level at 35 feet would maintain adequate freeboard and result in shell plate stresses meeting AWWA D100-11 when the reservoir is subjected to the design earthquake forces required by AWWA D100-11.

2. Retrofit shell plates by wrapping them with a second layer of plate or other material. Of course this approach would incur added cost.

3. Continue to use the reservoir with the shell plates as-is. If the shell plates are overstressed in the future by earthquake-induced forces matching the design forces required by AWWA D100-11, they will likely deform (e.g., "elephant's foot") but not rupture. Note that actual forces resulting from any future earthquakes may be more than or less than the design forces required by AWWA D100-11.

DISCUSSION AND RECOMMENDATIONS – ANGLE AND BAR MEMBERS SPANNING BETWEEN ROOF BEAMS

The shop drawings for the existing reservoir show steel bars running perpendicular to the W8 and W10 roof beams at the mid-span of those beams. During the inspection we observed the bars at the W8 beams, running over the top flange of the beams. At the W10 beams, we observed steel angles instead of bars, placed so the horizontal leg was resting on the top flange of the W10 beams.

The purpose of these bars and angles is not clear. Based on our analysis, these members are not required in order for the reservoir structure to resist the design loads. In addition, in our recent experience we do not see such members used in the design of reservoir roofs. These members may have been used to assist in layout of beams during erection of the reservoir.

We recommend the existing bars and angles be removed and the top flange of beams be seal welded to the roof plate. See the "Recommendations for Repair and Recoating" section of this report for more information.

RECOMMENDATIONS FOR REPAIR AND RECOATING

OVERVIEW

Recommended structural repairs include the following:

- Replacement of corroded bolts.
- Repair of severely corroded bottom flanges of W8s and W10s.
- Seal welding of top flange of W8s and W10s to the roof plate.

Recommended non-structural repairs include the following:

- Sealing welding lap joints on underside of roof plate.
- Recoating of interior and exterior of reservoir.

Optional repairs/improvements include the following:

- Improved reservoir access and ventilation.

REPLACEMENT OF CORRODED BOLTS

We recommend replacing all bolts that show signs of corrosion. Bolts should be replaced with A325 high strength steel bolts which are hot-dip galvanized. Generally, existing bolts at the center of the tank and at the perimeter of the tank appear to be in good condition and do not require replacement. Many of the existing bolts at beam connections to the W16 girders; however, show signs of corrosion and likely need to be replaced.

REPAIR OF ROOF BEAMS

As described earlier in this report, some W8 x 10 and W10 x 11.5 beams appear to have lost significant material in their bottom flanges. Our recommended repair to restore the load carrying capacity of these beams is to place a new cover plate on the underside of the damaged bottom flange and fillet weld it to the flange. The existing beam would first need to be sandblasted to remove corrosion. Then the edges of the bottom flange should be ground down to achieve a vertical surface that can accept the new fillet weld which will attach the cover plate. The welds should be continuous seal welds to eliminate any gaps that would be prone to corrosion. Figure 40 shows a conceptual detail of the recommended repair of roof beams.

There are two cases in which a repair may not be required for beams that have lost bottom flange material. First, if the loss of material occurs only near the end of the beam, where maximum internal stresses are lower than at mid-span of the beam, the beam may still be adequate without repair. Second, if the cross-sectional area of the bottom flange is not reduced by more than 25 percent, the beams will still be adequate. This is due to

the beams having a small amount of reserve capacity beyond what is required to support the worst-case design loads.

Where cover plates are required for repair, the plate would likely not need to extend the entire length of the beam. Limiting the length of cover plate will limit costs for the plate and for welding.

SEAL WELDING

We recommend seal welding the top of all beams to eliminate the corrosion-prone gap between top flange of beams and the roof plate. Structurally, seal welding will allow the roof plate to provide top flange stability for the roof beams. As a result, the existing transverse angles and bar members may be removed because they are not needed for the structural integrity of the reservoir. An additional benefit of removing the angles and bar members is it allows the gap between the top flange of the W8s and W10s to be reduced, which results in less seal welding and therefore less cost. Figure 39 shows a conceptual detail of the recommended seal welding.

In addition, we recommend seal welding the underside of all existing roof plate laps to eliminate the corrosion-prone gap.

IMPROVED RESERVOIR ACCESS AND VENTILATION

The recoating and repairs project also provides the City with an opportunity to look at other reservoir improvements. One thing that might be improved is reservoir access. The current reservoir has a ladder access. The ladder has a ladder gate for security and a cable safety climb system for personnel safety. A small area at the top of the ladder by the reservoir access hatch is enclosed with handrail.

A system that may be favored by operations staff is to replace the ladder with a spiral staircase. A spiral staircase eliminates the need for safety climb equipment and makes access easier. A spiral staircase would be designed per OSHA standards with landings as appropriate. A stairway gate and/or fencing around the bottom landing can be included for security. Figure 37 shows a spiral staircase with a stairway gate.

Other possible improvements could include enlarging the area enclosed by handrailing by the access hatch. This would provide more room for maintenance staff working around the access hatch. A handrail system could be extended to the tank vents to allow inspection and maintenance of those facilities without fall protection. Currently, there is a cable from the handrail to the center vent that is used as an attachment point for ones safety harness.

The existing tank has only one access manway on the tank shell. Current AWWA D-100 standards recommend two manways to allow access and ventilation during maintenance

activities when the tank is dewatered. A second manway could easily be added to the reservoir as part of an improvement project.

The reservoir currently has two vents that were installed at the time of construction. The center vent has a 25-5/8-inch nozzle while the second vent has a 29-5/8-inch nozzle and is located to the southeast of the center vent. Both vents are constructed with an expanded metal disc with a diameter of approximately 48 inches over the nozzle. A fiberglass hood then fits over the top of the expanded metal disc. When the tank drains, air enters from below the unit through the expanded metal into the hood space and then proceeds through the center portion of expanded metal and the nozzle into the tank. Insect screen has been fitted over the full area of the expanded metal. Currently, the vent appears adequate for protection from insects and debris but the expanded metal is corroded and should be replaced. In some places the expanded metal can be easily broken with finger pressure. The tank nozzles appear to be in fair to good shape from the limited inspection available without disassembling the vent units.

AWWA D100 recommends that tank venting be sized to allow the maximum flow from the tank without excessive pressure. The existing vents are capable of venting a flow of 40,400 gpm with slightly less than 0.25 inches of water pressure. 40,400 gpm is the calculated flow rate if the 20-inch outlet were to break at the base of the reservoir, a condition assumed as the worst case.

One feature that AWWA D100 recommends that is not present in the Anacortes reservoir is pressure vacuum relief. In newer vent installations there is a screened vacuum relief plate that is held in place by gravity during normal operation. If the screen gets clogged due to freezing moisture, the relief plate can be lifted from its place in the event of rapid tank draining to allow air in. This type of venting can be added to the existing tank by installing a new vent structure. The existing tank nozzles should be able to be reused without modification.

RESERVOIR COATING

Both the interior and exterior of the reservoir need to be recoated. The exterior has large areas where the entire paint system has flaked away revealing bare metal that is rusting. The interior roof structure requires extensive work that will also lead to interior recoating.

Our recommendation for recoating the interior is to first prepare to the Society of Protective Coatings SSPC-10 near white blast. During this process, the interior will be sandblasted to remove all of the existing coating down to bare metal and provide a suitable profile for recoating. Sandblasting will likely have to happen twice for this project; once to remove the rust and paint from the roof structure to allow inspection and repair and a second time after the repairs to prepare the surface for recoating.

After the SSPC-10 preparation, we would recommend that a suitable zinc-rich primer be applied. Zinc-rich primers contain small elemental zinc particles that can provide a

measure of cathodic protection. Prior to the intermediate coat, we would recommend a stripe coat through which all angular surfaces, such as ladders, rafters, and other accessories, get a brush painted coat to ensure good edge coverage. After the stripe coat, an intermediate and final coat can be applied. The stripe, intermediate, and final coats for the interior should be epoxy paint suitable for the application. Any paint used inside the reservoir must be NSF certified.

Because the exterior paint is in such poor shape and substantial portions have peeled revealing rusting base metal, our recommendation is that the entire exterior coating be removed by blasting to an SSPC-10 near white blast prior to painting similar to the interior. A zinc-rich primer would be used after surface preparation. As with the interior coat, a stripe coat should be specified for all angular edges prior to the intermediate coat. The intermediate coat can be epoxy paint. The final coat for the exterior should be a urethane with graffiti resistance.

Both the existing interior and exterior paints contain lead as confirmed by laboratory testing, the results of which are included in Appendix D. Since lead is a hazardous material, the removed coatings will require disposal at a suitable facility. Some sand blasting agents have the ability bind with lead making the resulting waste material non-hazardous and able to be disposed of in a landfill. The project specifications should contain a disclosure about the lead including lab results and should specify that the contractor dispose of the waste material suitably but leave means and methods up to him.

Since the exterior of the reservoir will be blasted, the contractor will need to contain the structure. Because of the hazardous nature of the paint, the containment will need to meet SSPC – Guide 6 Method 2 for containment. This method contains stipulations for both containment and ventilation.

Because of the importance of good preparation for coating performance, we recommend that the City employ a National Association of Corrosion Engineers (NACE) certified paint inspector to be present any time during painting. The inspection will verify the paint is being prepared per the manufacturer's recommendations, the surface has been prepared satisfactorily, the temperature and humidity are correct, and that the paint is applied correctly to the specified thickness.

The reservoir currently has a cathodic protection system including anodes that hang down into the water column at various points in the reservoir. The existing cathodic protection system could be reinstalled after the reservoir repairs and recoating is complete or the cathodic protection system could be evaluated to see if it requires upgrading or improving. Regardless, it is our recommendation that cathodic protection system installation be delayed until after the initial paint warranty period has expired (generally one to 2 years). Delaying the deployment of cathodic protection until after the initial warranty has expired will protect the City if there is a paint warranty issue. Painting contractors have been known to claim that problems arising during warranty period are due to improper or malfunctioning cathodic protection systems.

COST AND SCHEDULE ESTIMATES

See Appendix A for a cost estimate of recommended repairs and recoating.

As an alternate to spot-welding repairs to the roof structure, we considered removal of the existing roof structure and replacing it with a new structure which would be shop and field fabricated. The new structure could be set in place in sections to minimize the amount of field welding.

Based on discussions with two steel reservoir erection contractors (T. Bailey and CBI), we have found that repairing the existing roof will be less expensive than removal and replacement of the entire roof structure.

We estimate a total of 22 weeks will be required for repair and recoating to be completed. Table 3 shows our schedule estimates for each piece of work.

TABLE 3

Schedule Estimate

Description of Work	Estimated Construction Time
Sandblast and Prep of Interior Surfaces	2 weeks
Structural Repairs and Seal Welding	8 weeks
2nd Sandblasting and Coating Application to Interior Surfaces	5 weeks
Sandblast and Prep of Exterior Surfaces	4 weeks
Coating Application to Exterior Surfaces	3 weeks
TOTAL	**22 weeks**

We understand the reservoir needs to be in service during the summer months. Also, due to limits on temperature and humidity, recoating of exterior surfaces may not be possible during the winter months. Generally, recoating of interior surfaces may be completed at any time of year because the temperature and humidity can be controlled inside the reservoir by the use of heaters and dehumidifiers.

Given the above constraints, the following two options for schedule may be feasible:

1. Complete interior repair/recoating in winter followed immediately by exterior recoating in the spring so that the reservoir is back online by the high-demand summer months.

2. Complete interior repair/recoating in the winter/spring, put the reservoir back online during the summer, then complete exterior recoating in early

fall. This will necessitate emptying the reservoir for the exterior coating work, as exterior coating of a filled reservoir is not advisable.

APPENDIX A

COST ESTIMATE

City of Anacortes

RESERVOIR REPAIRS AND RECOATING

ENGINEER'S COST ESTIMATE
G & O 11548
OCTOBER 2011

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	CONTRACT AMOUNT
1	Mobilization and Demobilization	1	LS	$ 90,000.00	$ 90,000.00
2	Dehumidification and Heat	1	LS	$ 20,000.00	$ 20,000.00
3	Prepare Reservoir Interior and Prime Coat	1	LS	$ 212,000.00	$ 212,000.00
4	Paint Reservoir Interior Surface	1	LS	$ 108,000.00	$ 108,000.00
5	Prepare Reservoir Exterior and Prime Coat	1	LS	$ 160,000.00	$ 160,000.00
6	Paint Reservoir Exterior Coating	1	LS	$ 80,000.00	$ 80,000.00
7	Dispose of Blast Material	1	LS	$ 5,000.00	$ 5,000.00
8	Removal of Mill Scale	300	SF	$ 5.00	$ 1,500.00
9	Rafter Repair	1	LS	$ 36,000.00	$ 36,000.00
10	Reservoir Interior Seal Welding	1	LS	$ 300,000.00	$ 300,000.00
11	Install Tank Accessories	1	LS	$ 50,000.00	$ 50,000.00
	SUBTOTAL				**$ 1,062,500.00**
	SALES TAX (8.2%)				**$87,130.00**
	SUBTOTAL				**$1,149,630.00**
	CONTINGENCY (20%)				**$229,926.00**
	SUBTOTAL				**$1,379,556.00**
	ENGINEERING AND ADMINISTRATION (25%)				**344,889.00**
	TOTAL				**$1,724,445.00**

NOTES:

1. Item 9 assumes approximately 550 linear feet of bottom flange repair at W10 beams. This corresponds to roughly 24 of the 48 W10 beams requiring repair over 3/4 of their length.

APPENDIX B

FIGURES 1-40

FIGURE 1
Top of Center Column

FIGURE 2
Top of an Intermediate Column and Bearing Point of W16 Girders

FIGURE 3
Connection at Top of W16 Girders

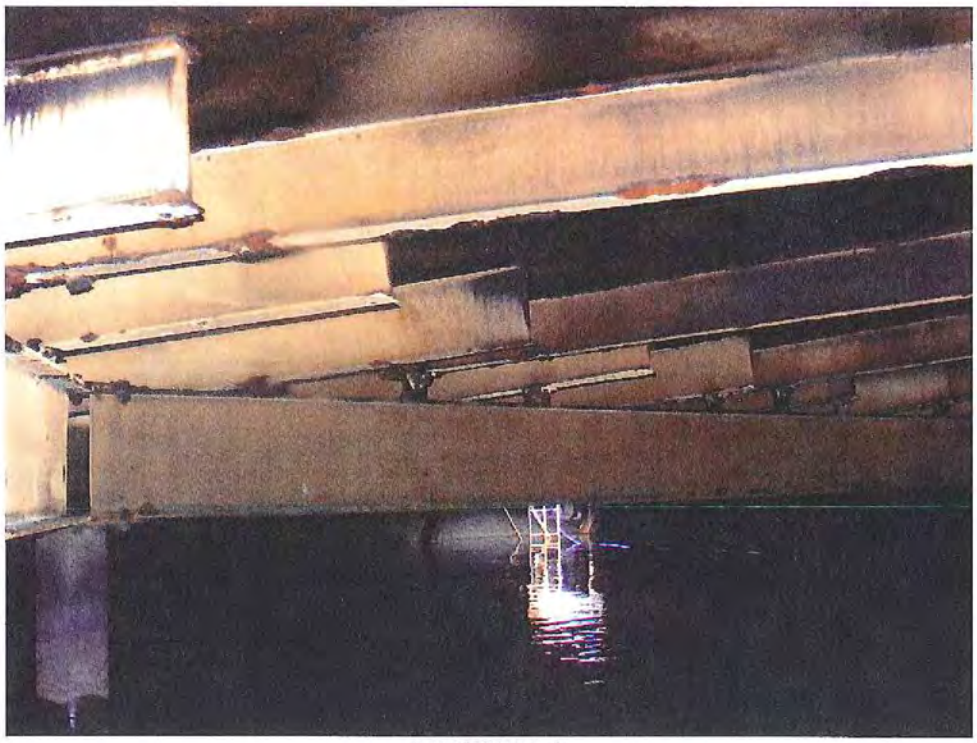


FIGURE 4
Wide View of W16 Girders

FIGURE 5
Top of a W16 Girder Near a W8 Connection

FIGURE 6
W8 Beams

FIGURE 7
W8 Beams

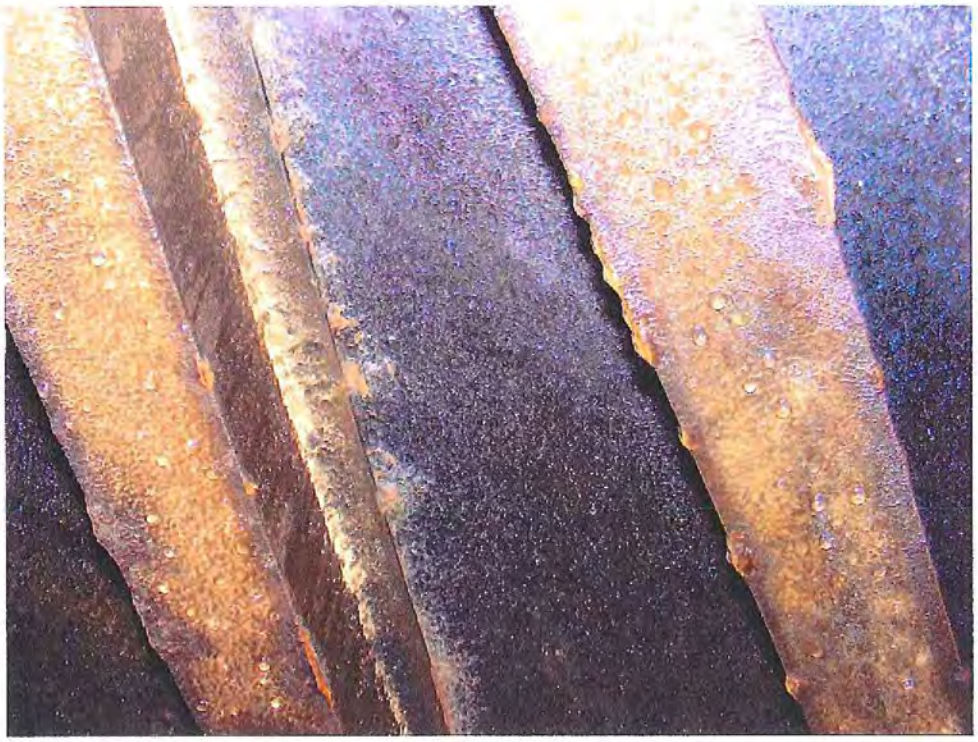


FIGURE 8
W8 Beams

FIGURE 9
W8 Beam

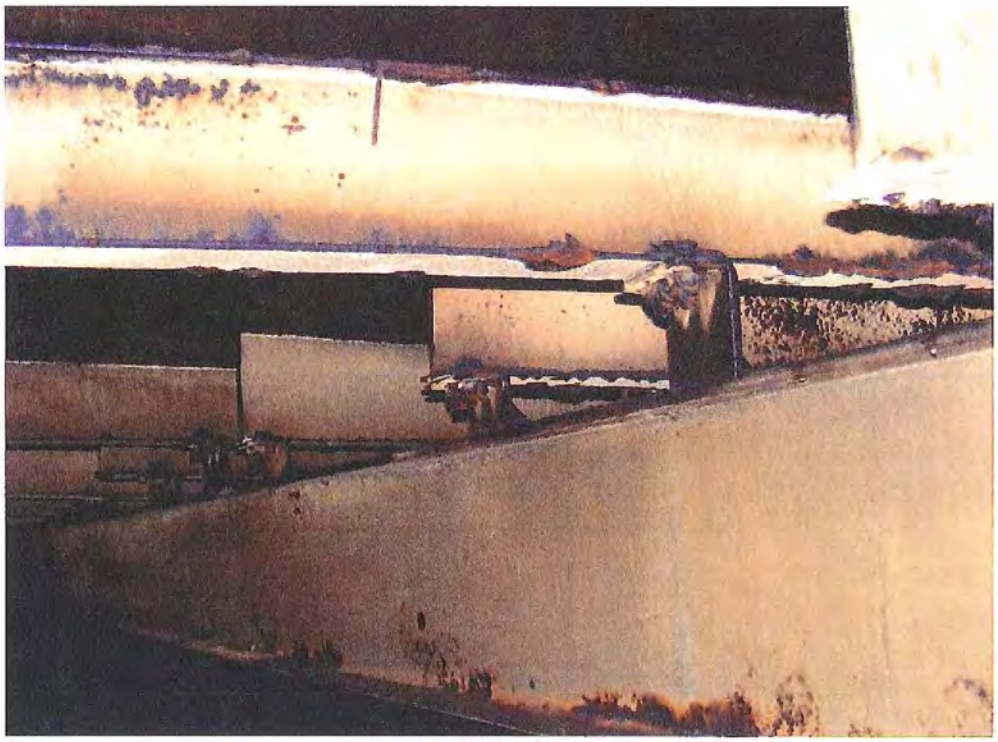


FIGURE 10
W8 Beam at W16 Support Girder

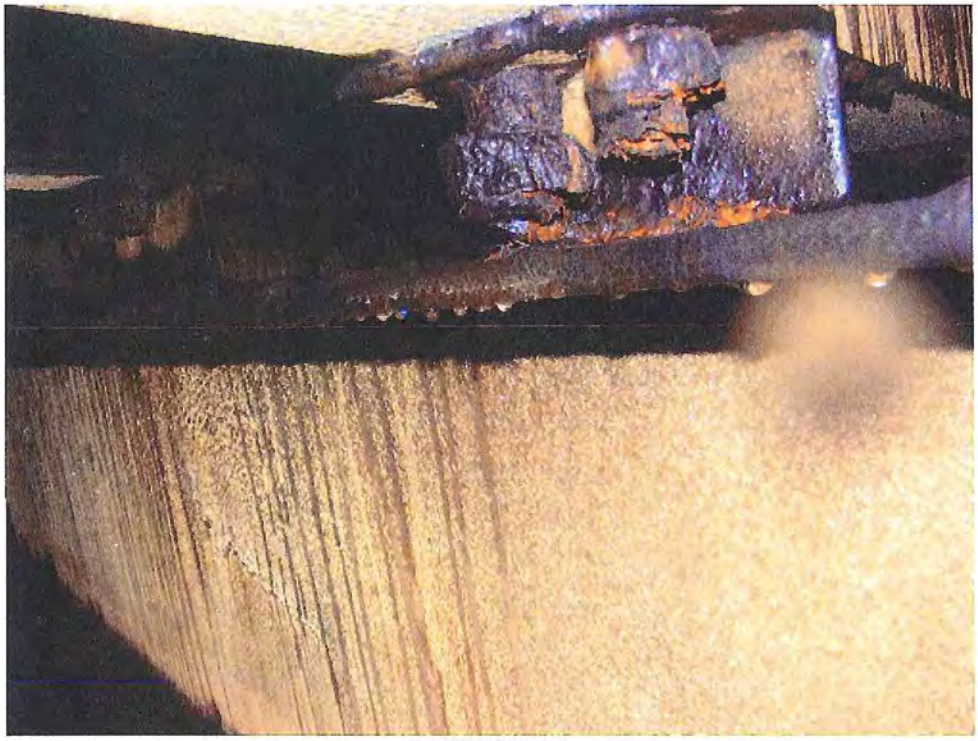


FIGURE 11
W8 Connection to W16

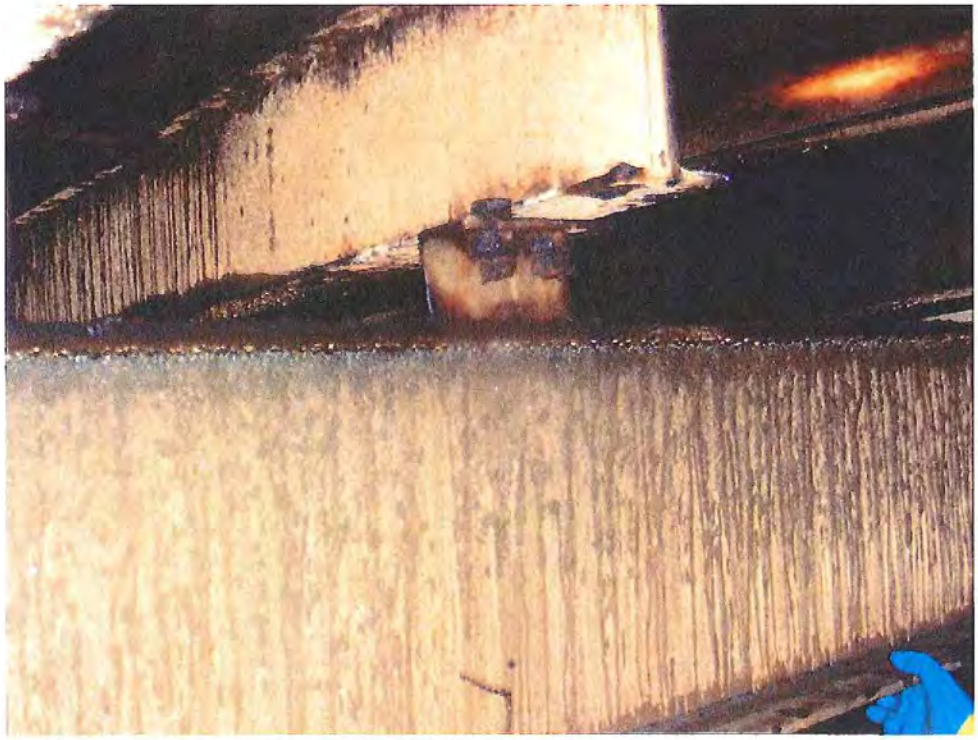


FIGURE 12
W8 Connection to W16

FIGURE 13
W10 Beams

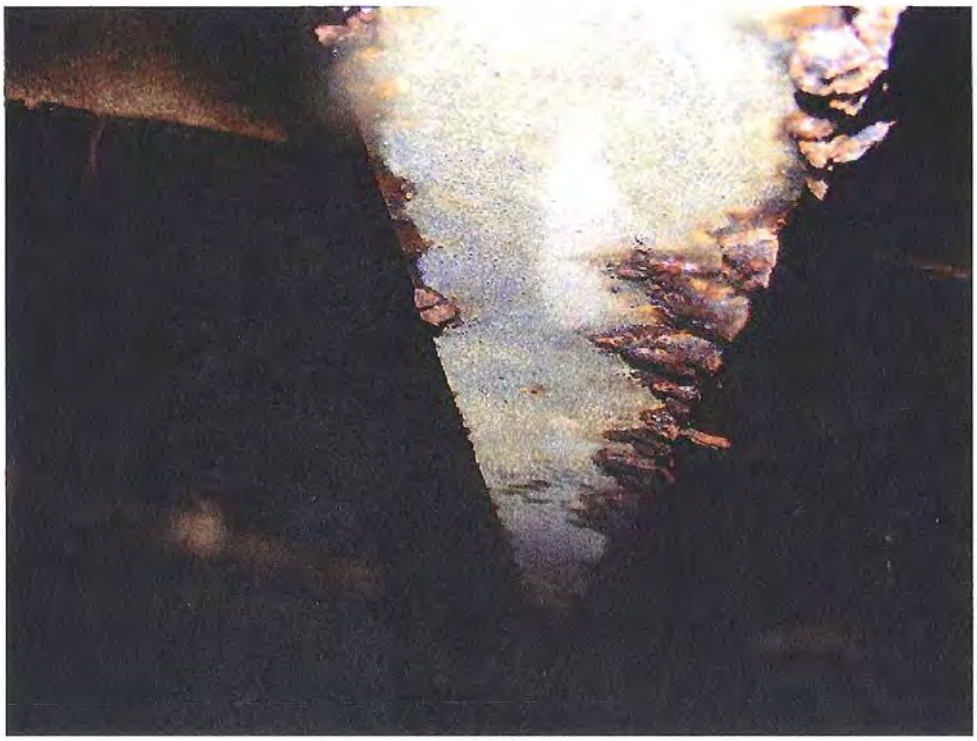


FIGURE 14
Bottom Flange of a W10 Beam

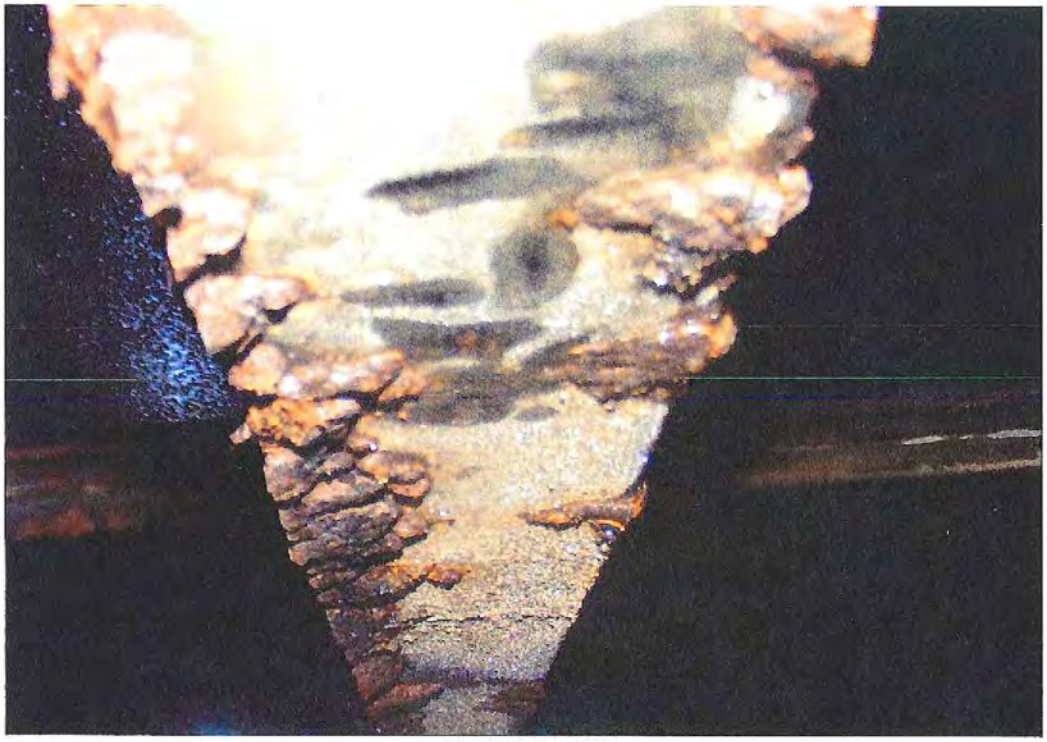


FIGURE 15
Bottom Flange of a W10 Beam

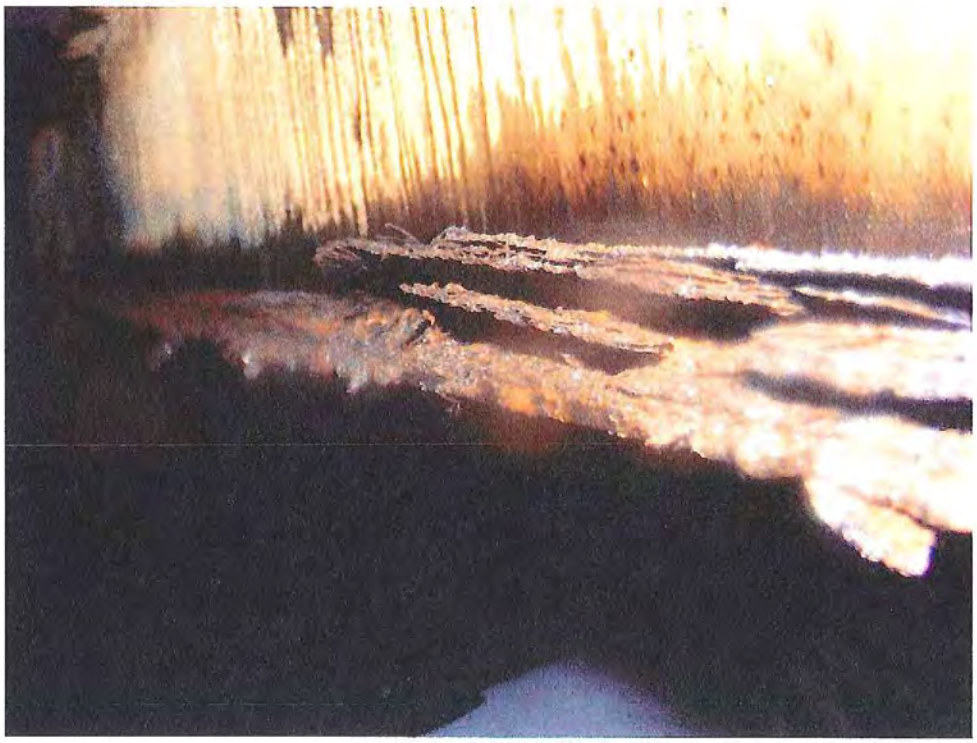


FIGURE 16
Bottom Flange of a W10 Beam with Rust "Laminations"

