Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem Oregon 97301-1266
(503) 986-0900
www.wrd.state.or.us

Application for a Permit to

Store Water in a Reservoir

(Standard Review)

Standard Review Process (ORS 537): You must use this form for any reservoir
storing more than 9.2 acre-feet *and* with a dam more than 10 feet high.

Use a separate form for each reservoir

*Please type or print in dark ink. If your application is found to be incomplete or inaccurate, we will return it to you.
If any requested information does not apply, insert "n/a". A summary of review criteria and procedures that are
generally applicable to these applications is available at www.wrd.state.or.us/OWRD/PUBS/forms.shtml.*

1. APPLICANT INFORMATION:

Applicant: _____**Monte**_____   _____**Wood**_____
                        First   Last

Mailing Address: _____**12945 SE Fairview Road**_____

_____**Dayton**_____   _____**Oregon**_____   _____**97114**_____
           City   State   Zip

Phone: **503-868-7330** _____ _____
              Home   Work   Other

*Fax: _____   *Email Address: _____

I(We) make application for a permit to construct a reservoir and store the following described waters of
the State of Oregon. The name of the reservoir is _____**Wood Reservoir**_____

2. SOURCE OF WATER for the proposed use: _____**Surface Run-off**_____,
a tributary of _____**Palmer Creek**_____.

Is the proposed use an enlargement of an existing dam/reservoir? ⦿ Yes ◯ No

If the reservoir is not in channel of a stream, state how it is to be filled:

Sheet flow surface run-off

For Department Use
App. No._____   Permit No._____   Date_____

3. DAM HEIGHT AND COMPOSITION

The maximum height of the structure will be $\underline{12.9'}$ feet above streambed or ground surface at the centerline of the crest of the dam.

Note: If your dam height is greater than or equal to 10.0' above land surface AND your reservoir will store equal to or greater than 9.2 acre-feet, engineered plans and specifications must be approved prior to storage of water.

The dam will be (check one):   ⊙ Earthfill   ○ Concrete   ○ Flash board   ○ Other

If "other" give description:

4. PRIMARY OUTLET WORKS

Describe the location and the dimensions of the outlet conduit through the dam:

10-inch pipeline through dam centerline

NOTE: Most dams across a natural stream channel will need an outlet conduit having a minimum diameter of 8 inches or greater.

5. EMERGENCY SPILLWAY

Describe the location and the dimensions of the spillway channel:

Located along the north side of the dam. 14' bottom, 4' sides (2' deep with 2' freeboard)

6. THE USE(s) of the impounded water will be:

Multipurpose   *Any use authorized under the Basin, including irrigation*

7. THE AMOUNT OF WATER to be stored is: _____ 20 _____ acre-feet.

The area submerged by the reservoir, when filled, will be _____ 5.3 _____ acres.

8. PROJECT SCHEDULE (List Month and Year)

Proposed date construction will begin: Permit Date + 1 year

Proposed date construction will be completed: Permit Date + 2 years

Proposed date beneficial water use will begin: Permit Date + 3 years

Is this project fully or partially funded by the American Recovery and Reinvestment Act? (Federal stimulus dollars) ○ Yes ◉ No

9. PROPERTY OWNERSHIP

Do you own all the land where you propose to divert, transport, and use water?

◉ Yes *(Please check appropriate box below then skip to section 10)*

    ☒ There are no encumbrances

    ☐ This land is encumbered by easements, rights of way, roads or other encumbrances *(please provide a copy of the recorded deed(s))*

○ No *(Please check the appropriate box below)*

    ☐ I have a recorded easement or written authorization permitting access.

    ☐ I do not currently have written authorization or easement permitting access.

    ☐ Written authorization or an easement is not necessary, because the only affected lands I do not own are state-owned submersible lands, and this application is for irrigated and/or domestic use only (ORS 274.040).

You must provide the legal description of: (1) the property from which the water is to be diverted, (2) any property crossed by the proposed ditch, canal or other work, and (3) any property on which the water is to be used as depicted on the map.

List the names and mailing addresses of all affected landowners*

* *Attach additional sheet(s) if necessary.*

10. MAP REQUIREMENTS The Department cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the township, range, section and quarter/quarter section of the proposed reservoir location and place of use. The map must provide tax lot numbers. See the map guidelines sheet for detailed map specifications.

11. SIGNATURE

By my signature below I confirm that I understand:
- I am asking to use water specifically as described in this application.
- Evaluation of this application will be based on information provided in the application packet.
- I cannot legally use water until the Water Resources Department issues a permit to me.
- If I get a permit, I must not waste water.
- If development of the water use is not according to the terms of the permit, the permit can be canceled.
- The water use must be compatible with local comprehensive land use plans.
- Even if the Department issues a permit, I may have to stop using water to allow senior water right holders to get water to which they are entitled.

I certify that the information I have provided in this application is an accurate representation of the proposed water use and is true and correct to the best of my knowledge:

Applicant: _____*Monte Wood*_____   _____*15 February 2011*_____
Signature *(If more than one applicant, all must sign.)*   Date

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Before you submit your application be sure to:

- Answer each question completely.
- Attach a legible map that includes township, range, section, quarter/quarter and tax lot.
- Include a Land Use Information Form or receipt stub signed by a local official.
- Include the legal description of all the property involved with this application. You may include a copy of your deed land sales contract or title insurance policy to meet this requirement.
- Include a check payable to the Oregon Water Resources Department for the appropriate amount. The Department's fee schedule can be found at www.wrd.state.or.us or call (503) 986-0900.

MAR 04 2011
WATER
SAL

STATE OF OREGON

COUNTY OF YAMHILL

CERTIFICATE OF WATER RIGHT

This Is to Certify, That   CARL WOOD

of   Route 1, Dayton   , State of   Oregon   , has made proof

to the satisfaction of the STATE ENGINEER of Oregon, of a right to store the waters of

an unnamed stream, tributary of Palmer Creek, a tributary of Yamhill River, to

be appropriated under Application No. 21038, Permit No. 16484,

for the purposes of

irrigation

under Reservoir Permit No.   R-823   of the State Engineer, and that said right to store said

waters has been perfected in accordance with the laws of Oregon; that the priority of the right

hereby confirmed dates from   July 31, 1945

that the amount of water entitled to be stored each year under such right, for the purposes afore-

said, shall not exceed   7   acre-feet.

The reservoir is located in Section   19 :   , Tp. 5 S, , R. 3 W. , W. M.
NW¼NW¼, as proj. within Richardson DLC 47

WITNESS the signature of the State Engineer,

affixed this   7th   day

of   February   , 1957 .

LEWIS A. STANLEY
....
State Engineer.

Recorded in State Record of Water Right Certificates, Volume   16   , page 21964. .

REPORT OF PERSON MAKING INSPECTION

(For use by Representative of State Engineer)

I, ..., do hereby certify that I have made

an inspection of the works described herein and in Permit No. ...., on the .... day

of ...., 19......, and found the foregoing statements and descriptions of works to

be accurate. In my opinion the appropriation has been completed to the extent of ....
(Quantity of water in second-feet or acre-feet)

and I recommend the issuance of water right certificate for this amount.

NOTICE TO INSPECTORS

If conditions do not justify the above report by you, please return the proof without your signature, with a full report by letter.
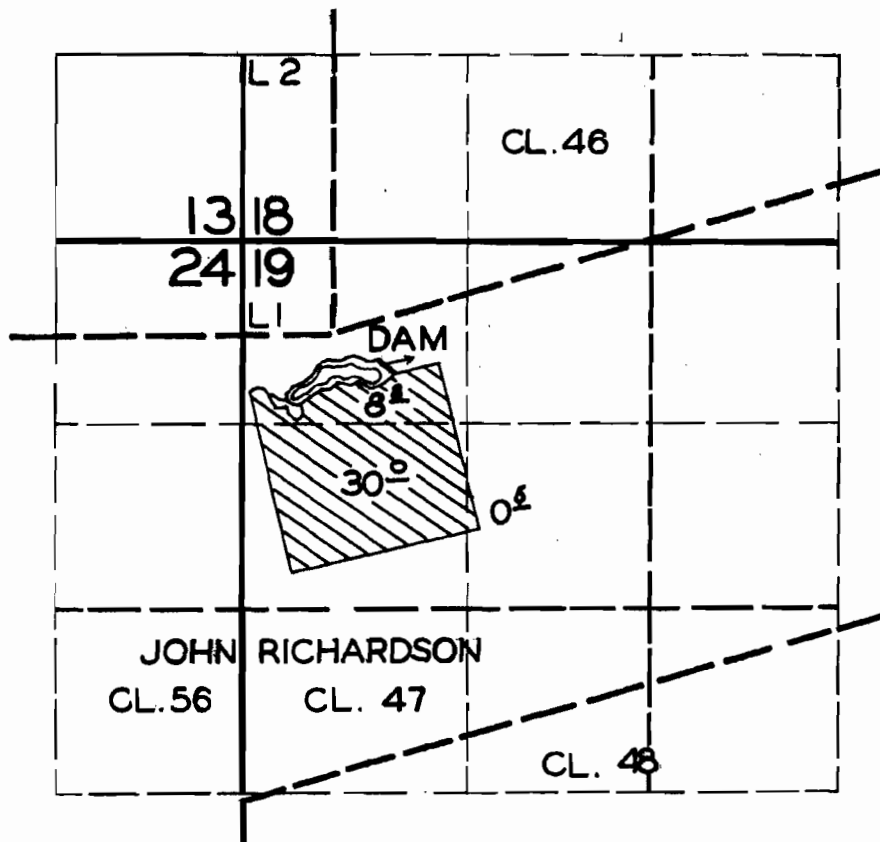
....
(Name)

....
(Title)

Dam 7' high 160' long earth fill. 12" outlet winter time spillway 7' w 3' deep boarded up in summer. Max depth 8" or est. less than 3 ft Area plane tabled on photo.

T. 5 S. R. 3 ‡ 4 W. W. M.

L 2

CL. 46

13 | 18

24 | 19

L 1

DAM

8ᴬ

30⁰

0ᴱ

JOHN RICHARDSON

CL. 56   CL. 47

CL. 48

FINAL PROOF SURVEY
UNDER
R-21038   R-823
Application No. 21037.. Permit No. 16484.
IN NAME OF
CARL WOOD

Surveyed 20 MAY 1955, by ...T. JONES..

Water Right Information Query Results

Contact Information

▼ **Current contact information**

OWNER:
▷　CARL WOOD
　　RT 1
　　DAYTON, OR 97114

Water Right Information

Status: Non-Cancelled

County: Yamhill

File Folder Location: Salem

Watermaster District: 16

Point(s) of Diversion

▶ **POD 1 - UNNAMED STREAM > PALMER CREEK**

Place(s) of Use　　Add TRS grouping

▶ **Use - STORAGE (Primary); Priority Date: 7/31/1945**

Water Right Genealogy

····· *No genealogy records available for this water right, try the family link below instead.*

Documents　　View all scanned documents

▶ **Application: R 21037**

▶ **Permit: R 823** document

▶ **Certificate: 21964** document , paper map

▷　View right with Web Mapping

▷　View Places of Use from Water Rights in the Same Area

View Water Rights in same Family

Help understanding and working with the Water Rights Information System

Report Errors with Water Right Data

Return to WRIS Query

F/u on large commercial irrigation across road from Millers' land (Pmt G-16126)

Land Use
Information Form

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900
www.wrd.state.or.us

Applicant(s): <u>Monte Wood</u>

Mailing Address: <u>12945 SE Fairview Road</u>

City: <u>Dayton</u> State: <u>Oregon</u> Zip Code: <u>97114</u> Daytime Phone: <u>503-868-7330</u>

A. Land and Location

Please include the following information for all tax lots where water will be diverted (taken from its source), conveyed (transported), and/or used or developed. Applicants for municipal use, or irrigation uses within irrigation districts may substitute existing and proposed service-area boundaries for the tax-lot information requested below.

Township	Range	Section	¼ ¼	Tax Lot #	Plan Designation (e.g., Rural Residential/RR-5)	Water to be:			Proposed Land Use:
5S	3W`	19	NW-NW	5S3W19-500	EFU/EF-80	☒ Diverted	☒ Conveyed	☒ Used	Pond
5S	3W	19	NW-NW	5S3W19-600	EFU/EF-80	☐ Diverted	☒ Conveyed	☒ Used	Pond
						☐ Diverted	☐ Conveyed	☐ Used	
						☐ Diverted	☐ Conveyed	☐ Used	

List all counties and cities where water is proposed to be diverted, conveyed, and/or used or developed:

Yamhill County

MAR 04 2011

B. Description of Proposed Use

Type of application to be filed with the Water Resources Department:
☒ Permit to Use or Store Water ☐ Water Right Transfer ☐ Permit Amendment or Ground Water Registration Modification
☐ Limited Water Use License ☐ Allocation of Conserved Water ☐ Exchange of Water

Source of water: ☐ Reservoir/Pond ☐ Ground Water ☒ Surface Water (name) <u>Runoff</u>

Estimated quantity of water needed: <u>20</u> ☐ cubic feet per second ☐ gallons per minute ☒ acre-feet

Intended use of water: ☐ Irrigation ☐ Commercial ☐ Industrial ☐ Domestic for _____ household(s)
☐ Municipal ☐ Quasi-Municipal ☐ Instream ☒ Other <u>Multipurpose</u>

Briefly describe:

This is an elargement of an existing permitted reservoir. Water will be used for irrigation of surounding farm ownership.

- ✂

Note to applicant: If the Land Use Information Form cannot be completed while you wait, please have a local government representative sign the receipt at the bottom of the next page and include it with the application filed with the Water Resources Department.

