

# PERMIT CHANGE TRACKING FORM

<b>DATE RECEIVED</b>	8/16/93	<b>PERMIT NUMBER</b>	ACT/015/025
<b>Title of Proposal:</b> CULVERT C-2U		<b>PERMIT CHANGE #</b>	93I
<b>Description:</b> CULVERT REPLACEMENT		<b>PERMITTEE</b>	CO-OP MINING CO.
		<b>MINE NAME</b>	BEAR CANYON MINE

	DATE DUE	DATE DONE	RESULT
<input type="checkbox"/> 15 DAY INITIAL RESPONSE TO PERMIT CHANGE APPLICATION			<input type="checkbox"/> ACCEPTED <input type="checkbox"/> REJECTED
<input type="checkbox"/> Notice of Review Status of proposed permit change sent to the Permittee.			<b>Permit Change Classification</b>
<input type="checkbox"/> Request additional review copies prior to Division/Other Agency review.			<input type="checkbox"/> Significant Permit Revision
<input type="checkbox"/> Notice of Approval of Publication. (If change is a Significant Revision.)			<input type="checkbox"/> Permit Amendment
<input type="checkbox"/> Notice of request to modify proposed permit change prior to approval.			<input type="checkbox"/> Incidental Boundary Change

REVIEW TRACKING	INITIAL REVIEW		MODIFIED REVIEW		FINAL REVIEW AND FINDINGS	
DOGM REVIEWER	DUE	DONE	DUE	DONE	DUE	DONE
<input type="checkbox"/> Administrative _____						
<input type="checkbox"/> Biology _____						
<input type="checkbox"/> Engineering _____						
<input type="checkbox"/> Geology _____						
<input type="checkbox"/> Soils _____						
<input checked="" type="checkbox"/> Hydrology <u>HUGH</u>						
<input type="checkbox"/> Bonding _____						
<input checked="" type="checkbox"/> AVS Check		9/1/93				

COORDINATED REVIEWS	DUE	DONE	DUE	DONE	DUE	DONE
<input type="checkbox"/> OSMRE						
<input type="checkbox"/> US Forest Service						
<input type="checkbox"/> Bureau of Land Management						
<input type="checkbox"/> US Fish and Wildlife Service						
<input type="checkbox"/> US National Parks Service						
<input type="checkbox"/> UT Environmental Quality						
<input type="checkbox"/> UT Water Resources						
<input type="checkbox"/> UT Water Rights						
<input type="checkbox"/> UT Wildlife Resources						
<input type="checkbox"/> UT State History						
<input type="checkbox"/> Other						

<input type="checkbox"/> Public Notice/Comment/Hearing Complete (If the permit change is a Significant Revision)	<input type="checkbox"/> Permit Change Approval Form signed and approved effective as of this date. <input type="checkbox"/> Permit Change Denied.
<input type="checkbox"/> Copies of permit change marked and ready for MRP.	<input type="checkbox"/> Notice of <input type="checkbox"/> Approval <input type="checkbox"/> Denial to Permittee.
<input type="checkbox"/> Special Conditions/Stipulations written for approval.	<input type="checkbox"/> Copy of Approved Permit Change to File.
<input type="checkbox"/> TA and CHIA modified as required.	<input type="checkbox"/> Copy of Approved Permit Change to Permittee.
<input type="checkbox"/> Permit Change Approval Form ready for approval.	<input type="checkbox"/> Copies to Other Agencies and Price Field Office.



## PERMIT AMENDMENT APPROVAL

Title: <b>CULVERT C-2U</b>	PERMIT NUMBER: <b>ACT/015/025</b>
Description: <b>REPLACE CULVERT</b>	PERMIT CHANGE #: <b>93I</b>
	MINE: <b>CO-OP MINING CO</b>
	PERMITTEE: <b>BEAR CANYON MINE</b>