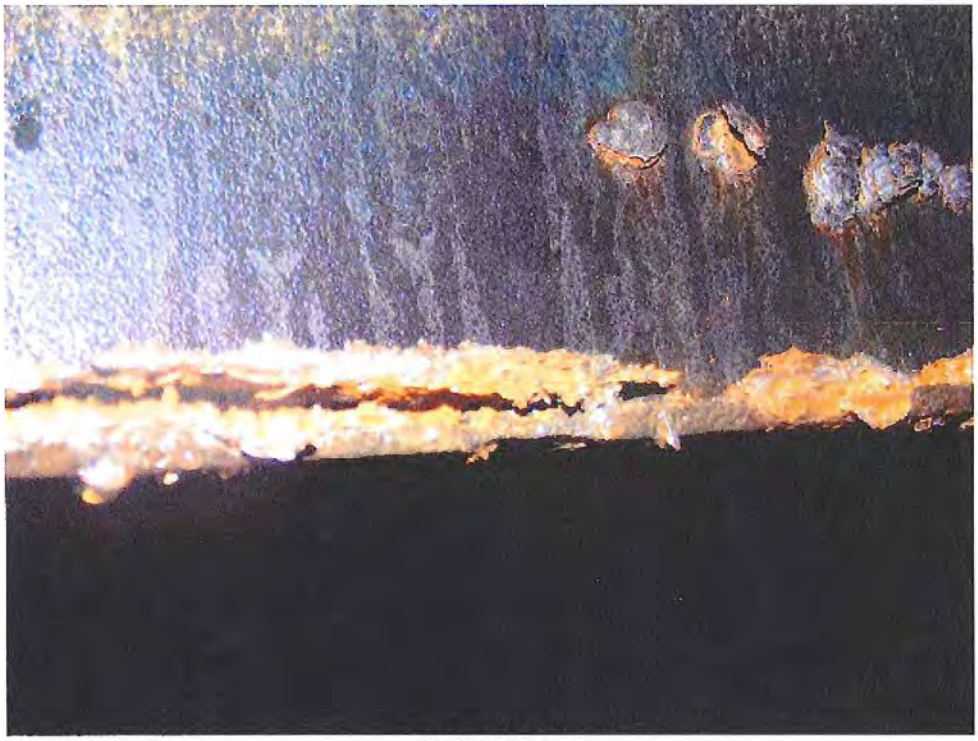


FIGURE 17
Web and Flange Corrosion in a W10 Beam

FIGURE 18
W10 Beam Near Perimeter of Tank

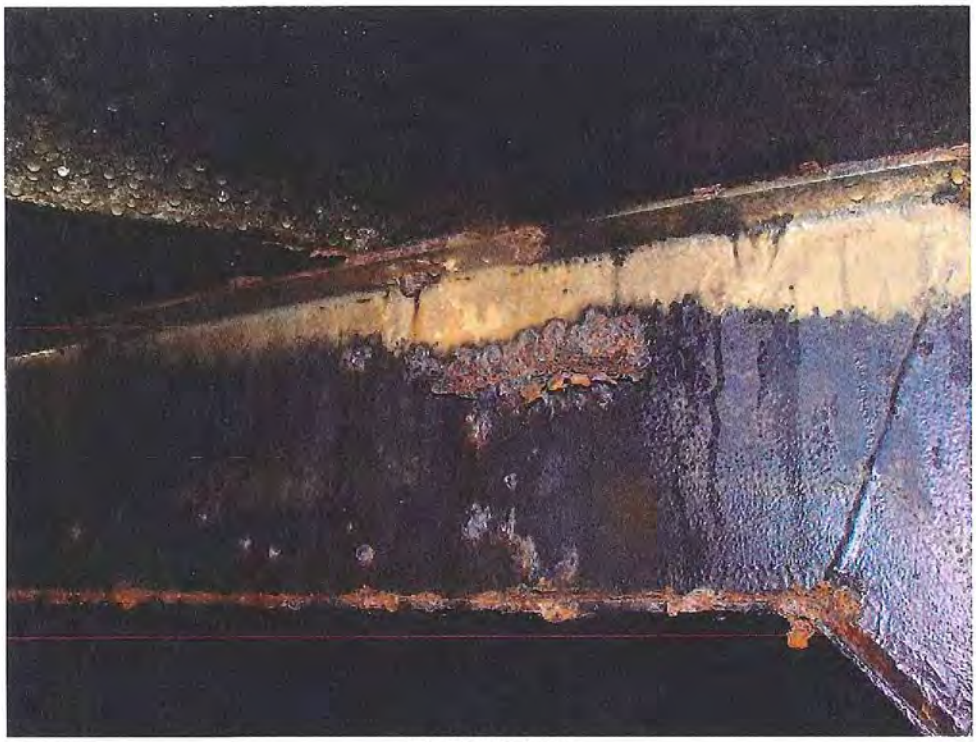


FIGURE 19
W10 Beam Near Perimeter of Tank

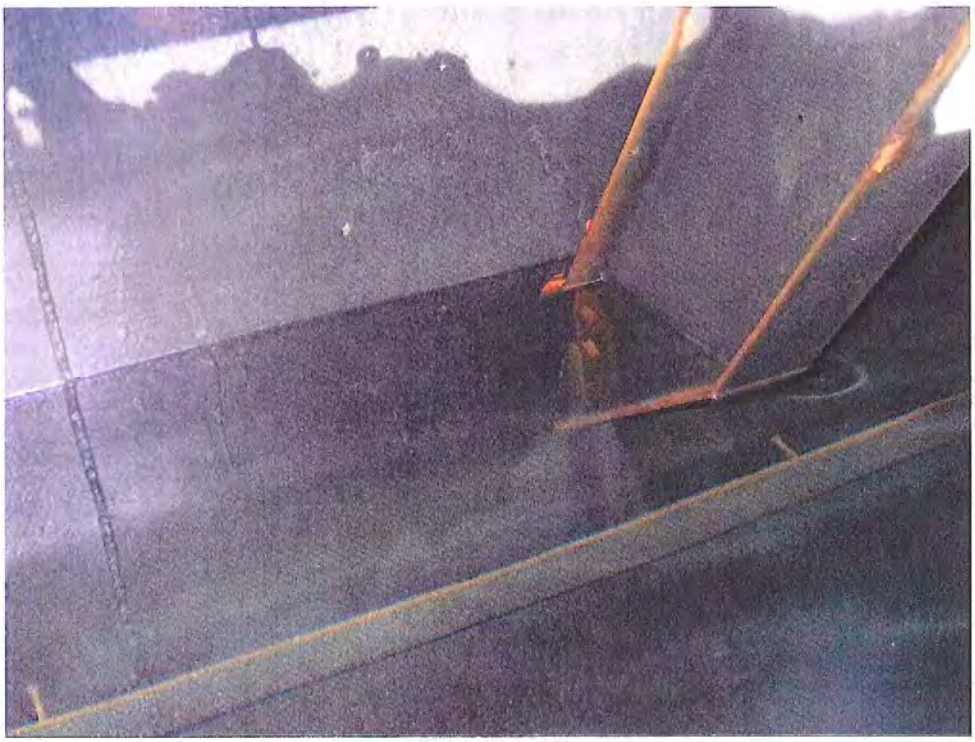


FIGURE 20
W10 Connection to Tank Shell

FIGURE 21
Significant Corrosion at a W10 Beam

FIGURE 22
Significant Corrosion at a W10 Beam

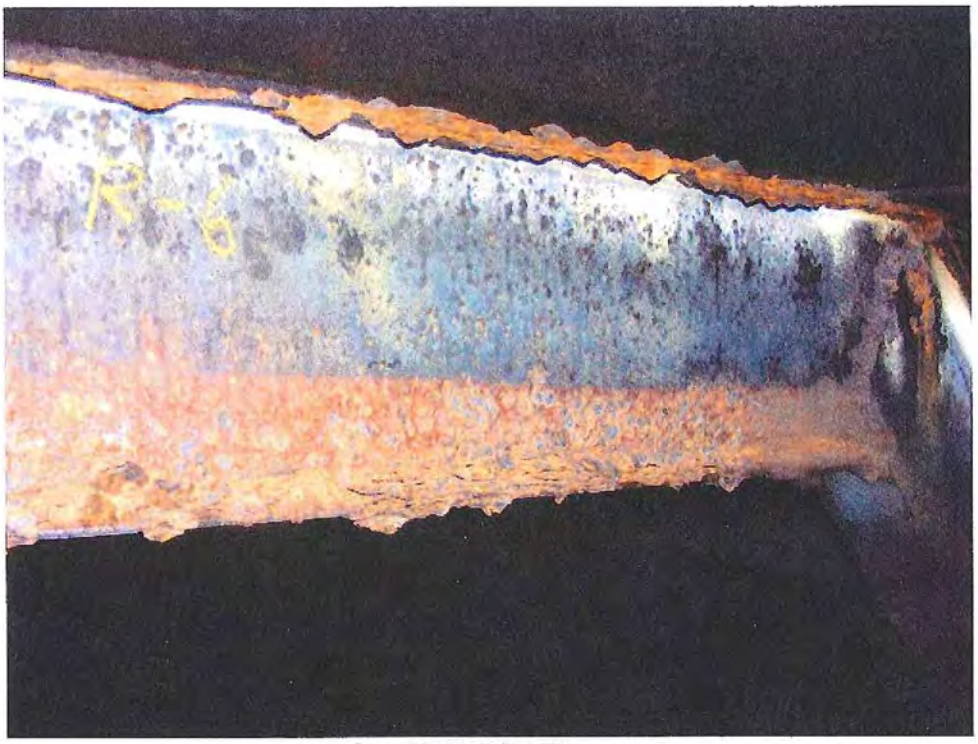


FIGURE 23
Significant Corrosion at a W10 Beam

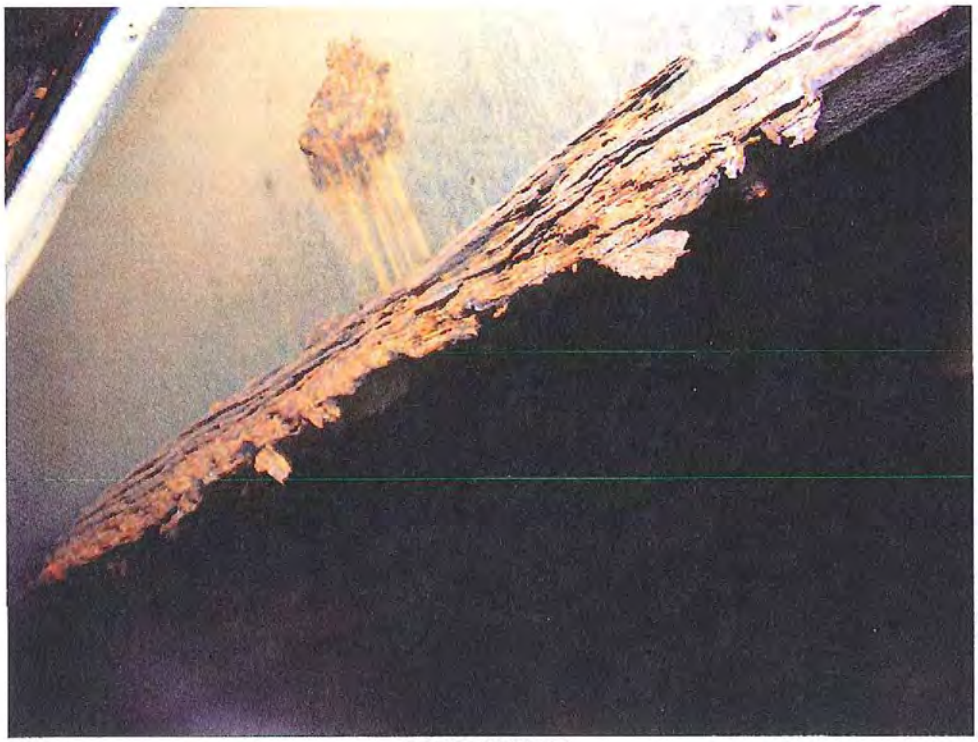


FIGURE 24
Significant Corrosion at a W10 Beam

FIGURE 25
Significant Corrosion at a W10 Beam

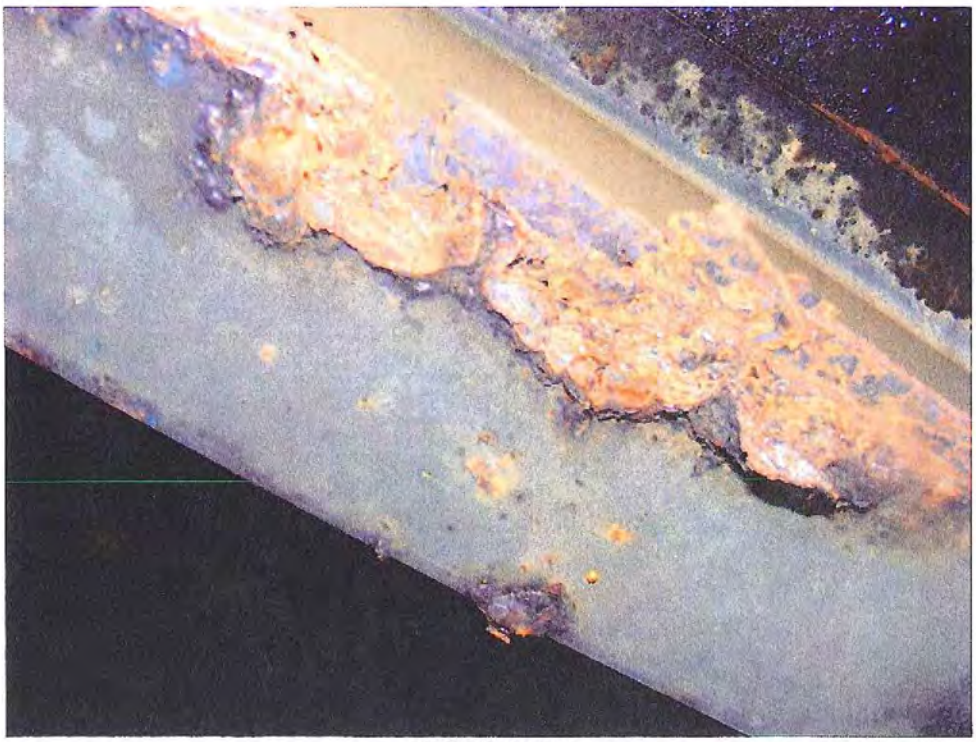


FIGURE 26
Underside of Bottom Flange of a W10 Beam

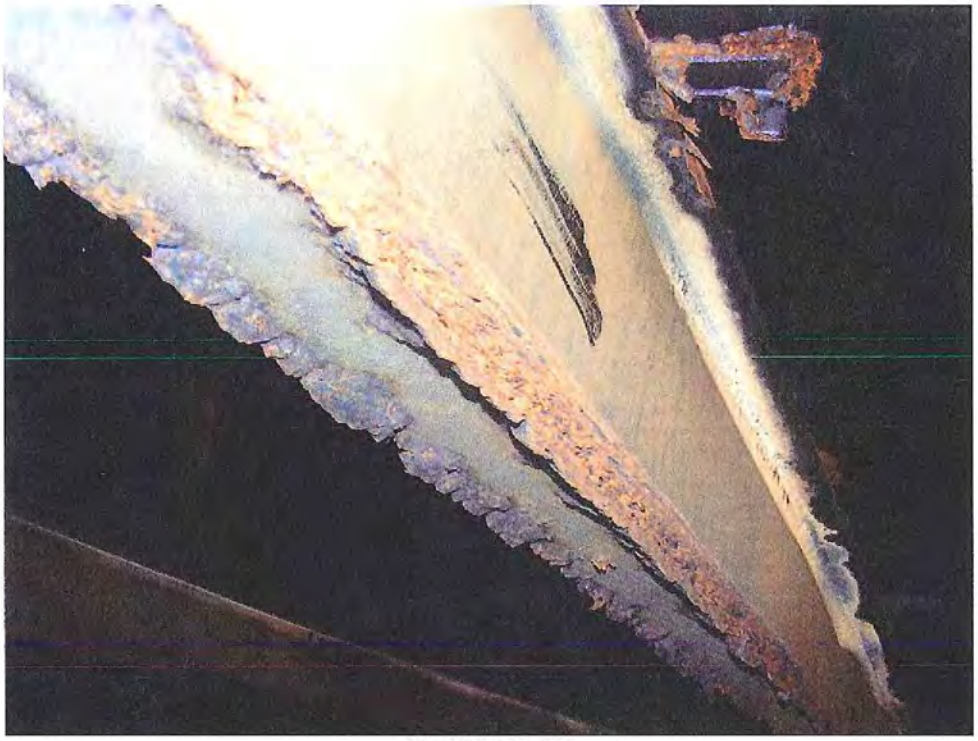


FIGURE 27
Significant Bottom Flange Corrosion of a W10 Beam

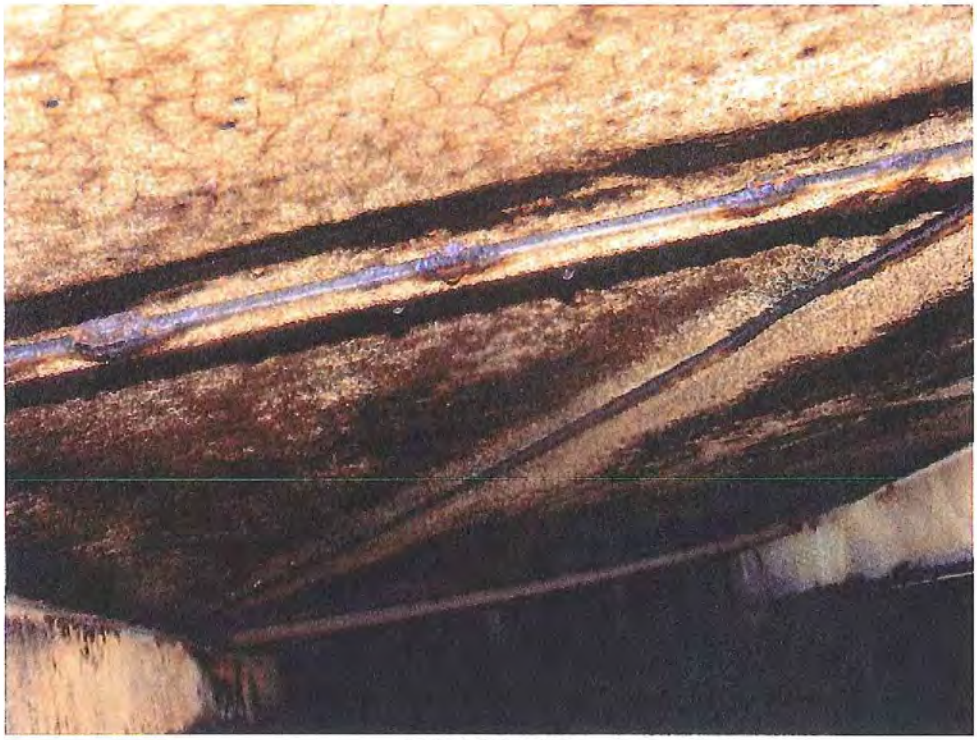


FIGURE 28
Steel Bar Running Between W8 Beams

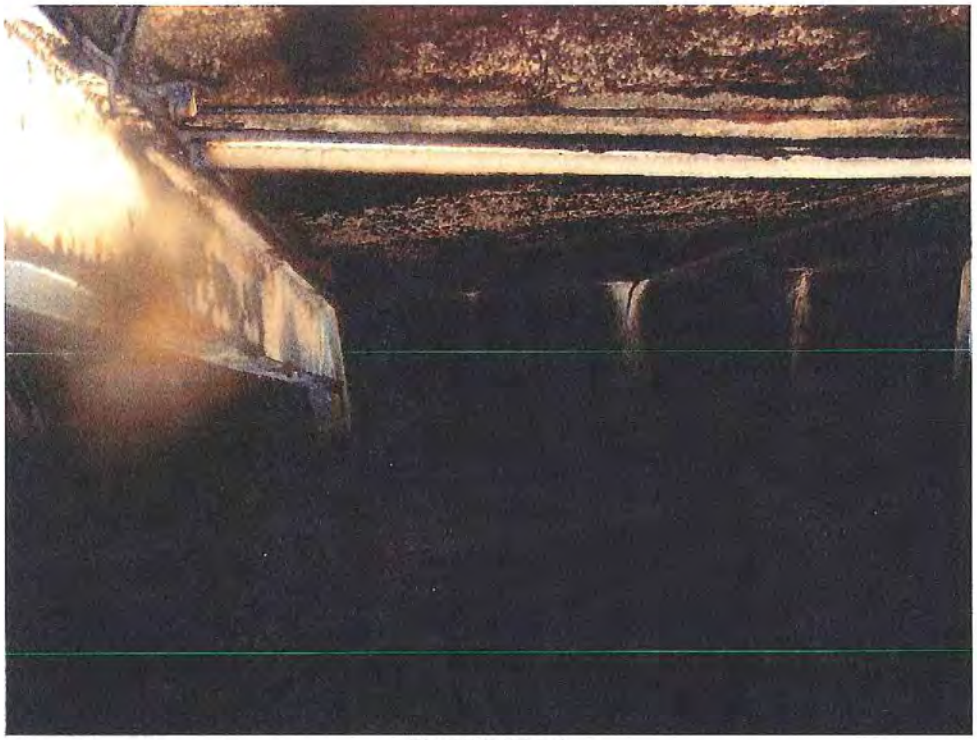


FIGURE 29
Steel Angle Running Between W10 Beams

FIGURE 30
Example of Gap Between Top of Beam and Underside of Roof Plate

FIGURE 31
Typical Roof Plate Condition Near Center of Reservoir

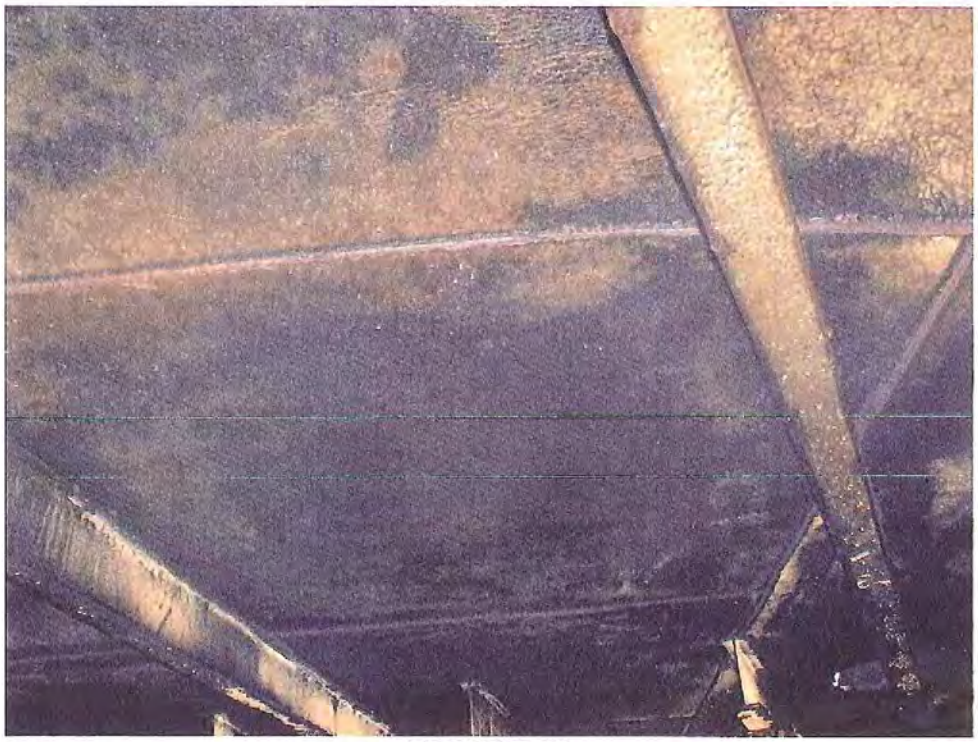


FIGURE 32
Typical Roof Plate Condition Near Center of Reservoir

FIGURE 33
Typical Roof Plate Condition Near Perimeter of Reservoir

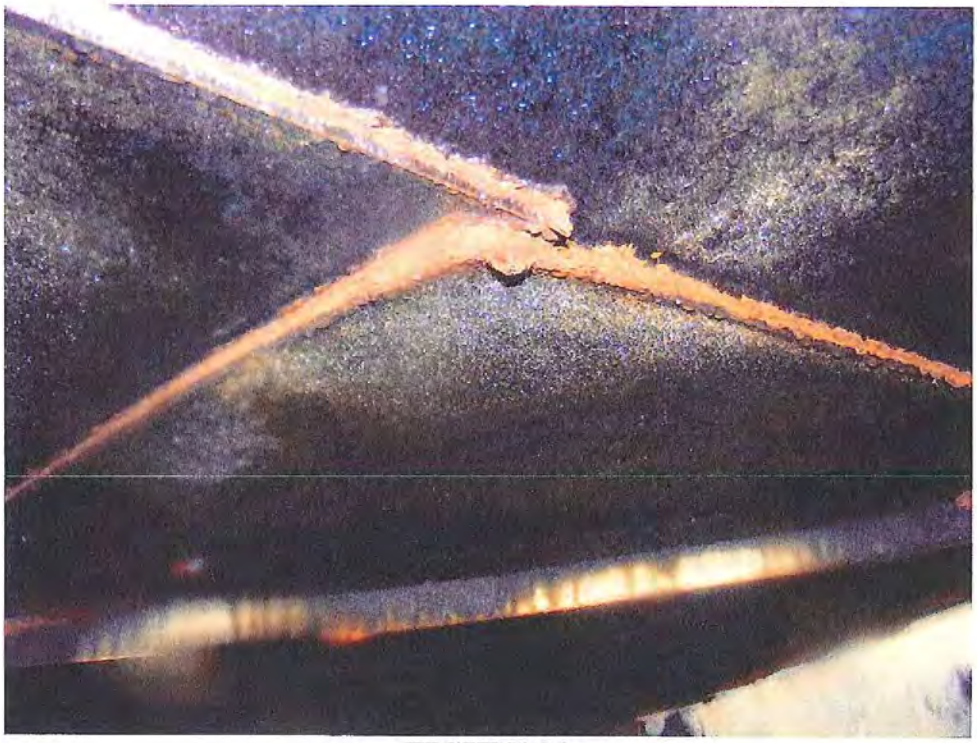


FIGURE 34
Typical Roof Plate Condition Near Perimeter of Reservoir

FIGURE 35
Typical Roof Plate Condition Near Perimeter of Reservoir

FIGURE 36
Example of Pitting on Underside of Roof Plate

FIGURE 37
Reservoir with Spiral Access Stairway

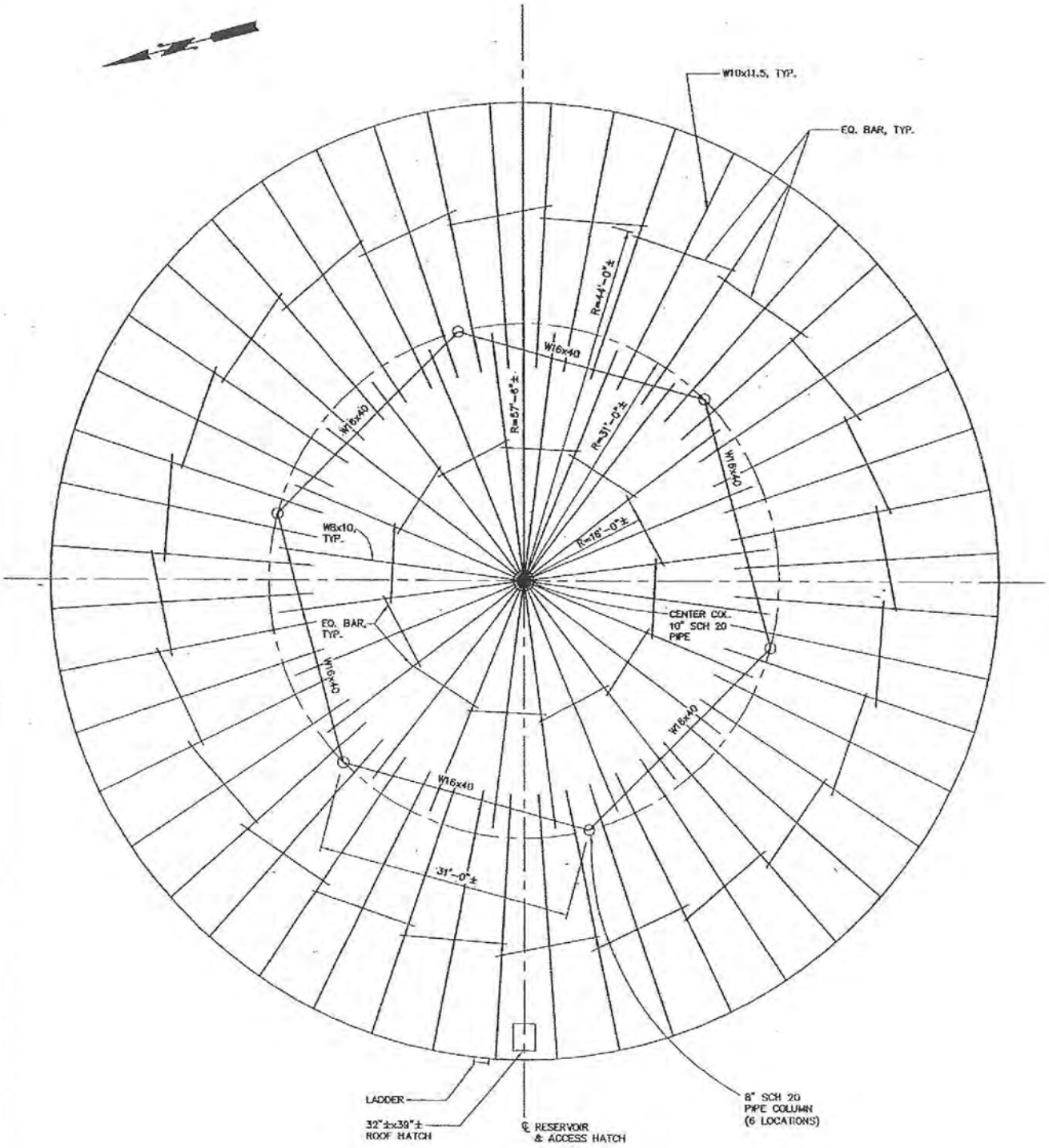


FIGURE 38 - EXISTING ROOF FRAMING PLAN

NOT TO SCALE

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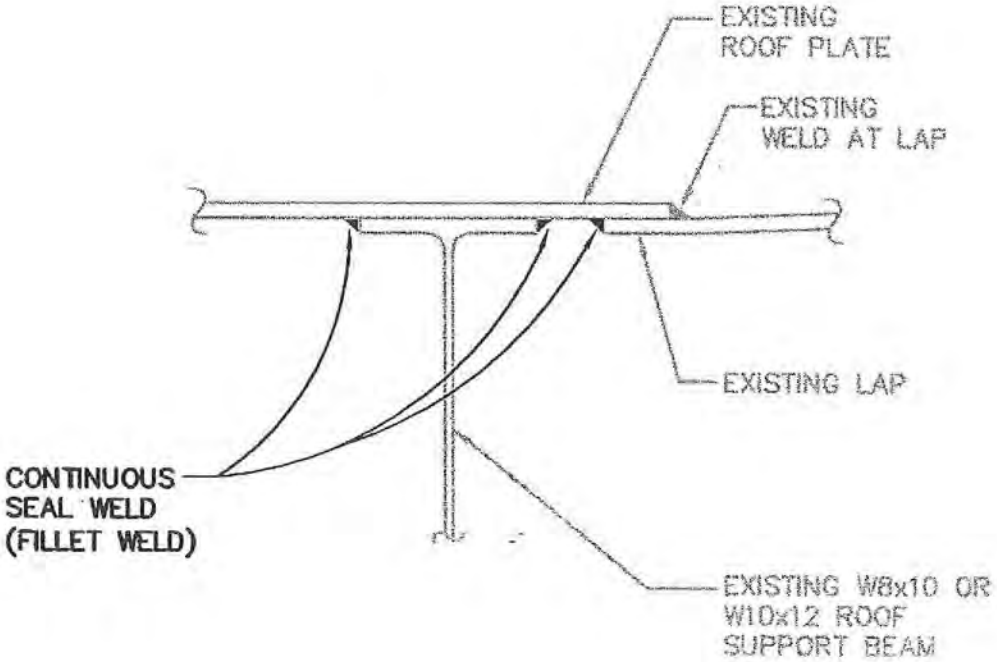

FIGURE 39 - RECOMMENDED REPAIR AT TOP OF W8 & W10 ROOF SUPPORT BEAMS (SECTION)

NOT TO SCALE

L:\Anacortes\11548\Structural\Report Figures 10-6-2011\FIGURES.dwg, 10/24/2011 3:50:41 PM, rhonia

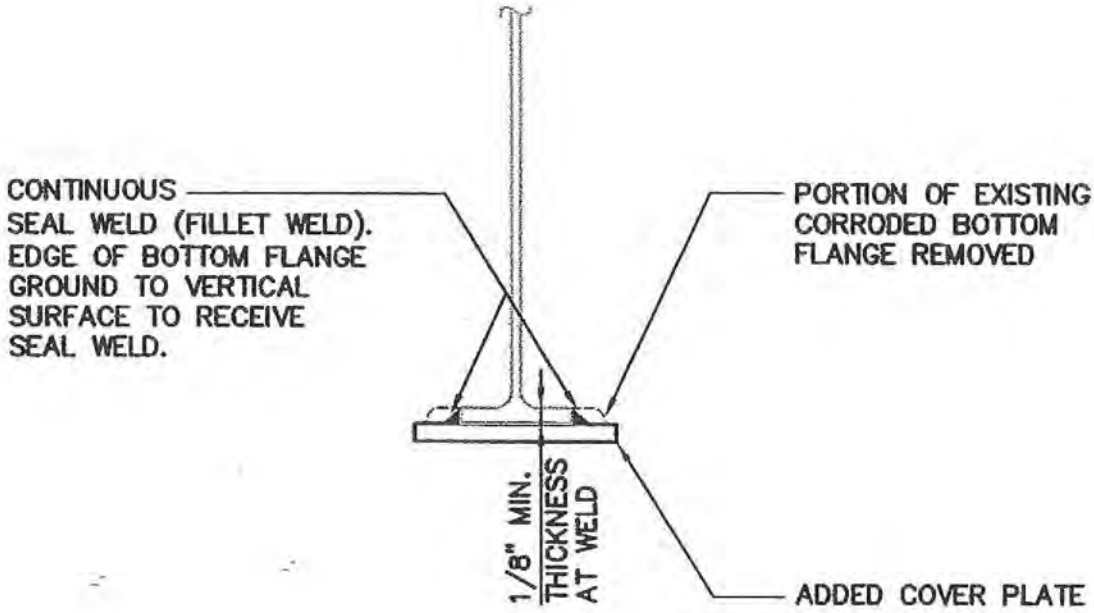

FIGURE 40 - RECOMMENDED REPAIR AT BOTTOM FLANGE OF W10 ROOF SUPPORT BEAMS (SECTION)

NOT TO SCALE

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APPENDIX C

STRUCTURAL CALCULATIONS

Roof Design

Per AWWA D100-11

Materials

Roof Plate	ASTM A283 Gr. C	Fy =	30.00 ksi
W-Sections	ASTM A36	Fy =	36.00 ksi
Phi for Flexure (LRFD, AISC) =		0.90	
Phi for Shear (LRFD, AISC) =		0.90	

Weights

Roof Plate	7.66 psf	0.19 in thick roof plate (3/16")
W10x12	12.00 plf	outer radial beams (48 total)
W8x10	10.00 plf	inner radial beams (24 total)
W16x40	40.00 plf	girders at intermediate circle of columns

Maximum Spans

roof plate	9.42 ft
W10x12	27.00 ft
W8x10	29.50 ft
W16x40	31.00 ft

Loads

S	25.00 psf	Snow
L	15.00 psf	Roof Live Load (D100-11, Section 3.1.3.2)

Check Roof Plate

w = D + S	32.66 plf	
M = w*L^2/10	289.70 lb-ft/ft	
S = b*d^2/6	0.07 in^3	
fb = M/S	49.44 ksi	
Fb	15.00 ksi	(Class 1, D100-11 Table 7)
fb/Fb	3.30 **NG**	

Check W10x12

Tributary Width at outside end:	9.75 ft
Tributary Width at inside end:	4.06 ft

wo = 1.2D + 1.6S	494.14 plf	
wi = 1.2D + 1.6S	214.00 plf	
Mu =	32.26 k-ft	
Vu =	5.41 k	
Phi*Mn =	47.00 k-ft	(D100-11 Sec. 3.6, AISC Table 3-10)
D/C ratio	0.69 **OK**	(roof pl and seal welding will provide cont. bracing
Phi*Vn =	36.46 ksi	(D100-11 Sec. 3.6, AISC)