See bottom of Page 3. →

For Local Government Use Only

The following section must be completed by a planning official from each county and city listed unless the project will be located entirely within the city limits. In that case, only the city planning agency must complete this form. This deals only with the local land-use plan. Do not include approval for activities such as building or grading permits.

Please check the appropriate box below and provide the requested information

[X] Land uses to be served by the proposed water uses (including proposed construction) are allowed outright or are not regulated by your comprehensive plan. Cite applicable ordinance section(s): _402. of the Yamhill Co. zoning ordinance._

☐ Land uses to be served by the proposed water uses (including proposed construction) involve discretionary land-use approvals as listed in the table below. (Please attach documentation of applicable land-use approvals which have already been obtained. Record of Action/land-use decision and accompanying findings are sufficient.) **If approvals have been obtained but all appeal periods have not ended, check "Being pursued."**

Type of Land-Use Approval Needed (e.g., plan amendments, rezones, conditional-use permits, etc.)	Cite Most Significant, Applicable Plan Policies & Ordinance Section References	Land-Use Approval:	
		☐ Obtained ☐ Denied	☐ Being Pursued ☐ Not Being Pursued
		☐ Obtained ☐ Denied	☐ Being Pursued ☐ Not Being Pursued
MAR 04 2011		☐ Obtained ☐ Denied	☐ Being Pursued ☐ Not Being Pursued
		☐ Obtained ☐ Denied	☐ Being Pursued ☐ Not Being Pursued
		☐ Obtained ☐ Denied	☐ Being Pursued ☐ Not Being Pursued

Local governments are invited to express special land-use concerns or make recommendations to the Water Resources Department regarding this proposed use of water below, or on a separate sheet.

Name: _Kenneth B. Friday_   Title: _Planning Division Manager_

Signature: _____   Phone: _503 434-7516_   Date: _3/3/2011_

Government Entity: _Yamhill Co._

Note to local government representative: Please complete this form or sign the receipt below and return it to the applicant. If you sign the receipt, you will have 30 days from the Water Resources Department's notice date to return the completed Land Use Information Form or WRD may presume the land use associated with the proposed use of water is compatible with local comprehensive plans.

Receipt for Request for Land Use Information

Applicant name: **Monte Wood**

City or County: **Yamhill**   Staff contact: _____

Signature: _____   Phone: _____   Date: _____

MAR 04 2011

BARGAIN AND SALE DEED

KNOW ALL MEN BY THESE PRESENTS, that **MONTE C. WOOD,** hereinafter referred to as **"GRANTOR,"** for the consideration hereinafter stated, does hereby **GRANT, BARGAIN, SELL** and **CONVEY** unto **MONTE C. WOOD and TERRI L. WOOD, Co-Trustees of the WOOD FAMILY TRUST DATED** _APRIL 5_ **,** 2010, by and between Monte C. Wood and Terri L. Wood, as Trustors, and Monte C. Wood and Terri L. Wood, as initial Trustee, and successor Trustees, hereinafter referred to as **"GRANTEE,"** and unto Grantee's successors and assigns, all of that certain real property with the tenements, hereditaments and appurtenances thereunto belonging or in anywise appertaining, situated in the County of Yamhill, State of Oregon, described as follows, to-wit:

See attached Exhibit A.

SUBJECT TO: All liens, encumbrances, easements and restrictions of record.

To have and to hold the same unto the said Grantee and Grantee's successors and assigns forever.

The true and actual consideration for this transfer stated in terms of dollars is none; however, the actual consideration consists of or includes other property or value given or promised, which is the whole consideration.

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, AND SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS

After Recording Return to:
Peterson & Prause L.L.P.
P.O. Box 827
McMinnville, Oregon 97128

Until a change is requested, all tax statements
shall be sent to the following address:
No change results from this transfer.

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30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, AND SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009.

IN WITNESS WHEREOF, the Grantor has executed this instrument on this 5th day of April, 2010.

monte c wood
Monte C. Wood

STATE OF OREGON   )
) ss.
County of Yamhill   )

The above and foregoing BARGAIN AND SALE DEED was acknowledged before me by MONTE C. WOOD this 5th day of April, 2010.

(SEAL)

OFFICIAL SEAL
BARBARA R WERNER
NOTARY PUBLIC-OREGON
COMMISSION NO. 440573
MY COMMISSION EXPIRES JULY 30, 2013

Barbara R. Werner
NOTARY PUBLIC FOR OREGON
My Commission Expires: 7/30/2013

PAGE 2/4 - BARGAIN AND SALE DEED

PARCEL 1:

12140 SE Fairview Road, Dayton, OR 97114
Yamhill County Tax Lot #R5319 00600

The West one-half of the following described real premises.

Beginning at a large stone at the Southwest corner of the Woodson Jeffries Donation Land Claim, Notification No. 1841, Claim No. 46 in Township 5 South of Range 3 West of the Willamette Meridian in Yamhill County, Oregon; said stone being the angle corner on the North line of the John Richardson Donation Land Claim thence West on North line of said Richardson claim 11.97 ½ chains to stake at NE corner of Lot 1; thence South 11° 53' East along line between Lots 1 and 2, 26.52 ½ chains to stake at Southeast corner of Lot 1; thence North 78° 07' East 23.02 ½ chains to stake at Southeast corner of Lot 2; thence North 11° 53' West 24.87 chains to stake set in center of county road on North line of said Richardson claim; thence South 74° West along North line of said Richardson Claim, 11.32 ½ chains to place of beginning, containing 57.279 acres, more or less.

EXCEPTING the following described tracts.

(1)   Those certain premises described in deed dated December 28, 1909, recorded January 29, 1910 in Vol. 57, page 565, Deed Records, Yamhill County, Oregon, from H. C. Wood and R. M. Wood, his wife, to J. T. Wood and described as follows: Being a part of the John Richardson Donation Land claim, Notification No. 1842, Claim No. 47, Township 5 South, Range 3 West of the Willamette Meridian, and more particularly described as beginning at a point 11.97 ½ chains West from the Southwest corner of the Woodson Jeffries D.L.C., and running thence South 11° 53' East, 26.52 ½ chains; thence North 78.7' East 1.89 chains; thence North 11° 53' West, 26.12 ½ chains; thence West 1.93 chains to the place of beginning, containing 5 acres, more or less.

(2)   Those certain premises described in deed dated September 10, 1955, recorded December 13, 1955, in Vol. 179, page 212 Deed Records, Yamhill County, Oregon, from Rose Wood, surviving widow of H. C. Wood, deceased, to Yamhill County, a political subdivision, said premises described as follows; a strip of land 25.0 feet in width off the North side of that certain tract of land described in Probate "A" 306, being part of the John Richardson D.L.C., Notification No. 1842, Claim No. 47, Township 5 South, Range 3 West of the Willamette Meridian, Oregon, and beginning at stone in the South corner of the Woodson Jeffries claim and angle corner of the Richardson Claim; thence North 89° 46' West along North line of claim and center of road 663.0 feet, to the Northwest corner of said tract; thence South 11° 53' East 25.5 feet, thence south 89° 46' East parallel with North line of claim 657.4 feet to point opposite and 25.0 feet from Station 14 + 15.4; thence Easterly with curve having central angle of 16° 31' feet, having a distance of 187.5 feet with long chord of which bears North 82° 13' East 167.4 feet to point opposite Station 139 + 55.4; thence North 74° 11' East 655.0 feet to East line of property; thence North 11° 53' West 25.0 feet to the North line of claim and center of road; thence South 74° 11' West along claim line 747.45 feet to beginning, containing .81 of an acre, more or less, of which .65 of an acre is within present right of way and .16 of an acre of new right of way.

Subject to rights of the public in streets, roads and highways.

PARCEL 2:

Yamhill County Tax Lot #R5319 00500

The East one-half of the following described real premises.

Beginning at a large stone at the Southwest corner of the Woodson Jeffries Donation Land Claim, Notification No. 1841, Claim No. 46 in Township 5 South of Range 3 West of the Willamette Meridian in Yamhill County, Oregon; said stone being the angle corner on the North line of the John Richardson Donation Land Claim thence West on North line of said Richardson claim 11.97 ½ chains to stake at Northeast corner of Lot 1; thence South 11° 53' East along line between Lots 1 and 2, 26.52 ½ chains to stake at Southeast corner of Lot 1; thence North 78° 07' East 23.02 ½ chains to stake at Southeast corner of Lot 2; thence North 11° 53' West 24.87 chains to stake set in center of county road on North line of said Richardson claim; thence South 74° West along North line of said Richardson Claim, 11.32 ½ chains to place of beginning.

EXCEPTING the following described tracts.

(1) Those certain premises described in deed dated December 28, 1909, recorded January 29, 1910 in Vol. 57, page 565, Deed Records, Yamhill County, Oregon, from H. C. Wood and R. M. Wood, his wife, to J. T. Wood and described as follows: Being a part of the John Richardson Donation Land claim, Notification No. 1842, Claim No. 47, Township 5 South, Range 3 West of the Willamette Meridian, and more particularly described as beginning at a point 11.97 ½ chains West from the Southwest corner of the Woodson Jeffries D.L.C., and running thence South 11° 53' East, 26.52 ½ chains; thence North 78.7' East 1.89 chains; thence North 11° 53' West, 26.12 ½ chains; thence West 1.93 chains to the place of beginning.

(2) Those certain premises described in deed dated September 10, 1955, recorded December 13, 1955, in Vol. 179, page 212 Deed Records, Yamhill County, Oregon, from Rose Wood, surviving widow of H. C. Wood, deceased, to Yamhill County, a political subdivision, said premises described as follows; a strip of land 25.0 feet in width off the North side of that certain tract of land described in Probate "A" 306, being part of the John Richardson D.L.C., Notification No. 1842, Claim No. 47, Township 5 South, Range 3 West of the Willamette Meridian, Oregon, and beginning at stone in the South corner of the Woodson Jeffries claim and angle corner of the Richardson Claim; thence North 89° 46' West along North line of claim and center of road 663.0 feet, to the Northwest corner of said tract; thence South 11° 53' East 25.5 feet, thence south 89° 46' East parallel with North line of claim 657.4 feet to point opposite and 25.0 feet from Station 14 + 15.4; thence Easterly with curve having central angle of 16° 31' radius of 598.0 feet, having a distance of 187.5 feet with long chord of which bears North 82° 13' East 167.4 feet to point opposite Station 139 + 55.4; thence North 74° 11' East 655.0 feet to East line of property; thence North 11° 53' West 25.0 feet to the North line of claim and center of road; thence South 74° 11' West along claim line 747.45 feet to beginning.

SAVE AND EXCEPTING all gas, oil and mineral rights reserved to John Wood and Iris Wood, as more particularly set forth in Deed recorded 12-15-86 in FV 209, Pages 896 and 897, Deed and Mortgage Records of Yamhill County, Oregon.

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Area 1.25 Sq Miles

$Q = 101 \times \begin{array}{c} 2.82 \\ 2.45 \\ 2.13 \end{array}$

Willamette Basin low elevation streams (Under ± 1000')
"Regionalized Flood Frequency Data for Oregon 1971"

$Q \sim$

$Q_{100} = 300$ cfs   285 CFS

$Q_{50} = 261$ cfs   247 CFS

$Q_{25} = 224$ CFS   215 CFS   Peak Discharges for Selected Frequencies   WRD web program

Use $Q_{100} = 293$ CFS

$Q_{50} = 254$ CFS

$Q_{15} = 220$ CFS

Design spillway for $Q_{100} = 293$ CFS

98   97 Top Wall   Install bearing pad

2%   1%   23'   10'   91.27
92.5   1% = 4.23   92.27   89.27

16"   8" if Form Both sides   1½ clear
10" if form One side other cast against soil   3" clear
4'±
#4 @ 12" OC cross section N-S
#4 @ 16" OC length section E-W
3'
8"
12"

97   97.0
23'   92.27
92.05   92.31   925   92.27   10%   91.27
92.143   cut off wall   10"   89.27
4' deep
4' beyond wall

Job No	By	Subject	Date	Sheet No.
	CB	Monte Wood	3-7-11	1
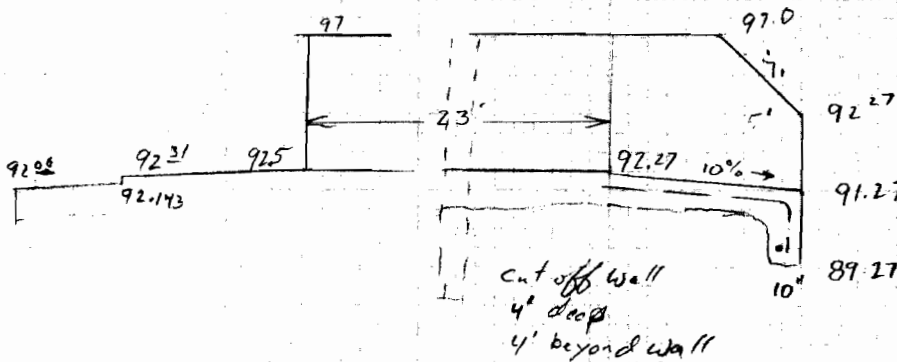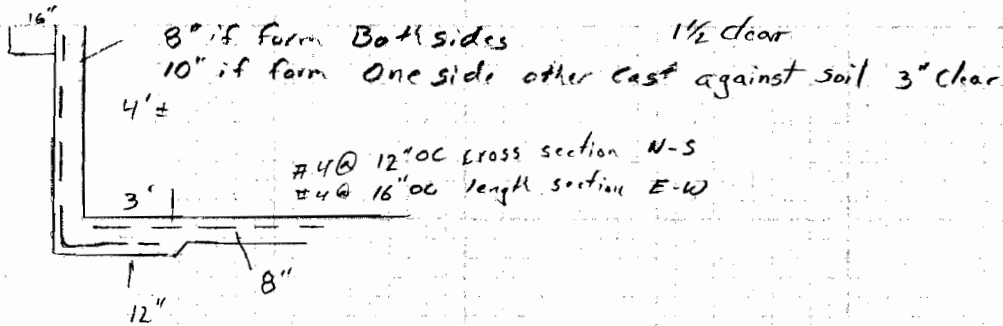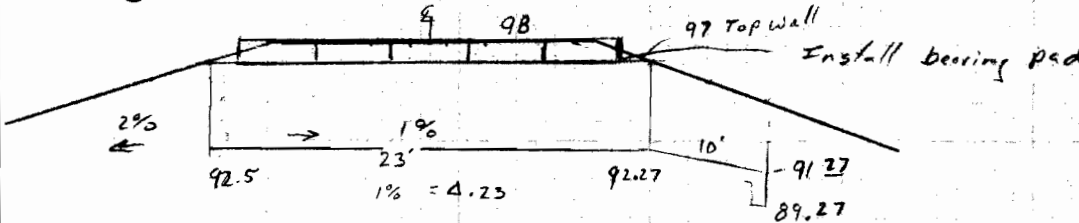
PEAK DISCHARGES FOR SELECTED FREQUENCIES

Report prepared for: autodelin
Time: 12:55

Date: 01/14/2011

Watershed Name:

PEAK DISCHARGE CALCULATION BY PREDICTION EQUATION

Peak discharges for the ungaged watershed have been determined from a
set of hydrologic prediction equations derived using generalized least
squares. The models relate peak discharges to physical watershed
characteristics such as area and precipitation. The equations take
this form:

$$Q(T) = (10.0^{C0(T)}) * (CHR1^{C1(T)}) * \ldots (CHRn^{Cn(T)})$$

```
    Q(T)  =  Peak Discharge for Return Period T
    Cx(T) =  Coefficient x for Return Period T
    CHR1  =  The First Watershed Characteristic
    CHRn  =  The nth Watershed Characteristic
```

Note: * = multiplication, ^ = exponentiation

For this ungaged watershed, peak discharges were estimated using
prediction equations for this flood region:

WESTERN INTERIOR WATERSHEDS - < 2875 FEET

WATERSHED ELEVATION = 377 FEET

For western interior watersheds with mean elevations below 2875 feet,
peaks are estimated using the prediction equations for western
interior watersheds below 3000 feet.

Prediction Equation for Interior Watersheds < 3000 Feet

$$Q(T) = (10.0^{C0(T)}) * (X1^{C1(T)}) * (X2^{C2(T)} * (X3^{C3(T)}) * (X4^{C4(T)}) * (X5^{C5(T)})$$

```
    Q(T)   =  Peak Discharge for Return Period T
    Cx(T)  =  Coefficient x for Return Period T
    X1     =  Drainage area                          (square miles)
    X2     =  Mean watershed slope                   (degrees)
    X3     =  2-year 24-hour precipitation intensity (inches)
    X4     =
    X5     =
```

Note: * = multiplication, ^ = exponentiation

Prediction Equation Coefficients

Return Period T	Coefficients					
	C0(T)	C1(T)	C2(T)	C3(T)	C4(T)	C5(T)
2	9.607E-01	9.004E-01	4.695E-01	8.481E-01		
5	1.162E+00	9.042E-01	4.735E-01	7.355E-01		
10	1.267E+00	9.064E-01	4.688E-01	6.937E-01		
20	1.351E+00	9.081E-01	4.633E-01	6.651E-01		
25	1.375E+00	9.086E-01	4.615E-01	6.578E-01		
50	1.443E+00	9.101E-01	4.559E-01	6.390E-01		
100	1.503E+00	9.114E-01	4.501E-01	6.252E-01		

```
  500  1.620E+00  9.141E-01  4.365E-01  6.059E-01
```

<pre>
                    Required Watershed Characteristics

Drainage area   (square miles)
Mean watershed slope   (degrees)   6.360
2-year 24-hour precipitation intensity   (inches)   2.070

</pre>

PEAK DISCHARGE ESTIMATES BASED ON PREDICTION EQUATIONS

Return Period years	Peak Flow cfs	95% Confidence Lower Limit cfs	Upper Limit cfs
2	51.5	27.2	97.4
5	76.1	40.3	144
10	93.1	48.8	178
20	110	56.5	213
	115	58.9	224
	131	66.0	261
	148	72.6	
500	186	86.6	400

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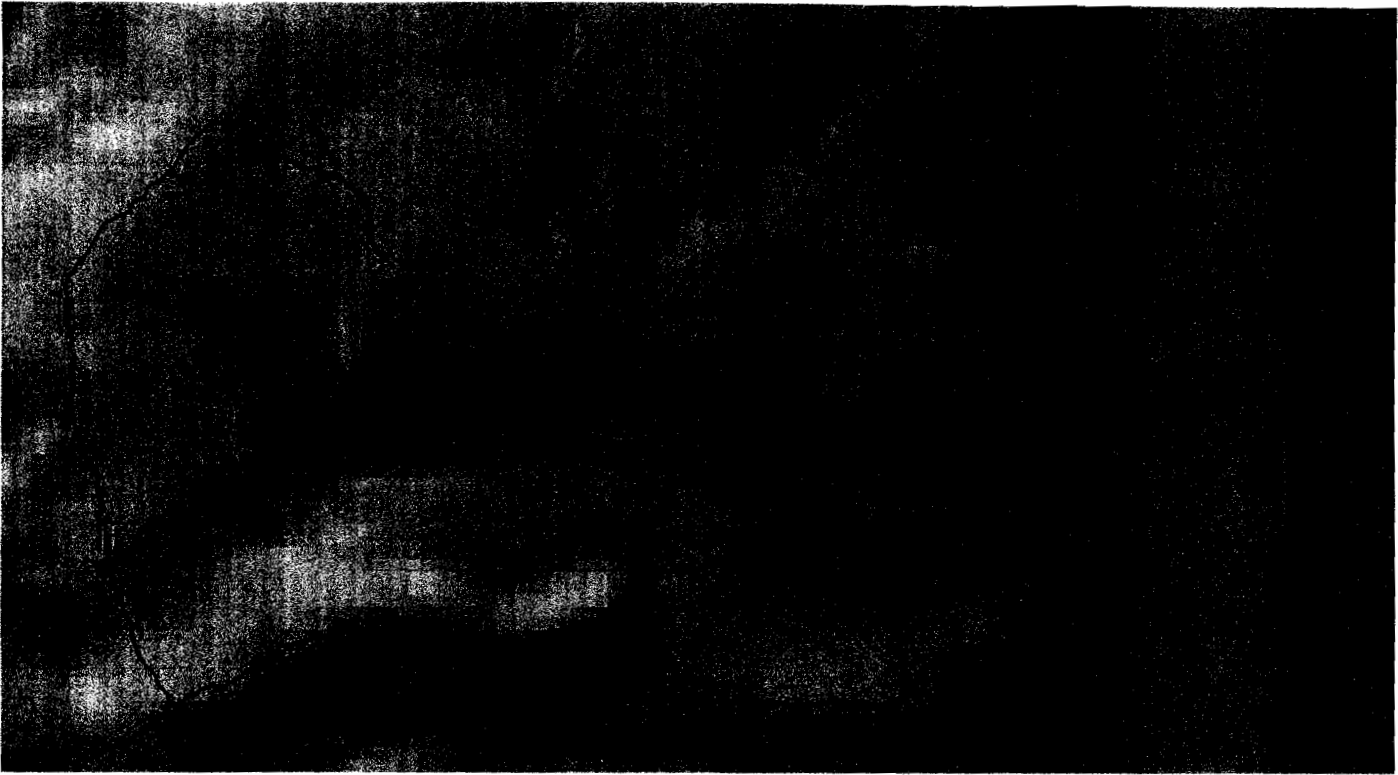
0   1 mile

⊕   Pour point

——   Watershed boundary

N
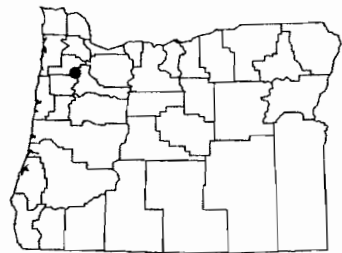
<BOL>DISCLAIMER</BOL>
This product is for informational purposes and may
not have been prepared for, or be suitable for legal,
engineering, or surveying purposes. Users of this
information should review or consult the primary data
and information sources to ascertain the usability of
the information.

Report and output shapefile is avilable for 7 days at:

http://www1.wrd.state.or.us/files/wars/110114.125528.zip

tmp#18.txt

Culvert Calculator   *Trial 1*

All calculator output should be verified prior to design use

Entered Data:
     Shape .... Rectangular
     Number of Barrels 1
     Solving for .... Headwater
     Chart Number 8
     Scale Number 1
     Chart Description .... BOX CULVERT WITH FLARED WINGWALLS; NO INLET TOP EDGE BEVEL
     Scale Description .... WINGWALLS FLARED 30 TO 75 DEGREES
     Overtopping .... Off
     Flowrate .... 293.0000 cfs
     Manning's n 0.0150
     Roadway Elevation .... 98.00 ft
     Inlet Elevation .... 92.50 ft
     Outlet Elevation .... 92.27 ft
     Height .... 4.0000 ft
     Width .... 14.0000 ft
     Length .... 23.0000 ft
     Entrance Loss 0.5000
     Tailwater .... ████████

Computed Results:
     Headwater .... 96.5316 ft Outlet Control
     Slope .... 0.0100 ft/ft
     Velocity .... 8.7649 fps

Messages:
     Outlet head > Inlet head.
     Computing Outlet Control headwater.
     Outlet not submerged.
     Normal Depth: 1.7086 ft
     Critical Depth: 2.3878 ft
     Normal depth <= critical depth.
     Flow is supercritical.
     Since culvert is supercritical no profile generated.
     Depth = critical depth.
     Headwater: 96.5316 ft

DIS-CHARGE Flow cfs	HEAD-WATER ELEV. ft	INLET CONTROL DEPTH ft	OUTLET CONTROL DEPTH ft	FLOW TYPE	NORMAL DEPTH ft	CRITICAL DEPTH ft	OUTLET VEL. fps	OUTLET DEPTH ft	TAILWATER VEL. fps	TAILWATER DEPTH ft
25.00	93.29	0.70	0.79	NA	0.36	2.39	0.89	0.36	0.00	2.00
50.00	93.63	1.13	1.03	NA	0.56	0.73	6.39	0.56	0.00	2.00
75.00	93.99	1.49	1.32	NA	0.72	0.96	7.45	0.72	0.00	2.00
100.00	94.32	1.82	1.67	NA	0.86	1.17	8.30	0.86	0.00	2.00
125.00	94.63	2.13	2.08	NA	0.99	1.35	9.02	0.99	0.00	2.00
150.00	95.03	2.41	2.53	NA	1.11	1.35	5.36	1.11	0.00	2.00
175.00	95.32	2.68	2.82	NA	1.23	1.35	6.25	1.23	0.00	2.00
200.00	95.59	2.94	3.09	NA	1.34	1.35	7.14	1.34	0.00	2.00
225.00	95.86	3.19	3.36	NA	1.44	1.35	8.03	1.44	0.00	2.00
250.00	96.11	3.43	3.61	NA	1.54	1.35	8.31	1.54	0.00	2.00
275.00	96.36	3.67	3.86	NA	1.64	1.35	8.58	1.64	0.00	2.00
████	████	3.83	4.03	NA	1.71	1.35	8.76	1.71	0.00	2.00

Channel Calculator �█████

Given Input Data:
```
Shape ......................... Trapezoidal
Solving for ................... Depth of Flow
Flowrate ...................... 293.0000 cfs
Slope ......................... ████████ ft/ft
Manning's n ...................   ████████        Jagged Rock Cuts
Height ........................ 6.0000 ft
Bottom width .................. 10.0000 ft
Left slope .................... 0.5000 ft/ft (V/H)
Right slope ................... 0.5000 ft/ft (V/H)
```

Computed Results:
```
Depth ......................... ████████        ← spillway depth at outlet size
Velocity ...................... ███████1 fps
Full Flowrate ................. 4185.4727 cfs
Flow area ..................... 19.52 ft2
Flow perimeter ................ 16.7124 ft
Hydraulic radius .............. 1.1677 ft
Top width ..................... 16.0038 ft
Area .......................... 132.00 ft2
Perimeter ..................... 36.8328 ft
Percent full .................. 25.0157 %
```

Critical Information
```
Critical depth ................ 2.5085 ft
Critical slope ................ 0.0156 ft/ft
Critical velocity ............. 7.7780 fps  ⟵
Critical area ................. 37.67 ft2
Critical perimeter ............ 21.2184 ft
Critical hydraulic radius ..... 1.7754 ft
Critical top width ............ 20.0340 ft
Specific energy ............... 5.0041 ft
Minimum energy ................ 3.7628 ft
Froude number ................. 2.3970
Flow condition ................ Supercritical
```

MAR 07

Channel Calculator ▮▮▮▮▮▮

Given Input Data:
```
Shape .......................... Trapezoidal
Solving for .................... Depth of Flow
Flowrate ....................... 293.0000 cfs
Slope .......................... ▮▮▮▮▮▮▮▮▮▮    Jagged Rock Cut w/ large Boulder or Concrete
Manning's n .................... ▮▮▮▮▮▮▮▮
Height ......................... 6.0000 ft
Bottom width ................... 23.0000 ft
Left slope ..................... 0.5000 ft/ft (V/H)
Right slope .................... 0.5000 ft/ft (V/H)
```