D/C ratio 0.15 **OK**

Check W8x10

Tributary Width at outside end: 8.12 ft
Tributary Width at inside end: 0.39 ft

wo = 1.2D + 1.6S 411.19 plf
wi = 1.2D + 1.6S 31.32 plf

Mu = 24.07 k-ft
Vu = 4.35 k

Phi*Mn = 32.00 k-ft (D100-11 Sec. 3.6, AISC Table 3-10)
D/C ratio 0.75 **OK** (roof pl and seal welding will provide cont. bracing of top flange)

Phi*Vn = 26.07 ksi (D100-11 Sec. 3.6, AISC)
D/C ratio 0.17 **OK**

Check W16x40

Approximate the sum of beam point loads as a uniformly distributed load

W10x12 reaction:	4.15	No. of reactions on one girder:	8
W8x10 reaction:	4.35	No. of reactions on one girder:	4

wu = 1.67 klf
Mu = 200.89 k-ft
Vu = 25.92 k

Phi*Mn = 270.00 k-ft (D100-11 Sec. 3.6, AISC Table 3-10)
D/C ratio 0.74 **OK** (beam conns will provide cont. bracing of top flange)

Phi*Vn = 94.87 ksi (D100-11 Sec. 3.6, AISC)
D/C ratio 0.27 **OK**

Check Maximum Rafter Spacing

L = 2575*t/sqrt(wd+wl) < 84 (D100-11 Eq. 3-39)

L = 101.43 > 84 Therefore, max rafter spacing should be 84", or 7 ft

Minimum Thickness of parts not in contact with water

Column KL/r = 1.0*41*12/2.96 =
166.22 < 175 **OK** (D100-11, Sec. 3.6.1.3)

roof pl = 3/16" = 3/16" min req'd. **OK** (D100-11, Sec. 3.10.2)

Wide Flange Shape or Similar (W8X10)

b_tf	4
t_tf	0.205
t_w	0.17
b_bf	4
t_bf	0.15375 ← REDUCED BY 25% TO ACCOUNT FOR CORROSION
d	7.89

Find Center of Gravity - y_bar

	Area	dy_bar	A*dy_bar
bot fl	0.615	0.076875	0.047278
web	1.280313	3.919375	5.018025
top fl	0.82	7.7875	6.38575
sum	2.715313		11.45105
		y_bar =	4.217214

Find I

	I of piece	Area	d to CG	A*d^2
bot fl	0.001212	0.615	4.140339	10.54258
web	6.051581	1.280313	0.297839	0.113574
top fl	0.002872	0.82	3.570286	10.45249
sum	6.055664	2.715313		21.10865
			I_total	27.16431 → ≈ 88% of $I_{ORIGINAL}$

Find PNA

PNA = 4.522316

Find Z

	Area	dy_bar to PNA	A * dy_bar
bot fl	0.615	4.445441	2.733946
web below PNA	0.742656	2.184283	1.622171
sum	1.357656		4.356118
		y_bar =	3.208557
web above PNA	0.537656	1.581342	0.850218
top fl	0.82	3.265184	2.677451
sum	1.357656		3.527669
		y_bar =	2.598352
sum TOTAL	2.715313		

Z = 7.883787 → ≈ 89% of $Z_{ORIGINAL}$

Wide Flange Shape or Similar (W10X12)

b_tf	**4**
t_tf	**0.21**
t_w	**0.19**
b_bf	**4**
t_bf	**0.1575** ← REDUCED BY 25% TO ACCOUNT FOR CORROSION
d	**9.87**

Find Center of Gravity - y_bar

	Area	dy_bar	A*dy_bar
bot fl	0.63	0.07875	0.049613
web	1.805475	4.90875	8.862625
top fl	0.84	9.765	8.2026
sum	3.275475		17.11484
		y_bar =	5.225147

Find I

	I of piece	Area	d to CG	A*d^2
bot fl	0.001302	0.63	5.146397	16.6858
web	13.58582	1.805475	0.316397	0.180741
top fl	0.003087	0.84	4.539853	17.31262
sum	13.59021	3.275475		34.17917
			I_total	47.76938 → ≈ 89% OF $I_{ORIGINAL}$

Find PNA

PNA = 5.461382

Find Z

	Area	dy_bar to PNA	A * dy_bar
bot fl	0.63	5.382632	3.391058
web below PNA	1.007738	2.651941	2.67246
sum	1.637738		6.063518
		y_bar =	3.702375
web above PNA	0.797738	2.099309	1.674698
top fl	0.84	4.303618	3.615039
sum	1.637738		5.289737
		y_bar =	3.229905
sum TOTAL	3.275475		

Z = 11.35326 → ≈ 90% OF $Z_{ORIGINAL}$

SEISMIC DESIGN CRITERIA

Project Name = Anacortes
Date = Thu Sep 22 08:54:00 PDT 2011

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 48.49
Longitude = -122.60000000000001
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.05 deg grid spacing

Period (sec)	Sa (g)
0.2	1.085 (Ss, Site Class B)
1.0	0.374 (S1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 48.49
Longitude = -122.60000000000001
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class D - Fa = 1.066 ,Fv = 1.651

Period (sec)	Sa (g)
0.2	1.156 (SMs, Site Class D)
1.0	0.618 (SM1, Site Class D)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 48.49
Longitude = -122.60000000000001
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.066 ,Fv = 1.651

Period (sec)	Sa (g)

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Center of Gravity Calcs.	Comp. By:	MJB

Diameter =	115	Tank diameter (ft)	s =	19,333.00	Allowable stress (psi)	Chptr 14
H_s =	41	Tank height (ft)	E =	1.00	Joint efficiency	
H =	40	Overflow height (ft)	G =	1.0	Specific gravity	

Shell Number	Shell Height (ft)	h_p (ft)	Thickness (in, AWWA 3.7)	Actual Thickness (in)	Shell Weight (psf)	Total Shell Weight (lbs)	Center of gravity of shell to floor (ft)	Shell Weight * Center of Gravity of Each Shell
		-1.00	-0.015		0.00	0	44.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
	3.46	2.46	0.038	0.2500	10.21	12,761	42.23	538,921
4	9.385	11.85	0.183	0.2500	10.21	34,613	32.85	1,136,944
3	9.385	21.23	0.328	0.3290	13.43	45,550	23.46	1,068,728
2	9.385	30.62	0.473	0.4740	19.36	65,626	14.08	923,848
1	9.385	40.00	0.619	0.6250	25.52	86,532	4.69	406,052

Average thickness =	0.3856	in	Sum =	4,074,493
Total weight =	245,082	lbs	X_s =	16.63 ft

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Hoop Stresses per AWWA D100-11	Comp. By:	MJB

S_S =	1.09	F_a =	1.1	T_s =	0.53	T_L =	16.00
S_1 =	0.37	F_v =	1.7	T_c =	6.69		
S_{MS} =	1.16	S_{DS} =	0.77	C_1 =	0.0168		
S_{M1} =	0.62	S_{D1} =	0.41	B =	0.6673		

S_{ai} = 0.77 (AWWA D100-11 13.2.7.3.1)

S_{ac} = 0.09 (AWWA D100-11 13.2.7.3.2)

D/H = 2.88

E = 1.00 Joint Efficiency (AWWA D100-11, 14.3.2.1)

R_i = 2.50 Response Modification Factor for a Self-Anchored Tank (AWWA D100-11, Table 28)

R_c = 1.50 Response Modification Factor for a Self-Anchored Tank (AWWA D100-11, Table 28)

I = 1.50 Seismic Use Group III Importance Factor (AWWA D100-11, Table 24)

A_i = 0.33 Impulsive design acceleration (Eq 13-17, AWWA D100-11)

A_c = 0.07 Convective design acceleration (Eq 13-18, AWWA D100-11)

A_v = 0.11 Vertical design acceleration (AWWA D100-11, 13.5.4.3)

G = 1.00 Specific Gravity

D = 115.00 Diameter of Tank (ft)

H = 40.00 Maximum Depth of Water in Tank (ft)

Y' = 4.31 Convective height confined by insufficient freeboard (ft)

Hs = 41.00 Water height to use for seismic due to insufficient freeboard provided (ft)

	Shell Ring	Water Depth, Y (ft)	Plate Thickness, t (in)	ASTM Steel Type	Hydrostatic Stress, σ_h (KSI)	Allowable Stress, σ_a (KSI)	Yield Stress, σ_y (KSI)	Factor of Safety (σ_a / σ_h)	N_{i1} (kips/in)	N_{i2} (kips/in)	N_{i3} (kips/in)
Top		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36	-	19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		-1.00	0.000	A36		19.33	36.00		0.535	0.456	6.075
		2.46	0.250	A36		19.33	36.00		1.046	0.913	6.075
	4	11.85	0.250	A36	14.167	19.33	36.00	1.36	2.184	2.055	6.075
	3	21.23	0.329	A36	19.294	19.33	36.00	1.00	2.961	3.054	6.075
	2	30.62	0.474	A36	19.312	19.33	36.00	1.00	3.376	3.910	6.075
Bottom	1	40.00	0.625	A36	19.136	19.33	36.00	1.01	3.429	4.622	6.075

	Shell Ring	Impulsive Hoop Stress, N_i (kips/in)	Convective Hoop Stress, N_c (kips/in)	Hydrodynamic Stess, σ_s (KSI)	Combined Stress, σ_{com} (KSI)	Seismic Allowable Stress, σ_e (KSI)	Factor of Safety (σ_e / σ_{com})
Top		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		0.535	0.87853				
		1.046	0.79963				
	4	2.184	0.63265	9.33212	28.65	25.78	0.90
	3	2.961	0.52315	9.47652	32.69	25.78	0.79
	2	3.376	0.46120	7.57162	29.60	25.78	0.87
Bottom	1	3.429	0.44115	5.98661	27.18	25.78	0.95

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

REFERENCE

AWWA D100: AWWA Standard for Welded Steel Tanks for Water Storage (2011)

DEFINE TANK DIMENSIONS

Tank Diameter: $D := 115ft$

Tank Radius: $r := \frac{D}{2}$ $\quad r = 57.5ft$

Existing Bolt Circle Radius: $r_b := r + 6.5in$

Tank Shell Height: $H_t := 41ft$

Required Overflow Height: $H := 40ft$

Estimated Roof Weight: $w_{roof} := 10.66psf$

CONVERSIONS

$psi := \frac{lb}{in^2}$ $\quad kip := 1000lb$

$klf := \frac{kip}{ft}$

$plf := \frac{lb}{ft}$

$kcf := \frac{kip}{ft^3}$

$psf := \frac{lb}{ft^2}$

$ksf := \frac{kip}{ft^2}$

$pcf := \frac{lb}{ft^3}$

$ksi := \frac{kip}{in^2}$

Height of roof beams: $h_{bm} := 10in$

Floor thickness: $t_{fl} := .25in$

Specific Gravity of Contents: $G := 1.0$

Density of Water: $\gamma_w := 62.4pcf$

Density of Concrete: $\gamma_{conc} := 144pcf$

Density of Soil: $\gamma_{soil} := 110pcf$

Density of Steel: $\gamma_{steel} := 490pcf$

Steel Modulus of Elasticity: $E_s := 29000000psi$

CAPACITY OF THE TANK

$$V := \left[H \cdot \pi \cdot \frac{D^2}{4} \cdot \left(7.48 \frac{gal}{ft^3}\right)\right]$$

$V = 3107757.7 \cdot gal$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

ALLOWABLE STRESSES

A36 steel

Yield: $\sigma_{Ay} := 36000psi$

Tension (AWWA D100, Table 5): $\sigma_{At} := 18000psi$

Compression (AWWA D100, Table 6): $\sigma_{Ac} := 18000psi$

SEISMIC DESIGN CRITERIA

MCE spectral response acceleration @ 0.2 sec:	$S_s := 1.085$	USGS maps (Site Class D assumed, typical)
MCE spectral response acceleration @ 1.0 sec:	$S_1 := .374$	USGS maps
Short-period site coeff. @ 0.2 sec:	$F_a := 1.066$	USGS maps
Long-period site coeff. @ 1.0 sec:	$F_v := 1.651$	USGS maps
Response modification coefficient for flat-bottom tank:		
Impulsive component:	$R_i := 2.5$	AWWA D100 Table 28
Convective component:	$R_c := 1.5$	
Seismic Use Group III Importance Factor:	$I_E := 1.5$	Assumed

CALCULATE SEISMIC DESIGN FACTORS

AWWA D100 Eq. 13-5:	$S_{MS} := F_a \cdot S_s$	$S_{MS} = 1.16$
AWWA D100 Eq. 13-6:	$S_{M1} := F_v \cdot S_1$	$S_{M1} = 0.62$
AWWA D100 Eq. 13-7:	$S_{DS} := \frac{2}{3} \cdot S_{MS}$	$S_{DS} = 0.77$
AWWA D100 Eq. 13-8:	$S_{D1} := \frac{2}{3} \cdot S_{M1}$	$S_{D1} = 0.41$
AWWA D100 Section 13.2.7.3.1 and 13.5.1:	$T_s := \frac{S_{D1}}{S_{DS}}$	$T_s = 0.53$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Center of Gravity Calcs.	Comp. By:	MJB

Diameter =	115	Tank diameter (ft)	s =	19,333.00	Allowable stress (psi)	Chptr 14
H_s =	41	Tank height (ft)	E =	1.00	Joint efficiency	
H =	40	Overflow height (ft)	G =	1.0	Specific gravity	

Shell Number	Shell Height (ft)	h_p (ft)	Thickness (in, AWWA 3.7)	Actual Thickness (in)	Shell Weight (psf)	Total Shell Weight (lbs)	Center of gravity of shell to floor (ft)	Shell Weight * Center of Gravity of Each Shell
		-1.00	-0.015		0.00	0	44.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
		-1.00	-0.015		0.00	0	45.69	0
	3.46	2.46	0.038	0.2500	10.21	12,761	42.23	538,921
4	9.385	11.85	0.183	0.2500	10.21	34,613	32.85	1,136,944
3	9.385	21.23	0.328	0.3290	13.43	45,550	23.46	1,068,728
2	9.385	30.62	0.473	0.4740	19.36	65,626	14.08	923,848
1	9.385	40.00	0.619	0.6250	25.52	86,532	4.69	406,052

Average thickness =	0.3856	in	Sum =	4,074,493	
Total weight =	245,082	lbs	X_s =	16.63	ft

See center of gravity calcs: $X_s := 16.63ft$

Average shell thickness: $t_s := .3856in$

Thickness of bottom shell: $t := .625in$

Design spectral response acceleration for impulsive components (AWWA D100 Eq. 13-9): $S_{ai} := S_{DS}$

Impulsive design acceleration (AWWA D100 Eq. 13-17): $A_i := \max\left(\frac{0.36S_1 I_E}{R_i}, \frac{S_{ai} I_E}{1.4R_i}\right)$ $A_i = 0.33$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE 1st MODE SLOSHING WAVE PERIOD T_c

1st modes sloshing wave period AWWA D100 Eq. 13-22): $T_c := 2\cdot\pi\cdot\sqrt{\dfrac{D}{3.68\cdot g\cdot \tanh\left(\dfrac{3.68\cdot H}{D}\right)}}$ $T_c = 6.69\,s$

Region-dependent transition period (AWWA D100 Fig. 19): $T_L := 16sec$

Spectral Acceleration of the sloshing liquid (AWWA D100 Eq. 13-12 & 13): $S_{ac} := \text{if}\left(T_c > T_L, \dfrac{1.5T_L\cdot S_{D1}\cdot 1sec}{T_c^{\,2}}, \dfrac{1.5\cdot S_{D1}\cdot 1sec}{T_c}\right)$ $S_{ac} = 0.092$

DETERMINE WAVE HEIGHT AND REQUIRED OVERFLOW HEIGHT

For Seismic Use Group III, the freeboard shall be d (AWWA D100, Section 13.5.4.4)

Convective design acceleration for sloshing (AWWA D100 Eq. 13-55 & 56): $A_f := \text{if}\left(T_c > T_L, \dfrac{1.5T_L\cdot S_{D1}\cdot 1sec}{T_c^{\,2}}, \dfrac{1.5\cdot S_{D1}\cdot 1sec}{T_c}\right)$ $A_f = 0.09$

Sloshing wave height (AWWA D100, Eq. 13-52): $d := 0.5\cdot D\cdot A_f$ $d = 5.31\cdot ft$

Freeboard Provided: $h_{freebrd} := H_t - H = 1\,ft$

EXAMPLE HOOP STRESSES FOR THE TANK SHELLS (See attached spreadsheet for calculations on all shells)

Y is the depth of water on the shell: $Y := 30.62ft = 30.62\,ft$

Hs is the equivalent total water height to use for impulsive water forces for the seismic load combination due to insufficient freeboard: $H_s := \min(40ft + 4.31ft, H_t) = 41\,ft$

Ys is the equivalent water height on the shell to use for hydrostatic and impulsive water forces for the seismic load combination due to insufficient freeboard: $Y_s := Y + 4.31ft = 34.93\,ft$

Shell thickness: $t_p := .474in$

Joint efficiency: $E := .85$

Hydrostatic hoop stress: $\sigma_h := \dfrac{2.6psf\cdot Y_s\cdot D\cdot G}{t_p\cdot E}\cdot\dfrac{1}{1in}$ $\sigma_h = 25.92\cdot ksi$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

Implusive hoop stress (AWWA D100, Eqs. 13-43, 13-44, and 13-45):

$$N_{i1} := 4.5\frac{lb}{in}A_i G\cdot\frac{D}{1ft}\cdot\frac{H_s}{1ft}\cdot\left[\frac{Y_s}{H_s} - 0.5\cdot\left(\frac{Y_s}{H_s}\right)^2\right]\cdot\tanh\left(0.866\cdot\frac{D}{H_s}\right) \qquad N_{i1} = 3.38\cdot\frac{kip}{in}$$

$$N_{i2} := 2.77\frac{lb}{in}\cdot A_i\cdot G\cdot\left(\frac{D}{1ft}\right)^2\cdot\left[\frac{Y_s}{0.75\cdot D} - 0.5\cdot\left(\frac{Y_s}{0.75\cdot D}\right)^2\right] \qquad N_{i2} = 3.91\cdot\frac{kip}{in}$$

$$N_{i3} := 1.39\frac{lb}{in}\cdot A_i\cdot G\cdot\left(\frac{D}{1ft}\right)^2 \qquad N_{i3} = 6.07\cdot\frac{kip}{in}$$

$$N_i := \text{if}\left(\frac{D}{H_s} < 1.33, \text{if}\left(Y_s < 0.75\cdot D, N_{i2}, N_{i3}\right), N_{i1}\right) \qquad N_i = 3.38\cdot\frac{kip}{in}$$

Convective hoop stress (AWWA D100, Eq. 13-46):

Convective design acceleration (AWWA D100 Eq. 13-18): $A_c := \frac{S_{ac}\cdot I_E}{1.4\cdot R_c}$ $\qquad A_c = 0.07$

$$N_c := \frac{0.98\frac{lb}{in}\cdot A_c\cdot G\cdot\left(\frac{D}{1ft}\right)^2\cdot\cosh\left[\frac{3.68\cdot(H-Y)}{D}\right]}{\cosh\left(\frac{3.68\cdot H}{D}\right)} \qquad N_c = 0.461\cdot\frac{kip}{in}$$

Vertical design acceleration (AWWA D100 Section 13.5.4.3): $A_v := \left(0.14\cdot S_{DS}\right)$ $\qquad A_v = 0.11$

Hydrostatic hoop tensile force (AWWA D100, Section 13.5.4.2.3): $N_h := 2.6\frac{lb}{ft^2\cdot in}G\cdot Y_s\cdot D$ $\qquad N_h = 10444.07\cdot\frac{lb}{in}$

Hydrodynamic hoop stress (AWWA D100, Eq. 13-42): $\sigma_s := \frac{\sqrt{N_i^2 + N_c^2 + \left(N_h\cdot A_v\right)^2}}{t_p}$ $\qquad \sigma_s = 7.57\cdot ksi$

Combined hoop stress: $\sigma_{com} := \sigma_h + \sigma_s$ $\qquad \sigma_{com} = 33.49\cdot ksi$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE APPROXIMATE WEIGHTS

Roof weight: $W_r := \left(\frac{\pi \cdot D^2}{4} \cdot w_{roof}\right)$ $W_r = 110.7 \cdot kip$

Shell weight: $W_s := \pi \cdot D \cdot t_s \cdot H_t \cdot \gamma_{steel}$ $W_s = 233.2 \cdot kip$

Floor weight: $W_{fl} := \frac{\pi \cdot D^2}{4} \cdot t_{fl} \cdot \gamma_{steel}$ $W_{fl} = 106 \cdot kip$

Water weight: $W_T := \gamma_w \cdot H \cdot \frac{\pi \cdot D^2}{4}$ $W_T = 25926 \cdot kip$

CALCULATE W_1, X_1, W_2, X_2

Weight of effective mass that moves in unison with tank shell (AWWA D100 Eq. 13-24):

$$W_i := \text{if}\left[\frac{D}{H_s} > \frac{4}{3}, \frac{\tanh\left(.866 \cdot \frac{D}{H_s}\right) \cdot W_T}{.866 \cdot \frac{D}{H_s}}, \left(1 - .218 \frac{D}{H_s}\right) \cdot W_T\right]$$

$W_i = 10508.8 \cdot kip$

Weight of effective mass of 1st sloshing mode (AWWA D100 Eq. 13-26):

$$W_c := .23\left(\frac{D}{H}\right) \cdot \tanh\left(\frac{3.67 \cdot H}{D}\right) \cdot W_T$$

$W_c = 14667.1 \cdot kip$

Height to center of mass W_i (AWWA D100 Eq. 13-28 & 29):

$$X_i := \text{if}\left[\frac{D}{H_s} > \frac{4}{3}, \frac{3}{8} \cdot H_s, \left(.5 - \frac{3}{32} \cdot \frac{D}{H_s}\right) \cdot H_s\right]$$

$X_i = 15.4\,ft$

Height to effective mass W_c (AWWA D100 Eq. 13-30):

$$X_c := \left(1 - \frac{\cosh\left(\frac{3.67 \cdot H}{D}\right) - 1}{\frac{3.67 \cdot H}{D} \cdot \sinh\left(\frac{3.67 \cdot H}{D}\right)}\right) \cdot H$$

$X_c = 22.3\,ft$

DETERMINE SEISMIC BASE SHEAR, V_{act}

Lateral base shear (AWWA D100 Eq. 13-31):

$$V_f := \sqrt{\left[A_i \cdot (W_s + W_r + W_{fl} + W_i)\right]^2 + (A_c \cdot W_c)^2}$$

$V_f = 3748 \cdot kip$

PERCENT OF TOTAL WEIGHT

$$Percent := \left(\frac{V_f}{W_r + W_s + W_{fl} + W_T}\right) \cdot 100$$

$Percent = 14.2\ \%$

< 33% (sliding friction)

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE SEISMIC OVERTURNING MOMENT, M

Overturning moment at bottom of shell (AWWA D100 Eq. 13-23):

$$M_s := \sqrt{\left[A_i \cdot \left(W_s \cdot X_s + W_r \cdot H_t + W_i \cdot X_i\right)\right]^2 + \left(A_c \cdot W_c \cdot X_c\right)^2}$$

$M_s = 60183 \cdot ft \cdot kip$

CHECK FOR UPLIFT OF THE TANK SHELL

Thickness & grade of bot. plate: $t_b := .25in$ $\sigma_{by} := 30ksi$

Weight of tank contents per foot of shell (AWWA D100, Eq. 13-37): $w_L := 7.9 \frac{lb^{.5}}{ft^{1.5}} \cdot t_b \cdot \sqrt{\sigma_{by} \cdot H \cdot G}$ $w_L = 2163.5 \cdot plf$

Roof load acting on the shell: $w_{rs} := \frac{0.42 W_r}{\pi \cdot D}$ (Factor of 0.42 applied to approximate reduction for center columns) $w_{rs} = 128.72 \cdot plf$

Weight of tank shell & roof per foot of shell (AWWA D100, Eq. 13-41): $w_t := \frac{W_s}{\pi \cdot D} + w_{rs}$ $w_t = 774.28 \cdot plf$

Uplift calculation (AWWA D100 Eq. 13-36): $J := \frac{M_s}{D^2 \cdot \left[w_t \cdot \left(1 - 0.4 \cdot A_v\right) + w_L\right]}$ $J = 1.57$

J is within 2% of 1.54, therefore OK - tank is self-anchored.

CHECK FOR COMPRESSION BUCKLING OF THE TANK SHELL (AWWA)

For Class 2 materials, Thickness-to-radius ratio (AWWA D100, Section 3.4.2): $ratio := \frac{t}{r}$ $ratio = 0.000906$

Allowable compression stress (AWWA D100, Table 11): $F_L := 1639psi$

$\sigma_a := F_L$

Actual compressive force at bottom of shell for $0.785 < J < 1.54$ (AWWA D100, Eq. 13-40): $\sigma_c := \left[\frac{w_t \cdot \left(1 + 0.4 \cdot A_v\right) + w_L}{\left(0.607 - 0.18667 \cdot 1.54^{2.3}\right)} - w_L\right] \cdot \frac{1}{t}$ $\sigma_c = 3.56 \cdot ksi$

Calculations for allowable compression stress, (AWWA 13.5.4.2.4) $P := H \cdot \gamma_w$

$\frac{P}{E_s} \cdot \left(\frac{r}{t}\right)^2 = 0.73$

$$\Delta C_c := \text{if}\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2 < 0.064, 0.72\cdot\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2\right]^{0.84}, \min\left[0.045\cdot\ln\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2 + 0.0018\right] + 0.194, 0.22\right]\right]$$

$$\Delta C_c = 0.18$$

$$\Delta\sigma_{cr} := \frac{\Delta C_c\cdot E_s\cdot t}{r} = 4724.47\cdot psi$$

Allowable compressive stress increase by 33% for seismic loading, for self-anchored tanks (AWWA D100, Eq. 13-47):

$$\sigma_e := 1.333\cdot\left(\sigma_a + \frac{\Delta\sigma_{cr}}{2}\right) \qquad \sigma_e = 5.33\cdot ksi$$

Compression buckling factor of safety:

$$FS_c := \frac{\sigma_e}{\sigma_c} \qquad FS_c = 1.5$$

OK

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Center of Gravity Calcs. -Reduced Water Level	Comp. By:	MJB

Diameter =	115	Tank diameter (ft)	s =	19,333.00	Allowable stress (psi)
H_s =	41	Tank height (ft)	E =	1.00	Joint efficiency
H =	35	Overflow height (ft)	G =	1.0	Specific gravity

Shell Number	Shell Height (ft)	h_p (ft)	Thickness (in, AWWA 3.7)	Actual Thickness (in)	Shell Weight (psf)	Total Shell Weight (lbs)	Center of gravity of shell to floor (ft)	Shell Weight * Center of Gravity of Each Shell
		-6.00	-0.093		0.00	0	39.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
		-6.00	-0.093		0.00	0	45.69	0
	3.46	-2.54	-0.039	0.2500	10.21	12,761	42.23	538,921
4	9.385	6.85	0.106	0.2500	10.21	34,613	32.85	1,136,944
3	9.385	16.23	0.251	0.3290	13.43	45,550	23.46	1,068,728
2	9.385	25.62	0.396	0.4740	19.36	65,626	14.08	923,848
1	9.385	35.00	0.541	0.6250	25.52	86,532	4.69	406,052

Average thickness =	0.3856	in	Sum =	4,074,493
Total weight =	245,082	lbs	X_s =	16.63 ft

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Hoop Stresses per AWWA D100-11 - Reduced Water Level	Comp. By:	MJB

S_S =	1.09	F_a =	1.1	T_s =	0.53	T_L =	16.00
S_1 =	0.37	F_v =	1.7	T_c =	6.89		
S_{MS} =	1.16	S_{DS} =	0.77	C_1 =	0.0158		
S_{M1} =	0.62	S_{D1} =	0.41	B =	0.6673		

S_{ai} = 0.77 (AWWA D100-11 13.2.7.3.1)

S_{ac} = 0.09 (AWWA D100-11 13.2.7.3.2)

D/H = 3.29

E = 1.00 Joint Efficiency (Table 15, AWWA D100-11)

R_i = 2.50 Response Modification Factor for a Self-Anchored Tank (AWWA D100-11, Table 28)

R_c = 1.50 Response Modification Factor for a Self-Anchored Tank (AWWA D100-11, Table 28)

I = 1.50 Seismic Use Group III Importance Factor (AWWA D100-11, Table 24)

A_i = 0.33 Impulsive design acceleration (Eq 13-17, AWWA D100-11)

A_c = 0.06 Convective design acceleration (Eq 13-18, AWWA D100-11)

A_v = 0.11 Vertical design acceleration (AWWA D100-11, 13.5.4.3)

G = 1.00 Specific Gravity

D = 115.00 Diameter of Tank (ft)

H = 35.00 Maximum Depth of Water in Tank (ft)

Shell Ring	Water Depth, Y (ft)	Plate Thickness, t (in)	ASTM Steel Type	Hydrostatic Stress, σ_h (KSI)	Allowable Stress, σ_a (KSI)	Yield Stress, σ_y (KSI)	Factor of Safety (σ_a / σ_h)	N_{i1} (kips/in)	N_{i2} (kips/in)	N_{i3} (kips/in)
Top	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-6.00	0.000	A36		19.33	36.00		-1.107	-0.871	6.075
	-2.54	0.250	A36		19.33	36.00		-0.447	-0.362	6.075
4	6.85	0.250	A36	8.187	19.33	36.00	2.36	1.049	0.923	6.075
3	16.23	0.329	A36	14.750	19.33	36.00	1.31	2.118	2.064	6.075
2	25.62	0.474	A36	16.158	19.33	36.00	1.20	2.759	3.061	6.075
Bottom 1	35.00	0.625	A36	16.744	19.33	36.00	1.15	2.973	3.916	6.075

Shell Ring	Impulsive Hoop Stress, N_i (kips/in)	Convective Hoop Stress, N_c (kips/in)	Hydrodynamic Stess, σ_s (KSI)	Combined Stress, σ_{com} (KSI)	Seismic Allowable Stress, σ_e (KSI)	Factor of Safety (σ_e / σ_{com})
Top	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-1.107	0.97471				
	-0.447	0.88718				
4	1.049	0.70191	5.12548	13.31	25.78	1.94
3	2.118	0.58043	6.86137	21.61	25.78	1.19
2	2.759	0.51169	6.17126	22.33	25.78	1.15
Bottom 1	2.973	0.48945	5.14794	21.89	25.78	1.18

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

REFERENCE

AWWA D100: AWWA Standard for Welded Steel Tanks for Water Storage (2011)

DEFINE TANK DIMENSIONS

Tank Diameter: $D := 115ft$

Tank Radius: $r := \frac{D}{2}$ $\quad r = 57.5ft$

Existing Bolt Circle Radius: $r_b := r + 6.5in$

Tank Shell Height: $H_t := 41ft$

Required Overflow Height: $H := 35ft$

Estimated Roof Weight: $w_{roof} := 10.66psf$

CONVERSIONS

$psi := \frac{lb}{in^2}$ $\quad kip := 1000lb$

$klf := \frac{kip}{ft}$

$plf := \frac{lb}{ft}$

$kcf := \frac{kip}{ft^3}$

$psf := \frac{lb}{ft^2}$

$ksf := \frac{kip}{ft^2}$

$pcf := \frac{lb}{ft^3}$

$ksi := \frac{kip}{in^2}$

Height of roof beams: $h_{bm} := 10in$

Floor thickness: $t_{fl} := .25in$

Specific Gravity of Contents: $G := 1.0$

Density of Water: $\gamma_w := 62.4pcf$

Density of Concrete: $\gamma_{conc} := 144pcf$

Density of Soil: $\gamma_{soil} := 110pcf$

Density of Steel: $\gamma_{steel} := 490pcf$

Steel Modulus of Elasticity: $E_s := 29000000psi$

CAPACITY OF THE TANK

$$V := \left[H \cdot \pi \cdot \frac{D^2}{4} \cdot \left(7.48 \frac{gal}{ft^3}\right)\right]$$

$V = 2719287.99\,gal$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

ALLOWABLE STRESSES

A36 steel

Yield: $\sigma_{Ay} := 36000psi$

Tension (AWWA D100, Table 5): $\sigma_{At} := 18000psi$

Compression (AWWA D100, Table 6): $\sigma_{Ac} := 18000psi$

SEISMIC DESIGN CRITERIA

MCE spectral response acceleration @ 0.2 sec:	$S_s := 1.085$	Geotechnical Report USGS maps (Site Class D assumed, typical)
MCE spectral response acceleration @ 1.0 sec:	$S_1 := .374$	USGS maps
Short-period site coeff. @ 0.2 sec:	$F_a := 1.066$	USGS maps
Long-period site coeff. @ 1.0 sec:	$F_v := 1.651$	USGS maps
Response modification coefficient for flat-bottom tank:		
Impulsive component:	$R_i := 2.5$	AWWA D100 Table 28
Convective component:	$R_c := 1.5$	
Seismic Use Group III Importance Factor:	$I_E := 1.5$	Assumed

CALCULATE SEISMIC DESIGN FACTORS

AWWA D100 Eq. 13-5:	$S_{MS} := F_a \cdot S_s$	$S_{MS} = 1.16$
AWWA D100 Eq. 13-6:	$S_{M1} := F_v \cdot S_1$	$S_{M1} = 0.62$
AWWA D100 Eq. 13-7:	$S_{DS} := \frac{2}{3} \cdot S_{MS}$	$S_{DS} = 0.77$
AWWA D100 Eq. 13-8:	$S_{D1} := \frac{2}{3} \cdot S_{M1}$	$S_{D1} = 0.41$
AWWA D100 Section 13.2.7.3.1:	$T_s := \frac{S_{D1}}{S_{DS}}$	$T_s = 0.53$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

Owner:	City of Anacortes	Job #:	11548
Project:	Existing 3MG Reservoir	Date:	22-Sep-11
Subject:	Center of Gravity Calcs. -Reduced Water Level	Comp. By:	MJB

Diameter =	115	Tank diameter (ft)	s =	18,000.00	Allowable stress (psi)
H_s =	41	Tank height (ft)	E =	0.85	Joint efficiency
H =	34	Overflow height (ft)	G =	1.0	Specific gravity

Shell Number	Shell Height (ft)	h_p (ft)	Thickness (in, AWWA 3.7)	Actual Thickness (in)	Shell Weight (psf)	Total Shell Weight (lbs)	Center of gravity of shell to floor (ft)	Shell Weight * Center of Gravity of Each Shell
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
		0.00	0.000		0.00	0	45.69	0
	3.46	3.46	0.068	0.2500	10.21	12,761	42.23	538,921
4	9.385	12.85	0.251	0.2500	10.21	34,613	32.85	1,136,944
3	9.385	22.23	0.434	0.3290	13.43	45,550	23.46	1,068,728
2	9.385	31.62	0.618	0.4740	19.36	65,626	14.08	923,848
1	9.385	41.00	0.801	0.6250	25.52	86,532	4.69	406,052

Average thickness = 0.3856 in Sum = 4,074,493

Total weight = 245,082 lbs X_s = 16.63 ft

See center of gravity calcs: $X_s := 16.63ft$

Average shell thickness: $t_s := 0.3856in$

Thickness of bottom shell: $t := .625in$

Design spectral response acceleration for impulsive components (AWWA D100 Eq. 13-9): $S_{ai} := S_{DS}$