Computed Results:
```
Depth .......................... 1.1654 ft
Velocity ....................... 9.9257 fps
Full Flowrate .................. 5276.3305 cfs
Flow area ...................... 29.52 ft2
Flow perimeter ................. 28.2116 ft
Hydraulic radius ............... 1.0464 ft
Top width ...................... 27.6614 ft
Area ........................... 210.00 ft2
Perimeter ...................... 49.8328 ft
Percent full ................... 19.4226 %
```

Critical Information
```
Critical depth ................. 1.6323 ft
Critical slope ................. 0.0213 ft/ft
Critical velocity .............. 6.8345 fps
Critical area .................. 42.87 ft2
Critical perimeter ............. 30.2997 ft
Critical hydraulic radius ...... 1.4149 ft
Critical top width ............. 29.5291 ft
Specific energy ................ 2.6964 ft
Minimum energy ................. 2.4484 ft
Froude number .................. 1.6939
Flow condition ................. Supercritical
```

MAR 07

Culvert Calculator

All calculator output should be verified prior to design use

Trial 2 change.
Tailwater depth
No Changes Noted
at 100yr flow

Entered Data:
```
    Shape ........................... Rectangular
    Number of Barrels .............. 1
    Solving for .................... Headwater
    Chart Number ................... 8
    Scale Number ................... 1
    Chart Description .............. BOX CULVERT WITH FLARED WINGWALLS; NO INLET TOP EDGE BEVEL
    Scale Description .............. WINGWALLS FLARED 30 TO 75 DEGREES
    Overtopping .................... Off
    Flowrate ....................... 293.0000 cfs
    Manning's n .................... 0.0150
    Roadway Elevation .............. 98.00 ft
    Inlet Elevation ................ ▓▓▓▓ ft
    Outlet Elevation ............... ▓▓▓▓ ft
    Height ......................... 4.5000 ft
    Width .......................... ▓▓▓000 ft
    Length ......................... 23.0000 ft
    Entrance Loss .................. 0.5000
    Tailwater ...................... ▓▓▓▓ ft
```

Computed Results:
```
    Headwater ...................... ▓▓▓▓6 ft Outlet Control
    Slope .......................... 0.0100 ft/ft
    Velocity ....................... 8.7649 fps
```

Messages:
```
    Outlet head > Inlet head.
    Computing Outlet Control headwater.
    Outlet not submerged.
    Normal Depth: 1.7086 ft
    Critical Depth: 2.3878 ft
    Normal depth <= critical depth.
    Flow is supercritical.
    Since culvert is supercritical no profile generated.
    Depth = critical depth.
    Headwater: 96.5316 ft
```

DIS-CHARGE Flow cfs	HEAD-WATER ELEV. ft	INLET CONTROL DEPTH ft	OUTLET CONTROL DEPTH ft	FLOW TYPE	NORMAL DEPTH ft	CRITICAL DEPTH ft	OUTLET VEL. fps	OUTLET DEPTH ft	TAILWATER VEL. fps	TAILWATER DEPTH ft
25.00	93.29	0.69	0.79	NA	0.36	2.39	1.19	0.36	0.00	1.50
50.00	93.62	1.12	1.03	NA	0.56	0.73	6.39	0.56	0.00	1.50
75.00	93.99	1.49	1.32	NA	0.72	0.96	7.45	0.72	0.00	1.50
100.00	94.31	1.81	1.67	NA	0.86	1.17	8.30	0.86	0.00	1.50
125.00	94.62	2.12	2.08	NA	0.99	1.35	9.02	0.99	0.00	1.50
150.00	95.03	2.40	2.53	NA	1.11	1.35	7.01	1.11	0.00	1.50
175.00	95.32	2.67	2.82	NA	1.23	1.35	7.38	1.23	0.00	1.50
200.00	95.59	2.93	3.09	NA	1.34	1.35	7.72	1.34	0.00	1.50
225.00	95.86	3.18	3.36	NA	1.44	1.35	8.03	1.44	0.00	1.50
250.00	96.11	3.42	3.61	NA	1.54	1.35	8.31	1.54	0.00	1.50
275.00	96.36	3.65	3.86	NA	1.64	1.35	8.58	1.64	0.00	1.50
293.00	96.53	3.82	4.03	NA	1.71	1.35	8.76	1.71	0.00	1.50

Channel Calculator ▆▆▆▆▆▆▆

Given Input Data:
```
Shape ........................... Trapezoidal
Solving for ..................... Depth of Flow
Flowrate ........................ 293.00 cfs
Slope ........................... ▆▆▆▆▆▆▆/ft
Manning's n ..................... ▆▆▆▆        LARGER RIP RAP
Height .......................... 6.00 ft
Bottom width .................... ▆▆▆▆▆▆ ✗
Left slope ...................... 0.500 ft/ft (V/H)
Right slope ..................... 0.500 ft/ft (V/H)
```

Computed Results:
```
Depth ........................... ▆▆▆▆▆▆▆
Velocity ........................ ▆▆▆▆▆▆▆
Full Flowrate ................... 4512.59 cfs
Flow area ....................... 29.32 ft2
Flow perimeter .................. 25.80 ft
Hydraulic radius ................ 1.14 ft
Top width ....................... 25.19 ft
Area ............................ 192.00 ft2
Perimeter ....................... 46.83 ft
Percent full .................... 21.63 %
```

Critical Information
```
Critical depth .................. 1.77 ft
Critical slope .................. 0.021 ft/ft
Critical velocity ............... 7.03 fps
Critical area ................... 41.65 ft2
Critical perimeter .............. 27.91 ft
Critical hydraulic radius ....... 1.49 ft
Critical top width .............. 27.08 ft
Specific energy ................. 2.85 ft
Minimum energy .................. 2.65 ft
Froude number ................... 1.63
Flow condition .................. Supercritical
```

Channel Calculator

Given Input Data:
Shape .... Trapezoidal
Solving for .... Depth of Flow
Flowrate .... 293.0 cfs
Slope ....
Manning's n ....
Height .... 6.00 ft
Bottom width ....
Left slope .... 0.50 ft/ft (V/H)
Right slope .... 0.50 ft/ft (V/H)

Computed Results:
Depth ....
Velocity .... 12.24 fps
Full Flowrate .... 3626.49 cfs
Flow area 23.94 ft2
Flow perimeter .... 19.06 ft
Hydraulic radius .... 1.26 ft
Top width .... 18.32 ft
Area 144.00 ft2
Perimeter .... 38.83 ft
Percent full .... 26.33 %

Critical Information
Critical depth .... 2.31 ft
Critical slope .... 0.016 ft/ft
Critical velocity .... 7.63 fps
Critical area 38.41 ft2
Critical perimeter .... 22.34 ft
Critical hydraulic radius .... 1.72 ft
Critical top width .... 21.24 ft
Specific energy .... 3.91 ft
Minimum energy .... 3.47 ft
Froude number 1.887
Flow condition .... Supercritical

Culvert Calculator

All calculator output should be verified prior to design use

Entered Data:
    Shape .... Rectangular
    Number of Barrels 1
    Solving for .... Headwater
    Chart Number 8
    Scale Number 2
    Chart Description .... BOX CULVERT WITH FLARED WINGWALLS; NO INLET TOP EDGE BEVEL
    Scale Description ....
    Overtopping .... Off
    Flowrate .... 293.00 cfs
    Manning's n 0.01
    Roadway Elevation .... 98.00 ft
    Inlet Elevation .... 92.50 ft
    Outlet Elevation .... 92.27 ft
    Height .... 4.50 ft
    Width .... 14.00 ft
    Length .... 23.00 ft
    Entrance Loss 0.50
    Tailwater .... 2.00 ft

Computed Results:
    Headwater .... 96.55 ft Inlet Control
    Slope .... 0.010 ft/ft
    Velocity .... 12.25 fps

Messages:
    Inlet head > Outlet head.
    Computing Inlet Control headwater.
    Solving Inlet Equation 26.
    Solving Inlet Equation 28.
    Headwater: 96.55 ft

DIS-CHARGE Flow cfs	HEAD-WATER ELEV. ft	INLET CONTROL DEPTH ft	OUTLET CONTROL DEPTH ft	FLOW TYPE	NORMAL DEPTH ft	CRITICAL DEPTH ft	OUTLET VEL. fps	OUTLET DEPTH ft	TAILWATER VEL. fps	TAILWATER DEPTH ft
25.00	93.52	0.75	1.02	NA	0.36	2.39	0.89	0.36	0.00	2.00
50.00	93.72	1.22	1.22	NA	0.56	2.39	1.79	0.56	0.00	2.00
75.00	94.10	1.60	1.43	NA	0.72	0.96	7.45	0.72	0.00	2.00
100.00	94.45	1.95	1.67	NA	0.86	1.17	8.30	0.86	0.00	2.00
125.00	94.77	2.27	1.94	NA	0.99	1.35	9.02	0.99	0.00	2.00
150.00	95.07	2.57	2.25	NA	1.11	1.53	9.64	1.11	0.00	2.00
175.00	95.36	2.86	2.59	NA	1.23	1.69	10.20	1.23	0.00	2.00
200.00	95.63	3.13	2.97	NA	1.34	1.85	10.70	1.34	0.00	2.00
225.00	95.89	3.39	3.38	NA	1.44	2.00	11.16	1.44	0.00	2.00
250.00	96.14	3.64	3.63	NA	1.54	2.15	11.58	1.54	0.00	2.00
275.00	96.39	3.89	3.88	NA	1.64	2.29	11.98	1.64	0.00	2.00
293.00	96.56	4.06	4.05	NA	1.71	2.39	12.25	1.71	0.00	2.00

Final
check HEC-RAS

TOP 12' WIDE CHANNEL

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	293.00 cfs
Slope	0.100 ft/ft
Manning's n	0.03
Height	3.00 ft
Bottom width	12.00 ft
Left slope	0.500 ft/ft (V/H)
Right slope	0.500 ft/ft (V/H)

Computed Results:

Depth	1.26 ft
Velocity	16.04 fps
Full Flowrate	1397.91 cfs
Flow area	18.27 ft2
Flow perimeter	17.63 ft
Hydraulic radius	1.04 ft
Top width	17.03 ft
Area	54.00 ft2
Perimeter	25.42 ft
Percent full	41.94 %

Critical Information

Critical depth	2.31 ft
Critical slope	0.012 ft/ft
Critical velocity	7.63 fps
Critical area	38.41 ft2
Critical perimeter	22.34 ft
Critical hydraulic radius	1.72 ft
Critical top width	21.24 ft
Specific energy	5.26 ft
Minimum energy	3.47 ft
Froude number	2.73
Flow condition	Supercritical

Channel Rating Curve Data

Depth - ft   Flowrate - cfs

Depth - ft	Flowrate - cfs
0.	0.00
0.5	60.37
1.0	196.76
1.5	398.58
2.0	664.92
2.5	997.24
3.0	1397.91

BOTTOM 20' WIDE CHANNEL

Channel Calculator

Given Input Data:

Shape .... Trapezoidal
Solving for .... Depth of Flow
Flowrate .... 293.00 cfs
Slope .... 0.020 ft/ft
Manning's n 0.03
Height .... 2.00 ft
Bottom width .... 20.00 ft
Left slope .... 0.500 ft/ft (V/H)
Right slope .... 0.500 ft/ft (V/H)

Computed Results:

Depth .... 1.52 ft
Velocity .... 8.37 fps
Full Flowrate .... 471.09 cfs
Flow area 35.00 ft2
Flow perimeter .... 26.79 ft
Hydraulic radius .... 1.31 ft
Top width .... 26.08 ft
Area 48.00 ft2
Perimeter .... 28.94 ft
Percent full .... 75.96 %

Critical Information

Critical depth .... 1.77 ft
Critical slope .... 0.012 ft/ft
Critical velocity .... 7.03 fps
Critical area 41.65 ft2
Critical perimeter .... 27.91 ft
Critical hydraulic radius .... 1.49 ft
Critical top width .... 27.08 ft
Specific energy .... 2.61 ft
Minimum energy .... 2.65 ft
Froude number 1.27
Flow condition .... Supercritical

Units=Structural Dimensions,ft,Flowrate,cfs
Channel Rating Curve Data
Depth - ft   Flowrate - cfs
  0.0   0.00
  0.25   13.97
  0.50   44.60
  0.75   88.24
  1.00 143.55
  1.25 209.82
  1.50 286.65
  1.75 373.78
  2.00 471.09

SPILLWAY OVERFLOW

Legend

EG PF 1
WS PF 1
Crit PF 1
Ground

(chart annotations: end flair 27.64; start flair 37.64; change in slope 68.24; 1%; 10%; Elevation (ft); Main Channel Distance (ft))

depth

	River	Reach	RS	Ch Dist	PF 1-Vel Left	PF 1-Vel Chnl	PF 1-Vel Right	
1	SPILLWAY	OVERFLOW	160.32	159.00	0.50	1.59	0.52	
2	SPILLWAY	OVERFLOW	157.23	155.91	0.78	1.95	0.83	
53	SPILLWAY	OVERFLOW	154.16	152.85	0.79	3.08	1.07	
54	SPILLWAY	OVERFLOW	151.713*	150.85	0.31	5.00	0.49	
55	SPILLWAY	OVERFLOW	149.266*	148.85		6.11		
56	SPILLWAY	OVERFLOW	146.82	146.85		8.93		
66	SPILLWAY	OVERFLOW	123.82	123.85		8.80		
70	SPILLWAY	OVERFLOW	118.55	118.65		8.80		
74 End Const.	SPILLWAY	OVERFLOW	113.82	113.85	1.58	8.77	1.60	
77 PC	SPILLWAY	OVERFLOW	111.89	111.90		8.01		
81 ½ CURVE	SPILLWAY	OVERFLOW	103.18	103.22		8.09		
85 PT	SPILLWAY	OVERFLOW	94.50	94.54		8.25		
90 SLOPE CHANGE	SPILLWAY	OVERFLOW	68.24	68.24		8.26		2.48
91	SPILLWAY	OVERFLOW	58.04*	58.04		8.25		2.45
93	SPILLWAY	OVERFLOW	37.64	37.64		8.20		2.45
94	SPILLWAY	OVERFLOW	27.64	27.64	3.75	7.46	3.48	
95	SPILLWAY	OVERFLOW	7.64	7.64	7.52	6.44	6.33	1.50
96	SPILLWAY	OVERFLOW	0	0.00		7.76		

fema flow   Plan: Plan /w wide base   2/3/2011

SPILLWAY OVERFLOW

Handwritten annotations on chart: "end flair 58.04", "start flair change in slope 68.24", "1%", "10%"

Legend: EG PF 1, WS PF 1, Crit PF 1, Ground

X-axis: Main Channel Distance (ft); Y-axis: Elevation (ft)

	River	Reach	RS	Ch Dist	PF 1-Vel Left	PF 1-Vel Chnl	PF 1-Vel Right
1	SPILLWAY	OVERFLOW	160.32	159.00	0.50	1.59	0.52
2	SPILLWAY	OVERFLOW	157.23	155.91	0.78	1.95	0.83
53	SPILLWAY	OVERFLOW	154.16	152.85	0.79	3.08	1.07
54	SPILLWAY	OVERFLOW	151.713*	150.85	0.31	5.00	0.49
55	SPILLWAY	OVERFLOW	149.266*	148.85		6.11	
56	SPILLWAY	OVERFLOW	146.82	146.85		8.93	
66	SPILLWAY	OVERFLOW	123.82	123.85		8.80	
70	SPILLWAY	OVERFLOW	118.55	118.65		8.80	
74 End Curve	SPILLWAY	OVERFLOW	113.82	113.85	1.58	8.77	1.60
77 PC	SPILLWAY	OVERFLOW	111.89	111.90		8.01	
81 ½ CURVE	SPILLWAY	OVERFLOW	103.18	103.22		8.09	
85 PT	SPILLWAY	OVERFLOW	94.50	94.54		8.25	
90 slope change	SPILLWAY	OVERFLOW	68.24	68.24		8.26	
91 20' WIDE	SPILLWAY	OVERFLOW	58.04*	58.04		7.39 vs 8.25	
93	SPILLWAY	OVERFLOW	37.64	37.64		6.83 vs 8.2	
94	SPILLWAY	OVERFLOW	27.64	27.64	3.75	7.46	3.48
95	SPILLWAY	OVERFLOW	7.64	7.64	7.52	6.44	6.33
96	SPILLWAY	OVERFLOW	0	0.00		7.76	

Not enough change for work done

fema flow   Plan: Plan 09   2/4/2011

SPILLWAY OVERFLOW

Legend
EG PF 1
WS PF 1
Crit PF 1
Ground

Main Channel Distance (ft)

Elevation (ft)
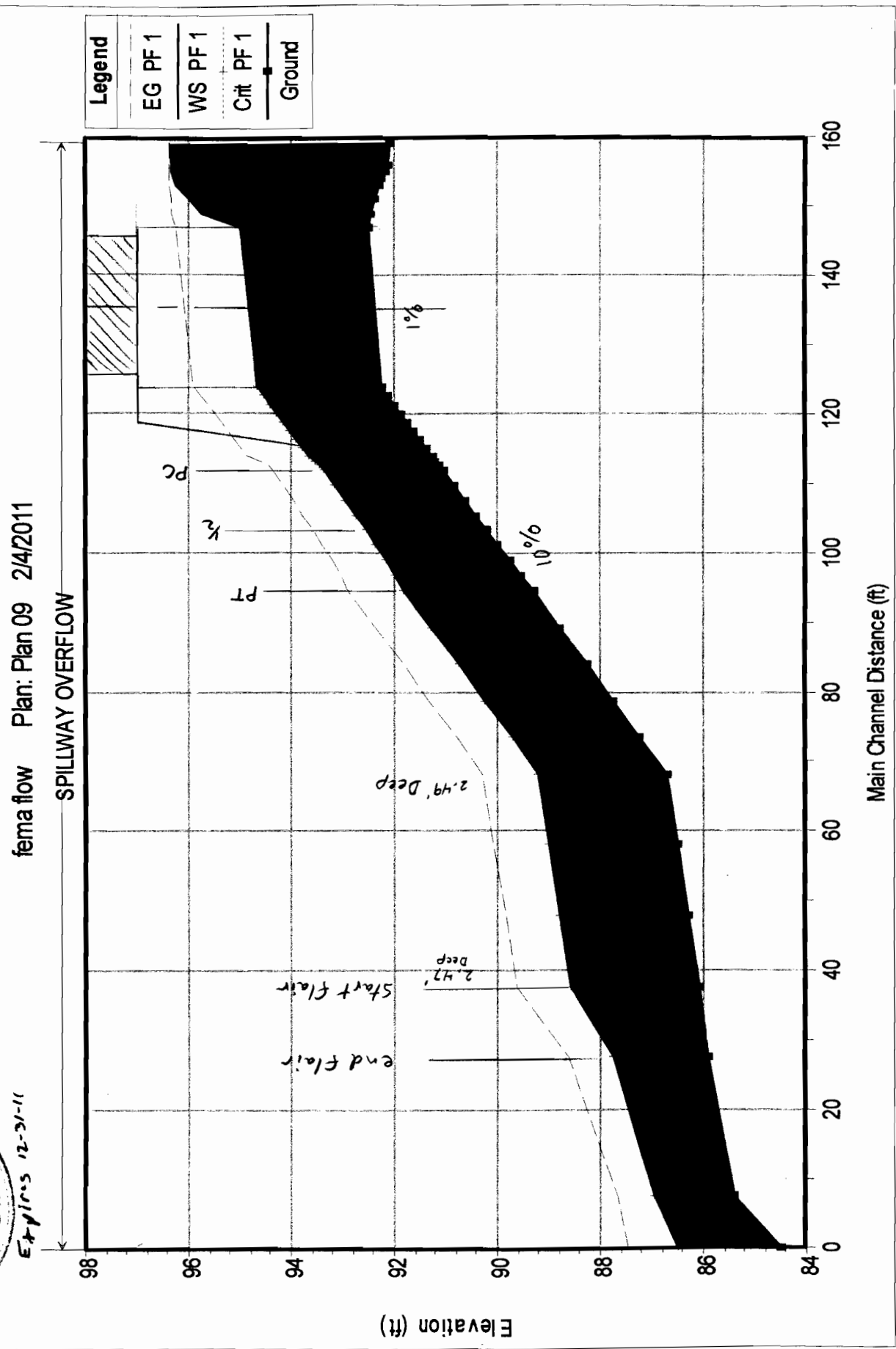
Wood Dam Spillway 300 cfs discharge

14' x 4.5' concrete
12' upper channel
20' lower channel
10' flair
1 : 1 side slope

	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Concrete start	160.32	300.00	92.07	96.36		96.39	0.000037	1.60	388.44	152.89	0.14
Stop log	157.23	300.00	92.12	96.35		96.38	0.000169	1.94	258.19	139.03	0.17
	156.206*	300.00	92.18	96.34		96.38	0.000231	2.20	228.74	136.07	0.20
	155.183*	300.00	92.25	96.31		96.38	0.000263	2.66	199.95	132.19	0.24
End stop log support	154.16	300.00	92.31	96.25		96.37	0.000276	3.21	169.42	127.01	0.29
	151.713*	300.00	92.37	95.98	94.56	96.35	0.000737	4.95	77.05	85.45	0.46
	149.266*	300.00	92.44	95.74		96.32	0.001289	6.16	48.70	14.79	0.60
Spillway channel start	146.82	300.00	92.50	95.00	95.00	96.26	0.003732	9.01	33.30	13.35	1.01
Spillway channel end	123.82	300.00	92.27	94.69	94.69	95.91	0.003667	8.87	33.84	14.01	1.01
	122.502*	300.00	92.14	94.56	94.56	95.78	0.003665	8.86	33.84	14.01	1.01
	121.185*	300.00	92.00	94.42	94.42	95.64	0.003669	8.87	33.84	14.01	1.01
	119.867*	300.00	91.87	94.29	94.29	95.51	0.003667	8.87	33.84	14.01	1.01
Wall taper start	118.55	300.00	91.74	94.16	94.16	95.38	0.003666	8.87	33.84	14.01	1.01
	117.367*	300.00	91.62	94.04	94.04	95.26	0.003668	8.87	33.83	14.01	1.01
	116.185*	300.00	91.50	93.92	93.92	95.14	0.003653	8.85	33.88	14.02	1.00
	115.002*	300.00	91.38	93.81	93.81	95.01	0.003407	8.80	34.52	15.37	1.00
End concrete 2.4'	113.82	300.00	91.26	93.66	93.66	94.86	0.002963	8.84	35.48	15.37	1.01
	113.176*	300.00	91.19	93.54	93.54	94.61	0.005261	8.30	36.34	17.33	1.00
	112.533*	300.00	91.13	93.45	93.45	94.48	0.008369	8.15	36.82	18.07	1.01
PC 2.32	111.89	300.00	91.06	93.38	93.38	94.39	0.021255	8.06	37.22	18.62	1.00
	109.712*	300.00	90.85	93.16	93.16	94.17	0.011924	8.08	37.11	18.42	1.00
	107.535*	300.00	90.63	92.96	92.96	93.98	0.011926	8.11	37.01	18.27	1.00
	105.357*	300.00	90.41	92.76	92.76	93.78	0.011933	8.13	36.90	18.11	1.00
1/2 2.35	103.18	300.00	90.20	92.56	92.56	93.59	0.021203	8.15	36.83	17.99	1.00
	101.01*	300.00	89.98	92.37	92.37	93.41	0.011937	8.18	36.66	17.73	1.00
	98.84*	300.00	89.75	92.18	92.18	93.23	0.011945	8.22	36.48	17.48	1.00
	96.67*	300.00	89.53	91.99	91.99	93.05	0.011999	8.27	36.27	17.25	1.01
PT 2.53	94.50	300.00	89.31	91.84	91.84	92.91	0.021337	8.30	36.15	17.09	1.01
	89.248*	300.00	88.79	91.29	91.29	92.36	0.012011	8.31	36.09	17.00	1.01
	83.996*	300.00	88.27	90.76	90.76	91.84	0.012029	8.31	36.08	17.00	1.01
	78.744*	300.00	87.75	90.24	90.24	91.32	0.012013	8.31	36.09	16.99	1.01
	73.492*	300.00	87.23	89.72	89.72	90.79	0.012042	8.32	36.07	16.99	1.01
Slope change 1 0'	68.24	300.00	86.71	89.20	89.20	90.27	0.021374	8.31	36.09	17.00	1.01
	58.04*	300.00	86.51	89.00	89.00	90.07	0.014541	8.31	36.12	17.05	1.01
	47.84*	300.00	86.30	88.79	88.79	89.85	0.018211	8.29	36.19	17.11	1.00
Start flair 12-20	37.64	300.00	86.10	88.57	88.57	89.64	0.021291	8.29	36.20	17.15	1.01
End flair 20	27.64	300.00	85.90	87.75	87.75	88.62	0.019173	7.54	40.44	23.72	0.98
End rip-rap	7.64	300.00	85.43	86.96	86.96	87.66	0.019013	6.51	44.94	32.00	0.96
channel	0	300.00	84.50	86.50	86.50	87.44	0.013301	7.81	38.42	20.20	1.00

Wall & footing   with load
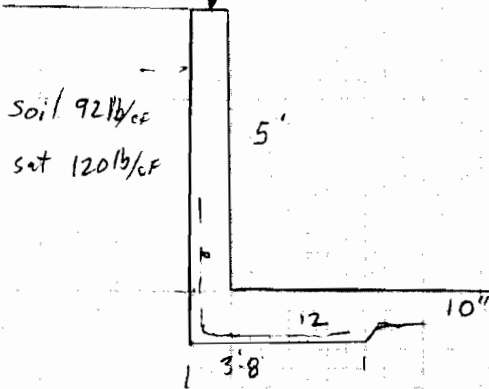
% solid

slab   18 (1) (.7) (150 lb) = 1680 lb ÷ 2 = 840 lb/LF

Vehicle   Assume HS 20

Soil 92 lb/cf
set 120 lb/cf

5'

12   10"

3'-8"

32 Kips   32 kips   8 Kips

8 kip   8 kip

14   1.5
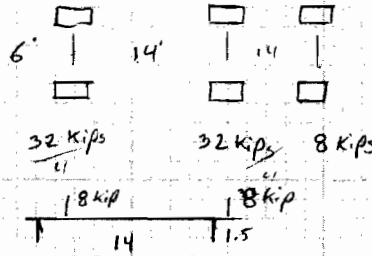
R = 15.860 kips

#4 @ 12" OC each way
3" clear bottom
1½ clear

cutoff wall 8" thick   4' beyond & below   w #4 @ 12" OC each way
Center of Wall

Boatwright Engineering
 Spillway

 f'c = 3000 psi
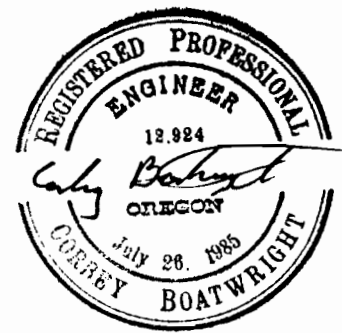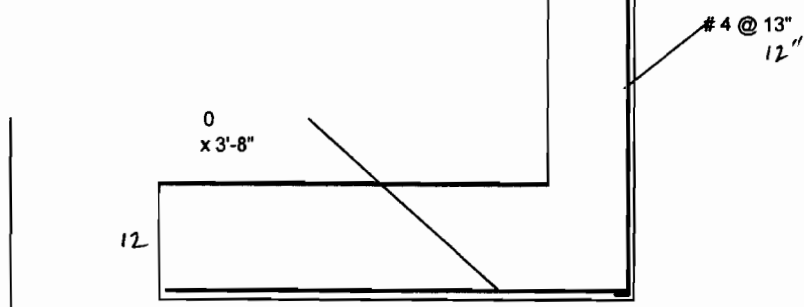 fy = 60000 psi