Impulsive design acceleration (AWWA D100 Eq. 13-17): $A_i := \max\left(\frac{0.36S_1 I_E}{R_i}, \frac{S_{ai} I_E}{1.4R_i}\right)$ $A_i = 0.33$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE 1st MODE SLOSHING WAVE PERIOD T_c

1st modes sloshing wave period AWWA D100 Eq. 13-22): $T_c := 2 \cdot \pi \cdot \sqrt{\frac{D}{3.68 \cdot g \cdot \tanh\left(\frac{3.68 \cdot H}{D}\right)}}$ $T_c = 6.89\,s$

Region-dependent transition period (AWWA D100 Fig. 19): $T_L := 16sec$

Spectral Acceleration of the sloshing liquid (AWWA D100 Eq. 13-12 & 13): $S_{ac} := if\left(T_c > T_L, \frac{1.5T_L \cdot S_{D1} \cdot 1sec}{T_c^2}, \frac{1.5 \cdot S_{D1} \cdot 1sec}{T_c}\right)$ $S_{ac} = 0.09$

DETERMINE WAVE HEIGHT AND REQUIRED OVERFLOW HEIGHT

For Seismic Use Group III, the freeboard shall be d (AWWA D100, Section 13.5.4.4)

Convective design acceleration for sloshing (AWWA D100 Eq. 13-55 & 56): $A_f := if\left(T_c > T_L, \frac{1.5T_L \cdot S_{D1} \cdot 1sec}{T_c^2}, \frac{1.5 \cdot S_{D1} \cdot 1sec}{T_c}\right)$ $A_f = 0.09$

Sloshing wave height (AWWA D100, Eq. 13-52): $d := 0.5 \cdot D \cdot A_f$ $d = 5.15 \cdot ft$

Required overflow height: $H_{req} := H_t - d - h_{bm}$ $H_{req} = 35\,ft$

THEREFORE H=35 OK

EXAMPLE HOOP STRESSES FOR THE TANK SHELLS (See attached spreadsheet for calculations on all shells)

Y is the depth of water on the shell: $Y := 24.62ft$

Shell thickness: $t_p := .474in$

Joint efficiency: $E := .85$

Hydrostatic hoop stress: $\sigma_h := \frac{2.6psf \cdot Y \cdot D \cdot G}{t_p \cdot E} \cdot \frac{1}{1in}$ $\sigma_h = 18.27 \cdot ksi$

Implusive hoop stress (AWWA D100, Eqs. 13-43, 13-44, and 13-45):

$$N_{i1} := 4.5\frac{lb}{in}A_i G\cdot\frac{D}{1ft}\cdot\frac{H}{1ft}\cdot\left[\frac{Y}{H} - 0.5\cdot\left(\frac{Y}{H}\right)^2\right]\cdot\tanh\left(0.866\cdot\frac{D}{H}\right) \qquad N_{i1} = 2.71\cdot\frac{kip}{in}$$

$$N_{i2} := 2.77\frac{lb}{in}\cdot A_i\cdot G\cdot\left(\frac{D}{1ft}\right)^2\cdot\left[\frac{Y}{0.75\cdot D} - 0.5\cdot\left(\frac{Y}{0.75\cdot D}\right)^2\right] \qquad N_{i2} = 2.96\cdot\frac{kip}{in}$$

$$N_{i3} := 1.39\frac{lb}{in}\cdot A_i\cdot G\cdot\left(\frac{D}{1ft}\right)^2 \qquad N_{i3} = 6.07\cdot\frac{kip}{in}$$

$$N_i := if\left(\frac{D}{H} < 1.33, if\left(Y < 0.75\cdot D, N_{i2}, N_{i3}\right), N_{i1}\right) \qquad N_i = 2.71\cdot\frac{kip}{in}$$

Convective hoop stress (AWWA D100, Eq. 13-46):

Convective design acceleration (AWWA D100 Eq. 13-18): $A_c := \frac{S_{ac}\cdot I_E}{1.4\cdot R_c}$ $\qquad A_c = 0.06$

$$N_c := \frac{0.98\frac{lb}{in}\cdot A_c\cdot G\cdot\left(\frac{D}{1ft}\right)^2\cdot\cosh\left[\frac{3.68\cdot(H-Y)}{D}\right]}{\cosh\left(\frac{3.68\cdot H}{D}\right)} \qquad N_c = 0.5165\cdot\frac{kip}{in}$$

Vertical design acceleration (AWWA D100 Section 13.5.4.3): $A_v := \left(0.14\cdot S_{DS}\right)$ $\qquad A_v = 0.11$

Hydrostatic hoop tensile force (AWWA D100, Section 13.5.4.2.3): $N_h := 2.6\frac{lb}{ft^2\cdot in}G\cdot Y\cdot D$ $\qquad N_h = 7361.38\cdot\frac{lb}{in}$

Hydrodynamic hoop stress (AWWA D100, Eq. 13-42): $\sigma_s := \frac{\sqrt{N_i^2 + N_c^2 + \left(N_h\cdot A_v\right)^2}}{t_p}$ $\qquad \sigma_s = 6.06\cdot ksi$

Combined hoop stress: $\sigma_{com} := \sigma_h + \sigma_s$ $\qquad \sigma_{com} = 24.33\cdot ksi$

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE APPROXIMATE WEIGHTS

Roof weight: $W_r := \left(\frac{\pi \cdot D^2}{4} \cdot w_{roof}\right)$ $W_r = 110.7 \cdot kip$

Shell weight: $W_s := \pi \cdot D \cdot t_s \cdot H_t \cdot \gamma_{steel}$ $W_s = 233.2 \cdot kip$

Floor weight: $W_{fl} := \frac{\pi \cdot D^2}{4} \cdot t_{fl} \cdot \gamma_{steel}$ $W_{fl} = 106 \cdot kip$

Water weight: $W_T := \gamma_w \cdot H \cdot \frac{\pi \cdot D^2}{4}$ $W_T = 22685 \cdot kip$

CALCULATE W_1, X_1, W_2, X_2

Weight of effective mass that moves in unison with tank shell (AWWA D100 Eq. 13-24):

$$W_i := \text{if}\left[\frac{D}{H} > \frac{4}{3}, \frac{\tanh\left(.866 \cdot \frac{D}{H}\right) \cdot W_T}{.866 \cdot \frac{D}{H}}, \left(1 - .218 \frac{D}{H}\right) \cdot W_T\right]$$

$W_i = 7918.77 \cdot kip$

Weight of effective mass of 1st sloshing mode (AWWA D100 Eq. 13-26):

$$W_c := .23\left(\frac{D}{H}\right) \cdot \tanh\left(\frac{3.67 \cdot H}{D}\right) \cdot W_T$$

$W_c = 13826.2 \cdot kip$

Height to center of mass W_i (AWWA D100 Eq. 13-28 & 29):

$$X_i := \text{if}\left[\frac{D}{H} > \frac{4}{3}, \frac{3}{8} \cdot H, \left(.5 - \frac{3}{32} \cdot \frac{D}{H}\right) \cdot H\right]$$

$X_i = 13.1\,ft$

Height to effective mass W_c (AWWA D100 Eq. 13-30):

$$X_c := \left(1 - \frac{\cosh\left(\frac{3.67 \cdot H}{D}\right) - 1}{\frac{3.67 \cdot H}{D} \cdot \sinh\left(\frac{3.67 \cdot H}{D}\right)}\right) \cdot H$$

$X_c = 19.1\,ft$

DETERMINE SEISMIC BASE SHEAR, V_{act}

Lateral base shear (AWWA D100 Eq. 13-31):

$$V_f := \sqrt{\left[A_i \cdot (W_s + W_r + W_{fl} + W_i)\right]^2 + (A_c \cdot W_c)^2}$$

$V_f = 2904 \cdot kip$

PERCENT OF TOTAL WEIGHT

$$Percent := \left(\frac{V_f}{W_r + W_s + W_{fl} + W_T}\right) \cdot 100$$

$Percent = 12.6\ \%$

< 33% (sliding friction)

CITY OF ANACORTES - EXISTING 3MG RESERVOIR

DETERMINE SEISMIC OVERTURNING MOMENT, M

Overturning moment at bottom of shell (AWWA D100 Eq. 13-23):

$$M_s := \sqrt{\left[A_i \cdot \left(W_s \cdot X_s + W_r \cdot H_t + W_i \cdot X_i\right)\right]^2 + \left(A_c \cdot W_c \cdot X_c\right)^2}$$

$M_s = 40801 \cdot ft \cdot kip$

CHECK FOR UPLIFT OF THE TANK SHELL

Thickness of bottom annular plate: $t_b := 0.25in$

Weight of tank contents per foot of shell (AWWA D100, Eq. 13-37): $w_L := 7.9 \frac{lb^{.5}}{ft^{1.5}} \cdot t_b \cdot \sqrt{\sigma_{Ay} \cdot H \cdot G}$ $w_L = 2216.93 \cdot plf$

Roof load acting on the shell: $w_{rs} := \frac{0.5W_r}{\pi \cdot D}$ (Factor of 0.5 applied to approximate reduction for center columns) $w_{rs} = 153.24 \cdot plf$

Weight of tank shell & roof per foot of shell (AWWA D100, Eq. 13-41): $w_t := \frac{W_s}{\pi \cdot D} + w_{rs}$ $w_t = 798.8 \cdot plf$

Uplift calculation (AWWA D100 Eq. 13-36): $J := \frac{M_s}{D^2 \cdot \left[w_t \cdot \left(1 - 0.4 \cdot A_v\right) + w_L\right]}$ $J = 1.03$

$J < 1.54$ No uplift exists: Tank is self anchored

CHECK FOR COMPRESSION BUCKLING OF THE TANK SHELL (AWWA)

For Class 2 materials, Thickness-to-radius ratio (AWWA D100, Section 3.4.2): $ratio := \frac{t}{r}$ $ratio = 0.000906$

Allowable compression stress (AWWA D100, Table 11): $F_L := 1639psi$

$\sigma_a := F_L$

Actual compressive force at bottom of shell (AWWA D100, Eq. 13-39): $\sigma_c := \left[w_t \cdot \left(1 + 0.4 \cdot A_v\right) + \frac{1.273 \cdot M_s}{D^2}\right] \cdot \frac{1}{t}$ $\sigma_c = 0.63 \cdot ksi$

Calculations for allowable compression stress, (AWWA 13.5.4.2.4) $P := H \cdot \gamma_w$

$\frac{P}{E_s} \cdot \left(\frac{r}{t}\right)^2 = 0.64$

$$\Delta C_c := \text{if}\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2 < 0.064, 0.72\cdot\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2\right]^{0.84}, \min\left[0.045\cdot\ln\left[\frac{P}{E_s}\cdot\left(\frac{r}{t}\right)^2 + 0.0018\right] + 0.194, 0.22\right]\right]$$

$$\Delta C_c = 0.17$$

$$\Delta\sigma_{cr} := \frac{\Delta C_c\cdot E_s\cdot t}{r} = 4567.05\cdot psi$$

Allowable compressive stress increase by 33% for seismic loading, for self-anchored tanks (AWWA D100, Eq. 13-47):

$$\sigma_e := 1.333\cdot\left(\sigma_a + \frac{\Delta\sigma_{cr}}{2}\right) \qquad \sigma_e = 5.23\cdot ksi$$

Compression buckling factor of safety:

$$FS_c := \frac{\sigma_e}{\sigma_c} \qquad FS_c = 8.24 \qquad \text{OK}$$

APPENDIX D

PAINT LEAD TEST RESULTS

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

METALS REPORT

Results of Analysis by Mod. EPA Method 6020

Measurement of Metals in Solids by ICP/MS

Case File Number:	MIS02389A2	**Matrix:**	Paint
Sample ID No.:	EXTERIOR	**Sample Weight (g):**	0.53
Date Collected:	9/16/2011	**Final Volume (mL):**	50
Date Received:	10/7/2011	**Dilution:**	100
Date Analyzed	10/19/2011	**Analyst:**	WF
Date of Report:	10/19/2011	**Supervisor's Initials:**	

Results Total Metals

Parameter	Result (mg/kg)	RL (mg/kg)	Parameter	Result (mg/kg)	RL (mg/kg)
Lead	28800	9			

RL: Reporting Limit

Results relate only to the submitted sample. Aquatic Research, Inc. makes no claim about the other portions of this commodity/lo

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

METALS REPORT

Results of Analysis by Mod. EPA Method 6020

Measurement of Metals in Solids by ICP/MS

Case File Number:	MIS02389A1	**Matrix:**	Paint
Sample ID No.:	INTERIOR	**Sample Weight (g):**	0.50
Date Collected:	9/16/2011	**Final Volume (mL):**	50
Date Received:	10/7/2011	**Dilution:**	100
Date Analyzed	10/19/2011	**Analyst:**	WF
Date of Report:	10/19/2011	**Supervisor's Initials:**	

Results Total Metals

Parameter	Result (mg/kg)	RL (mg/kg)	Parameter	Result (mg/kg)	RL (mg/kg)
Lead	68300	10			

RL: Reporting Limit

Results relate only to the submitted sample. Aquatic Research, Inc. makes no claim about the other portions of this commodity/lo

The Anacortes Blue Heron Circle Reservoirs project will adhere to the Washington Department of Ecology (DOE) 2005 Stormwater Management Manual for Western Washington (2005 SMMWW). The SMMWW has nine minimum requirements for stormwater management applicable to new development and redevelopment sites depending on the type and size of the proposed project. The Project proposes the addition of approximately 5,235 square feet (SF) of new impervious surfaces, which surpasses the SMMWW threshold of 5,000 SF that triggers the need to meet the applicable minimum requirements. As a result, all nine Minimum Requirements apply to the proposed project.

Minimum Requirement #5 - On-site Stormwater Management requires the project to employ on-site stormwater best management practices (BMPs) to the maximum extent feasible. Roof Downspout BMPs described in Chapter 3 of Volume III, and Dispersion and Soil Quality BMPs described in Chapter 5 of Volume V shall be implemented to reduce the hydrologic disruption of the developed site. Post-construction soil quality depth in accordance with BMP T5.13 will be used in all lawn and landscaped areas that are not otherwise intended for bioretention or ponds. Roof Downspout and impervious surface BMPs will be evaluated and incorporated into the design.

The total of new plus replaced impervious surfaces is estimated to be well above the 5,000 SF threshold, and the value of the proposed improvements exceeds 50% of the assessed value of the existing site improvements. Therefore, all minimum requirements apply to both the new and replaced impervious surfaces, as well as converted vegetation.

Flow control for the new and replaced surfaces will be provided with an underground detention vault or an above detention pond. The runoff discharged from the flow control facility will tie into the existing storm conveyance system to the north of the existing reservoir, which ties into the conveyance system in Blue Heron Circle.

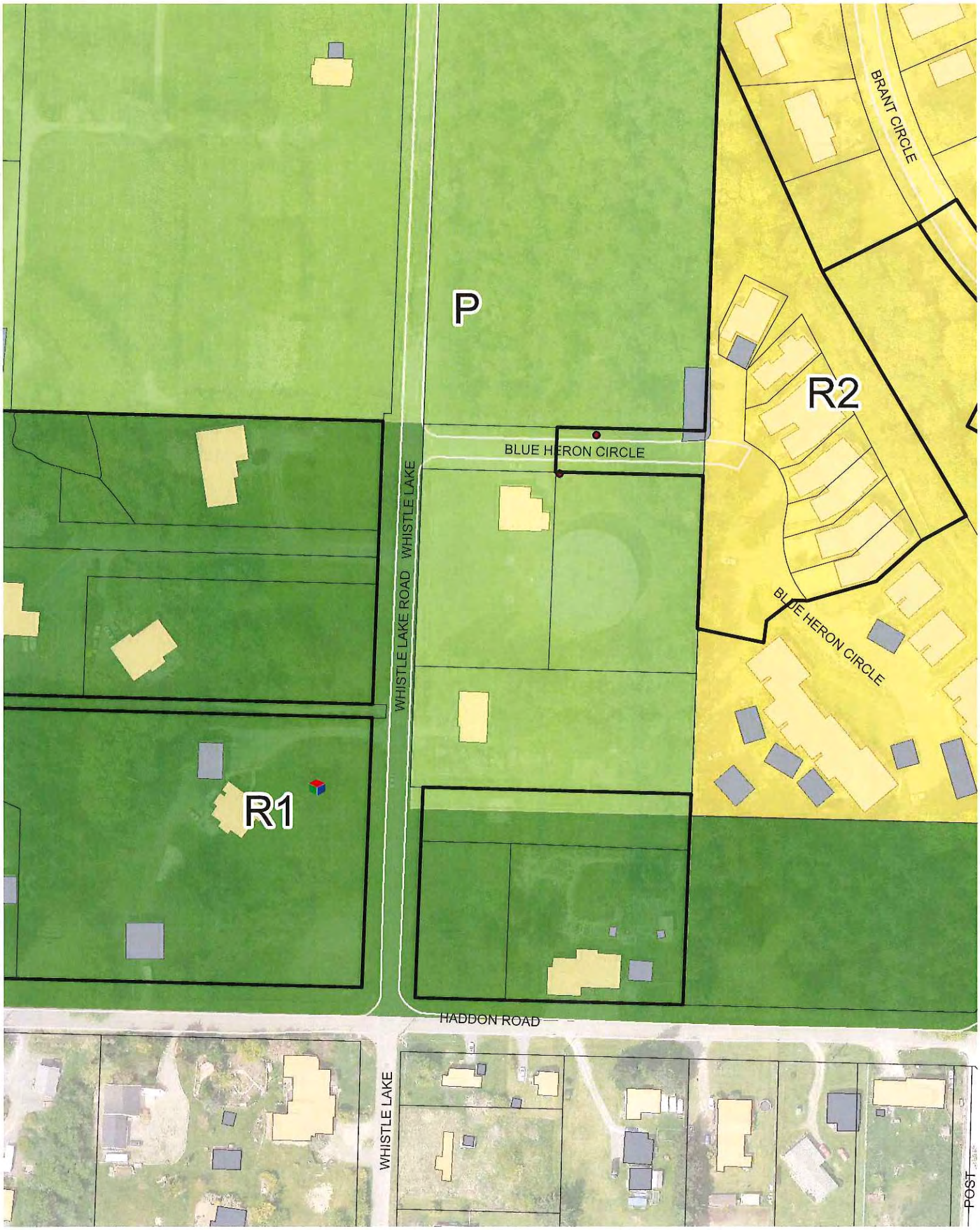
The Anacortes Blue Heron Reservoir project does not propose any pollution generating impervious surfaces (PGIS); therefore, water quality treatment will not be required.

EXHIBIT #2:

ASSESSOR'S INFO AND CITY GIS MAP

4119
4200
300
4302
BLUE HERON CIRCLE
301
WHISTLE LAKE ROAD
4308
4315
4320

BRANT CIRCLE
BLUE HERON CIRCLE
WHISTLE LAKE
WHISTLE LAKE ROAD
BLUE HERON CIRCLE
HADDON ROAD
WHISTLE LAKE
POST


P
R2
R1
BRANT CIRCLE
BLUE HERON CIRCLE
BLUE HERON CIRCLE
WHISTLE LAKE ROAD
WHISTLE LAKE
HADDON ROAD
WHISTLE LAKE
POST

Details for Parcel: P33173

Jurisdiction: ANACORTES
Please contact the city of **ANACORTES** for ANACORTES zoning information.

Zoning Designation:

Parcel Number	XrefID	Quarter	Section	Township	Range
P33173	350230-0-198-0201	00	30	35	02

Owner Information
CITY OF ANACORTES
PO BOX 547
ANACORTES, WA 98221

Site Address(es)

Map Links
Open in iMap
Assessor's Parcel Map:
PDF | DWF

Current Legal Description Abbreviation Definitions
(0.8300 ac) PTN GV LT 6 BEG 15FT E & 255FT N OF SW CSD LT 6 TH E 315FT TH N 355FT M/L TO SE C TR CONV W D STITT AF#843086 & TPOB TH W 165FT M/L TO E LI TR CONV ANACORTES A F#218072 TH S ALG SD E LI & E LI EXT 220 FT TH E 165FT TAP S OF POB TH N TPB

2016 Values for 2017 Taxes*	Exemption
Building Market Value	$.00
Land Market Value	+$76,500.00
Total Market Value	$76,500.00
Assessed Value	$76,500.00
Taxable Value	$.00

Sale Information
Deed Type WARRANTY DEED
Sale Date 1977-05-01
Sale Price $16,000.00

2017 Property Tax Summary
2017 Taxes will be available after 2/15/2017

Use the Taxes link above for 2016 taxes

** Effective date of value is January 1 of the assessment year (2016)*

Legal Description at time of Assessment

***Land Use**	(690) MISCELLANEOUS SERVICES		WAC 458-53-030
Neighborhood	(6E1PBLDG) ALL COUNTY EXEMPT PUBLIC BUILDING		
Levy Code	0900	**Fire District**	
School District	SD103	**Exemptions**	City Owned
Utilities		**Acres**	0.83

Improvement 1 Attributes Summary			
Building Style	COMMERCIAL REAL PROPERTY		
Year Built		**Foundation**	
Above Grade Living Area		**Exterior Walls**	
Finished Basement		**Roof Covering**	
***Total Living Area**		**Heat/Air Conditioning**	
Unfinished Basement		**Fireplace**	
***Total Garage Area**		**Bedrooms**	
Bathrooms			
For additional information on individual segments see Improvements tab			

* Land Use codes are for assessment administration purposes and do not represent jurisdictional zoning. Please contact the appropriate planning department in your jurisdiction for land use questions.

* Total living area includes above grade living area and finished basement area.

* Garage square footage includes all garage areas, basement garages, attached garages, detached garages, etc.

Assessment data for improvements is based on exterior inspections. Please contact the Assessor's office if the information does not accurately reflect the interior characteristics.

Details for Parcel: P33044

Jurisdiction: ANACORTES
Please contact the city of **ANACORTES** for ANACORTES zoning information.

Zoning Designation:

Parcel Number	XrefID	Quarter	Section	Township	Range
P33044	350230-0-014-0005	00	30	35	02

Owner Information
CITY OF ANACORTES
PO BOX 547
ANACORTES, WA 98221

Site Address(es)

Map Links
Open in iMap
Assessor's Parcel Map:
PDF | DWF

Current Legal Description Abbreviation Definitions
(0.9400 ac) TR 150X270 IN S1/2 OF W 20RDS LOT 6-93A C

2016 Values for 2017 Taxes* Exemption

Building Market Value	$624,500.00
Land Market Value	+$85,000.00
Total Market Value	$709,500.00
Assessed Value	$709,500.00
Taxable Value	$.00

Sale Information
Deed Type
Sale Date
Sale Price $.00

2017 Property Tax Summary
2017 Taxes will be available after 2/15/2017

Use the Taxes link above for 2016 taxes

** Effective date of value is January 1 of the assessment year (2016)*

Legal Description at time of Assessment

***Land Use**	(480) UTILITIES (DIKE & DRAIN PROPERTY)		WAC 458-53-030
Neighborhood	(6E1PBLDG) ALL COUNTY EXEMPT PUBLIC BUILDING		
Levy Code	0900	**Fire District**	
School District	SD103	**Exemptions**	City Owned
Utilities	SEW,WTR-P	**Acres**	0.94

Improvement 1 Attributes Summary

Building Style	COMMERCIAL REAL PROPERTY		
Year Built		**Foundation**	
Above Grade Living Area		**Exterior Walls**	
Finished Basement		**Roof Covering**	
***Total Living Area**		**Heat/Air Conditioning**	
Unfinished Basement		**Fireplace**	
***Total Garage Area**		**Bedrooms**	
Bathrooms			

For additional information on individual segments see Improvements tab

* Land Use codes are for assessment administration purposes and do not represent jurisdictional zoning. Please contact the appropriate planning department in your jurisdiction for land use questions.

* Total living area includes above grade living area and finished basement area.

* Garage square footage includes all garage areas; basement garages, attached garages, detached garages, etc.

Assessment data for improvements is based on exterior inspections. Please contact the Assessor's office if the information does not accurately reflect the interior characteristics.

EXHIBIT #3:

NOA & NOH USING OPTIONAL SEPA DNS & RESCHEDULED NOH

NOTICE OF APPLICATION & HEARING WITH OPTIONAL SEPA DNS:

Notice Is Hereby Given That An Application Was Made For The Following Proposal:

Request: The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs. Subject parcels involved are: P33173 & P33044. Per AMC 17.04.070(E), the subject applications are being reviewed via an integrated and consolidated permit review process. The source of the funding for the subject proposal is from the State of Washington's Department of Health Drinking Water State Revolving Fund Loans in the amount of approximately $4,974,755.

Applicant: City of Anacortes Public Works Department **File Number**: CUP-2016-1002

Project Location: Project site is located south of Blue Heron Circle & east of Whistle Lake Road

Date of Application: September 30, 2016 **Date Application Deemed Complete:** November 16, 2016

Public Comment Period: Any person may comment on this application by writing to the address below and/or by testifying at the public hearing. Staff will issue a recommendation on the project after the 30-day comment period ends on **December 16, 2016, at 5:00 pm**. Written comments on the proposal should be submitted before the end of the comment period but will be accepted until the close of the Open-Record Public Hearing.

Required Project Permits/Approvals: The following may be required in addition to the above: Civil Construction Plan approval, Building Permit Application Approval, & Department of Health Approval

Preliminary Determination of Consistency: At this time, no determination of consistency with City of Anacortes plans, regulations, or standards has been made. At a minimum, this project will be subject to the following plans and regulations: the Comprehensive Plan; Anacortes Municipal Code (Zoning, etc.), Engineering Design and Building Standards.

SEPA Review: Based on the submitted application and available information, the City anticipates issuing an DNS for this proposal and the optional DNS process as specified in WAC § 197.11.355 is being utilized. Consequently, this may be the only opportunity to comment on the environmental impacts of this proposal. This proposal may include mitigation measures under applicable codes, and the project review process may incorporate or require mitigation measures regardless of whether an EIS is prepared. A copy of the subsequent SEPA threshold determination for the proposal may be obtained upon request. The SEPA comment deadline ends on **December 16, 2016, at 5:00 PM**. **Existing Environmental Documents:** SEPA Environmental Checklist, Cultural Resource Report, Inadvertent Discovery Plan, & Geotechnical Report.

Open-Record Public Hearing: An open-record public hearing will be held by the **Planning Commission at 6:00 PM on Wednesday, December 28, 2016. Closed-Record Public Hearing:** A closed-record public hearing to hear any appeals of the Planning Commission's recommendation and to make a decision on the application will be held by the **City Council at 6:00 PM on Tuesday January 17, 2017.** A **site visit** will be held at **4:00 PM onsite prior to each of these two hearings**. Both hearings will be held in City Council chambers located at 904 6th Street, Anacortes, WA.

How to become a party of record: You may become a party of record by submitting written comments, including a (USPS) mailing address, to the City of Anacortes PCED at the address listed below. E-mailed comments must include a return (USPS) mailing address in order for the sender to be considered a party of record. Questions about this proposal, requests to receive future notices of hearings and/or the decision, once made, and/or appeal procedures should be directed to the contact person listed below. The application and complete case file are available for review at the City of Anacortes PCED located at 904 6th Street, Anacortes, WA 98221. A decision on this application will be made within 120 days from the date of completeness.

For Project Information: Kevin Cricchio, AICP, Associate Planner; Phone: (360) 630-6270; Email: kevinc@cityofanacortes.org; City of Anacortes, P.O. Box 547, Anacortes, WA 98221

Date Issued: November 16, 2016 **Publish:** November 16, 2016

RESCHEDULED NOTICE OF HEARING:

Notice Is Hereby Given That An Application Was Made For The Following Proposal:

Request: The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs. Subject parcels involved are: P33173 & P33044. Per AMC 17.04.070(E), the subject applications are being reviewed via an integrated and consolidated permit review process. The source of the funding for the subject proposal is from the State of Washington's Department of Health Drinking Water State Revolving Fund Loans in the amount of approximately $4,974,755.

Applicant: City of Anacortes Public Works Department **File Number**: CUP-2016-1002

Project Location: Project site is located south of Blue Heron Circle & east of Whistle Lake Road

Date of Application: September 30, 2016 **Date Application Deemed Complete:** November 16, 2016

Public Comment Period: Any person may comment on this application by writing to the address below and/or by testifying at the public hearing. Staff will issue a recommendation on the project after the 30-day comment period ends on **December 16, 2016, at 5:00 pm**. Written comments on the proposal should be submitted before the end of the comment period but will be accepted until the close of the Open-Record Public Hearing.

Required Project Permits/Approvals: The following may be required in addition to the above: Civil Construction Plan approval, Building Permit Application Approval, & Department of Health Approval

Preliminary Determination of Consistency: At this time, no determination of consistency with City of Anacortes plans, regulations, or standards has been made. At a minimum, this project will be subject to the following plans and regulations: the Comprehensive Plan; Anacortes Municipal Code (Zoning, etc.), Engineering Design and Building Standards.

SEPA Review: Based on the submitted application and available information, the City anticipates issuing an DNS for this proposal and the optional DNS process as specified in WAC § 197.11.355 is being utilized. Consequently, this may be the only opportunity to comment on the environmental impacts of this proposal. This proposal may include mitigation measures under applicable codes, and the project review process may incorporate or require mitigation measures regardless of whether an EIS is prepared. A copy of the subsequent SEPA threshold determination for the proposal may be obtained upon request. The SEPA comment deadline ends on **December 16, 2016, at 5:00 PM**. **Existing Environmental Documents:** SEPA Environmental Checklist, Cultural Resource Report, Inadvertent Discovery Plan, & Geotechnical Report.

Open-Record Public Hearing: The open-record public hearing before the **Planning Commission** has been rescheduled for **6:00 PM on Wednesday, January 04, 2017**. **Closed-Record Public Hearing:** A closed-record public hearing to hear any appeals of the Planning Commission's recommendation and to make a decision on the application will be held by the **City Council at 6:00 PM on Tuesday January 17, 2017.** A **site visit** will be held at **4:00 PM onsite prior to each of these two hearings**. Both hearings will be held in City Council chambers located at 904 6th Street, Anacortes, WA.

How to become a party of record: You may become a party of record by submitting written comments, including a (USPS) mailing address, to the City of Anacortes PCED at the address listed below. E-mailed comments must include a return (USPS) mailing address in order for the sender to be considered a party of record. Questions about this proposal, requests to receive future notices of hearings and/or the decision, once made, and/or appeal procedures should be directed to the contact person listed below. The application and complete case file are available for review at the City of Anacortes PCED located at 904 6th Street, Anacortes, WA 98221. A decision on this application will be made within 120 days from the date of completeness.

For Project Information: Kevin Cricchio, AICP, Associate Planner; Phone: (360) 630-6270; Email: kevinc@cityofanacortes.org; City of Anacortes, P.O. Box 547, Anacortes, WA 98221

Date Issued: December 21, 2016 **Publish:** December 21, 2016

EXHIBIT #4:

PUBLIC COMMENTS RECEIVED

TO DATE, NO PUBLIC COMMENTS HAVE BEEN RECEIVED

EXHIBIT #5:

AGENCY & DEPARTMENT COMMENTS RECEIVED

Anacortes Planning, Community & Economic Development Dept.
Permit Center
P.O. Box 547, Anacortes, WA 98221-0547 PH (360) 293-1901
Don Measamer, *Director of Planning, Community and Economic Development* FAX (360) 293-1938

Department / Agency Comment Form:

November 14, 2016

Project Name: **CUP-2016-1002, Two 1.5 million gallon water tanks/reservoirs**

From: Kevin Cricchio, AICP, Associate Planner; City of Anacortes; 904 6th Street; P.O. Box 547, Anacortes, WA 98221; Phone: (360) 630-6270; Email: kevinc@cityofanacortes.org

Description of Subject Proposal:	**CUP-2016-1002:** The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs. Subject parcels involved are: P33173 & P33044. Project site is located south of Blue Heron Circle & east of Whistle Lake Road. Subject property is located in a portion of Section 30; Township 35 North; Range 02; Willamette Meridian and is located in the Public Use Zoning District. **Provide any conditions or requirements to me by: 5:00 PM on December 16, 2016.**
Applicant/ Landowner:	City of Anacortes Public Works Department P.O. Box 547 Anacortes, WA 98221

PREVIOUS DRG: 08-08-16
PRE-2016-0024

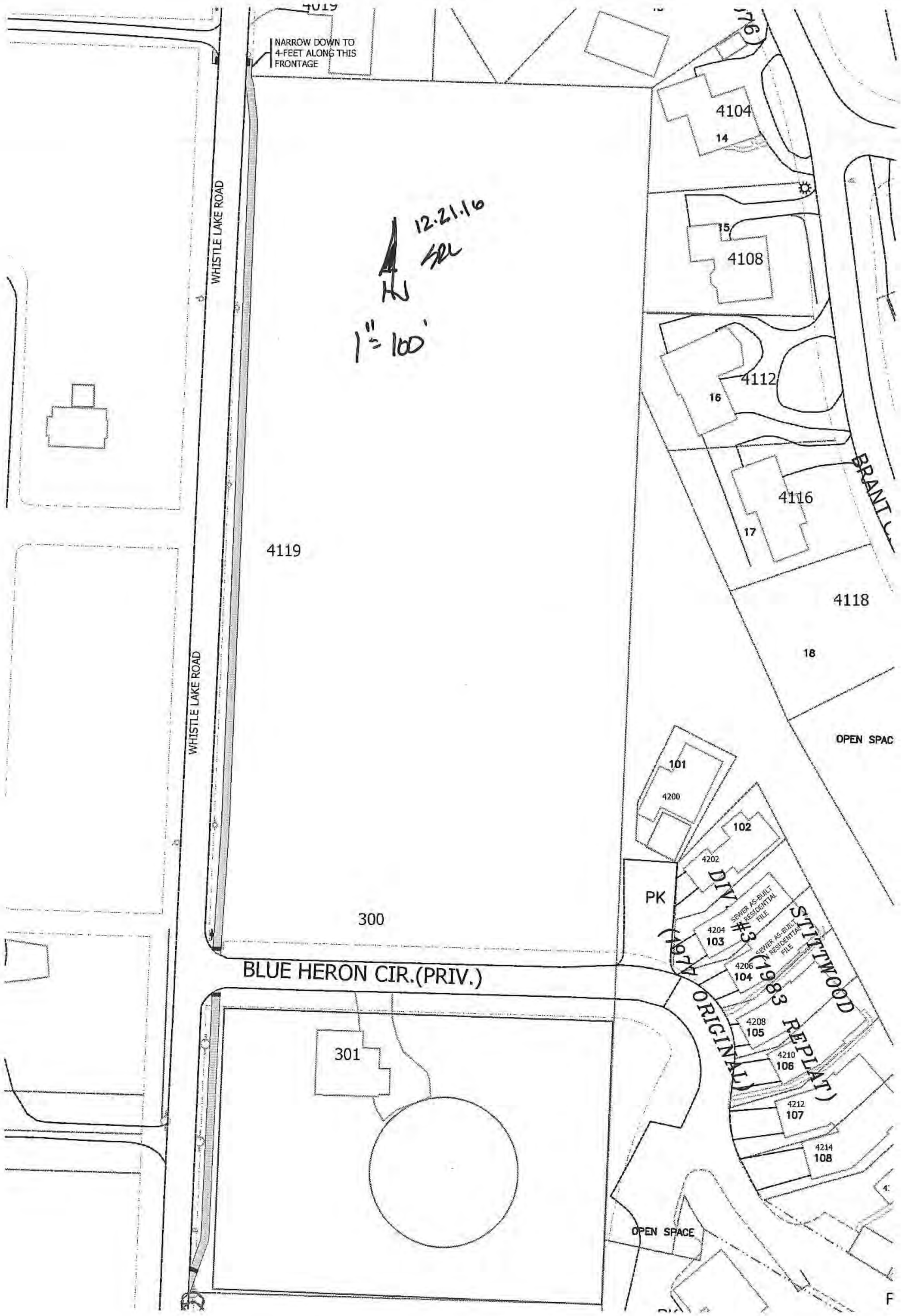
Conditions &/or Requirements:

- CONSTRUCT A 6' WIDE PAVED PATH ACRUSS THE FRONTAGE OF WATER TOWER PROPERTY.

- CONSTRUCT A 6' WIDE PAVED PATH, APPROXIMATELY 660 LF NORTH FROM BLUE HERON CIRCLE TO SOUTHERLY BOUNDARY OF 4019 WHISTLE LAKE ROAD, IMPROVE CROSSING TO CEMETERY

Signature: STEVEN LANGE **Date:** 12.20.16

Dept. / Agency Name: PUBLIC WORKS ENGINEERING DEPARTMENT - COA.


NARROW DOWN TO 4-FEET ALONG THIS FRONTAGE
WHISTLE LAKE ROAD
12.21.16
SDL
1" = 100'
4104
14
15
4108
4112
16
4116
17
BRANT
4118
18
OPEN SPAC
4119
300
PK
101
4200
102
4202
DIV #3 (1974 ORIGINAL)
SEWER AS-BUILT RESIDENTIAL FILE
4204
103
4206
104
STITTWOOD (1983 REPLAT)
4208
105
4210
106
4212
107
4214
108
BLUE HERON CIR.(PRIV.)
301
OPEN SPACE

Development Review Group

(DRG)

Name of Applicant: City of Anacortes

Brief Description: Conditional Use Permit- Two 1.5 million gallon water tanks/reservoirs

Please initial if approved and/or include your comments:

Street Department: AEK

Comments: OK.

Water Department: & BR

Comments:

OK

Solid Waste: MK

Comments:

OK

Sandi Andersen: SA

Comments:

Cricchio, Kevin

From: Kim.Carpenter@skagitpud.org
Sent: Monday, November 14, 2016 2:30 PM
To: Cricchio, Kevin
Subject: Re: CUP-2016-1002, Two Water Tanks Proposed; P33173 & P33044

Mr. Cricchio
The District is in receipt of your email dated 11/14 regarding the above referenced project.
Your email has been forwarded to our Environmental Services Coordinator for review and response.
Should you require further assistance, please contact us.
Kim

Kim Carpenter
Executive Assistant/Clerk of the Board

Skagit PUD
1415 Freeway Drive
PO Box 1436
Mount Vernon, WA 98273

P. (360) 848-4460
F. (360) 416-0352
E. Kim.Carpenter@skagitpud.org
W. www.SkagitPUD.org

This message is intended exclusively for the individual or entity to which it is addressed. This communication may contain information that is proprietary, privileged or confidential or otherwise legally exempt from disclosure. If you are not the named addressee, you are not authorized to read, print, retain, copy or disseminate this message or any part of it. If you have received this message in error, please notify the sender immediately by e-mail and delete all copies of the message.

From: "Cricchio, Kevin" <kevinc@cityofanacortes.org>
To: Development Review Group <DevelopmentReviewGroup@cityofanacortes.org>, '"stormer@wsdot.wa.gov"' <stormer@wsdot.wa.gov>, '"Thompson, Doug S (DFW)"' <Doug.Thompson@dfw.wa.gov>, '"Kaehler, Gretchen (DAHP)"' <Gretchen.Kaehler@DAHP.wa.gov>, '"SEPAdesk@dfw.wa.gov"' <SEPAdesk@dfw.wa.gov>, '"sepacenter@dnr.wa.gov"' <sepacenter@dnr.wa.gov>, '"SEPA (DAHP)"' <sepa@dahp.wa.gov>, '"brandonb@co.skagit.wa.us"' <brandonb@co.skagit.wa.us>, '"ddigges@skagittransit.org"' <ddigges@skagittransit.org>, '"Miller, Mark"' <mark_miller@fws.gov>, '"lcampbell@swinomish.nsn.us"' <lcampbell@swinomish.nsn.us>, '"thyatt@skagitcoop.org"' <thyatt@skagitcoop.org>, 'Todd Woodard' <twoodard@samishtribe.nsn.us>, 'Jackie Ferry' <jferry@samishtribe.nsn.us>, '"sschuyler@UPPERSKAGIT.com"' <sschuyler@UPPERSKAGIT.com>, 'Sarah Tchang' <sarah@portofanacortes.com>, '"masmundson@nwcleanair.org"' <masmundson@nwcleanair.org>, '"PUD@skagitpud.org"' <PUD@skagitpud.org>, 'Torhil Ramsay' <tramsay@asd103.org>, '"McCammant, Ted"' <Ted.McCammant@cngc.com>, '"jane.major@pse.com"' <jane.major@pse.com>, '"SEPAUNIT@ECY.WA.GOV"' <SEPAUNIT@ECY.WA.GOV>, '"dalep@co.skagit.wa.us"' <dalep@co.skagit.wa.us>, '"Shane W. Whitney"' <shaneww@co.skagit.wa.us>, '"dwsrf@doh.wa.gov"' <dwsrf@doh.wa.gov>, "Reynolds, Matt" <MattR@cityofanacortes.org>
Date: 11/14/2016 01:56 PM
Subject: CUP-2016-1002, Two Water Tanks Proposed; P33173 & P33044

11-14-16

RE: CUP-2016-1002, Two Water Tanks Proposed; P33173 & P33044

Hello everyone. Attached is a conditional use permit, variance request, and SEPA environmental review to permit the construction of two 1.5 million gallon water tanks/reservoirs on the subject property. The existing 3 million gallon water tank will be removed. Please provide any comments to me **by 5:00 PM on December 16, 2016**. Thank you.

Kevin Cricchio, AICP
Associate Planner

EXHIBIT #6:

ISSUED SEPA DNS

State Environmental Policy Act (SEPA)
Determination of Non-Significance (DNS):

Proposal: The City of Anacortes' Public Works Department has applied for a Conditional Use Permit, Variance request, & SEPA environmental review to permit the construction of two 1.5 million gallon water tanks /reservoirs on the subject property. The existing 47 foot tall 3 million gallon water tank/reservoir located onsite will be removed. The Variance request is to increase the maximum permitted height of 35 feet to approximately 50 feet above grade for the two new reservoirs. Subject parcels involved are: P33173 & P33044. Per AMC 17.04.070(E), the subject applications are being reviewed via an integrated and consolidated permit review process. The source of the funding for the subject proposal is from the State of Washington's Department of Health Drinking Water State Revolving Fund Loans in the amount of approximately $4,974,755.,

File Number: CUP-2016-1002

Applicant /Proponent: City of Anacortes' Public Works Department

Location of Proposal: Project site is located south of Blue Heron Circle & east of Whistle Lake Road

Lead Agency: City of Anacortes, Planning, Community, & Economic Development Department

Threshold Determination: Determination of Nonsignificance (DNS). The lead agency has determined that this project action proposal does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public upon request.

☒ This DNS is issued under WAC 197.11.355. There is no additional comment period for this DNS as the optional DNS process was used per WAC 197.11.355. A comment period was already provided associated with the Notice of Application and Hearing Using Optional DNS Process.

Pursuant to the procedures adopted under AMC § 18.04.250, no administrative appeal of the SEPA threshold determination is provided for this legislative action. The SEPA threshold determination may be appealed to the Skagit County Superior Court under RCW 43.21.C.075 after the City's final action on the underlying action(s). The issuance of this DNS does not constitute approval of the proposal.

If you have any questions, please contact Kevin Cricchio, AICP, Associate Planner; Planning, Community, & Economic Development Department; P.O. Box 547, Anacortes, WA 98221; 360-630-6270; or via email at kevinc@cityofanacortes.org.

SEPA Responsible Official: Don Measamer, Director, Planning, Community & Economic Development Department

Signature:

Don Measamer, Director

December 21, 2016
Date of Issuance:

EXHIBIT #7:

CULTURAL RESOURCE REVIEW & INADVERTENT DISCOVERY PLAN

DRAYTON ARCHAEOLOGY

Cultural Resources Review of the Blue Heron Circle Reservoir Rehabilitation Project, Anacortes, Skagit County, Washington

Prepared By:
Garth L. Baldwin, M.A., RPA
Marsha R. Hanson, B.A.

Prepared For:
Widener & Associates
10108 32nd Avenue West, Suite D
Everett, Washington 98204

RECEIVED
OCT 25 2016

Drayton Archaeology Report: 0716M

August 16, 2016

Box 5424 - Bellingham WA 98227-5424 - www.draytonarchaeology.com

CONTENTS

Summary 1
Regulatory Context 1
Area of Potential Efects (APE) and Proposed Undertaking 2
Background Review 6
Topography and Geology 6
Vegetation and Fauna 7
Cultural Context 8
Ethnographic 8
Historic 9
Previous Cultural Resource Studies and Archaeological Sites 10
Cultural Resource Expectations 13
Field Investigation 13
Recommendations 17
References 19

FIGURES

Figure 1. Portion of the USGS (1978) Anacortes South, WA topographic map detailing the location of the project area 4
Figure 2. Aerial map indicating the approximate location of the proposed reservoir installation. Image from Google Earth, adapted by DA. 5
Table 1. Previous cultural resource surveys conducted within one-mile of the APE. 11
Figure 3. Aerial map showing location of shovel probe. 16

PHOTOS

Photo 1. Overview of the project area, view is to the south. 14
Photo 2. Overview of the project area, view is to the east/northeast. 15
Photo 3. Overview of SP1 showing soils encountered within the project area. 17

Cultural Resources Review of the Blue Heron Circle Reservoir Rehabilitation Project, Anacortes, Skagit County, Washington

Author:	Garth L. Baldwin, Marsha R. Hanson
Date:	August 16, 2016
Location:	City of Anacortes, Skagit County, Washington
USGS Quad:	Anacortes South, WA 7.5 minute USGS Quadrangle (1978)
Township, Range, Section:	T35N, R2E, Section 30

SUMMARY

Drayton Archaeology (Drayton or DA) was retained by Widener & Associates on behalf of the City of Anacortes to conduct a cultural resources assessment for the City of Anacortes Blue Heron Circle Reservoir Rehabilitation Project located southeast of the intersection of Whistle Lake Road and Blue Heron Court, Anacortes, Washington. The proposed project seeks to construct one, 1.5 million gallon (MG) reservoir adjacent to the existing 3 MG reservoir, then demolish the old one and replace it with another 1.5-MG reservoir. The project will be funded through Washington Department of Health (DOH), Drinking Water State Revolving Fund (DWSRF). The EPA loan number is DM-16-952-025. The funds are distributed by DOH, but originate with the U.S. Environmental Protection Agency (EPA). As lead federal agency EPA is responsible for ensuring that projects funded by the DWSRF meet section 106 requirements. EPA has delegated administration of the DWSRF in Washington State to the Office of Drinking Water within DOH. The study was conducted to satisfy partial compliance with section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended. As the lead agency having jurisdiction over the undertaking, FHWA is required under 36 Code of Federal Regulations (CFR) Part 800 of the NHPA to consider any potential effects to historic properties that the undertaking may cause.

Drayton's cultural resources assessment consisted of background review, field investigation, and the production of this report. Background review determined that the project area is located in an area of low probability for cultural resources. Field investigation included pedestrian survey and subsurface testing. As a result of background and field research no evidence of precontact or historic archaeological deposits were encountered. As proposed the project does not appear to have the potential to affect any cultural resources therefore additional professional archeological oversight is appears unwarranted. <u>It is our recommendation that EPA assert a determination of No Historic Properties Affected to the Washington State Historic Preservation Officer and all other interested and consulting parties.</u>

REGULATORY CONTEXT

This cultural resources assessment was conducted, in part, to satisfy regulatory requirements for section 106 of the National Historic Preservation Act (NHPA) and the implementing regulations

in 36 CFR Part 800. Section 106 requires Federal agencies take into account the effects of their undertakings on historic properties. A historic property is typically aged 50 years or older and is defined in 36 CFR part 800.16(l)(1) as follows:

> ... any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

The procedures under section 106 generally require the Federal agency involved in the undertaking to identify the area of potential effect (APE), inventory any historic properties that may be located within the APE, and determine if the identified historic properties located within the APE may be eligible for listing on the NRHP. An APE is defined in 36 CFR 800.16(d), as follows:

> ... the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

If NRHP-eligible historic properties are identified within the APE, then potential adverse effects to the historic properties must be assessed and a resolution of adverse effects must be recommended. Under section 106, the responsible Federal agency must, at a minimum, consult with and seek comment from the State Historic Preservation Officer (SHPO) and/or the Tribal Historic Preservation Officer (THPO), as applicable, and consult with any affected or potentially affected Native American Tribe(s).

AREA OF POTENTIAL EFECTS (APE) AND PROPOSED UNDERTAKING

The APE is located southeast of the intersection of Whistle Lake Road and Blue Heron Court, Anacortes, in the SW ¼ of the SE ¼ of Section 30, Township 35 North, Range 2E, of the Willamette Meridian (Figure 1). The APE consists of an about 1-acre of cleared and open land that houses a reservoir on a City of Anacortes owned parcel. It is bordered by single family residences on the west, south, and eastern boundaries, with undeveloped woodlands to the north (Figure 2).

In the order of operations, the proposed undertaking is to construct a 1.5 million gallon (MG) reservoir adjacent to the existing 3-MG reservoir at the Blue Heron Circle Reservoir site. Then the

older, 3-MG Reservoir would be razed. Another 1.5-MG reservoir would then be built in place of the old one. Site work would require grading, deposition of ~1500 square yards of gravel fill, construction of two reservoirs, installation of ~500 lineal feet of new yard piping and valving, and associated telemetry controls. The site would be restored upon completion with finish grading, revegetation and ~2,000 lineal feet of new fencing.

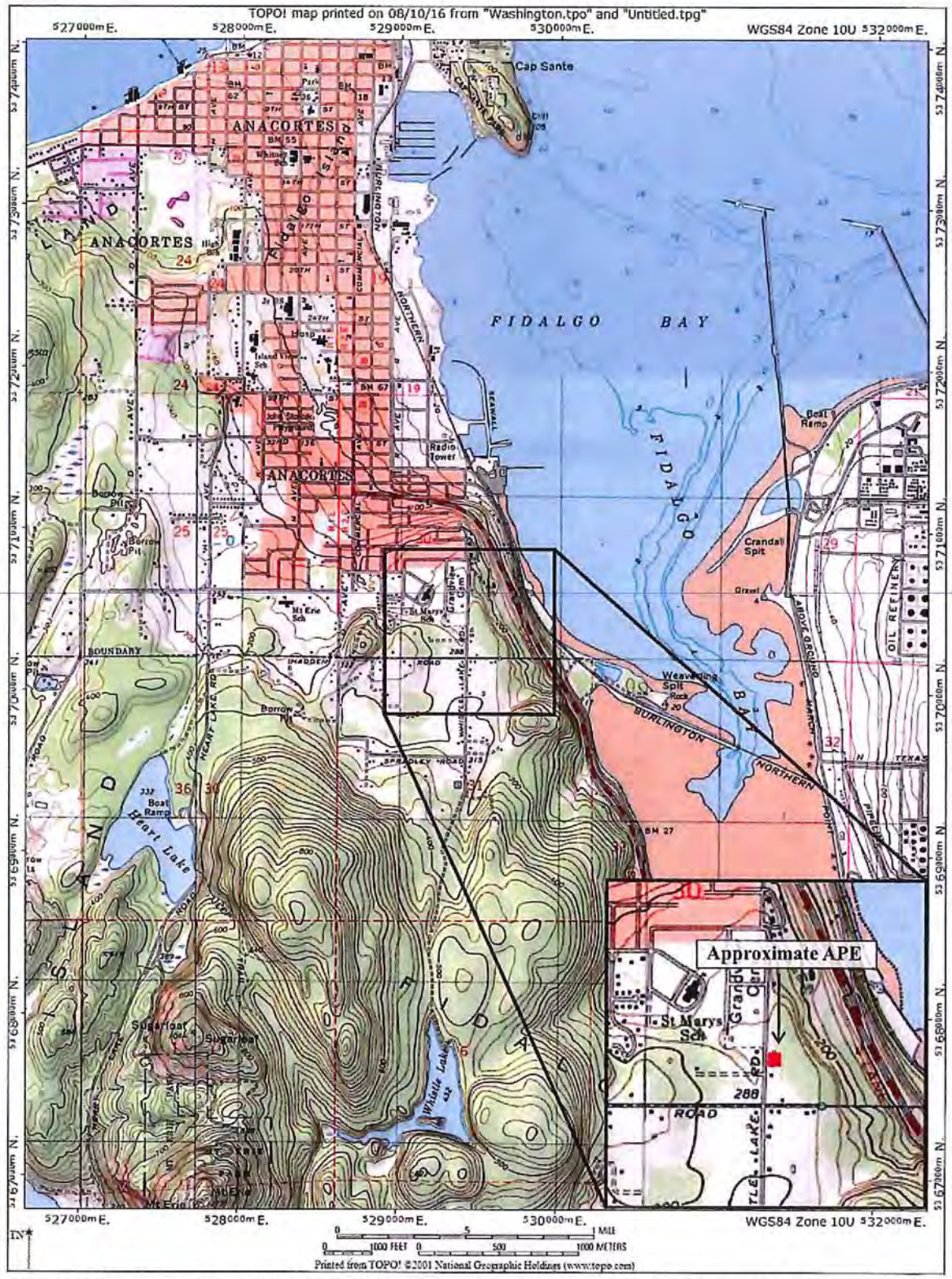


Figure 1. Portion of the USGS (1978) Anacortes South, WA topographic map detailing the location of the project area.

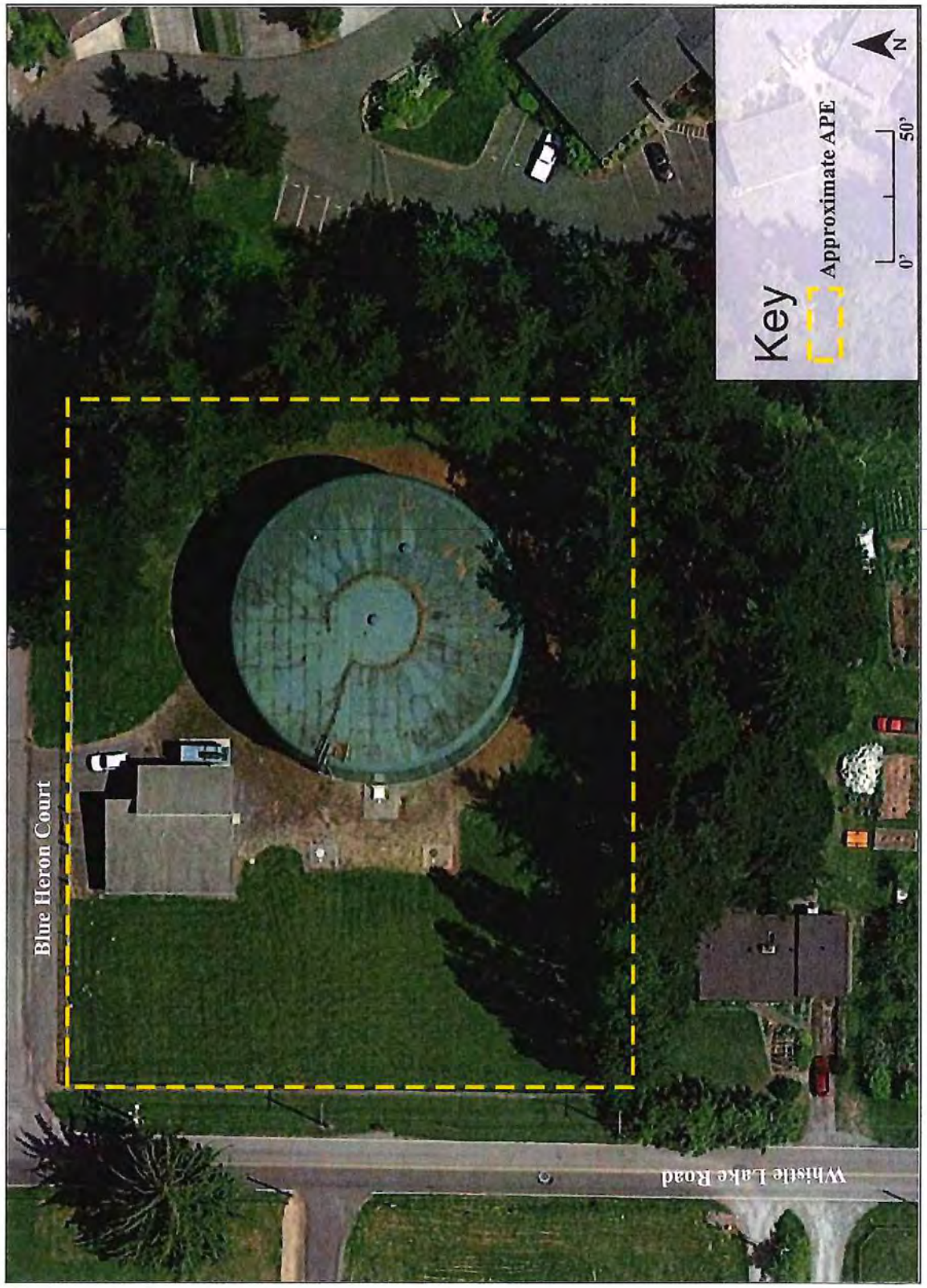


Figure 2. Aerial map indicating the approximate location of the proposed reservoir installation. Image from Google Earth, adapted by DA.

BACKGROUND REVIEW

Determining the probability for historic properties to be present within the project area was based largely upon review and analysis of past environmental and cultural contexts and previous cultural resources studies and sites recorded within one-mile of the project area. Consulted sources included reviewing local geologic data to better understand the depositional environment; archaeological, historic and ethnographic records on file on the Washington Information System for Architectural and Archaeological Records Data (WISAARD) database; and selected published local historic records.

Topography and Geology

The project is located in the City of Anacortes on Fidalgo Island. Fidalgo Island has a complex geological history. The bedrock consists of an assemblage of Paleozoic through Mesozoic (~540-65 million year ago) sedimentary and volcanic rocks that were accreted to North America as oceanic crust was subducted under the continental crust (Brown and Dragovich 2003).

Fidalgo Island falls within the Puget Lowlands, a geological and physiographic province that was shaped by at least four periods of extensive glaciation during the Pleistocene (Easterbrook 2003; Waitt and Thorson 1983). The bedrock was depressed and deeply scoured by glaciers and sediments were deposited and often reworked as the glaciers advanced and retreated. A thick mantle of glacial till and drift were left on many portions of Fidalgo Island at the end of the last of these glacial periods: the Fraser Glaciation.

The Vashon Stade of the Fraser Glaciation began around 18,000 B.P. with an advance of the Cordilleran ice sheet into the lowlands (Porter and Swanson 1998). As the ice built up one lobe flowed down into the Puget Lowland and another lobe filled the Strait of Juan de Fuca. The ice in the Puget Lobe reached its terminus just south of Olympia between 14,500 and 14,000 BP (Clague and James 2002; Easterbrook 2003; Waitt and Thorson 1983). The Puget Lobe was thicker towards the north and thinned towards its terminus. The depth of the ice over the San Juan Islands is estimated to have been about 1600-1800 meters (Easterbrook 2003).

The Puget Lobe began to retreat shortly after reaching its terminus. Marine waters entered the lowlands that had been carved out by the glacier and filled Puget Sound. The remaining ice was floated and wasted away rapidly. Everson glaciomarine drift deposits dating between 12,500 and 11,500 BP were released from the melting glacial ice and deposited on the sea floor across the northern and central Puget Lowland (Easterbrook 2003). The enormous weight of the ice had depressed the land but as the crust rebounded relative sea levels fell and exposed some of the drift deposits (Clague and James 2002; Easterbrook 2003).

The project area overlies the bedrock of the Fidalgo complex (Brown and Dragovich 2003). The Fidalgo complex consists of peridotite, gabbro, quartz diorite-tonalite, sedimentary breccia, argillite, and volcanic-lithic sandstone. The surficial geology within the project area has been mapped as Vashon Stade glacial outwash deposits.

According to the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS n.d.) and the University of California Davis SoilWeb (UCDavis SoilWeb n.d.) soils in the project area have been mapped as Keystone loamy sand 0 to 8 percent slopes. The Keystone series is described as consisting of very deep, somewhat excessively drained soils formed in sandy glacial outwash on plains, hillslopes, kames, and moraines at elevations of near sea level to 90 meters AMSL. A typical pedon is described as:

> Oi--0 to 3 cm; slightly decomposed plant material; clear smooth boundary.
>
> A1--3 to 8 cm; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; strong coarse granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; moderately acid (pH 5.7); clear wavy boundary.
>
> A2--8 to 20 cm; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many very fine, fine, and medium roots; 5 percent gravel; moderately acid (pH 5.6); clear wavy boundary. (Combined A horizon thickness is 13 to 24 cm)
>
> Bw1--20 to 48 cm; light yellowish brown (2.5Y 6/4) loamy sand, olive brown (2.5Y 4/3) moist; single grain; loose, nonsticky, nonplastic; common fine and many medium and coarse roots; 5 percent gravel; strongly acid (pH 5.5); clear wavy boundary.
>
> Bw2--48 to 86 cm; light yellowish brown (2.5Y 6/4) very gravelly loamy sand, light olive brown (2.5Y 5/3) moist; single grain; loose, nonsticky, nonplastic; few fine and medium roots; 25 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 6.0); clear wavy boundary. (Combined Bw horizon thickness is 30 to 68 cm)
>
> C--86 to 150 cm; light yellowish brown (2.5Y 6/3) loamy sand, light olive brown (2.5Y 5/3) moist; massive; moderately hard, friable, nonsticky, nonplastic; slightly acid (pH 6.3); 5 percent gravel.

Vegetation and Fauna

The Puget Sound basin, as part of the Puget Trough, is part of the *Tsuga heterophylla* zone. Precontact vegetation would have included an overstory of Western red cedar (*Thuja plicata*), Western hemlock (*Tsuga heterophylla*), and Douglas fir (*Pseudotsuga menziesii*) (Franklin and

Dyrness 1973). Lowland areas would have had a canopy dominated by, but not limited to, red alder (*Alnus rubra*), Oregon maple (*Acer macrophyllum*), and willow (*Salix sp.*) with a thick understory of stinging nettles (*Urtica diocia*), bracken fern (*Pteridum aquilinum*), sword fern (*Polystichum munitum*), skunk cabbage (*Lysichiton americanus*) and Nootka rose (*Rosa nutakana*).

A substantial marine invertebrate population in coastal waters near the project area would have included bivalves such as the steamer clam (*Leukoma staminea*), butter clam (*Saxidomus giganteus*), horse clam (*Tresus capax*), and basket cockle (*Clinocardium nuttali*). Univalves would have included frilled dogwinkle (*Nucella lamellosa*). These shellfish were a significant contribution to the precontact diet.

Abundant pink salmon (*Oncorhynchus gorbuscha*) runs go through Deception Pass on their route to the Skagit River. Other anadromous fish species would also be available in the nearshore and offshore environments. Additional harvested marine species in the surrounding waters would have included dogfish (*Squalus acanthias*), Pacific cod (*Gadus macrocephalus*), lingcod (*Ophidon elongatus*), herring (*Clupea hareengus*), and Eulachon (*Thaleichthys pacificus*).

In addition to a broad range of seasonal and permanent birds, the near shore waters contain various marine mammal species that may have contributed to the precontact diet, Harbor Seal (*Phoca vitulina*) being the most prominent. Terrestrial mammals are rarer and tend to be smaller species. Blacktailed deer (*Odocoileus hemionus*) are still found on Fidalgo and elk (*Cervus canadensis*) were previously found on the island.

Cultural Context

Ethnographic

There are number of Coast Salish groups that have traditional claims to the area surrounding the project area. The aboriginal inhabitants of the area were classified by Suttles (1951:6) as Northern Straits Salish, a group of Coast Salish peoples differentiated by dialect and areas of occupation. It is important to note that these names were imposed upon the indigenous population by Europeans who expected them to be static groups and that these labels would logically apply to all descendents. The Samish are recognized as the local Northern Straits Salish group, although the Swinomish and Lummi have made claims to the area because of longtime family connections and traditional cooperative use. Distinguishing the Northern Straits Salish is their language, Lkungen, which differs from its close sister language Klallam (Southern Straits Salish) and is distinct from Lushootseed, spoken by other Coast Salish peoples further to the south and east (Blukis-Onat 1987; Thompson 1978). Straits Salish peoples also differ from other Coast Salish by the subsistence strategies focused primarily on marine resources and reef-netting of sockeye salmon.

Native people of the Northwest coast recognized ancestry, rights to resources, resource locations, settlement areas, songs, dances, rituals and other cultural expressions as dynamic and individually restrictive, not group based as is understood by the European world view of nationalities. Prior to European contact and influence the Coast Salish peoples were less segmented. They were more of a fluid entity then after the divisive influences brought by Euroamericans and other non-Native influences. Traditional land use rights were determined by marriage and/or inheritance; therefore, intermarriage (for one) between groups frequently created dynamic opportunities for resource acquisition. In addition, the artificial political boundary of the US/Canada border is another artifice of European conquest that further divided indigenous life ways.

According to Ruby and Brown (1992[1986]) winter villages were preferentially located on Fidalgo, Samish and Guemes Islands during the precontact period. According to Suttles (1951), the north and west shores of Fidalgo Island were used exclusively by the antecedents of today's Samish Nation. Resources were taken from specific areas when it was the best time of year to do so, people would have travelled throughout the area occupying particular areas relative to what resource was available and to which they had rights to exploit. In the spring and summer they utilized the southern and eastern portions of Lopez Island and the surrounding smaller islands as part of their seasonal round to live and gather resources during the year (Suttles 1951). There were not fixed boundaries and that the highly mobile people maintained extensive contact with their neighbors and shared use areas with each other (Blukis -Onat 1987).

Historic

Expansion for colonization along with trade brought Europeans into contact with the Native population of the islands. The navigable trade waters surrounding the San Juan Islands were first visited by Spanish explorers Francisco de Eliza, Juan Pantoja y Arriga, and later British explorers such as Lieutenant William Broughton, sailing under George Vancouver. Fidalgo Island was first sighted by the Spanish on July 5, 1790 by Manuel Quimper while exploring the inland waters of Washington (Blumenthal 2004). He named the island for Lieutenant Salvador Fidalgo who he had previously dispatched to explore the Alaskan coast and determine the extent of Russian migration (Blumenthal 2004).

The early European explorers would have been looking for resources to exploit such as timber, farmland, and furs. The first settlers did not arrive on Fidalgo Island until the 1850's. Its relative isolation and resource potential relegated it to a secondary concern for Euroamerican settlement (Lunsford 2009). Shortly after the arrival of permanent residents to the island the majority of the Native population relocated to nearby islands or the Swinomish Reservation once it was established in 1873 (Sampson 1972).

In 1879 the town of Anacortes, originally called Ship Harbor, was founded by railroad surveyor Amos Bowman. Eventually the town was renamed for his wife, Anna Curtis Bowman. In the 1880s Anacortes had a large population boom as a result of the expectation that it would become a railway

terminus. Between January and March 1890 the population of the town grew from 40 to 3,000. However in 1893 Anacortes along with other towns hoping to be railroad terminals were suffering from the "Panic of 1893" an economic depression tied to the overbuilding and questionable financing of the railroad industry that resulted in bank failures and was the worst economic depression the United States had faced to that date. Anacortes rebounded from this economic crisis with the establishment of fish canneries, fruit canneries, sawmills, shingle mills, and factories by the turn of the century (Lunsford 2009).

The first of these canneries, the Fidalgo Island Packing Company, was opened in 1893. This cannery employed about 350 people including Chinese, Norwegian, and Greek Euroamerican immigrants, as well as a large body of Samish workers, employed for their knowledge of traditional salmon fishing and netting sites located nearby (Waterhouse 1986). The Samish lived in separate quarters, like the Chinese, away from the larger body of Euroamerican employees. The remains of their living area are still observable surrounding Cannery Lake and the Ship Harbor wetlands around the Washington State Ferry Terminal (Baldwin et al. 2007; Gill 2008; Koziarski and Baldwin 2010a, 2010b, 2010c; Waterhouse 1986; Wessen and Waterhouse 1987). Cannery operations continued in Ship Harbor into the 1920's when the cannery and rail were closed, abandoned, and subsequently sold to the Port of Anacortes.

Previous Cultural Resource Studies and Archaeological Sites

The first regional study of indigenous society on the Northwest Coast was conducted by the Jesup North Pacific Expedition in 1897-1902 (Smith 1907). The multidiscipline group was lead by Franz Boas, and sponsored by the American Museum of Natural history. The expedition accounted for early documentation of many groups throughout Washington State and the northwest coast generally, but little else happened in way of research until after World War II.

Archaeological investigations in the general vicinity were conducted by Alan Bryan (1963). The efforts in the area were concentrated more on the readily identifiable shell matrix sites along the shoreline while interior, particularly populated cities were largely excluded. More recently there have been efforts to identify cultural resources as part of development-based efforts and some historic structure reviews sponsored by the City of Anacortes and DAHP (Baldwin 2013a, 2013b; Barsh 2003; Gilpin 2009; Hartmann 2012; Hodges 2003a; Jordan et al. 2008; Kohler 2007, 2010; Koziarski and Baldwin 2010a, 2010b, 2010c; Thompson, et.al 2009).

According to the WISAARD database (accessed July 29, 2016) there have been 18 cultural resource studies previously conducted within approximately one mile of the present project area (Table 1), in which most reviews have been limited to locations near the Fidalgo Bay shoreline. Julie M. Kohler (2007, 2010) conducted a number of efforts to record and assess historic structures within selected portions of the City of Anacortes. Although her most recent work included the present project area, nothing of note was recorded on or near the site. Her latest project built upon

four previous surveys undertaken in 1976, 1987 and 2007. The shoreward cultural resources reviews are located near or beyond one mile from the project area, but are presented in brief for context.

Table 1. Previous cultural resource surveys conducted within one-mile of the APE.