 5'-0" Free Height
 0'-0" Soil Cover

 3'-0" Toe Length
 3'-8" Base Length

8.0" Stem Width at Top
8.0" Stem Width at Bottom

Active Press. Coeff. = 0.45
Hor. Seismic Coeff. = 0.00
Friction Angle = 28 deg
Backfill Density = 120 pcf

0'-0" Heel Length
1'-0" Footing Thickness

8

0
x 3'-8"

12

4 @ 13"
12"

User:

Boatwright Engineering

Project: Monty Woods
Descrip: Spillway
Engineer: Corbey Boatwright

Page #

Date: 01/18/2011

ASDIP v 4.0	CANTILEVER RETAINING WALL DESIGN	www.asdipsoft.com

SECTION GEOMETRY

Wall Free Height	**5.00**	ft
Soil Cover @ Toe	**0.00**	ft
Stem Width @ Top	**8.00**	in
Stem Width @ Bottom	**8.00**	in
Footing Thickness	**12.00**	in
Toe Length (Front)	**3.00**	ft
Heel Length (Back)	**0.00**	ft
Backfill Slope (H:V)	**1 : 0.00**	

SEISMIC EARTH PRESSURES

Hor. Seismic Coefficient kh ..	**0.00**	
Seismic Active Coeff. Kae	0.46	
Seismic Force Pae-Pa	0.00	k/ft

SOIL BEARING PRESSURES

Allow. Bearing Pressure	**3.00**	ksf	
Max. Pressure @ Toe	0.00	ksf	OK
Min. Pressure @ Heel	0.00	ksf	
Total Footing Length	3.67	ft	
Footing Length / 6	0.61	ft	
Resultant Eccentricity e	-1.03	ft	
Resultant Is Within the Middle Third			

ADDITIONAL LOADS

Equivalent Surcharge	**0.00**	ft
Vertical Load	**15.60**	k/ft
Distance from Front Face	**0.00**	ft
Horizontal Load	**0.00**	k/ft
Distance below Stem Top	**0.00**	ft

BACKFILL PROPERTIES

Backfill Density	**120.0**	pcf
Internal Friction Angle ø	**28**	deg
Coulomb Lateral Earth Pressure Theory		
Calculated Active Coeff. Ka ..	0.33	
Use Active Press. Coeff. Ka .	**0.45**	
Active Pressure @ Heel	54.0	psf/ft
Active Pressure @ Toe	59.9	psf/ft

SHEAR KEY DESIGN

Shear Key Width	**0.00**	in	
Shear Key Depth	**0.00**	in	
Shear Force @ Key	0.00	k/ft	
Maximum Shear Stress	0.00	psi	OK
Allowable Shear Stress	60.25	psi	

OVERTURNING CALCULATIONS

	OVERTURNING				RESISTING		
	Force	Arm	Moment		Force	Arm	Moment
	k/ft	ft	k-ft/ft		k/ft	ft	k-ft/ft
Seismic Pae-Pa	0.00	3.60	0.00	Stem Top	0.50	3.33	1.67
Active Pa @ Heel ..	0.96	2.00	1.92	Stem Taper	0.00	3.67	0.00
Active Pa @ Toe ...	-0.03	0.33	-0.01	Footing Weight	0.55	1.83	1.01
Surcharge	0.00	3.00	0.00	Shear Key	0.00	3.00	0.00
Horizontal Load	0.00	6.00	0.00	Soil Cover @ Toe ..	0.00	1.50	0.00
Rh =	0.93	OTM =	1.91	Stem Wedge	0.00	3.67	0.00
Arm of Horizontal Resultant ...		2.05	ft	Soil @ Heel	0.00	3.67	0.00
				Backfill Slope	0.00	3.67	0.00
Safety Factor				Seismic Pae-Pa	0.00	3.67	0.00
against Overturning ...	26.28	OK		Pa vert @ Heel	0.16	3.67	0.60
				Vertical Load	15.60	3.00	46.80
				Surcharge	0.00	3.67	0.00
				Rv =	16.81	RM =	50.08
				Arm of Vertical Resultant		2.98	ft

Report

User:		Project:	Monty Woods		Page #
Boatwright Engineering		Descrip:	Spillway		Date: 01/18/2011
		Engineer:	Corbey Boatwright		

ASDIP v 4.0	**CANTILEVER RETAINING WALL DESIGN**	*www.asdipsoft.com*
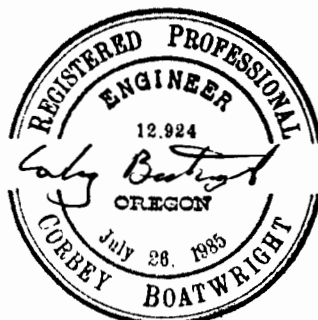
STEM DESIGN @ TENTH POINTS

Section	Moment	d	As min	As use
y/H	k-ft/ft	in	in²/ft	in²/ft
0.1	0.0	6.2	0.17	0.17
0.2	0.0	6.2	0.17	0.17
0.3	0.0	6.2	0.17	0.17
0.4	0.1	6.2	0.17	0.17
0.5	0.2	6.2	0.17	0.17
0.6	0.4	6.2	0.17	0.17
0.7	0.6	6.2	0.17	0.17
0.8	0.9	6.2	0.17	0.17
0.9	1.3	6.2	0.17	0.17
1.0	1.8	6.2	0.17	0.17

Critical Shear Height from Top .	4.48	ft
Shear Force @ Critical Height	0.87	k/ft OK
Resisting Shear Phi*Vc	6.16	k/ft
At Bottom Use Bars # 4 @ 13 in.		
Vertical Bars Embed. ldh reqd.	7.7	in OK
Vertical Bars Embed. provided	8.2	in
Vertical Bars Splice Length	28.5	in

SLIDING CALCULATIONS

Footing-Soil Friction Coeff.	**0.50**	
Friction Force	8.41	k/ft
Passive Pressure Coeff. Kp ...	2.00	
Depth to Neglect Passive	**0.00**	in
Passive Pressure at Top	0.24	ksf
Passive Pressure at Bottom	0.24	ksf
Passive Force Pp	0.12	k/ft
Sliding Resisting Force	8.53	k/ft
Lateral Sliding Force	0.93	k/ft
Safety Factor against Sliding ..	9.18	OK

LOAD FACTORS

Dead	1.2
Live	1.6
Lateral ...	1.6
Seismic .	1.0

PHI FACTORS

Bending .	0.90
Shear	0.75

TOE DESIGN

	Force	Arm	Moment
	k/ft	ft	k-ft/ft
Upward Pressure ...	ERR	ERR	ERR
Concrete Weight	-0.45	1.50	-0.68
Soil Cover	-0.00	1.50	-0.00
	ERR		ERR
Maximum Bending Moment		ERR	k-ft/ft
ERR			
Bars Development Length ld ..		19.7	in OK
Shear Force @ Critical Sect. ..		ERR	ERR
Resisting Shear Phi*Vc		8.50	k/ft

HEEL DESIGN

	Force	Arm	Moment
	k/ft	ft	k-ft/ft
Upward Pressure ...	ERR	0.00	ERR
Concrete Weight	0.00	0.00	0.00
Backfill Weight	0.00	0.00	0.00
Surcharge	0.00	0.00	0.00
	ERR		ERR

Upward Pressure Neglected in Heel Design

Maximum Bending Moment	ERR	k-ft/ft
ERR		
Bars Development Length ld ..	25.6	in NG
Shear Force @ Critical Sect. ..	ERR	ERR
Resisting Shear Phi*Vc	9.48	k/ft

Report (Cont.)

Expires 12-31-11

span 6'

Stop log   height   96 - 92.31 = 3.69' = 44.28"

8 x	7¼	Need = 6.1 boards	7 = 6.47" over
6 x	5½	Need ≈ 8.05 boards	
5 x	3½	Need = 12.6 boards	

Cut top board to fit
2" lip on bottom   46.3"

If USE 8x

3.69 (62.4) = 230.26 lb/LF
3.09 (62.4) = 192.56 lb/LF   ⟹ 211.41 lb/LF

Bottom board

$M = \frac{w\ell^2}{8} = \frac{211.4\,(6)^2}{8} = 951.3\,ft\,lb$

$R = \frac{w\ell}{2} = \frac{211.4\,(6)}{2} = 634.2\,lb$

Redwood No 2

$F_b = 925\,psi$ 925(.85) = 786.5 < 1,150 psi $C_M = 1$ NDS pg 30
$C_M = .85$
$C_{fu} = 1.15$ 2 or 3"

$F_b = \frac{M}{S}$ = $S = \frac{M}{F_b}$ = $\frac{951.3\,(12)}{1.15 \cdot 925}$ = 10.73 in   NG

$\frac{951.3\,(12)}{1.05\,(925)} = 11.75\,in$

4×8 $S_x = 14.80$

$F_v = \frac{2}{3}\frac{V}{A} =$
$F_v = 160\,psi$ = $f_v = 160\,(.97) = 155.2\,psi$
$C_M = 0.97$

$A = \frac{2}{3}\frac{V}{F_v} = \frac{2}{3}\frac{634.2}{155.2} = 2.72\,in < 25.38\,in^2$

Redwood No 2
or
Western Cedars Select structural

Job No.	By	Subject	Date	Sheet No.
	CB	Monte Wood	1-17-11	

Depth at which 3×8 planks can be used

		lb/LF		M	V R
	6				
0.84	— 5	52.16	←	71.01	319.54 f/lb
1.44	— 4	89.86	←	108.71	489.19 f/lb
2.04	—	127.56	←	146.41	658.84 f/lb
2.65	3	165.26			
3.25	— 2	202.96	←	184.11	828.5 ft lb
		192.56	←	211.41	951.3 ft lb
	1	230.26			

$3 \times 8 \quad S = 7.552 \, in^3$

$$M = \frac{F_b S}{12} = \frac{925(1.15) \, 7.552}{12} = 669.4$$

Could install support at mid point $7.25 - 2 + 7.25 = 12.5'' \, Tall$ ◁
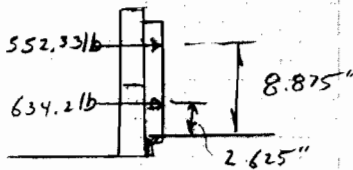
$Shear = 552.33 + 634.2 = 1186.5 \, lb$

$Moment = 634.2 (0.2188) + 552.33 (0.7396) = 547.2 \, ft/lb$

2" Angle $F_b = \frac{M}{S}$ $S = \frac{M}{F_b}$

$$F_b = .6 F_y = 22 \, ksi$$

$$S = \frac{6.566^2}{22} = 0.30 \, in^3$$

$f_v = \frac{2}{3} \frac{V}{A} =$ $A = \frac{2}{3} \frac{1.186}{14.5} = 0.05 \, in < any$

$$f_v = .4 F_y = 14.5 \, ksi$$

USE $2 \times 2 \times \frac{5}{16}$ Angle $S = 0.30 \, in^3$

Side channels $2 \times 2 \times \frac{1}{4}$ w/ #4" @ 12" OC
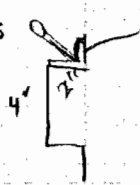
↑ flow