Citation	Report Title	Performing Agency	Cultural Resources Identified
Baldwin, Garth L., and Marsha R. Hanson 2016	Cultural Resources Review of the Haddon Road Planned Unit Development Project, Skagit County, Washington	Drayton Archaeology	No Significant Cultural Resources Identified
Ferry, Jackie 2015	Archaeological Monitoring Report for the Barbecue Pit Cover Installation, Fidalgo Bay RV Resort, Anacortes, Skagit County, WA	Samish Indian Nation	45SK42
Hovezak, Mark 2007	Archaeological Assessment of the Hrutfiord CREP Project Area, Blaine, Whatcom County, Washington	Rosario Archaeology	No Significant Cultural Resources Identified
Baker, R. Todd 2014	Cultural Resource Survey: Proposed Telecommunications Tower Site Site Name: WA1 Storvik Park-New Build, Anacortes, Skagit County, Washington	Terracon Consultants, Inc.	No significant cultural resources identified
Ferry, Jackie 2013	Archaeological Monitoring Report for the Parking Lot Development, Fidalgo Bay RV Resort, Anacortes, Skagit County, WA	Samish Indian Nation	No significant cultural resources identified
Analytical Environmental Services 2011	Fidalgo Bay Resort Flats Cultural Resources Study Samish Indian Nation Fee-To-Trust Project	Analytical Environmental Services	45SK43
Hartmann, Glenn D. 2012	Cultural Resources Assessment for the HFA Boatyard Project, Anacortes, Skagit County, WA	Cultural Resource Consultants, Inc.	No significant cultural resources identified
Nelson, Margaret A., and Randall F. Schalk 2010	Archaeological Testing at Weaverling Spit, Site 45SK43, Skagit County, Washington, Final Technical Report	Cascadia Archaeology	45SK43
Moreno, Meredith A., Justin C. Preston, and Garth L. Baldwin 2011	Archaeological Assessment for the Fidalgo Bay Road Improvement Project, Anacortes, Washington	Drayton Archaeological Research	No significant cultural resources identified

Citation	Report Title	Performing Agency	Cultural Resources Identified
Smart, Tamela S., Alyson M. Rollins, and Brett N. Meidinger 2009	Archaeological Monitoring Report: Fidalgo Bay Beach Nourishment and Shoreline Stabilization, Skagit County, Washington	Equinox Research and Consulting International Inc.	45SK43, 45SK296
Chatters, James 2010	Cultural Resources Assessment of Remedial Investigation Activities, Former Custom Plywood Property, Anacortes, WA	AMEC Geomatrix, Inc.	45SK436
Barg, Diana M. 2008	Monitoring Report for the Dance Hall Demolition Project, Weaverling Spit, Skagit County, Washington	Samish Indian Nation	45SK42, 45SK322
Kaehler, Gretchen, and Gail Thompson 2008	Historical Evaluation of the Tugboat *Enchantress*, Anacortes, Washington	Historical Research Associates, Inc.	45SK369
Wessen, Gary C. 2008	An Archaeological Survey and Evaluation of the 'Dance Hall' Demolition Project Area, Weaverling Spit, Skagit County, Washington	Wessen & Associates, Inc.	45SK42, 45SK322
Nelson, Margaret A. 2006	Test Excavations at Weaverling Spit, Site 45SK43 Skagit County, Washington	Cascadia Archaeology	45SK43
Hodges, Charles M. 2003	Cultural Resource Reconnaissance for the Thompson Trail Project, Phase 1, City of Anacortes, Skagit County, Washington	Northwest Archaeological Associates, Inc.	45SK296
Hodges, Charles M. 2003	Cultural Resource Reconnaissance for the Thompson Trail Project, Phase 2, City of Anacortes, Skagit County, Washington	Northwest Archaeological Associates, Inc.	45SK43, 45SK296
Campbell, Sarah K. 2003	Weaverling Spit 45SK43 Permit #03-02	Equinox Research and Consulting International Inc.	45SK43
Trost, Teresa 2005	Cultural Resource Assessment of Tract B (P33038, City Account No. 350230-0-012-0106) and Tract C (P33039, City Account No. 350230-0-012-0205)	Cascadia Archaeology	No significant cultural resources identified

Six archaeological sites have been recorded within one mile of the project area, all located along the shoreline or on Weaverling Spit. Sites 45SK322, 45SK42, and 45SK43 are all located on

Weaverling Spit and consist of shell midden deposits, with the former sites also containing fire-altered rock, chipped stone artifacts, faunal remains including marine shells and animal bone, and charcoal (Bryan 1954; Bryan and Osmundson 1954; Blukis Onat 1981; Ferry 2015; Hodges 2003b, 2003c; Moura 2003; Trost 2005; Nelson 2006, 2010; Schalk 2004; Wessen 2008a, 2008b). Three historic sites were also recorded including the Custom Plywood Mill Ruin 45SK436 (Chatters 2010), *The Enchantress,* 45SK369, a Miki-class tugboat (Kaehler 2008), and a railway segment of the Seattle and Northern Railway Company's Skagit Line, 45SK296 (Hodges 2003c).

CULTURAL RESOURCE EXPECTATIONS

Based on a review of the previous efforts at identifying cultural resources, past historical, environmental and cultural reviews, the project area was considered to be located in an area to have a low probability for either historic-era or precontact cultural deposits, structures, or isolated items. The expectations were based upon:

- Previous inventories of historic or potentially historic structures in the city of Anacortes.
- The topographic and geologic context of the project area is unlikely to contain cultural resources.
- Cultural resources, either historic or prehistoric, are likely to be located near shoreline areas.

Nonetheless, all types of cultural resources were considered during work, however improbable. Remnants of precontact activities related to lithic resource acquisition and testing (cobble tool scatters), fire modified rock (suggestive of processing/camping activities), temporary camps or resource processing locations that could represent a range of ephemeral hunting, gathering and/or ceremonial activities. Historic cultural resources thought possible included trash scatters or artifacts associated with logging, farming or residential settlement. Considering the depositional environment of the project area any potential cultural resource deposits were expected to be highly disturbed.

FIELD INVESTIGATION

Field investigation was conducted by DA archaeologist, Oliver Patsch on August 1, 2016 in clear, sunny and warm weather. Field investigation included pedestrian survey, exposed soil inspection and excavation of shovel probes (SPs). Photographs of the area and representative soil profiles were recorded for the probes.

Pedestrian survey within the project area was conducted in order to identify any surface features such as historic properties, foundations, or earthen works, as well as to identify suitable areas for subsurface inspection. Subsurface investigation consisted of shovel probe placed judgmentally within the project area. Shovel probes measuring approximately 40 to 50 centimeters in diameter were excavated to sterile subsoil, groundwater, or glacial till, depending on the conditions.

Excavated sediment was screened through ¼ inch hardware mesh. All shovel probes were measured, described, photographed and GPSed. Notes detailing the soil profile were prepared and include information about soil stratigraphy, constituents, and features. Each shovel test location was backfilled upon completion of hand excavation.

The project area consists of an open, cleared area located near an already existing water facility and building (Photos 1 and 2). Vegetation on site consists of landscaped grasses, with a variety of conifers and deciduous trees located along the southern portion of the project area.

Photo 1. Overview of the project area, view is to the south.

Photo 2. Overview of the project area, view is to the east/northeast.

One SP, was excavated within the project area (Figure 3). Soils observed were consistent with the Keystone series previously mapped by the USDA NRCS (n.d.) and UCDavis SoilWeb (n.d.) (Photo 3) with slight variations occurring across the area. No cultural material was encountered in any of the SPs.

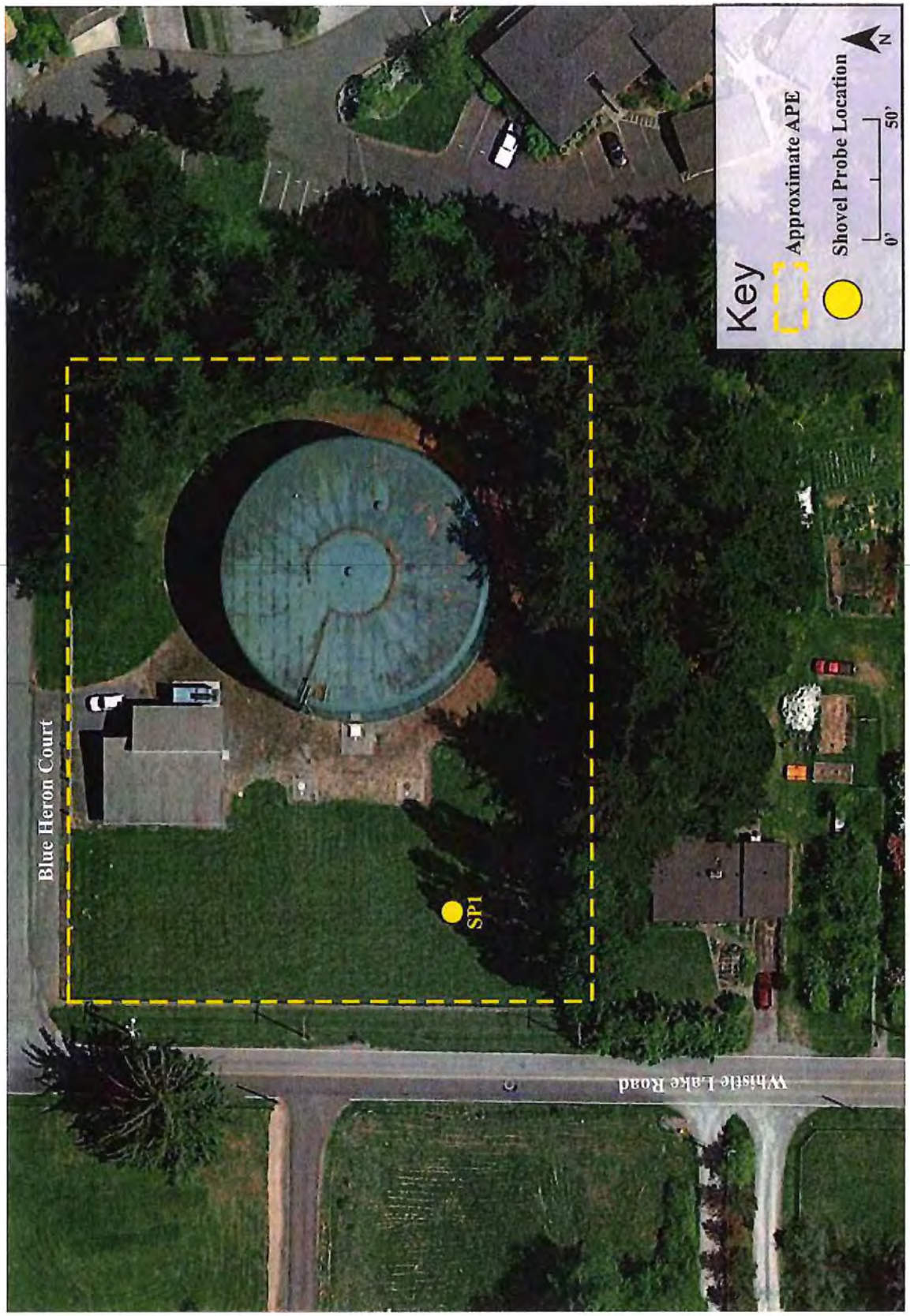


Figure 3. Aerial map showing location of shovel probe.

Photo 3. Overview of SP1 showing soils encountered within the project area.

RECOMMENDATIONS

The archaeological investigation of the City of Anacortes Blue Heron Circle Reservoir Rehabilitation Project did not encounter cultural deposits. Drayton's cultural resources assessment consisted of background review, field investigation, and production of this report. Background review determined the area of potential effects (APE) to be located in an area of low probability for historic properties. Field investigation included pedestrian and subsurface survey. No evidence of precontact or historic archaeological deposits was encountered. As proposed, the project does not appear to have the potential to affect any historic properties, and no further cultural resources oversight is warranted. It is our recommendation that EPA assert a determination of No Historic Properties Affected to the Washington State Historic Preservation Officer and all other interested and consulting parties.

Shovel testing in any area is a cost effective means to locate subsurface deposits, but it is certainly not exhaustive. Therefore, no shovel testing regiment is 100% accurate in recovering or locating buried cultural sites. In the event any items of cultural patrimony are encountered, by law all work must cease. It is further recommended that proponents become familiar with Washington State laws, particularly Revised Code of Washington (RCW) Chapter 27.53.060, RCW 27.44.040 and RCW 68.50.645.

Washington State law provides for the protection of all archaeological resources under RCW Chapter 27.53, Archaeological Sites and Resources, which prohibits the unauthorized removal, theft, and/or destruction of archaeological resources and sites. This statute also provides for prosecution and financial penalties covering consultation and the recovery of archaeological resources. Furthermore, RCW Chapter 27.44, Indian Graves and Records, states that the willful removal, mutilation, defacing, and/or destruction of Indian burials constitutes a Class C felony.

In the event that archaeological materials are encountered during the development of the property, an archaeologist should immediately be notified and work halted in the vicinity of the find until the materials can be inspected and assessed. At that time, the appropriate persons are to be notified of the exact nature and extent of the resource so that measures can be taken to secure them. In the event of inadvertently discovered human remains or indeterminate bones, pursuant to RCW 68.50.645, all work must stop immediately and local law enforcement agencies must be contacted. Any remains should be covered and secured against further disturbance, and communication should be immediately established with local law enforcement, the State Physical Anthropologist at DAHP, and the appropriate Tribal Historic Preservation Officer(s), and the Samish, Skagit, and Swinomish Tribes.

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INADVERTENT DISCOVERY PLAN AND PROCEDURES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

BLUE HERON CIRCLE 3 MG RESERVOIR REHABILITATION PROJECT, CITY OF ANACORTES, SKAGIT COUNTY WASHINGTON

1. INTRODUCTION

The City of Anacortes (Water System 02200) plans to construct the Blue Heron Circle 3 MG Reservoir Rehabilitation Project. The purpose of this project is to construct a 1.5 million gallon (MG) reservoir adjacent to the existing 3 MG reservoir, then demolish the old one and replace it with another 1.5 MG reservoir. The following Inadvertent Discovery Plan (IDP) outlines procedures to follow, in accordance with state and federal laws, if archaeological materials or human remains are discovered.

2. RECOGNIZING CULTURAL RESOURCES

A cultural resource discovery could be prehistoric or historic. Examples include, but are not limited to:

- An accumulation of shell, burned rocks, or other food related materials
- Bones or small pieces of bone,
- An area of charcoal or very dark stained soil with artifacts,
- Stone tools or waste flakes (i.e. an arrowhead, or stone chips),
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years,
- Buried railroad tracks, decking, or other industrial materials.

When in doubt, assume the material is a cultural resource.

3. ON-SITE RESPONSIBILITIES

STEP 1: STOP WORK. If any City of Anacortes employee, contractor or subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work adjacent to the discovery must stop. The discovery location should be secured at all times.

STEP 2: NOTIFY MONITOR. If there is an archaeological monitor for the project, notify that person. If there is a monitoring plan in place, the monitor will follow its provisions.

STEP 3: NOTIFY PROJECT MANAGEMENT AND CULTURAL RESOURCES PROGRAM. Contact the Project Manager and the Cultural Resources (CR) Program Manager:

Project Manager:
Matt Reynolds
City of Anacortes
360-299-1951
mattr@cityofanacortes.org

CR Program Manager:
Ross Widener
Widener & Associates
425-348-3059
rwidener@prodigy.net

If you can't reach the CR Program manager, contact your project's assigned Cultural Resources Specialist:

Assigned CR Specialist:
Garth Baldwin
Drayton Archaeology
360-739-3921
garth@draytonarchaeology.com

The Project Manager or the Cultural Resources Program Manager will make all other calls and notifications.

If human remains are encountered, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and to shield them from being photographed. Do not call 911 or speak with the media.

4. FURTHER CONTACTS AND CONSULTATION

A. Project Manager's Responsibilities:

- Protect Find: The Project Manager is responsible for taking appropriate steps to protect the discovery site. All work will stop in an area adequate to provide for the total security, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material as set forth in this document.

- Direct Construction Elsewhere On-site: The Project Manager may direct construction away from cultural resources to work in other areas prior to contacting the concerned parties.

- Contact CR Manager: If the CR Program Manager has not yet been contacted, the Project Manager will do so.

B. CR Program Manager's Responsibilities:

- Identify Find: The CR Program Manager (or a CR Specialist if so delegated), will ensure that a qualified professional archaeologist examines the find to determine if it is archaeological.
    - If it is determined not archaeological, work may proceed with no further delay.
    - If it is determined to be archaeological, the CR Manager or CR Specialist will continue with notification.
    - If the find may be human remains or funerary objects, the CR Manager or CR Specialist will ensure that a qualified physical anthropologist examines the find. If it is determined to be human remains, the procedure described in Section 5 will be followed.
- Notify DAHP: The CR Program Manager (or a CR Specialist if so delegated) will contact the involved federal agencies, including the Department of Health, Drinking Water State Revolving Fund (DOH, DWSRF) and the Department of Archaeology and Historic Preservation (DAHP).
- Notify Tribes: If the discovery may relate to Native American interests, the Manager or Specialist will also contact the project's Tribal Liaison, or, if the project is not assigned a Liaison, the Executive Tribal Liaison.

Federal/State Agencies:

Agency: The Department of Health (DOH)
Heather Youckton
Cultural Resources Coordinator
360.236.3106
Heather.youckton@doh.wa.gov

Department of Archaeology and Historic Preservation:

Dr. Allyson Brooks	or	Dr. Rob Whitlam
State Historic Preservation Officer		State Archaeologist
360.586.3066		360.586.3080

The CR Program Manager or Specialist, will contact the interested and affected Tribes if the DOH Cultural Resources Coordinator is unavailable.

Tribes consulted on this project are:

Swinomish Tribe:
Larry W Campbell
THPO
360.466.7352
lcampbell@swinomish.nsn.us

Samish Indian Nation:
Jacquelyn Ferry
THPO
360.293.6404 x126
jferry@samishtribe.nsn.us

Sauk-Suiattle Indian Tribe:
Norma Joseph
THPO
360.436.0131 x266
njoseph@sauk-suiattle.com

C. Further Activities

- Archaeological discoveries will be documented as described in Section 6.
- Construction in the discovery area may resume as described in Section 7.

5. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect.

If the project occurs on federal lands (e.g., national forest or park, military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 apply, and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the City of Anacortes will comply with applicable state and federal laws, and the following procedure:

A. Notify Law Enforcement Agency or Coroner's Office:

In addition to the actions described in Sections 3 and 4, the Project Manager will immediately notify the local law enforcement agency or coroner's office.

The coroner (with assistance of law enforcement personnel) will determine if the remains are human, whether the discovery site constitutes a crime scene, and will notify DAHP.

Skagit County Medical Examiner & Coroner
360-336-9431

B. Participate in Consultation:

Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. City of Anacortes personnel will participate in consultation.

C. Further Activities:

- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.

- When consultation and documentation activities are complete, construction in the discovery area may resume as described in Section 7.

6. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological deposits discovered during construction will be assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

Cultural Resources Program staff will ensure the proper documentation and assessment of any discovered cultural resources in cooperation with the federal agencies, including the DOH, DWSRF, DAHP, affected tribes, and a contracted consultant (if any).

All prehistoric and historic cultural material discovered during project construction will be recorded by a professional archaeologist on State of Washington cultural resource site or isolate form using standard techniques. Site overviews, features, and artifacts will be photographed; stratigraphic profiles and soil/sediment descriptions will be prepared for subsurface exposures. Discovery locations will be documented on scaled site plans and site location maps.

Cultural features, horizons and artifacts detected in buried sediments may require further evaluation using hand-dug test units. Units may be dug in controlled fashion to expose features, collect samples from undisturbed contexts, or interpret complex stratigraphy. A test excavation unit or small trench might also be used to determine if an intact occupation surface is present. Test units will be used only when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. Excavations will be conducted using state-of-the-art techniques for controlling provenience.

Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock will be recorded for each probe on a standard form. Test excavation units will be recorded on unit-level forms, which include plan maps for each excavated level, and material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all artifacts

recovered from the level. A stratigraphic profile will be drawn for at least one wall of each test excavation unit.

Sediments excavated for purposes of cultural resources investigation will be screened through 1/8-inch mesh, unless soil conditions warrant ¼-inch mesh.

All prehistoric and historic artifacts collected from the surface and from probes and excavation units will be analyzed, catalogued, and temporarily curated. Ultimate disposition of cultural materials will be determined in consultation with the federal agencies, DAHP, and the affected tribes.

Within 90 days of concluding fieldwork, a technical report describing any and all monitoring and resultant archaeological excavations will be provided to the Project Manager, who will forward the report to the DOH DWSRF program for review and delivery to the federal agencies (if any), SHPO, and the affected tribe(s).

If assessment activity exposes human remains (burials, isolated teeth, or bones), the process described in Section 5 above will be followed.

7. PROCEEDING WITH CONSTRUCTION

Project construction outside 100 feet of the discovery location may continue while documentation and assessment of the cultural resources proceed. A CR Specialist must determine the boundaries of the discovery location with consultation of the DOH. In consultation with DOH, DAHP and affected tribes, Project Manager and Cultural Resources Program staff will determine the appropriate level of documentation and treatment of the resource. If federal agencies are involved, the agencies will make the final determinations about treatment and documentation.

Construction may continue at the discovery location only after the process outlined in this plan is followed and DOH, DWSRF (and the federal agencies, if any) determine that compliance with state and federal laws is complete.

NOTICE TO THE PUBLIC OF INTENT TO REQUEST RELEASE OF FUNDS

DATE: October 18, 2016

Matt Reynolds
(Name of Applicant)

904 6th Street, Anacortes, WA, 98221
(Street, City, Zip Code)

360-299-1951 x238
(Telephone Number)

TO ALL INTERESTED AGENCIES, GROUPS AND PERSONS

On or about November 18, 2016, the City of Anacortes will request the State of Washington Department of Health and Department of Commerce to release funds under Section 106 of the National Historic Preservation Act, National Environmental Policy Act, and Washington State Environmental Policy Act.

The City of Anacortes will undertake the projects described below utilizing Drinking Water State Revolving Fund Loans. A Determination of No Historic Properties Affected was issued for this project. A copy of the Project Review Sheet for Section 106 is on file at the above address and is available for public examination and copying upon request.

Project Information:

Blue Heron Circle 3 MG Reservoir Rehabilitation Project
(Project Title or Name)

The purpose of this project is to construct a 1.5 million gallon (MG) reservoir adjacent to the existing 3 MG reservoir, then demolish the old one and replace it with another 1.5 MG reservoir.
(Purpose and Nature of Project)

Township 35N, Range 02E, Section 30
(Location of Project)

$4,974,755
(Estimated Cost of the Project)

Objections of the project may be submitted to the Office of Drinking Water Director, Garin Schrieve, Department of Health, P.O. Box 47822, Olympia, Washington 98504-7822. Any objections received after November 18, 2016 will not be considered by the Department of Health.

EXHIBIT #8:

GEOTECHNICAL REPORT

Draft Geotechnical Design Report
Anacortes Blue Heron Circle Reservoir Project
Anacortes, Washington

October 25, 2016

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value.

Since 1954.

Draft

Submitted To:
Greg Pierson, PE
HDR
500 108th Avenue NE, Suite 1200
Bellevue, Washington 98004

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-22259-001

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 SITE AND PROJECT DESCRIPTION 1

3.0 GEOTECHNICAL INVESTIGATIONS 1

4.0 LABORATORY TESTING 2
- 4.1 Water Content Determinations 2
- 4.2 Grain Size Analyses 2

5.0 SUBSURFACE CONDITIONS 2
- 5.1 General Geology 3
- 5.2 Geologic Units 3
- 5.3 Subsurface Conditions 4

6.0 CONCLUSIONS AND RECOMMENDATIONS 5
- 6.1 Foundations 5
- 6.2 Lateral Earth Pressure and Load Resistance 6
- 6.3 Seismic Design Considerations 6
- 6.4 Floor Slabs 8
- 6.5 Estimated Infiltration Rates 8
- 6.6 Site Grading and Excavation 9
- 6.7 Structural Backfill and Compaction 10
- 6.8 Wet Weather Earthwork 10
- 6.9 Review of Plans and Construction Monitoring 11
- 6.10 Additional Considerations 11

7.0 LIMITATIONS 12

8.0 REFERENCES 14

TABLES

1 Estimated Existing Fill Thickness, Bearing Elevation, Approximate Existing Ground Surface Elevation, and Depth to Sand Layer 4
2 International Building Code 2015 Ground Motion Parameters 7
3 Estimated Long-Term Infiltration Rates 9

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FIGURES

1 Vicinity Map
2 Site and Exploration Plan

APPENDICES

A Subsurface Exploration Logs
B Laboratory Tests
C Important Information About Your Geotechnical/Environmental Report

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DRAFT GEOTECHNICAL DESIGN REPORT
ANACORTES BLUE HERON CIRCLE RESERVOIR PROJECT
ANACORTES, WASHINGTON

1.0 INTRODUCTION

This draft geotechnical report presents the results of our geotechnical explorations and laboratory testing performed for the Anacortes Blue Heron Circle Reservoir Phase 1 project. The existing 3.0-million-gallon water storage reservoir is located at Blue Heron Circle in Anacortes, Washington, as shown in Figure 1.

Included in this report are a site and project description, results of our geotechnical explorations (boring and test pits), laboratory testing, and a description of the subsurface soil and groundwater conditions. Geotechnical recommendations for design of the proposed building foundations and site development are provided.

The services detailed in this report were provided in accordance with the scope of services as outlined in our contract with HDR, task Order 0034, dated June 17, 2016.

2.0 SITE AND PROJECT DESCRIPTION

The City of Anacortes initiated structural analyses of the reservoir in 2011, which indicated deterioration in the roof beams and roof plate joints due to corrosion. In addition, evaluation also found that the coatings also contain lead. Therefore, the reservoir will need to be replaced. We understand that the current goal of the City of Anacortes and HDR is to design two replacement reservoirs at the location shown in the Site and Exploration Plan, Figure 2.

3.0 GEOTECHNICAL INVESTIGATIONS

To evaluate the subsurface and groundwater conditions, geotechnical investigations were conducted at the Blue Heron Circle water reservoir site on October 3, 2016. A total of six test pits and one boring were excavated/drilled to characterize the subsurface conditions at the site.

The locations of the test pits and boring are shown in Figure 2. The test pits were excavated using a rubber-tired excavator operated by the Clearcreek earthwork contractor, under subcontractor to Shannon & Wilson, Inc. (Shannon & Wilson). A 30-foot-deep boring was drilled by a track-mounted drill rig operated by the Holocene drilling contractor, under subcontractor to Shannon & Wilson. The depths of the test pits ranged from 4 to 8.5 feet below

existing ground surface (bgs) and subsequently backfilled using excavated materials. Boring B-1 was drilled to 30 feet bgs and subsequently backfilled using bentonite chip fill. A Shannon & Wilson representative observed and logged the test pits and the boring, retrieved representative grab and Standard Penetration Test samples for subsequent laboratory testing, and prepared descriptive test pit and boring logs. The samples were placed in airtight jars and returned to our laboratory for testing. The logs of the test pits and boring are presented in Appendix A. A soil description and log key is also presented in Appendix A.

4.0 LABORATORY TESTING

Laboratory tests were performed on selected soil samples retrieved from the test pits and the boring. The laboratory testing program included a variety of tests to classify the soils and to provide data for engineering studies. Classification and index laboratory tests included visual classification and tests to determine natural water content and grain size distribution. The results from the laboratory tests are included in Appendix B.

4.1 Water Content Determinations

Water content was determined on selected samples in general accordance with ASTM International (ASTM) D2216, Test Method for Determination of Water (Moisture) Content of Soil and Rock. The water content is shown numerically or graphically on test pit logs and boring log, where such test was performed (Appendix A).

4.2 Grain Size Analyses

The grain size distribution of selected samples was determined in general accordance with ASTM D422, Standard Test Method for Particle-Size Analysis of Soils. Results of these analyses are presented as gradation curves in Appendix B. Each gradation sheet provides the Unified Soil Classification System (USCS) group symbol, the sample description, and water content. The USCS for samples with fewer than 50 percent fines were classified in general accordance with ASTM D2488, Standard Recommended Practice for Description of Soils (Visual-Manual Procedure).

5.0 SUBSURFACE CONDITIONS

The geology and subsurface conditions at the project site were inferred from soil samples and information obtained from the test pits and the boring and from geologic maps of the area. The following sections include a description of the general geology and the subsurface soil

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encountered on the project site. Groundwater was not encountered in exploration test pits or the boring at time of excavation/drilling.

5.1 General Geology

The project site is located on the elevated southern plateau of the City of Anacortes. According to geological maps by Dragovich and others (2000), the site is overlaid by glacially derived recessional deposits during the latest stage of Fraser glaciation.

Through latest stage of glaciation during the Pleistocene period, Fraser glaciation and glacial and non-glacial sediments were deposited on the Metasedimentary and Metavolcanic rocks that occupy the southern plateau of the City of Anacortes. Between 28,000 and 15,000 years ago during the last glaciation, the glaciers covering the Puget Lowland receded toward the north and deposited glacial and non-glacial sediments.

5.2 Geologic Units

Based on our geotechnical explorations, the project area is predominantly underlain by glacially derived recessional Glaciomarine Drift (Qgdm) and recessional Glaciomarine Outwash (Qgom). Recent fill (Hf) overlies the glacial soils on the project site. The soil units encountered in our geotechnical investigations at the project site, from youngest to oldest, are as follows:

- **Fill (Hf)** – Materials likely placed during construction of existing water reservoir, both engineered and nonengineered. Typically, very loose to medium dense, silty Sand to poorly graded Sand with Silt containing construction debris, wood chips and debris, and organics. The fill thicknesses identified in the test pits and boring ranged from 0.5 to 8 feet as indicated in Table 1.
- **Glaciomarine Drift (Qgdm)** – Glaciofluvial sediment deposited as the glacial ice receded from the Puget Lowland. Typically, medium dense to dense and very stiff Silts, silty Clay, Clay, and clay-rich diamiction that may locally contain lenses and layers of sandy or gravelly outwash. These deposits are typically 2.5 to 4.5 feet thick where encountered in test pits and the boring.
- **Glaciomarine Outwash (Qgom)** – Glaciofluvial sediment deposited as the glacial ice receded from the Puget Lowland. Typically, medium dense to very dense, clean Sand and poorly graded Sand with Silt to silty Sand. These deposits are typically encountered below Qgdm and extended to the bottom of test pits and boring B-1.

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5.3 Subsurface Conditions

Our understanding of the subsurface soil conditions at the project site is based on our interpretation of conducted geotechnical exploration and on our general understanding of the geologic history and stratigraphy of the region.

Estimated thickness of existing fill, bearing elevation on Qgdm and/or Qgom and the elevation of the Sand (Qgom) for the purpose of onsite stormwater infiltration are shown in Table 1:

TABLE 1
ESTIMATED EXISTING FILL THICKNESS, BEARING ELEVATION, APPROXIMATE EXISTING GROUND SURFACE ELEVATION, AND DEPTH TO SAND LAYER

Exploration Designation	Existing Fill Thickness (feet)	Recommended Bearing Elevation (feet)	Elevation of Sand (Qgom) (feet)	Approximate Existing Ground Surface Elevation (feet)
B-1	8.0	286	281	294
TP-1	0.7	285	285	288
TP-2	0.5	287	285	288
TP-3	2.5	286	283	289
TP-4	7.5	286	Not Observed	294
TP-5	2.5	286	Not Observed	291
TP-6	8.0	286	Not Observed	294

In general, the project site consists of a 0.5 to 8-foot-thick layer of Fill (Hf) over Glaciomarine Drift (Qgdm) underlain by Glaciomarine Outwash (Qgom). The Qgom is typically encountered between elevation (EL) +285 and EL +281 and extends to the bottom of test pits and boring B-1.

The fill includes about 6 inches of crushed rock surfacing that was encountered within an approximately 10-foot-wide perimeter around the existing water reservoir. At the new reservoir No. 1 site, the fill consisting of onsite reused material, likely placed during construction of the existing water reservoir. Typically, this fill extends between 2.5 and 8 feet bgs. The onsite generated fill is typically present west and southwest of the existing water reservoir and encountered in TP-4, TP-5, TP-6, and B-1, shown in Figure 2. The fill is composed of light brown to dark brown, dry to moist, loose to medium dense, silty Sand to poorly graded Sand with Silt containing trace to abundant wood debris, construction debris, and organics.

The Qgdm found below the fill and is a relatively thin layer ranging between 2.5 to 4.5 feet and consists of light gray and gray, moist, dense, sandy Silt and very stiff, lean Clay with sand. The Qgdm is underlain by Qgom, which consists of medium dense to dense, brown-gray, moist, poorly graded Sand with silt to silty Sand.

Groundwater was not encountered during subsurface exploration.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Foundations

The test pit and boring explorations indicated that competent bearing soils consisting of medium dense to dense native soils are present beneath the proposed reservoir footprints. Based on the results of our subsurface explorations and engineering studies, we recommend the new water reservoirs be supported on continuous ring walls and spread footings bearing on undisturbed, dense Qgdm deposits and/or Qgom deposits present below fill (Hf). An allowable bearing pressure of 6 kips per square foot (ksf) is recommended for design. Undisturbed bearing soils consisting of Qgdm or Qgom are typically encountered at elevation EL +286 feet, as summarized in Table 1. For interior footings (if any) bearing on densely compacted structural fill, an allowable bearing pressure of 3 ksf is recommended for design. The minimum depth of building foundations should be 18 inches below the lowest adjacent grade. The allowable bearing values may be increased by one-third for transient loading. The base of all excavations should be dry and cleared of loose soil and organic matter at the time of concrete placement.

Foundation subgrades that become disturbed during the excavation process should be systematically compacted to a dense condition prior to placing steel and concrete. All subgrades should be evaluated by a geotechnical engineer (or representative) from our firm during construction to confirm the presence of competent bearing soil.

Assuming a foundation loading of approximately 6 ksf or less on the dense native soils, we estimate that the total settlement of the proposed foundations would be less than ½ inch, with maximum differential settlement, amounting to less than half the value of the total settlement. These settlements would occur as the foundation is loaded during construction and during first filling of the reservoirs.

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6.2 Lateral Earth Pressure and Load Resistance

Lateral earth pressures act on the buried portions of the walls. For buried walls that are allowed to move 0.001 times the wall height or more, we recommend using a static, active lateral earth pressure equivalent to a fluid weight of 35 pounds per cubic foot (pcf) for design. For buried walls that are not allowed to move 0.001 times the wall height (braced condition), a static, at-rest lateral earth pressure equivalent to 55 pcf should be used. If a slope will exist above the top of a retaining wall, 1 pcf should be added the design lateral earth pressure for each degree of slope inclination. These lateral earth pressures assume the wall backfill includes proper drainage so that hydrostatic pressures will not increase.