Job No.	CB By	Monte Wood Subject	1-17-11 Date	Sheet No.
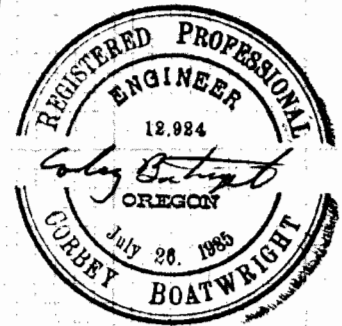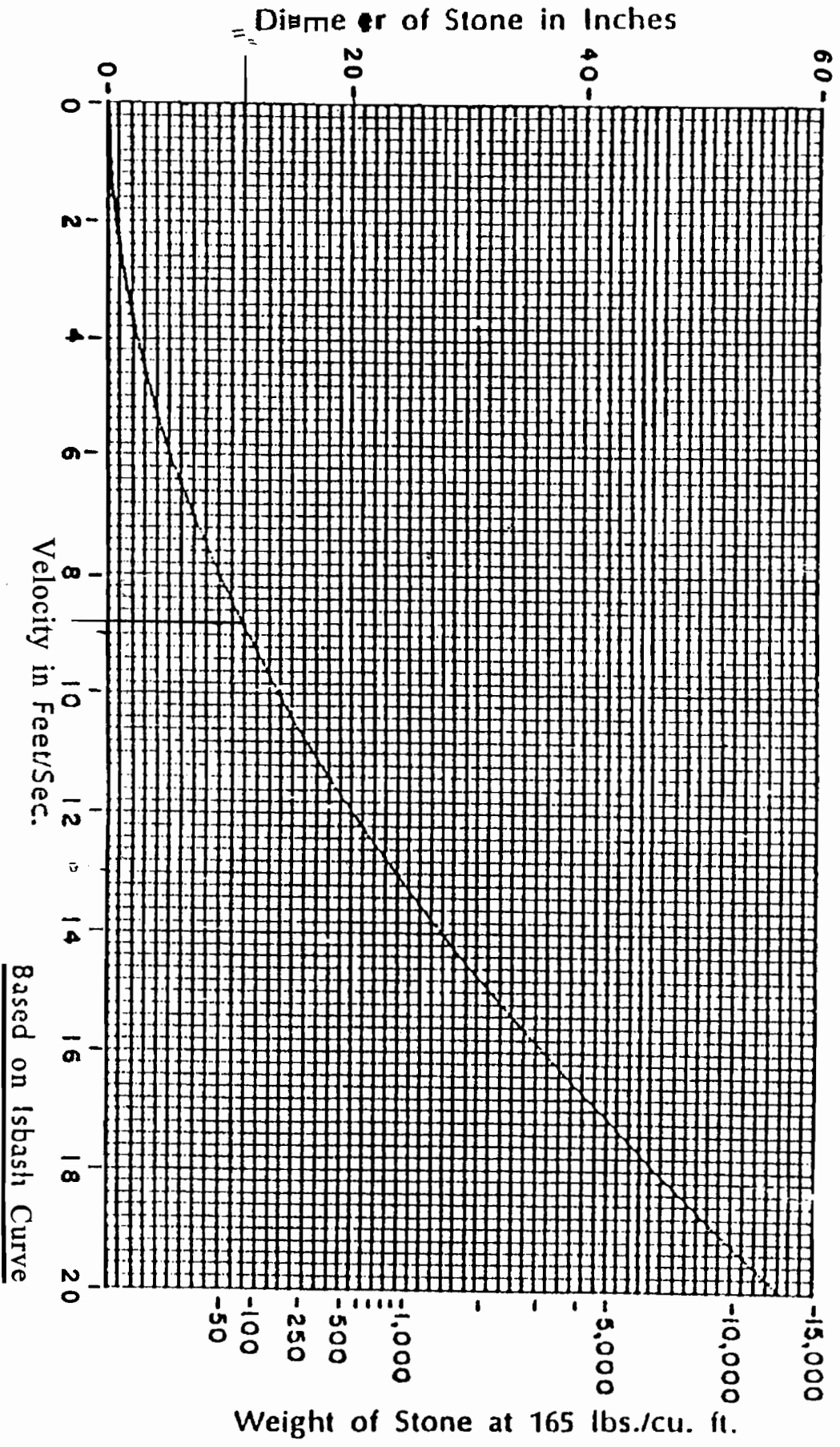
Figure C-1 – Maximum Stone Size for riprap.

MONTE WOOD

Dam and Storage Reservoir

REGISTERED PROFESSIONAL
ENGINEER
12.924
[signature]
OREGON
July 26, 1985
CORBEY BOATWRIGHT

Expires 12-31-2011

February 2011

Monte Wood Dam

Contract Documents

The owner desires proposals from a select bidders list of contractors to complete an earth fill dam and incidentals, piping and structure complete as shown on the plans prepared by Boatwright Engineering, Inc., 2613 12th Street SE, Salem, Oregon 97302.

Proposals will be received, opened and read at the office of Boatwright Engineering, Inc. on March 17, 2011 at 10:00 A.M.   Construction should be initiated after all wetland and water right permits have been obtained, estimated to be after _____, 2011.

The selected contractor shall carry workman's compensation insurance and contractor's general liability insurance in the amount of $1,000,000.00.

Monthly pay estimates will be prepared by the contractor and approved by the engineer.   Payment will be 95% of the work completed.   The final payment will be made within 45 days of completion and acceptance by the owner and engineer.   The contractor shall be required to file in writing, prior to final payment being made, that all materials, labor and equipment of this contract have been paid in full.

_____

Signature of Representative

_____

Select Bidder Company

_____

Title

_____

Date

herein submit the following unit price bid for the construction of the Wood Dam with construction to be completed prior to October 10, 2011, weather permitting.

MONTE WOOD DAM
BID PROPOSAL

Item	Description		Estimated Quantity	Unit Price	Total Price
1.	Mobilization		LS.		$_____
2.	Excavation and Embankment				
	a.	Stripping 8" deep: spillway, dam site, fire lane, old dam site.	2470 CY	$_____	$_____
	b.	Excavation			
		1. Core trench 5' deep	144 CY	$_____	$_____
		2. Removal of existing dam	1064 CY	$_____	$_____
		3. Spillway excavate to subgrade	404 CY	$_____	$_____
	c.	Embankment			
		1. Dam - in place	4020 CY	$_____	$_____
		2. Core trench - in place 1	44 CY	$_____	$_____
3.	10" drain line, box, sluice valve, operating stem, concrete encasement - 94 LF		L.S.		$_____
	a.	Class 100 rip rap in place at outlet	11 CY	$_____	$_____
	b.	USGS Style C Staff Gage, 10 Ft, installed and complete	L.S.		$_____
4.	6" toe drain pipe, fabric and rock		233 LF	$_____	$_____
5.	Spillway				
	a.	Concrete spillway, 42 CY	L.S.		$_____
	b.	Bridge decking - 16' x 20'	L.S.		$_____
	c.	Liner under rip rap - 350 SY in place	L.S.		$_____
	d.	1"-0, rock bedding, 4" deep	83 TONS	$_____	$_____
	e.	Class 350 rip rap in place	11 CY	$_____	$_____
	f.	Class 100 rip rap in place			
		1. Spillway	123 CY	$_____	$_____

Item	Description	Estimated Quantity	Unit Price	Total Price
g.	Stop Logs, 3" x 8" x 6', Redwood #2, or Western Cedar Select Structural, 18 ea.	L.S.		$_____
6.	Fire Truck Access			
a.	Driveway approach including paving rock, culvert	L.S.		$_____
b.	1"-0 gravel road	82 Tons	$_____	$_____
	2"-0 gravel road and turnaround	423 Tons	$_____	$_____
c.	Waterline to dry hydrant including piping, elbows, screen, dry hydrant, thrust blocking, backfill.	L.S.		$_____
7.	Gravel Access Road Across Dam			
a.	1"-0 rock, 17' wide - 3" depth	83 Tons	$_____	$_____
	2"-0 rock, 17' wide - 9" depth	290 Tons	$_____	$_____
8.	Seeding Exposed Earth Surface	L.S.		$_____
			Subtotal - Items 1 - 8	$_____
9.	**Alternate** - winterization shut down for completion next year, erosion controls and monitoring.	L.S.		$_____
10.	Chain Link Fencing - laid on the upstream side of the dam between elevation 90 and 97 to protect surface from burrowing animals (by owner) 271' x 22'	662 S.Y.		XXXX XXXXX

_____ _____ _____ _____
Contractor   Signature   Title   Date

With owner's signature the contractor is authorized to proceed with construction.

_____ _____   _____
Signature   Owner   Date

Monte Wood Dam

Contract Documents

The owner desires proposals from a select bidders list of contractors to complete an earth fill dam and incidentals, piping and structure complete as shown on the plans prepared by Boatwright Engineering, Inc., 2613 12th Street SE, Salem, Oregon 97302.

Proposals will be received, opened and read at the office of Boatwright Engineering, Inc. on March 17, 2011 at 10:00 A.M. Construction should be initiated after all wetland and water right permits have been obtained, estimated to be after _____, 2011.

The selected contractor shall carry workman's compensation insurance and contractor's general liability insurance in the amount of $1,000,000.00.

Monthly pay estimates will be prepared by the contractor and approved by the engineer. Payment will be 95% of the work completed. The final payment will be made within 45 days of completion and acceptance by the owner and engineer. The contractor shall be required to file in writing, prior to final payment being made, that all materials, labor and equipment of this contract have been paid in full.

_____
Signature of Representative

_____
Select Bidder Company

_____
Title

_____
Date

herein submit the following unit price bid for the construction of the Wood Dam with construction to be completed prior to October 10, 2011, weather permitting.

Monte Wood

DAM AND STORAGE RESERVOIR

SPECIFICATIONS

February 2011

INTRODUCTION:

Mr. Wood owns a 78 acre farm that lies north of Hopewell in Yamhill County. It is located on the west side of Lafayette Highway and on the south side of Fairview Road.

The farm is mostly cleared and in agricultural production. There is an existing dam on this site that was built in the late 1940's which has overtopped several times. The new dam is to be constructed downstream of the existing dam and the material from the existing dam is to be excavated out and salvaged for the new dam, where practical.

The proposed construction area has had a wetland delineation prepared and the owner wishes to develop areas around the reservoir for more native vegetation. Impact to the existing wetland will be kept to a minimum so that the borrow sites will not extend into the wetland and the borrow will be in the area near the dam site.

The native soil in the area at the dam and borrow site is Woodburn Silt Loam, consisting of silt loam soil 0 to 65 inches in depth. The soil has a slow permeability and erosion can be a slight hazard. Soil samples from the test pits show a liquid limit of 46.4 to 50.5, plasticity index of 10.8 to 15.8, and a density of 87 to 94 lb/CF at optimum moisture.

CONSTRUCTION TIME FRAME:

Depending on Mr. Wood's budget, the work might need to be constructed over a two year period. The removal of the existing dam could be done in the channel but any main channel work should be done since the drain will not handle any large flows. The fire lane, spillway, and, possibly, the core trench, may be done in the first year. Any disturbed surface that is not completed needs to be protected by winterization with a barrier approved by the engineer.

EXCAVATION AND EMBANKMENT:

All of the land area to be incorporated in the dam and reservoir storage area shall be stripped of surface growth to a depth of 8 inches, more or less, to remove vegetation and roots and soils with significant organic materials. These materials shall be disposed of on the farm lands at the direction of the owner with spreading, as required, to develop a uniform grade that will accommodate farm equipment for final grading and planting of ground cover. Strippings will be placed on the downstream face of the dam at the completion of construction and graded to allow the exposed surface to be planted, by others, with a grass seed mixture of perennial grass seed or other grass seed from the owner.

EXCAVATION:

After stripping is completed on all or part of the land to be impacted, the contractor shall manage the fill-borrow areas to maximize the water content in the undisturbed soils so as to be near the optimum moisture content needed. This will require limiting surface exposure or ripping the soils in advance of excavation to achieve the most desirable moisture content.

CORE TRENCH EXCAVATION & BACKFILL:

The contractor shall excavate a short section of core trench with a minimum bottom width of 12 feet in order to accommodate the excavation and compactive equipment proposed to be utilized on the job. The excavated side slopes shall be at one horizontal to one vertical (1:1) allowing the compactive effort to be directly over the embankment's interface with the excavated side slopes. The contractor shall scarify the excavated side slopes as the fill of the core trench proceeds up the slope. No embankment shall be placed in standing water. If water is encountered, the contractor is required to dewater the core trench bottom prior to placing the embankment. The core trench shall be excavated to expose any farm tile crossings.

No embankment fill shall be placed until preparation of the foundation and the excavation of the core trench has been completed and examined in its entirety by the engineer, or by the Water Resources Dam Safety Engineer, or both.

The contractor can excavate a section of core trench and stockpile these materials, then excavate the next section of core trench with placement as backfill on the section earlier excavated; proceeding along the length of the core trench in a leap frog pattern.

The core trench shall be backfilled in 6 to 8-inch compacted lifts to obtain a minimum density of 95% based on sample tests AASHT0 T-99A, T-27, T-265. Copies of the laboratory test results are included in these specifications.

FARM TILE:

Farm tiles may be encountered in excavating the core trench. When encountered, the contractor shall excavate and remove the width of the embankment fill with the side walls laid back at 1 to 1 and a minimum trench bottom width of 36 inches. These excavated trenches shall be backfilled in 6 to 8-inch compacted lifts using excavation equipment, mounted compactors, or, hand-operated compactors.

EMBANKMENT:

The earth embankment shall be placed in 6 to 8-inch compacted lifts to 95% minimum density to AASHT0 T-99A test results. The outer slopes of the dam shall be over built in width to allow the outer slope embankment to be stripped of those soils with a density less than the 95% T-99A. The stripped material may be incorporated into the embankment fills above the level of stripping. The embankment placed in the vicinity of the drain needs to be completed to a depth equal to the concrete

encasement for the pipe, plus 12 inches. At the completion of the compacted fill in these areas, the specified piping shall be placed on blocking and held down against the buoyancy effect of concrete encasement by the use of horseshoe shaped reinforcing bars installed over the top of the pipe. Extensions of the reinforcing bars shall penetrate the underlying undisturbed soils.

The embankment outside of the pipe zones can proceed during the installation of the pipes in a manner that leaves a surface slope that allows the balance of the embankment within the pipe zones to be placed at the required density and in 6 to 8 inch lifts.

Any surplus excavated materials not required for the completion of the earthen dam as shown on the plans, shall be disposed of on-site within 600 feet of the dam or impoundment area, at a location to be designated by the owner and engineer.

RESERVOIR DRAIN PIPING SYSTEM:

The reservoir shall be equipped with a 10 inch ADS N-12 drain pipe. The pipe shall be installed in a concrete backfilled ditch. The pipe shall be anchored against the buoyancy effect of the concrete backfill. The pipe shall be set on blocking above the bottom of the excavated ditch. Concrete encase in a single pour using 2500 psi concrete placed at 8" slump and vibrated to eliminate voids and pockets.

The 10 ADS N-12 drain pipe shall terminate in the drain box with a slide-type valve, Waterman Canal Gate Valve model C-20F, or equal, manufactured to be capable of opening at 20 feet of seating head.

The reservoir drain valve shall be operated by a 1¼" galvanized iron pipe operating stem located up the inside face of the dam with support posts set in concrete, as shown on the plans.

The operating pipe brackets mounted on these posts shall be welded to the support post after the posts are set in concrete so the operating pipe will be in a straight alignment. Surplus height on the posts may be cut off only after the welding of the operating pipe support is completed.

The concrete drain box shall be constructed with 3000 psi compressive strength at 28 days and be placed at 4 inches, or less, of slump. Reinforcing steel shall be deformed and of the size and spacing called for on the plans utilizing 60,000 psi yield steel rebars.

The discharge end of the 10 inch diameter ADS N-12 pipe shall be equipped with 6 cubic yards of hand-placed rip-rap, consisting of hard, angular, durable, basalt rock in the 15 lb. to 75 lb. range. The rip-rap shall be placed as follows: 1) around and above the exit end of the pipe, 2) downstream on the bottom of an open channel ditch with a 4 foot bottom width, 3) along the side slopes of the ditch. The side slopes shall be constructed at two horizontal to one vertical (2:1) and the rip-rap placed to a point at least 30 inches above the bottom of the finished ditch section.

TOE DRAINS:

The contractor shall install 6" perforated ADS N-12 pipe near the downstream toe of the earth embankment where the dam fill height exceeds 10 feet. The pipe shall be placed in a 24 inch wide

trench lined with an ADS nonwoven 3300 geotextile fabric containment envelope for free draining washed round rock ¾"-½" with a minimum fabric lap of 12". The french drain shall run parallel to the dam centerline and be set 12" into the undisturbed native soils with up to 6' of fill embankment cover.

SPILLWAY:

The spillway has been designed to pass a 1% frequency storm of 300 CFS with a 1.50' freeboard. The owner desires to use the dam as an access road to the south side of his property requiring the concrete spillway as shown.

The concrete shall be 300 psi compressive strength at 28 days and be placed at 4 inches, or less, of slump. Reinforcing steel shall be deformed and of the size and spacing called for on the plans, utilizing 60,000 psi yield steel rebars. The deck is to be salvaged, pre-stressed, bridge decking that has been used as ODOT temporary bridge system.

The volume of water flowing through the spillway requires the rip-rap channel to resist 83 ft/sec velocity at a depth of 2.5 feet during a 1% storm. Larger rip-rap will need to be placed at the end of the concrete spillway to reduce the high water velocity (energy diffuser) and eliminate scouring that would occur there.

RIP-RAP CHANNEL:

The channel shall be excavated to the grade and width shown. A geotextile liner meeting the following minimum physical requirements shall be placed upon the native soil:

Grab Strength	180 lb
Elongation	Not Specified
Puncture Strength	180 lb
Burst Strength	190 psi
Trapezoid Tear	50 lb
Permeability	36 gal/min/ft^2

The liner is to be covered with 1"-0 crushed rock bedding, 4 inches in depth, followed by 16" of class 100 rip-rap on all of the channel and side walls, up to 4 feet from the end of the concrete spillway. In this 4 foot section of the channel the rip-rap is to be class 350.

Care should be taken when handling the rip-rap to minimize separation of the gradation. An alternate method of armament of the channel may be prepared by the contractor but must be approved by the engineer and the WRD Dam Safety Engineer.

SEEDING AND FERTILIZATION OF EXPOSED EARTHEN SURFACE AT THE COMPLETION OF CONSTRUCTION:

At the completion of construction, and prior to September 15, the owner shall seed all exposed earthen surfaces with a mixture of 30 lbs. of common ryegrass and 20 lbs. of short fescue,. Owner shall apply 250 lbs. of 16-20-0 fertilizer, per acre.

DENSITY TESTING OF COMPACTED EMBANKMENT:

During the course of construction, as compacted earth backfill is being placed, the contractor shall retain a testing laboratory to run in-place density tests on the embankment requiring a density of 95% of T-99A. A minimum of five density tests shall be performed on the core trench backfill. A minimum of ten density tests shall be performed on the balance of the embankment. These tests shall be taken at a minimum of three different depths of compacted embankment, being: 2.5 feet ±, 12.5 feet ±, and 22.5 feet ± below the crest of the dam. The laboratory performing these tests shall make copies of the test results available to the contractor and project engineer within 4 days of the field work.

The contractor shall be responsible to pay for these 10 field in-place density tests. If, during the course of excavation and embankment, soils are encountered that yield in place densities 3 pounds per cubic foot greater than or less than the densities herein shown of 94.3 pounds per cubic foot, a separate proctor test shall be required to be performed for which the owner will reimburse the contractor, at cost, based on a statement from the testing laboratory.

WATER AVAILABILITY FOR CONSTRUCTION:

The owner has an irrigation well and pump on the farm which the contractor can utilize for maintaining the optimum moisture content in soil to be placed in engineering fill. The contractor must meet with the owner prior to making any modifications to the piping to accommodate his use of this source of supply.

MAIN ACCESS / FIRE LANE

The contractor shall construct a 20-foot wide access road with a 3-point turnaround area for access to the reservoir by fire suppression vehicles. The access shall be as shown on the plans. A 3-foot wide by 3-inch thick concrete apron shall be formed at the juncture of the access road with SE Fairview Road. A 45-foot long, 12-inch diameter culvert of ADS N-12, or approved equal, shall be placed at the ditch line. The road approach shall be constructed with 28-foot turn radii. The gravel portion of the road shall be constructed with 15 inches of 2"-0 base rock and 3 inches of 1"-0 finish grade rock. Both legs of the L-shaped turn-around shall be 60 feet in length from their centerline-centerline intersection and shall have 28-foot radii. The contractor shall obtain the driveway permit from Yamhill County. A copy of the Yamhill County Public Works Dept. Application Form and the Public Works Fee schedule are attached below.

PRIVATE ROADWAY

The contractor shall construct a 17-foot wide private roadway from the end of the Main Access / Fire Lane section described above, across the dam, as shown on the plans. The private roadway shall be constructed with 9 inches of 2"-0 base rock and 3 inches of 1"-0 finish grade rock.

DRY HYDRANT LINE

The owner is providing a dry hydrant connection adjacent to the fire lane so that the local firefighting authority can access the stored reservoir water in times of emergency.

The contractor shall install a Red Head Brass, Style 133, 8-inch dia. dry hydrant underwater strainer, or approved equal, on Red Head Brass, Style 134 dry hydrant underwater supports, or approved equal. Contractor shall provide 1-inch OD pipes or rods, as required by the manufacturer, for the supports and shall imbed the pipe a minimum of 30-inches into undisturbed soil. The dry hydrant strainer shall be connected to approximately 142 LF of 8-inch dia. PVC pipe that traverses between the reservoir pool and the fire lane, utilizing two 22½ bends to manage the slope, as shown on the plans. The pipeline shall maintain cover depths as shown on the plans. At the fire lane the contractor shall install an 8-inch, 90 elbow and an 8-inch by 6-inch reducer and bring a 6-inch PVC pipe to the surface and to the required elevation for the hydrant port.

Permit #_____

Yamhill County
Public Works Department
2060 Lafayette Avenue, McMinnville, OR 97128

John Phelan	William A. Gille P.E.,P.L.S.	Randy Webb
Director Public Works	County Engineer	Permit Specialist
phelanj@co.yamhill.or.us	gilleb@co.yamhill.or.us	webbr@co.yamhill.or.us
Phone Number (503) 434-7515	Fax. 503-472-4068	503-434-7370

PERMITS: Who needs one?

Any time an individual, contractor, or company needs to perform work within the County Rights-of-Way, whether in the road, along the shoulder, or in the ditch, a Right-of-Way Permit is required.

Examples of work frequently performed in the Right-of-Way and requiring a permit include subdivisions, drainage issues, utility construction, driveway installation and use changes, private situations and special events.

The purpose of the permit is to insure that activities conducted in the Right-of-Way do not constitute a danger to the traveling public or the individuals involved and that the project does not degrade the right-of-way thereby increasing maintenance costs to the taxpayer.

INSTRUCTIONS:

Complete the "APPLICANT INFORMATION" below by printing. Insufficient information will delay processing. Include two sets of plans and if required: (a certificate of insurance, a bond or guarantee of payment and any set fees). Read the reverse side of this form, sign and date your acknowledgement. Special provisions may be added to the permit when and if issued.

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* * * * * * * * APPLICANT INFORMATION * * * * * * * * *

APPLICANT: _____ **POSITION:** _____

COMPANY NAME: _____

MAILING ADDRESS: _____

E-MAIL ADDRESS: _____

BUSINESS PHONE: _____ **Cell :** _____ **FAX:** _____

WORK BEING PERFORMED BY: Company: [Subcontractor: [Self: [Other: [_____

Field supervisors name: _____

Firms name: _____ Telephone: _____

PROJECT LOCATION: TOWNSHIP: _____ **RANGE:** _____ **SECTION:** _____ **TAX LOT:** _____

PROJECT ADDRESS: _____

PROJECT DESCRIPTION: _____

_____

_____

_____

_____

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* * * * * * * * * * * COUNTY'S RECORD * * * * * * * * * * * * * *

PERMIT: _____ **INSURANCE:** _____ **BOND/GUARANTEE AMOUNT:** _____

TWO SETS OF CONSTRUCTION PLANS SUBMITTED: _____ **FEE AMOUNT:** _____

PROVISIONS AND DRAWINGS ATTACHED: _____

_____

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┌─────────────────────────────────────────────────────────────────────┐
│ SPECIAL PROVISIONS: _____   │
│ _____      │
│ _____      │
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GENERAL PROVISIONS:

1. **SEE YAMHILL COUNTY ORDINANCE 776 FOR SPECIFICE PROVISIONS.** Copies may be obtained from our office.

2. **CALL YAMHILL COUNTY PUBLIC WORKS AT 503-434-7514, one working day prior to start of activity and no later than 7:00 A.M. the day work commences TO SCHEDULE INSPECTION OF YOUR PROJECT.** Give a contact name, call back telephone number, location of work, type of work, time the work is scheduled to start and the permit number. Delays of work longer than one day require additional notification.

3. Oregon law requires excavators to follow rules adopted by the Oregon Utility Notification Center. Copies may be obtained by calling the center at 503-232-1987 or 1-800-332-2344.

4. A copy of an "APPROVED" permit and project plans must be on the site at all times work is in progress.

5. Traffic control shall conform to the requirements of the Manual On Uniform Traffic Control Devices.

6. Permits for construction expire _____ months from date of issue.

The Applicant shall indemnify and save harmless Yamhill County, its Board of Commissioners, officers and employees from all suits and actions; or claims of any character brought because of any injuries or damages received or sustained by any person, or property on account of the operations of the said Applicant, his subcontractors or the employees of either; or on account of or in consequence of any neglect in safeguarding the work; or because of any act or omission, neglect or misconduct of the said Applicant.

The Applicant hereby applies to Yamhill County Public Works Department for permission to perform operations within Rights-of-Way under Yamhill County jurisdiction. This is subject to and with full knowledge of the appropriate General Provisions contained in Yamhill County Ordinance 776 and supplemented by design standards and/or modified by any special provisions. It shall be the obligation of the applicant to obtain a copy of Ordinance 776 and all specified attachments from Yamhill County Public Works Department before commencement of any project covered under a permit and to comply with all applicable requirements.

APPLICANT'S SIGNATURE: _____ DATE: _____

DIRECTOR: _____ DATE: _____

PERMIT SPECIALIST: _____ DATE: _____

INITAL SITE REVIEW BY: _____ DATE: _____
PERMIT ISSUED BY: _____ VIA: _____ DATE: _____
START WORK NOTICE BY: _____ C # _____ DATE: _____
CONSTRUCTION APPROVED BY: _____ DATE: _____
NOTES: _____
_____
_____
_____
_____

FINAL INSPECTION APPROVED BY: _____ DATE: _____

NOTICE PUBLIC WORKS FEES
FISCAL YEAR 2010 – 2011

Effective July1, 2009 the following fees are established for functions or services provided within the Yamhill County Department of Public Works.

NAME OF FUNCTION OR SERVICE PROVIDED	NEW FEE SCHEDULE
Utility permit, including inspection	$150.00
Temporary Use Permit	$150.00
Driveway Access Permit, including inspection	$150.00
Engineering Subdivision Application, including Access Permit	$413.75
Partition Review, including Access Permit	$370.75
Subdivision Design Review	$191.65 per lot
Subdivision Construction Inspection	$ 98.75 per lot
Partition Inspection	$0.90 per linear foot
Hourly Research Fee	$ 60.85

NORTHWEST TESTING LABORATORIES

CONSTRUCTION INSPECTION
MATERIALS INSPECTION
CHEMICAL ANALYSIS
PHYSICAL TESTING

NON-DESTRUCTIVE TESTING
WELDING CERTIFICATION
SOIL TESTING
ASSAYING

September 20, 1984

Boatwright Engineering
2613 12th SE
Salem, Oregon   97302

Attention: Jack Hills

Gentlemen:

Subject: Tests performed on samples submitted to our laboratory.
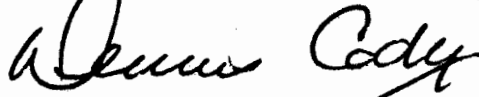
Report:

Sample Number 1

Location:	Borrow area 18"-36" depth grayish brown silt loam
Maximum Density:	87.5 lab./cu. ft.
Opt. Moisture:	28.5%
Liquid Limit:	50.5
Plastic Index:	15.8

Sample Number 2

Location:	Borrow area 4'-5' depth grayish brown silt loam
Maximum Density:	92.0 lbs./cu. ft.
Opt. Moisture:	25.0%
Liquid Limit:	46.4
Plastic Index:	10.8

If we may be of further assistance to you, please feel free to call on us.

Respectfully,
NORTHWEST TESTING LABORATORIES, INC.

Dennis Cody
Manager, Salem Branch

Report Number: S-9823/9824