Lateral loads due to wind and seismic forces may be resisted by friction along the base of foundations and by passive soil resistance against buried portions of the foundation. Footings or foundation mats that bear in the undisturbed native soils may be designed using a coefficient of base friction of 0.4. Passive soil resistance against the buried portions of foundations may be calculated based on an equivalent fluid density of 350 pcf. This value for passive soil resistance includes a factor of safety of 1.5 on the ultimate soil strength in order to limit lateral movements. This value is based on the assumption of a horizontal surface extending beyond the footing for a distance of at least two times the depth of embedment. Passive resistance should be ignored in the upper 12 inches unless it is specifically required for lateral stability and the backfill in this zone is densely compacted structural fill. It should be ignored entirely if future development could result in removal of the soils providing lateral resistance.

6.3 Seismic Design Considerations

The project is located in a moderately active seismic region. While the region has historically experienced moderate to large earthquakes (i.e., April 13, 1949, magnitude 7.1 Olympia Earthquake; April 29, 1965, magnitude 6.5 Seattle-Tacoma Earthquake; and February 28, 2001, magnitude 6.8 Nisqually Earthquake), geologic evidence suggests that larger earthquakes have occurred in the prehistoric past and will occur in the future (e.g., magnitude 8.5 to 9.0 Cascadia Subduction Zone Interplate events, magnitude 7.5 Seattle Fault events).

We understand that the proposed structures will be designed in accordance with the International Building Code (IBC) 2015 (International Code Council, 2015). For the IBC 2015, the seismological inputs are short-period spectral acceleration, S_S, and spectral acceleration at the 1-second period, S_1. The coefficients, S_S and S_1, are for a maximum considered earthquake, which corresponds to a ground motion with a 2 percent probability of exceedance in 50 years, or

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a 2,475-year return period (with a deterministic maximum cap in some regions). The coefficients are based on regional probabilistic ground motion studies completed in 2008 by the U.S. Geological Survey.

The spectral response acceleration values are scaled by site soil response factors to account for site amplification/damping effects. The site classification determines the site soil response factors. Our analysis of geologic conditions indicates that the building site is underlain by competent glacially derived recessional sediments and, therefore, the site can be classified as Site Class D. The IBC does not require a site-specific ground motion evaluation for Site Class D sites.

The seismological inputs are short-period spectral acceleration, S_S, and spectral acceleration at the 1-second period, S_1, taken from approved National Earthquake Hazards Reduction Program spectral response acceleration contour map for Class B sites (shown in Figure 1613 in the code). Sites classified as Class B are defined as firm rock having a shear-wave velocity between 2,500 and 5,000 feet per second in the top 100 feet. The seismological inputs are modified for Site Class D. The mapped S_S and S_1 values, site coefficients and design values corresponding to Site Class D are presented in Table 2.

TABLE 2
INTERNATIONAL BUILDING CODE 2015
GROUND MOTION PARAMETERS

S_S (g's)	S_1 (g's)	Site Class	S_{MS} (g's)	S_{M1} (g's)	S_{DS} (g's)	S_{D1} (g's)
1.106	0.436	D	1.170	0.682	0.780	0.455

We have also evaluated potential seismically induced geologic hazards (i.e., ground rupture, liquefaction, and slope instability) and have found these to be negligible at the site. The project area is located approximately 8 miles from the Devils Mountain Fault Zone. This east-west-trending fault zone extends for more than 125 kilometers (km) from the Cascade Range foothills, through northern Whidbey Island into the eastern inlet of the Strait of Juan de Fuca (Johnson and others, 2001). Paleoseismology investigation of the fault zone is lacking and no information exists on earthquake reoccurrence interval. However, researchers have found evidence of three liquefaction events in post A.D. 900 deltaic deposits located in the Snohomish River delta, approximately 35 km south of the Devils Mountain fault. While it is believed that one of these liquefaction events is correlated to a strong earthquake associated with the Seattle fault, the others are likely associated with Devils Mountain earthquake source, and/or other further south

located faults, Strawberry Point, and Utsalady Point fault. The potential for ground rupture is minimal at the subject site due to the long recurrence interval and the distance to the faults. Liquefaction is not a concern at the project site as the underlying glacially derived soils are sufficiently dense to preclude liquefaction. Finally, the project site location is relatively flat and underlain by medium dense to very dense granular soils with no history of instability. Therefore, slope instability is not a design issue for this project in our opinion.

6.4 Floor Slabs

We recommend that floor slabs designed for very low deflection of 0.05 inch or less be supported by dense, native soil or compacted structural fill placed directly onto dense, native soil. If existing fill as described herein or unanticipated loose, soft, or unsuitable soil is encountered, it should be removed and replaced with compacted structural fill. Structural fill should be compacted to a dense, unyielding condition according to our recommendations presented in Section 6.8, Structural Backfill and Compaction. A modulus of subgrade reaction of 300 pounds per cubic inch may be used to design the slab, assuming dense structural fill consisting of imported, clean, well-graded gravel and sand will be present. If onsite fill is reused under the slab and compacted to dense and unyielding condition, a modulus of subgrade reaction of 100 pounds per cubic inch may be used for design. It should be noted that the onsite fill is moisture sensitive and could be difficult to compact during winter and periods of rain. The onsite fill containing construction debris and organics should not be used as structural fill beneath floor slabs.

6.5 Estimated Infiltration Rates

We evaluated two soil samples using the Washington State Department of Ecology Stormwater Management in Western Washington 2005, Volume III Hydraulic Analysis and Flow Control Design/Best Management Practices, method 2, to estimate preliminary long-term infiltration rates. Two tested samples were selected from TP-1 and TP-5, located adjacent to the proposed water reservoirs. Method 2 uses the D_{10} grain size (10 percent passing size) from an ASTM D422 Grain Size Test. Plots showing the grain size distribution test results are presented in Appendix B. Using method 2, the estimated long-term infiltration rates based on the selected samples obtained from TP-1 and TP-5, corresponding geological units and depths are shown in Table 3.

We recommend the bottom of infiltration facilities be installed in Qgom consisting of poorly graded Sand with Silt. Depths to Qgom where observed in excavated test pits and boring B-1 are

indicated in Table 1. Because Qgdm contains about 60 percent of fines, and is densely compacted, it does not allow for substantial infiltration. In our opinion, it should not be considered for stormwater infiltration design.

TABLE 3
ESTIMATED LONG-TERM INFILTRATION RATES

Test Pit No.	Depth	Soil Type	Estimated Long-Term Infiltration Rate (inches/hour)
TP-1	4.0	Qgom	2.0
TP-5	5.0	Qgdm	Not Applicable

The long-term design infiltration rate should also consider the variability of soils at the site, the degree of long-term maintenance of the infiltration facility, and the use (or not) of pretreatment to reduce total suspended solids.

To further evaluate potential infiltration rates for the proposed stormwater infiltration facilities we recommend performing a pilot infiltration test in accordance with the guidelines and procedures for determining design infiltration rates presented in the Washington State Department of Ecology Stormwater Management manual.

6.6 Site Grading and Excavation

Based on our explorations, stripping depths to remove unsuitable, fill (Hf) containing loose to medium dense, silty Sand to poorly graded Sand with Silt containing construction debris, wood chips and debris, and organics range from 0.5 to 8 feet as indicated in Table 1. Excavations are likely to be dry during the summer months. If excavation takes place during the wet weather season, then it will be necessary to employ a sump pump to control seepage into the excavations.

While the bearing material is typically dense in its undisturbed state, it is moisture-sensitive due to the presence of fine sand and silt. Therefore, control of surface water and protection from heavy rainfall infiltration will be necessary to maintain the stability of the subgrade. The Contractor should be responsible for the control of surface water within the contract limits. In this regard sloping, slope protection, ditching, sumps, dewatering, and other measures should be employed as necessary to permit proper completion of the work.

Excavations can be accomplished with conventional excavating equipment, such as a dozer, front-end loader, or backhoe. For planning purposes, we recommend that temporary unsupported open cut slopes in the dense sand be no steeper than 1 Horizontal to 1 Vertical. We

recommend that all exposed cut slopes be protected with a waterproof covering during periods of wet weather to reduce sloughing and erosion. Final grades should slope away from the building to prevent ponding of water next to the structure.

6.7 Structural Backfill and Compaction

Any fill placed beneath load-bearing structures or fill relied on for lateral resistance should consist of compacted structural fill. Structural fill should consist of relatively well-graded sand and gravel having a maximum particle size of about 3 inches. It should contain less than 20 percent fines (material passing the No. 200 sieve, based on the ¾-inch minus fraction) and, during wet weather or wet conditions, it should contain no more than 5 percent fines. Structural fill should not contain organics or deleterious material. It should be placed in horizontal lifts and compacted to at least 95 percent of its Modified Proctor maximum density (ASTM D1557), and should be verified to be in a dense and unyielding condition. The thickness of loose lifts should not exceed 8 inches for heavy equipment compactors, and 6 inches for hand-operated compactors.

6.8 Wet Weather Earthwork

Earthwork would most easily be accomplished during the normally drier months of June through mid-October. It is our opinion that earthwork performed during the wet weather months will prove more costly. The condition of exposed very dense and hard sand and silt will deteriorate rapidly when exposed to moisture and construction activity. This could lead to deeper footing excavations than anticipated. The following recommendations are applicable if earthwork is to be accomplished in wet weather or in wet conditions:

- Earthwork should be accomplished in small sections to minimize exposure to wet weather. If there is to be traffic over the exposed subgrade, the undisturbed subgrade should be protected with a compacted layer of clean sand and gravel, crushed rock, or a 2- to 3-inch-thick lean concrete pad. This should be done as needed to protect the foundation soils and act as a working surface. An overexcavation may be needed to accommodate this protective layer. The size or type of equipment used in the excavation may have to be limited to prevent soil disturbance.
- Fill material should consist of clean, crushed rock or gravel, of which not more than 5 percent by dry weight passes the No. 200 mesh sieve, based on wet-sieving the fraction passing the ¾-inch sieve. The fines should be non-plastic. Such soil would need to be imported to the site. The identification of suitable wet-weather backfilling material should be made by a geotechnical engineer from our firm experienced in wet-weather construction.

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- The ground surface in the construction area should be sloped and sealed with a smooth-drum, vibratory roller or equivalent to promote the rapid runoff of precipitation, to prevent surface water from flowing into excavations, and to prevent ponding of water. Soils that become too wet for compaction should be removed and replaced with clean granular soil.
- Excavation and placement of structural fill material should be observed on a full-time basis by a geotechnical engineer or technician experienced in wet-weather earthwork to determine that all unsuitable materials are removed and suitable compaction and site drainage is achieved.
- Covering work areas, soil stockpiles, or slopes with plastic; sloping, ditching, sumps, dewatering, and other measures should be employed as necessary to permit proper completion of the work. Bales of straw and/or geotextile silt fences should be strategically located to control soil movement and erosion.

The above recommendations for wet weather earthwork should be incorporated into the contract specifications.

6.9 Review of Plans and Construction Monitoring

We recommend that our firm be retained to review those portions of the plans and specifications that pertain to the geotechnical aspects of the project to determine if they are consistent with our recommendations. We also recommend that we be retained to monitor excavations and earthwork, footing and floor-slab subgrade preparation, drainage installation, fill placement and compaction, and other geotechnically related work.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples or test pits. Such unexpected conditions may require the Contractor to make adjustments in his procedures to attain a properly constructed project. Some contingency fund is recommended to accommodate potential extra costs related to unexpected subsurface conditions.

6.10 Additional Considerations

Test pit excavations were loosely backfilled with the excavated material. Where test pits are located in a proposed structure area, the loose material should be removed and replaced with appropriately compacted structural fill or the footings should be lowered to bear in very dense native soil. Alternatively, the excavation could be structurally bridged or backfilled with lean-mix concrete.

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7.0 LIMITATIONS

This report was prepared for the exclusive use of HDR, the City of Anacortes, and members of the design team for specific application to the design of the currently proposed project at this site. Subsurface information and test results should be provided to prospective contractors for information on factual data only. The information and discussion of subsurface conditions should not be interpreted as a warranty of subsurface conditions, such as may be interpreted from test pit logs and subsurface profiles.

The analyses, conclusions, and recommendations contained in this report are based on current site conditions. We assume that explorations conducted for this project are representative of the subsurface conditions throughout the site; i.e., the subsurface conditions between explorations are not significantly different from those encountered at exploration locations. If conditions different from those described in this report are observed or appear to be present during construction, we should be advised at once so that we can review the conditions and reconsider our recommendations, where necessary. If there is a substantial lapse of time between the submission of this report and the start of construction, or if conditions have changed due to natural causes or construction operations at or near the site, we should review this report to determine the applicability of our conclusions and recommendations considering the changed conditions and time lapse.

Within the limitations of scope, schedule, and budget, the analyses, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no warranty, either express or implied.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples or conducting subsurface explorations. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

The scope of our services for this report did not include any environmental assessment or evaluation regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around the site.

Shannon & Wilson has prepared the attached Appendix C, "Important Information About Your Geotechnical/Environmental Report," to assist you and others in understanding the use and limitations of this report.

SHANNON & WILSON, INC.

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Milan Radic PE
Geotechnical Engineer

MXR:MWP/mxr

8.0 REFERENCES

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0 1 2

Approximate Scale in Miles

NOTE

Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

VICINITY MAP

October 2016 | 21-1-22259-001

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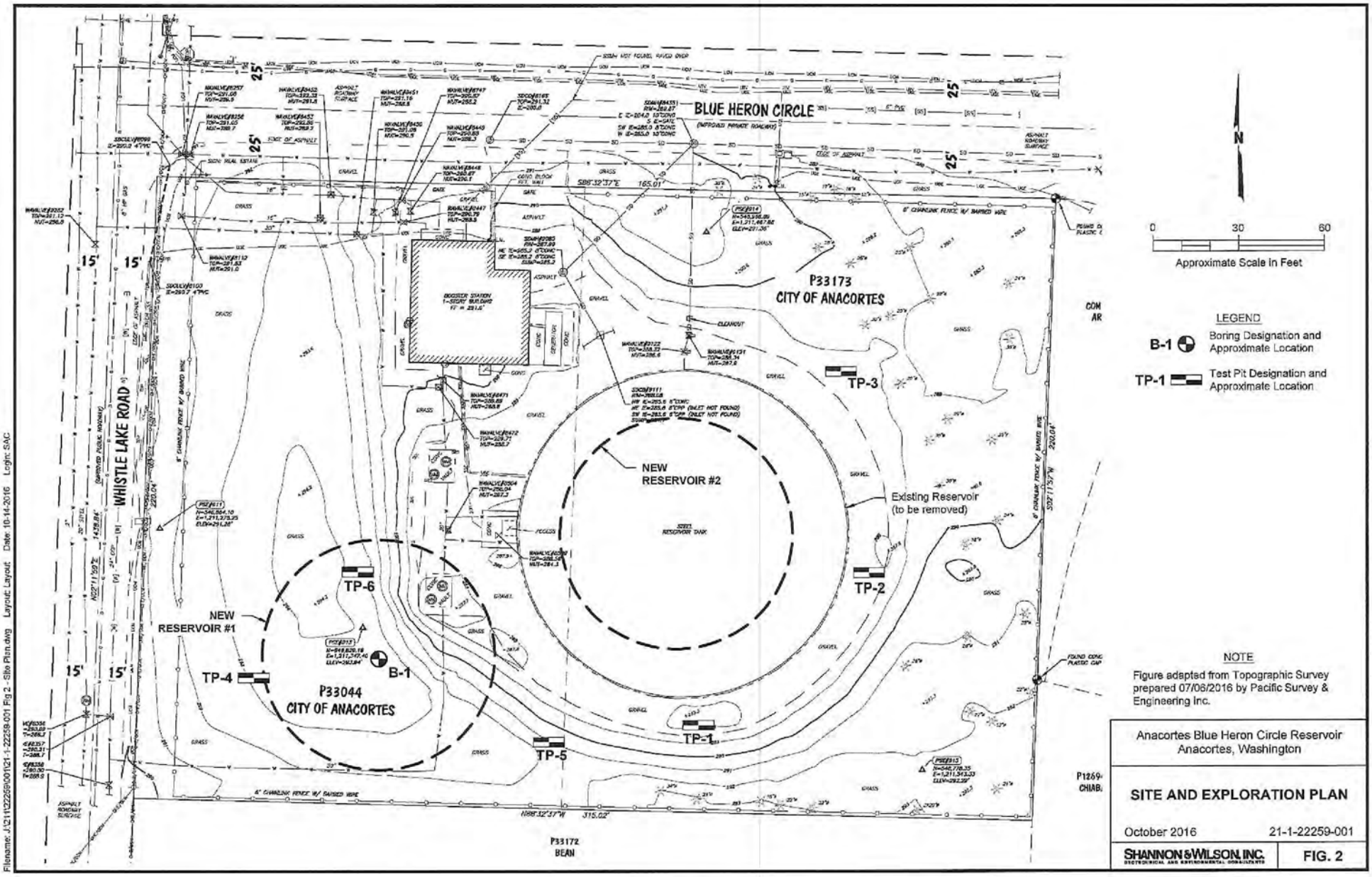
FIG. 1

Filename: J:\211\22259\001\21-1-22259-001 Vic Map.dwg Date: 10-14-2016 Login: SAC



NOTE

Figure adapted from Topographic Survey prepared 07/06/2016 by Pacific Survey & Engineering Inc.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

SITE AND EXPLORATION PLAN

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FIG. 2

Filename: J:\211\22259\001\21-1-22259-001 Fig 2 - Site Plan.dwg Layout: Layout1 Date: 10-14-2016 Login: SAC

APPENDIX A

SUBSURFACE EXPLORATION LOGS

TABLE OF CONTENTS

FIGURES

A-1	Soil Description and Log Key (3 sheets)
A-2	Log of Boring B-1
A-3	Log of Test Pit TP-1
A-4	Log of Test Pit TP-2
A-5	Log of Test Pit TP-3
A-6	Log of Test Pit TP-4
A-7	Log of Test Pit TP-5
A-8	Log of Test Pit TP-6

Draft

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor.*
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	 #200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	 #4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Inclinometer or Non-perforated Casing
Perforated or Screened Casing	Vibrating Wire Piezometer

PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

SOIL DESCRIPTION AND LOG KEY

October 2016 | 21-1-22259-001

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FIG. A-1
Sheet 1 of 3

SOIL_CLASS_KEY PG1 21-22259.GPJ SHAN WIL.GDT 10/25/16

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

SOIL DESCRIPTION AND LOG KEY

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FIG. A-1
Sheet 2 of 3

SOIL_CLASS_KEY PG2 21-22259.GPJ SHAN WIL.GDT 10/25/16

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

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ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

SOIL DESCRIPTION AND LOG KEY

October 2016 | 21-1-22259-001

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FIG. A-1
Sheet 3 of 3

Total Depth:	31.5 ft.	Northing:		Drilling Method:	Hollow Stem Auger	Hole Diam.:	6 in.
Top Elevation:	~ 294 ft.	Easting:		Drilling Company:	Holocene Drilling	Rod Diam.:	
Vert. Datum:		Station:		Drill Rig Equipment:	D-170	Hammer Type:	Automatic
Horiz. Datum:		Offset:		Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

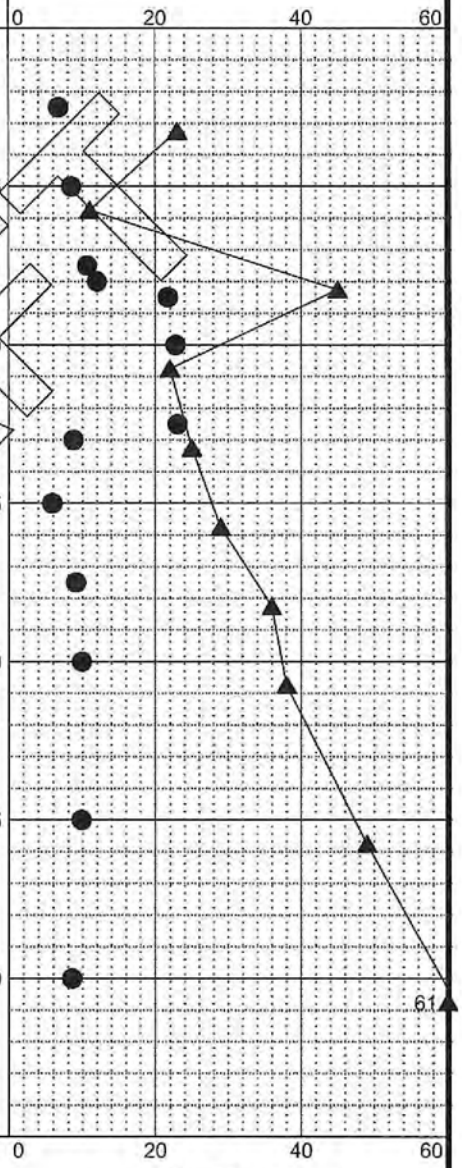
Description	Depth, ft.
Topsoil/Sod.	0.3
Medium dense, light brown, *Silty Sand (SM)*; dry to moist; fine to coarse sand; nonplastic fines; little organics and roots. Fill (Hf)	5.0
Medium dense, light gray-brown, *Poorly Graded Sand with Silt (SP-SM)*; moist; fine to medium sand; nonplastic fines. Fill (Hf)	7.0
Medium dense, dark brown, *Silty Sand (SM)*; moist; fine to coarse sand; nonplastic to low plasticity fines; some organics and wood debris. Fill (Hf)	8.0 / 8.5
Dense, gray-brown, *Silty Sand with Gravel (SM)*; moist; subangular to subrounded gravel; fine to medium sand; nonplastic fines. Glaciomarine Drift (Qgdm)	12.5
Hard, gray, *Lean Clay with Sand (CL)*; moist; iron-oxide staining; fine sand; low plasticity fines. Glaciomarine Drift (Qgdm)	17.0
Medium dense, brown-gray, *Poorly Graded Sand with Silt (SP-SM)*; moist; fine to medium sand. Glaciomarine Outwash (Qgom)	
Dense, brown-gray, *Poorly Graded Sand with Silt (SP-SM)* ; moist; fine to medium sand. Glaciomarine Outwash (Qgom)	
BOTTOM OF BORING COMPLETED 10/3/2016	31.5

Depth, ft. | Symbol | Samples | Ground Water Depth, ft.

None Observed During Drilling

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



◇ % Fines (<0.075mm)

● % Water Content

LEGEND

* Sample Not Recovered

G Grab Sample

I 2.0" O.D. Split Spoon Sample

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Anacortes Blue Heron Circle Reservoir
Anacortes, Washington

LOG OF BORING B-1

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FIG. A-2

REV 2 - Log in Progress

MASTER LOG E 21-22259.GPJ SHAN WIL.GDT 10/25/16 Log: MXR Rev: MXR Typ: LKN

File: J:\211\22259\001\21-1-22259-001 TP.dwg Date: 10-21-2016 Author: SAC

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LOG OF TEST PIT TP-1

JOB NO: 21-1-22259-001 DATE: 10-3-2016 LOCATION: See Site and Exploration Plan

PROJECT: Anacortes Blue Heron Circle Reservoir, Anacortes, Washington

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
(1) Organics;	None Observed			0
(2) Crushed rock, base coarse. Fill (Hf)			S-1	
(3) Medium dense, light brown, *Silty Sand with Gravel (SM);* moist; subrounded to subangular gravel; fine to coarse sand; nonplastic fines. Glaciomarine Drift (Qgdm)			S-2	2
(4) Dense, light brown to yellow brown, *Poory Graded Sand with Silt (SP-SM)*; fine to medium sand. Glaciomarine Outwash (Qgom)		5.9	S-3	4
				6
				8
				10
				12

Sketch of North Pit Side

Surface Elevation: Approx. ~288 Ft.

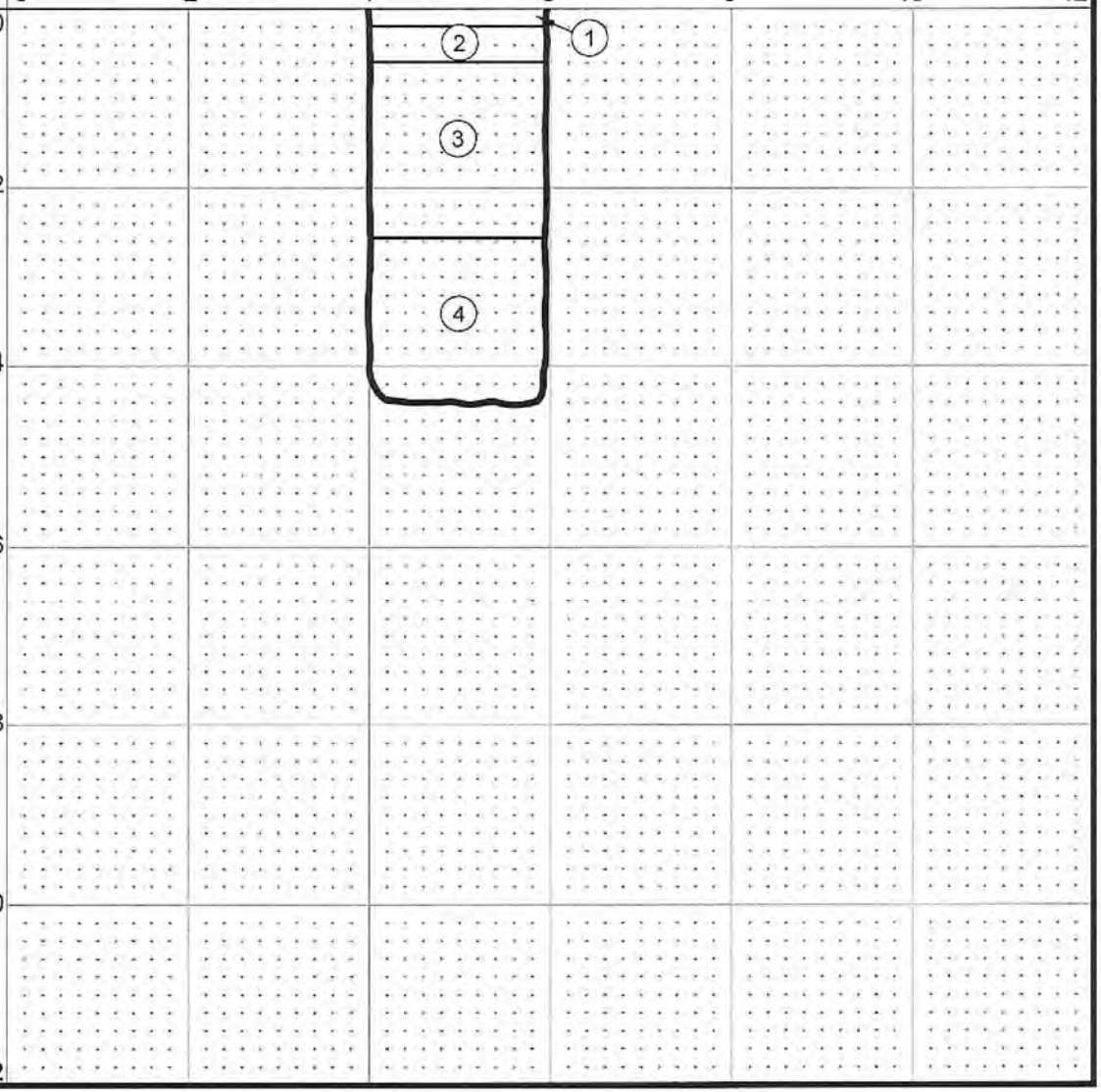

FIG. A-3

File: J:\211\22259\001\21-1-22259-001 TP.dwg Date: 10-21-2016 Author: SAC

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

LOG OF TEST PIT TP-2

JOB NO: 21-1-22259-001 DATE: 10-3-2016 LOCATION: See Site and Exploration Plan

PROJECT: Anacortes Blue Heron Circle Reservoir, Anacortes, Washington

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
(1) Organics;	None Observed			0
(2) Crushed rock, base coarse. Fill (Hf)				
(3) Dense, light brown, *Silty Sand with Gravel (SM) to Silty Gravel with Sand (GM)*; moist; subrounded to subangular gravel; fine to medium sand; nonplastic fines. Glaciomarine Drift (Qgdm)			S-1	2
			S-2	
(4) Dense, light brown to yellow brown, *Poorly Graded Sand with Silt (SP-SM)*; moist; fine to medium sand. Glaciomarine Outwash (Qgom)				4
				6
				8
				10
				12

Sketch of Northwest Pit Side

Surface Elevation: Approx. 288 Ft.

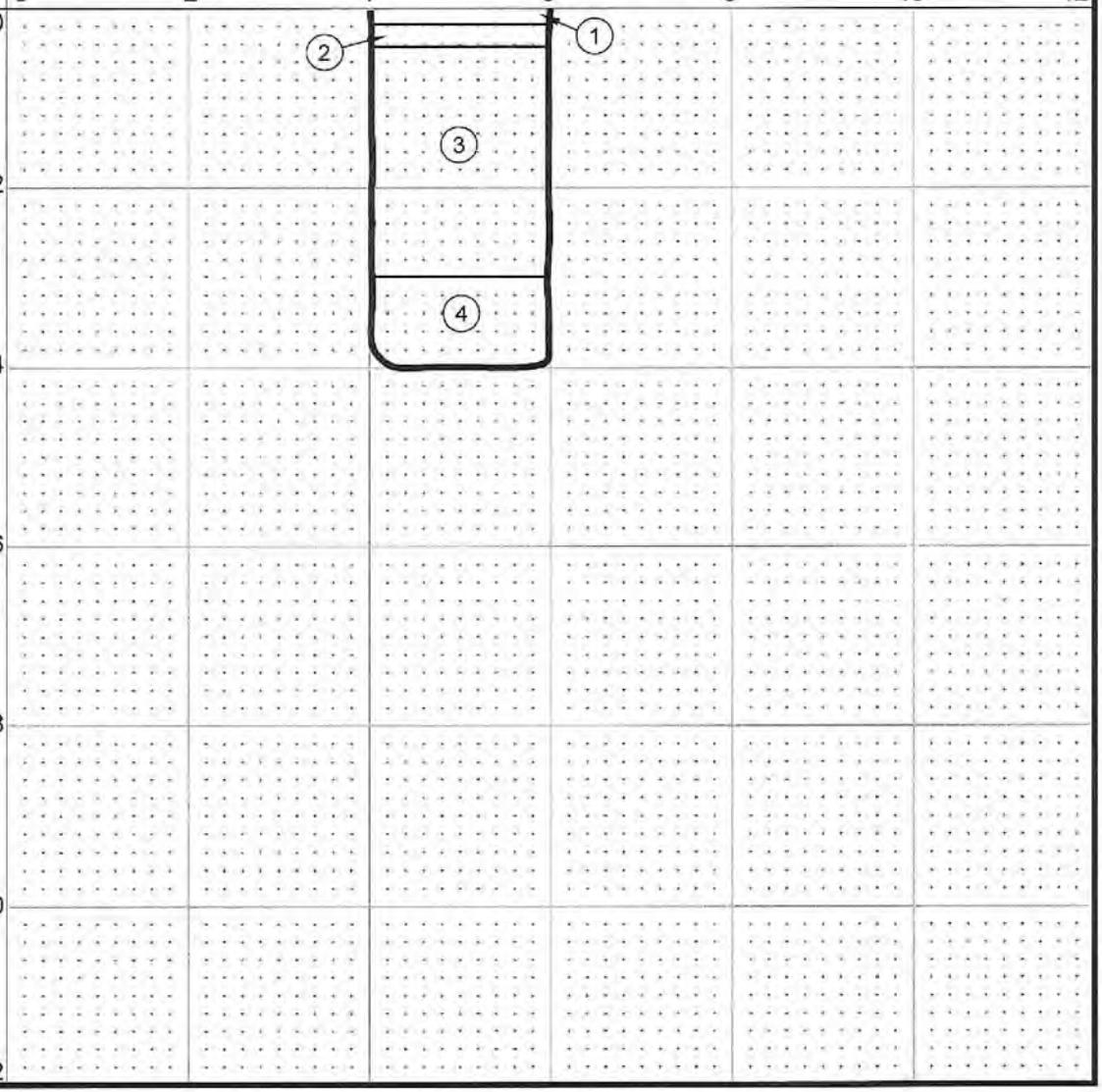

FIG. A-4

File: J:\211\22259\001\21-1-22259-001 TP.dwg Date: 10-21-2016 Author: SAC

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

LOG OF TEST PIT TP-3

JOB NO: 21-1-22259-001 DATE: 10-3-2016 LOCATION: See Site and Exploration Plan

PROJECT: Anacortes Blue Heron Circle Reservoir, Anacortes, Washington

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
(1) Topsoil / Sod / Roots;	None Observed			0
(2) Light brown, *Silty Sand With Gravel (SM)*; moist; subrounded to subangular gravel; fine to coarse sand; nonplastic fines; little organics with tree roots. Fill (Hf)			S-1	2
(3) Dense, light brown to light gray, *Silty Sand with Gravel (SM)*; moist; subrounded gravel; fine to medium sand; nonplastic fines. Glaciomarine Drift (Qgdm)			S-2	4
(4) Dense, light brown to yellow brown, *Poorly Graded Sand with Silt (SP-SM)*; moist; fine to medium sand. Glaciomarine Outwash (Qgom)			S-3	6
				8
				10
				12

Sketch of East Pit Side

Surface Elevation: Approx. 289 Ft.

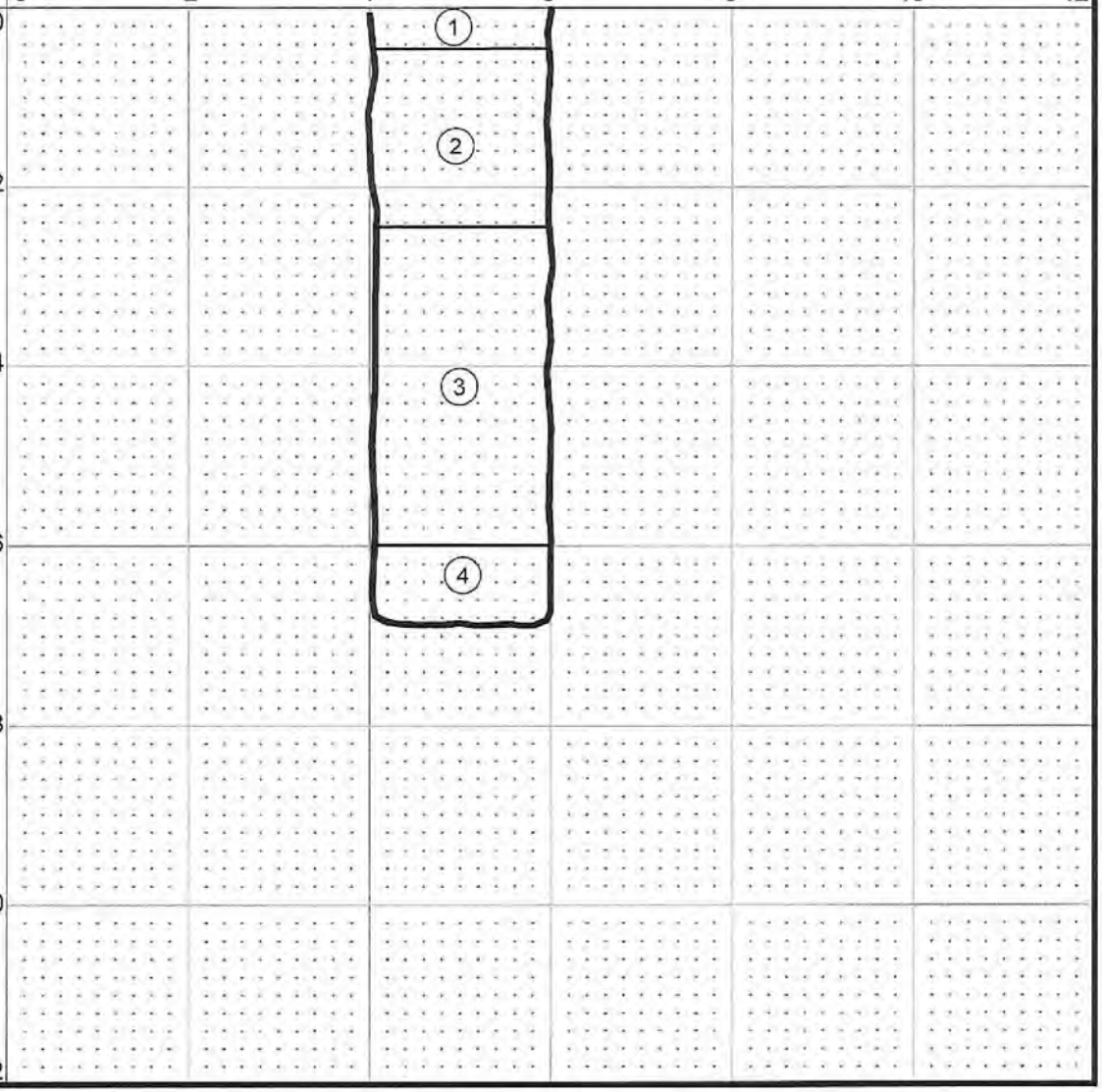

FIG. A-5

City of Anacortes
904 6th Street
P.O.Box 547
Anacortes, WA 98221-0547

Invoice/Permit #: ROW-2016-1221
Applied date: 10/26/2016
Issue date:
Expire date: 10/26/2017

Job Address: 2209 12TH ST
ANACORTES WA 98221

Permit Type: Franchise Right-of-Way Permit
Project:

APN:

Remarks: Starting from the W. side of the above address,we will bore 50ft north, then bore 48ft north under 12th St(SR20), then we will bore 10ft north to pole.

Owner: COMCAST
Address: 400 SEQUOIA DR
BELLINGHAM WA 98226-7133
Phone: (360) 527-8211

Contractor:
Address:
Phone:
License #:

General Information:

Street Cut	Y
Natural Gas	N
Cable	Y
Culvert	N
Power	N
Curb Cut	N
Telephone	N
Outside Traveled Way	N
Inside Traveled Way	Y

Fees:

Inside Traveled Way	50.00
Total Calculated:	50.00
Deposits/Receipts:	0.00
Total Due:	50.00

THIS PERMIT BECOMES NULL AND VOID IF WORK OR CONSTRUCTION AUTHORIZED IS NOT COMMENCED WITHIN 180 DAYS, OR IF CONSTRUCTION OR WORK IS SUSPENDED OR ABANDONED FOR A PERIOD OF 180 DAYS AT ANY TIME AFTER WORK IS COMMENCED. I HEREBY CERTIFY THAT I HAVE READ AND EXAMINED THIS APPLICATION AND KNOW THE SAME TO BE TRUE AND CORRECT. ALL PROVISIONS OF LAWS AND ORDINANCES GOVERNING THIS TYPE OF WORK WILL BE COMPLIED WITH WHETHER SPECIFIED HEREIN OR NOT, THE GRANTING OF A PERMIT DOES NOT PRESUME TO GIVE AUTHORITY TO VIOLATE OR CANCEL THE PROVISIONS OF ANY OTHER STATE OR LOCAL LAW REGULATING CONSTRUCTION OR THE PERFORMANCE OF CONSTRUCTION.

SIGNATURE OF OWNER OR AUTHORIZED AGENT

ISSUED BY

EXHIBIT #9:

ENVIRONMENTAL REVIEW TECHNICAL MEMORANDUM

Environmental Review Technical Memorandum

To: Matt Reynolds, City of Anacortes

From: Maki Dalzell, PWS, HDR

Date: September 30, 2016

Subject: Environmental Review of the Blue Heron Circle Reservoir Project

1.0 Objective

The purpose of this Technical Memorandum is to summarize existing documentation of natural resource elements and provide direct observations of natural environment features at the Blue Heron Circle Reservoir Project located in Anacortes, Washington (see Figure 1). This memorandum has been prepared by a natural resource scientist with expertise in wetland and stream studies, habitat biology, and natural vegetation. No site-specific natural resource studies have been performed to support this analysis.

2.0 Project Location

The proposed project is located within the City of Anacortes, Washington (Township 35 North, Range 2 East Section 30). The project site is located in a City-owned property at 4210 Blue Heron Circle, Anacortes, WA. (Parcel numbers P33173 and P33044). The project site is currently fenced and access is restricted. Within the property, a 3 million gallon (MG) water reservoir and a booster pump station are located (Figure 2). The project site is within a low-density residential area zoned P (public). Private property and homes are adjacent to the parcels on the west, south, and east sides. North of the parcel is another City-owned property that is undeveloped.

3.0 Project Description

The City of Anacortes (City) operates four finished water reservoirs that serve the City's distribution system. The existing 3.0 MG water storage reservoir located at Blue Heron Circle in Anacortes is one of the City's key water distribution system assets. The City's transmission mains terminate at this reservoir, which provides for operational, emergency, and fire storage and also provides critical pressure buffering to prevent surges from flow variations to the City's wholesale customers that have connections upstream of the reservoir. Finished water from the 3.0 MG reservoir also supplies two 2.0 MG reservoirs, one at 29th Street and the other at Skyline, providing operational, emergency and fire storage for higher pressure zones. The fourth distribution reservoir is a 30,000-gallon tank that serves the Fidalgo Bay Estates area which has its turnout prior to entering the 3.0 MG reservoir. Therefore, almost all finished water entering the City's distribution system passes through the Blue Heron Circle reservoir and the entire water supply system cannot be easily operated without a reservoir at the terminus of the transmission mains.

This project will replace the City's existing Blue Heron Circle reservoir which has structural deficiencies with two new reservoirs, each holding 1.5 MG. The project will also include new piping and associated equipment. Construction of the project will begin in February 2017 and be completed in June 2018. The project will be constructed in three phases. During the first phase, a new 1.5 MG reservoir will be constructed to the north of the existing reservoir along with supporting piping and vaults and be put into service. Then, during the second phase, the existing 3 MG reservoir will be demolished. The third phase

includes construction of the second 1.5 MG reservoir at the location of the existing reservoir, along with revegetation and other activities. Work activities include site preparation, site grading, gravel installation, construction of the reservoirs, installation of approximately 500 linear feet of new yard piping and valving, and associated telemetry and controls. After construction, the site will be restored with finished grading and re-vegetated with grass. Changes to existing fencing, booster station, and generator are not anticipated.

4.0 Existing Conditions and Impact Analysis

This summary is based on a review of existing data (see Section 5.0 Background Documents), a reconnaissance-level site visit (conducted on September 9, 2016), and review of concept level project design drawings.

4.1 Project Site

The new reservoirs would be constructed in the City-owned property where the existing reservoir is located (see Figure 2). Maintained lawn covers most of the project site around the existing reservoir and the booster pump station building, and Douglas fir (*Pseudotsuga menziesii*) trees are located south and east perimeter of the property. Approximately 33 Douglas fir trees were identified within the property, and three poplar (*Populus*. spp) trees were also identified near the southwest end of the property line outside of the fence line according to the project survey data. Common dandelion (*Taraxacum officinale*), hairy cat's ear (*Hypochaeris radicata*), and narrow-leaf plantain (*Plantago lanceolata*) were also observed at the project site. Trees located within the project site would not be removed during construction. These trees are located away from the excavation area so that their roots are unlikely to be damaged from any excavation activities for the proposed reservoirs.

Staging areas would take place in the northwest corner of the property next to the booster pump station building and along the southern perimeter of the property (Figure 2). Vegetation in the proposed contractor staging area consists of mowed grasses that are regularly maintained. Overall, the project site primarily consists of mowed grass with some trees along the perimeter of the site that provide little habitat value or habitat protection. Based on the review of the Washington Department of Fish and Wildlife (WDFW 2016) priority and habitat species (PHS) database and field observations during the site visit, no critical areas were identified within the project site; therefore, no disturbance to critical areas or other sensitive areas is anticipated to occur as a result of the project.

4.2 Sensitive Areas and Species near the Project Site

Based on a review of the WDFW PHS database (2016), no priority habitats or species occurrences are mapped in the project vicinity, and there are no streams or wetlands located in the project vicinity (WDFW 2016; WDNR 2016, USFWS 2016a, Skagit County 2016). According to the PHS data, a bald eagle (*Haliaeetus leucocephalus*) nest is the closest documented species; however, the nest is located approximately a half mile north of the project site. No bald eagle nests or any other raptor nests were identified within the project vicinity during the site visit.

The undeveloped City-owned property to the north of the project site and a privately-owned property approximately 200 feet southeast of the project site consist of second-growth, single-storied small to medium trees with a shrub/forb understory. Douglas fir, big-leaf maple (*Acer macrophyllum*), common snowberry (*Symphoricarpos albus*) are the most common species observed during the site visit. English ivy is also observed on the trees along Blue Heron Circle. No old-growth stands were observed near the project site. The forested areas likely provide foraging, cover, and refugia opportunities for amphibian, reptile, bird, and mammal species associated with this cover type. Most mammals and reptiles likely use forest stands for breeding; amphibians breed when ponds or stream backwaters are present. Live trees

and shrubs provide food and cover for mammals, and nesting sites for birds. No wildlife species were observed during the site visit in the project vicinity.

Fidalgo Bay is located approximately 2,000 feet east of the project site. Washington Department of Natural Resources (WDNR) owns approximately 80 acres of the tidelands and bedlands of the bay, which include tidal flats, salt marshes, sand and gravel beaches, and expansive native eelgrass beds (WDNR 2008). These areas provide breeding, foraging, and rearing habitat for fish and bird species. Brant geese, cormorants, peregrine falcons, and bald eagles, as well as many shorebirds and dabbling and diving ducks are known to utilize the bay area (WDNR 2008).

Marbled murrelet (*Brachyramphus marmoratus*) is federally-threatened under the Endangered Species Act (ESA), and murrelets have been documented to forage in Fidalgo Bay (WDNR 2008). However, marbled murrelets are not expected to interact or be affected by the project activity because the foraging area is significantly removed from the area where the project activity will take place. Murrelets using the marine waters in Fidalgo Bay or near Anacortes are not expected to fly across the construction areas when travelling to and from their nest sites. Feeding murrelets tend to fly along identifying terrain, such as river riparian corridors and salt water shorelines, when accessing their nests. They are not expected to fly up a steep bluff located between the bay and the project site during the breeding season.

If marbled murrelets forage in Fidalgo Bay during construction, they would not have direct line-of-sight contact with the construction. Birds foraging in Fidalgo Bay will be more than 2,000 feet from the construction site, and thus are not expected to be disturbed by construction noise. This is particularly true since traffic noise from Highway 20 is an existing, clearly identifiable noise source in the area. There are no documented nests of marbled murrelets or bald eagles present near the project site, and no suitable habitat is present within at least 100 feet from the area of disturbance. Due to lack of species occurrence and suitable habitat in the project vicinity, bald eagles, marbled murrelets, and other sensitive species are not expected to be affected by the proposed project.

5.0 Background Documents

The following documents were reviewed for this memorandum:

Skagit County. 2016. Wetlands/Hydric Soils and Streams maps. http://www.skagitcounty.net/Departments/GIS/Gallery/main.htm. Accessed September 2016

USFWS (U.S. Fish and Wildlife Service). 2016a. National Wetland Inventory. Wetlands Online Mapper. http://www.fws.gov/wetlands/Data/Mapper.html Accessed September 2016.

USFWS (U.S. Fish and Wildlife Service.) 2016b. Customized IPaC Trust Resource Report for the West Duwamish CSO Project. Generated September 7, 2016. https://ecos.fws.gov/ipac

WDFW (Washington Department of Fish and Wildlife). 2016. WDFW Priority Habitat and Species (PHS): PHS on the Website: http://wdfw.wa.gov/mapping/phs/. Accessed September 2016.

WDNR (Washington Department of Natural Resources). 2016. Forest Practices Application Review System (FPARS) mapping tool. https://fortress.wa.gov/dnr/protectiongis/ fpamt/index.html#. Accessed September 2016.

WDNR (Washington Department of Natural Resources). 2008. Fidalgo Bay Environmental Aquatic Reserve Management Plan. Skagit County, Washington April 2008. Prepared by Aquatic Resources Program.

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Figures

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FIGURE 1
PROJECT VICINITY

PATH: G:\PROJECTS\WASHINGTON\CITY_OF_ANACORTES_007754\BLUE_HERON_CIRCLE_RESERVOIR_100300711\7.2_WP\MAP_DOCS\VICINITY.MXD - USER: MDALZELL - DATE: 9/30/2016

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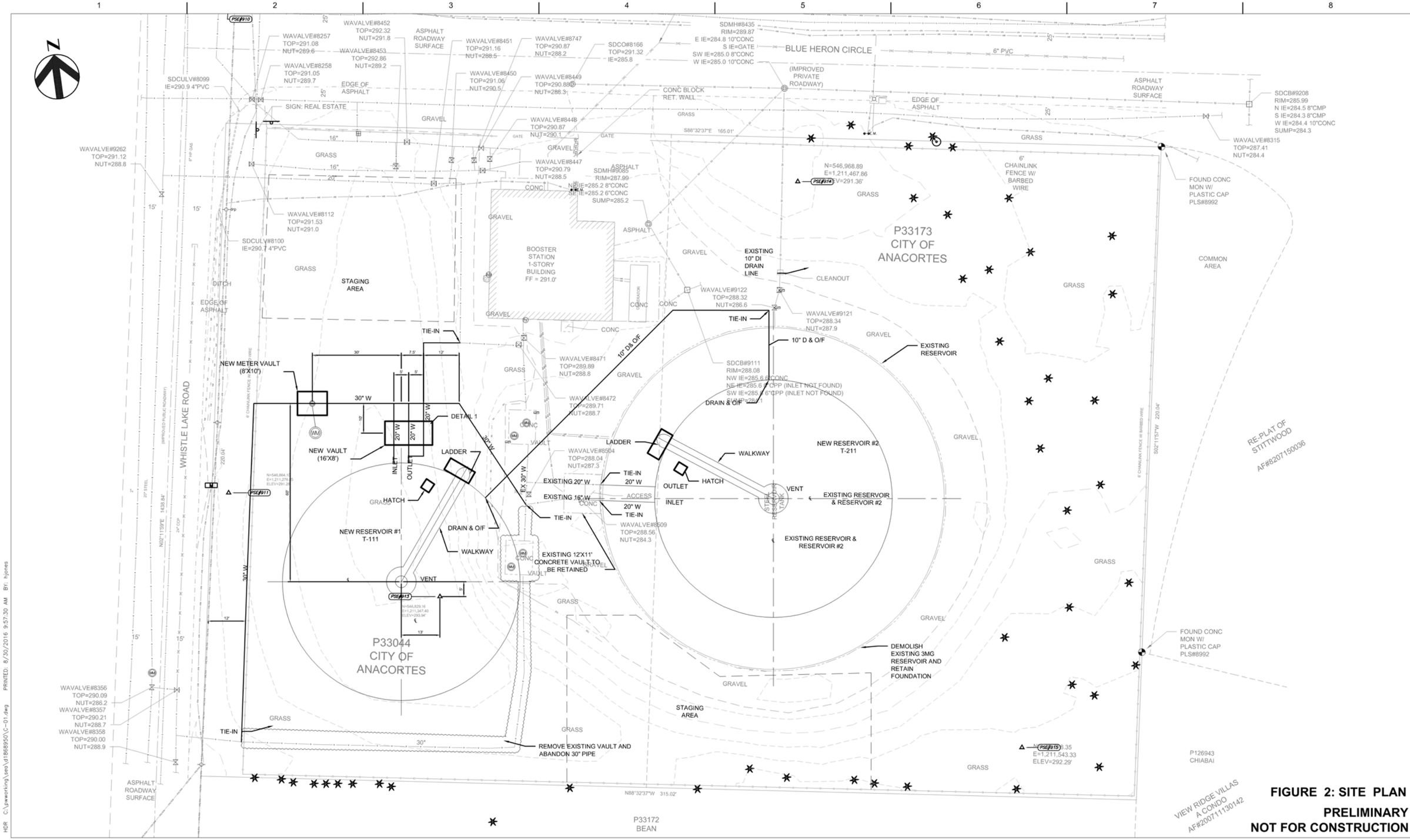

FIGURE 2: SITE PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER:	
DESIGNED BY:	
CHECKED BY:	
CAD:	
PROJECT NUMBER:	-

ANACORTES BLUE HERON CIRCLE RESERVOIR
PROPOSED LOCATIONS FOR NEW RESERVOIRS
AND ASSOCIATED WATER PIPE

0 1" 2"

FILENAME	C-01.dwg
SCALE	1" = 30'

SHEET: - Of -

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Site Photographs

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Photo 1. View of the existing water reservoir and new water reservoir site, looking east from Whistle Lake Road

Photo 2. View of proposed typical staging area, looking northeast from the southwest corner of the project site

Photo 3. Proposed staging area and new water reservoir site, looking south from Blue Heron Circle

Photo 4. Booster pump station within the project site, looking southwest from Blue Heron Circle

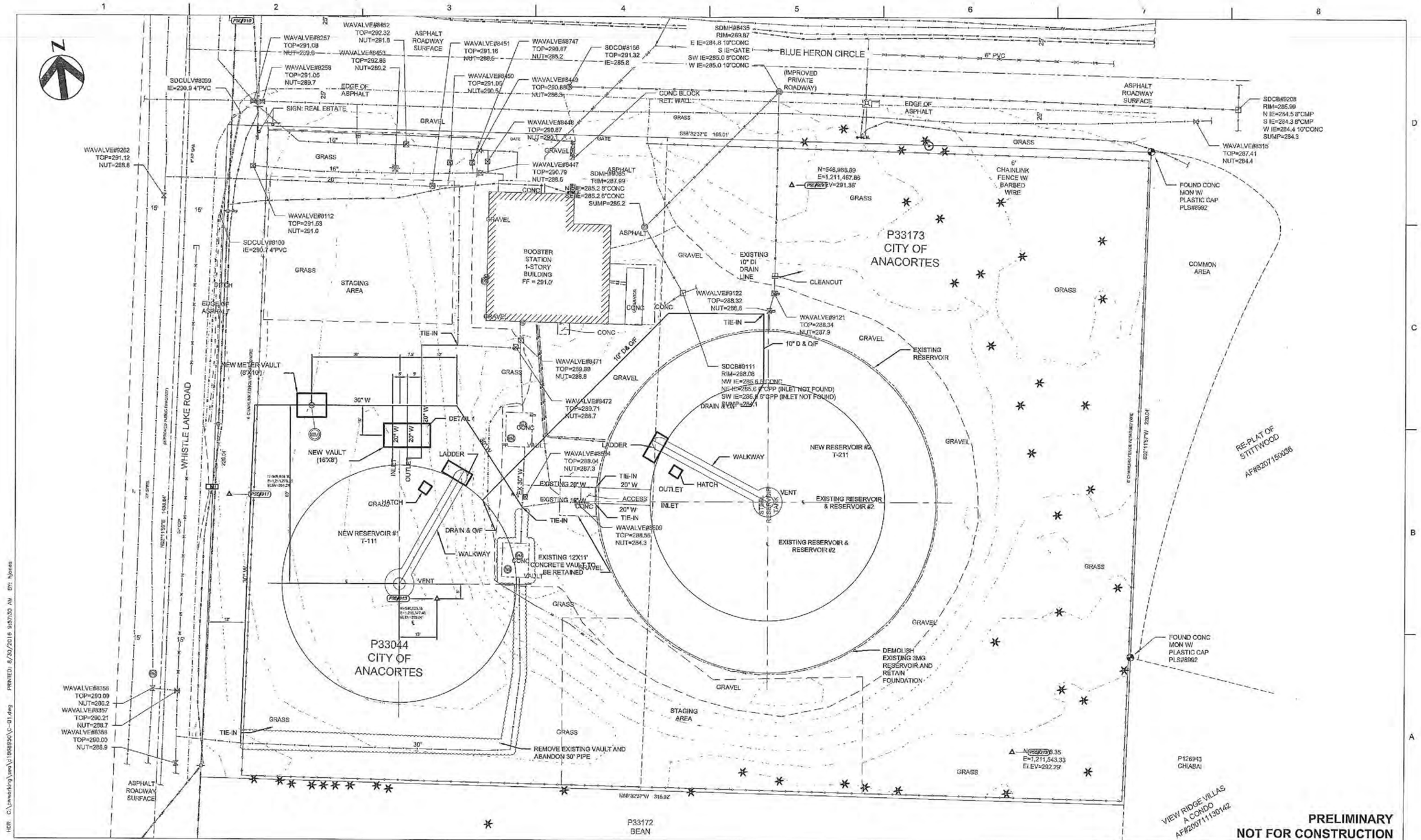
Photo 5. View of the east end of the project site, looking east from Blue Heron Circle

Photo 6. Whistle Lake Road, looking south

Photo 7. Blue Heron Circle and undeveloped property to the north of the street, looking west

EXHIBIT #10:

SITE PLAN & CROSS SECTIONS



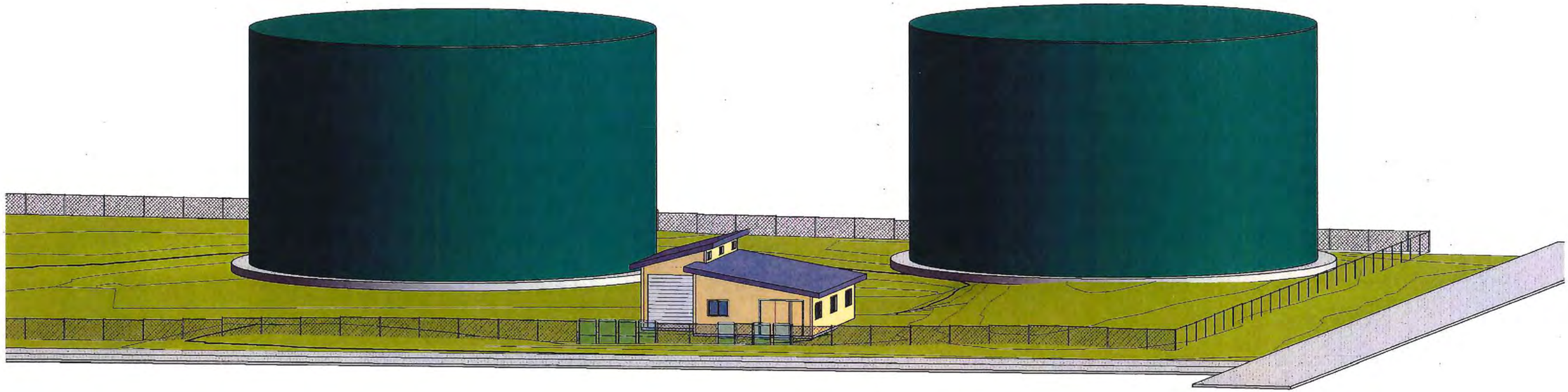
ISSUE	DATE	DESCRIPTION

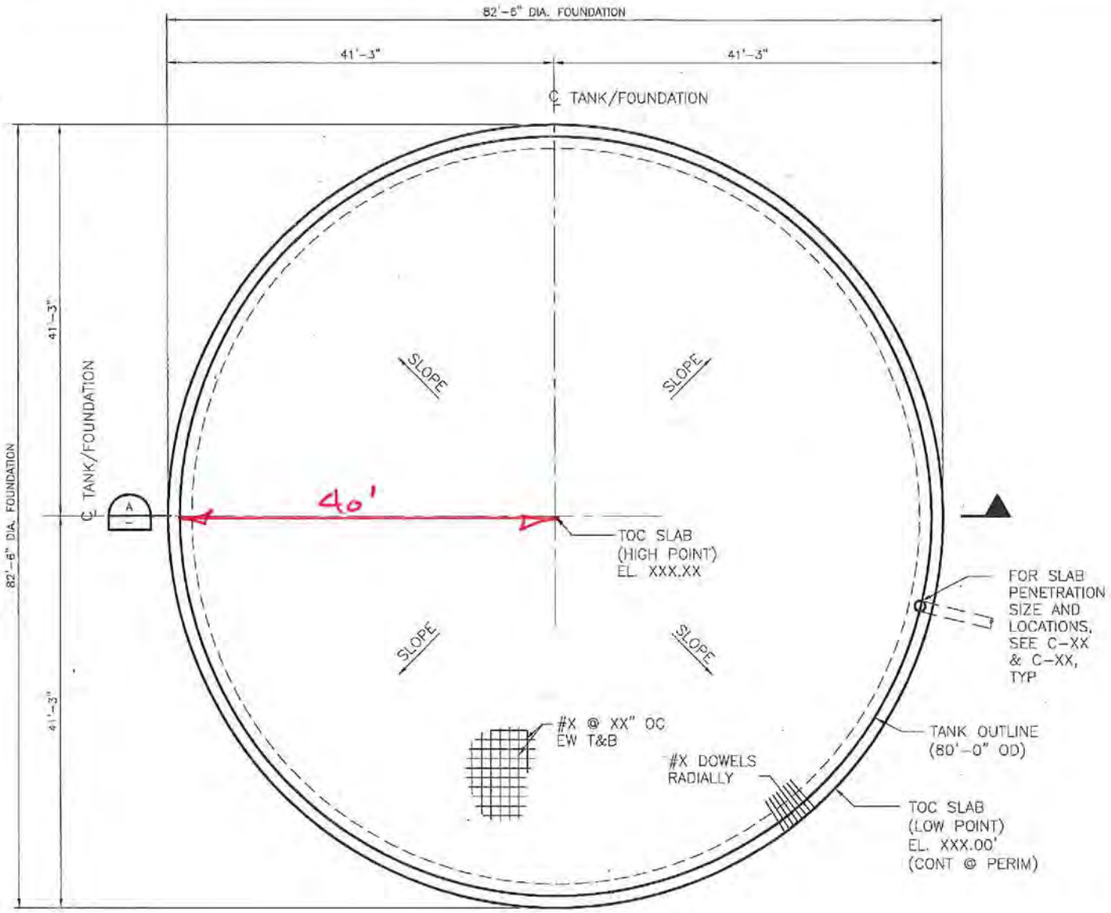
PROJECT MANAGER:
DESIGNED BY:
CHECKED BY:
CAD:
PROJECT NUMBER:

ANACORTES BLUE HERON CIRCLE RESERVOIR
PROPOSED LOCATIONS FOR NEW RESERVOIRS
AND ASSOCIATED WATER PIPE

0 1" 2"

FILENAME C-01.dwg
SCALE 1" = 30'
SHEET: - OF -





FOUNDATION PLAN

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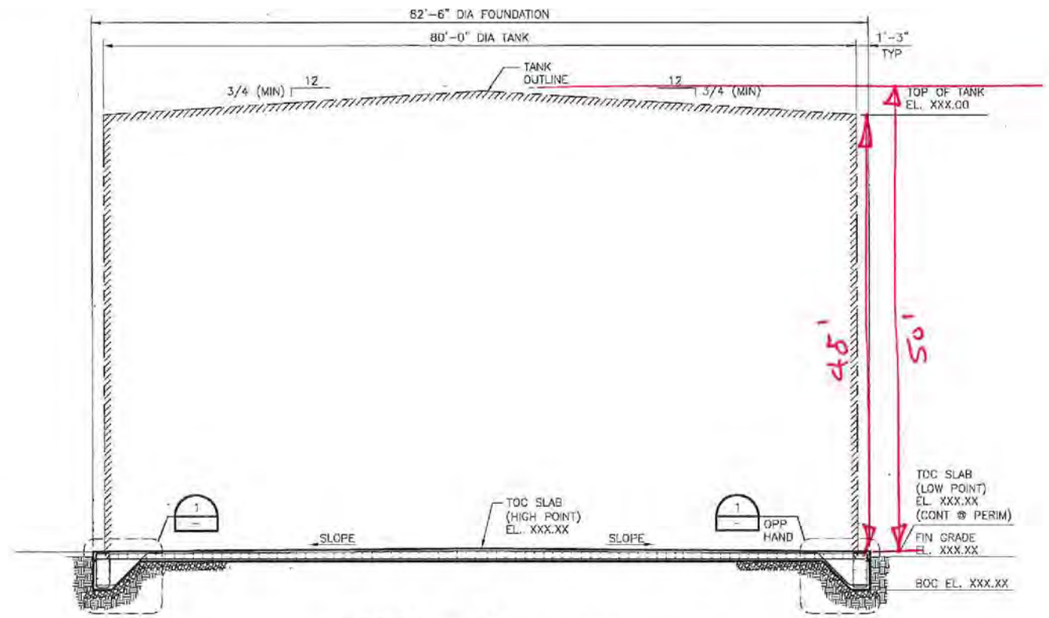
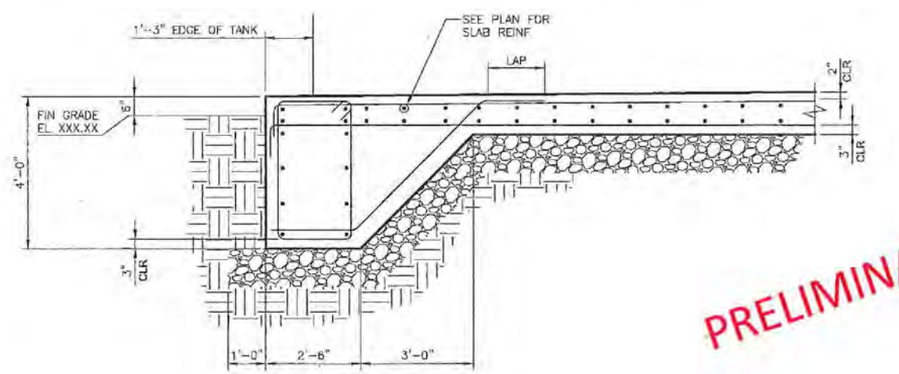


SECTION A

1/8"=1'-0"

NOTES:

1. CONCRETE FOOTING SHALL BE MOIST CURED FOR 14 DAYS.
2. TANK FLOOR SHALL NOT BE INSTALLED ON CONCRETE FOUNDATION BEFORE 28 DAYS.



DETAIL 1

1/2"=1'-0"

PRELIMINARY

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HDR

		PROJECT MANAGER	XXX X. XXXXXX
ISSUE	DATE	DESCRIPTION	PROJECT NUMBER XXXXXXXXXXXXXX

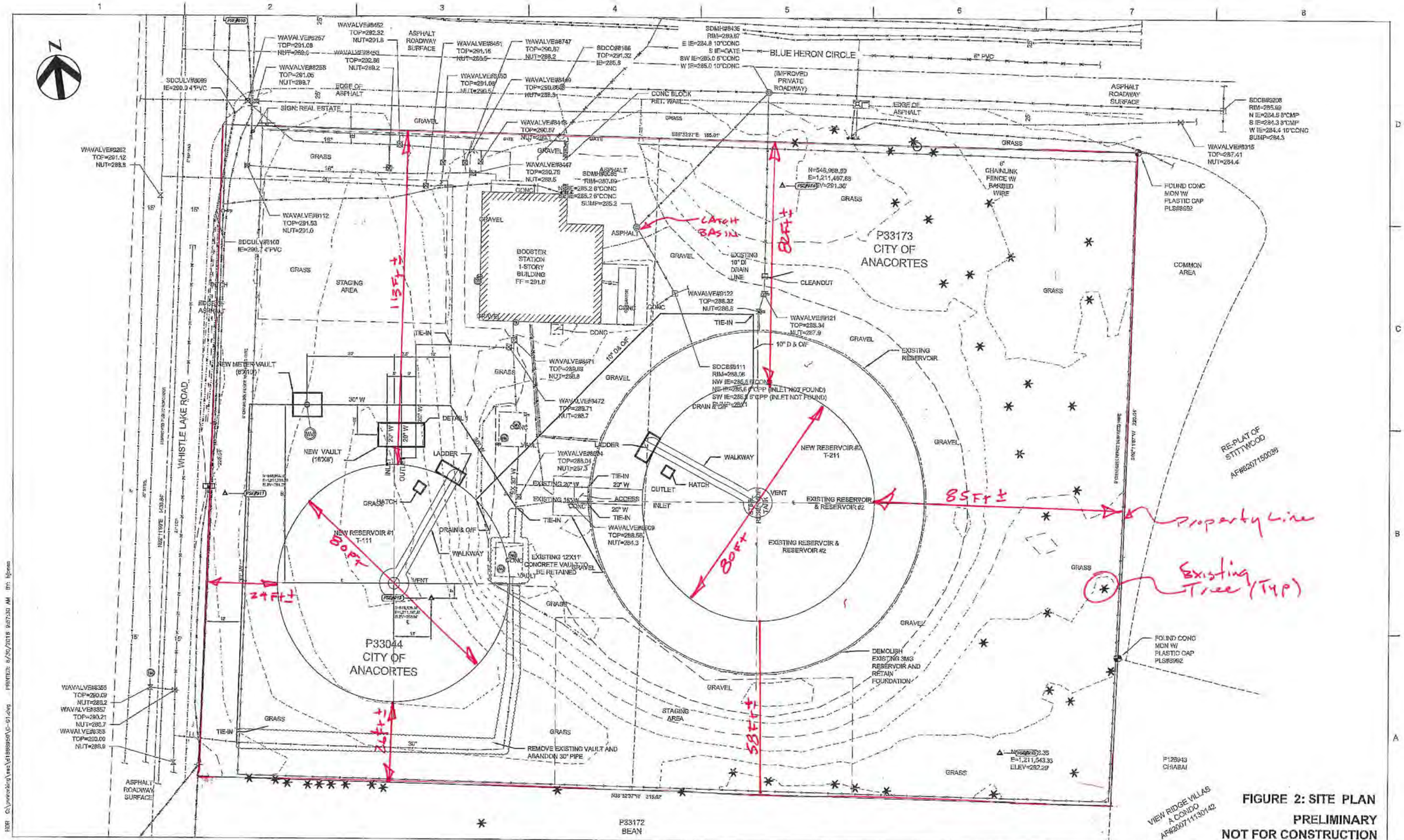
TITLE 1
TITLE 2
TITLE 3

0 1" 2"

FILENAME

SCALE

SHEET



PROJECT MANAGER:	
DESIGNED BY:	
CHECKED BY:	
CAD:	

HDR

ANACORTES BLUE HERON CIRCLE RESERVOIR
PROPOSED LOCATIONS FOR NEW RESERVOIRS
AND ASSOCIATED WATER PIPE

0 1" 2"

FILENAME C-01.dwg

SHEET: – OF