### WRITTEN FINDINGS FOR PERMIT APPLICATION APPROVAL

YES, NO or N/A

1. The application is complete and accurate and the applicant has complied with all the requirements of the State Program.	
2. The proposed permit area is not within an area under study or administrative proceedings under a petition, filed pursuant to R645-103-400 or 30 CFR 769, to have an area designated as unsuitable for coal mining and reclamation operations, unless:  A. The applicant has demonstrated that before January 4, 1977, substantial legal and financial commitments were made in relation to the operation covered by the permit application, or  B. The applicant has demonstrated that the proposed permit area is not within an area designated as unsuitable for mining pursuant to R645-103-300 and R645-103-400 or 30 CFR 769 or subject to the prohibitions or limitations of R645-103-230.	
3. For coal mining and reclamation operations where the private mineral estate to be mined has been severed from the private surface estate, the applicant has submitted to the Division the documentation required under R645-301-114.200.	
4. The Division has made an assessment of the probable cumulative impacts of all anticipated coal mining and reclamation operations on the hydrologic balance in the cumulative impact area and has determined that the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area.	
5. The operation would not affect the continued existence of endangered or threatened species or result in destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act of 1973 (16 U.S.C. 1531 et.seq.).	
6. The Division has taken into account the effect of the proposed permitting action on properties listed on and eligible for listing on the National Register of Historic Places. This finding may be supported in part by inclusion of appropriate permit conditions or changes in the operation plan protecting historic resources, or a documented decision that the Division has determined that no additional protection measures are necessary.	
7. The Applicant has demonstrated that reclamation as required by the State Program can be accomplished according to information given in the permit application.	
8. The Applicant has demonstrated that any existing structure will comply with the applicable performance standards of R645-301 and R645-302.	
9. The Applicant has paid all reclamation fees from previous and existing coal mining and reclamation operations as required by 30 CFR Part 870.	
10. The Applicant has satisfied the applicable requirements of R645-302.	
11. The Applicant has, if applicable, satisfied the requirements for approval of a long-term, intensive agricultural postmining land use, in accordance with the requirements of R645-301-353.400.	

### SPECIAL CONDITIONS OR STIPULATIONS TO THE PERMIT AMENDMENT APPROVAL

YES      NO

1. Are there any variances associated with this permit amendment approval? If yes, attach.			
2. Are there any special conditions associated with this permit amendment approval? If yes, attach.			
3. Are there any stipulations associated with this permit amendment approval? If yes, attach.			

**The Division hereby grants approval for Permit Amendment to the Existing Permit by incorporation of the proposed changes described herein and effective the date signed below. All other terms and conditions of the Existing Permit shall be maintained and in effect except as superseded by this Permit Amendment.**

Signed \_\_\_\_\_  
 Director, Division of Oil, Gas and Mining

\_\_\_\_\_ EFFECTIVE DATE

# APPLICATION FOR PERMIT CHANGE

93 I

Title of Change:

Culvert C-24 Replacement

Permit Number: ACT 015' 025

Mine: Bear Canyon

Permittee: CO-OP Mining Co.

Description, include reason for change and timing required to implement:

Culvert needs replacement ASAP. Steel Culvert will function with greater strength

- Yes  No 1. Change in the size of the Permit Area? \_\_\_\_\_ acres  increase  decrease.
- Yes  No 2. Change in the size of the Disturbed Area? \_\_\_\_\_ acres  increase  decrease.
- Yes  No 3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
- Yes  No 4. Will permit change include operations in hydrologic basins other than currently approved?
- Yes  No 5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes  No 6. Does permit change require or include public notice publication?
- Yes  No 7. Permit change as a result of a Violation? Violation # \_\_\_\_\_
- Yes  No 8. Permit change as a result of a Division Order? D.O.# \_\_\_\_\_
- Yes  No 9. Permit change as a result of other laws or regulations? Explain: \_\_\_\_\_
- Yes  No 10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
- Yes  No 11. Does the permit change affect the surface landowner or change the post mining land use?
- Yes  No 12. Does permit change require or include collection and reporting of any baseline information?
- Yes  No 13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
- Yes  No 14. Does permit change require or include soil removal, storage or placement?
- Yes  No 15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
- Yes  No 16. Does permit change require or include construction, modification, or removal of surface facilities?
- Yes  No 17. Does permit change require or include water monitoring, sediment or drainage control measures?
- Yes  No 18. Does permit change require or include certified designs, maps, or calculations?
- Yes  No 19. Does permit change require or include underground design or mine sequence and timing?
- Yes  No 20. Does permit change require or include subsidence control or monitoring?
- Yes  No 21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
- Yes  No 22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
- Yes  No 23. Is this permit change coal exploration activity  inside  outside of the permit area?

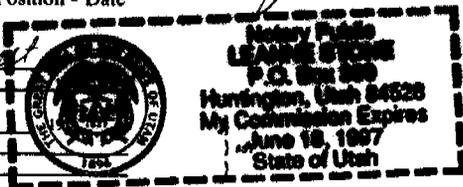
Attach 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein

*Wendell Owen - Resident* 8/11/93  
Signed - Name - Position - Date

Subscribed and sworn to before me this 11 day of August  
*Sharon Stone*  
Notary Public

My Commission Expires: \_\_\_\_\_  
Attest: STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_



Received by Oil, Gas & Mining

8/16/93

ASSIGNED PERMIT CHANGE NUMBER





State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt  
Governor

Ted Stewart  
Executive Director

James W. Carter  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340  
801-359-3940 (Fax)  
801-538-5319 (TDD)

September 16, 1993

Mr. Robert Hagen, Director  
Office of Surface Mining  
Reclamation and Enforcement  
505 Marquette N.W., Suite 1200  
Albuquerque, New Mexico 87102

Re: Culvert C-2U Replacement, Co-Op Mining Company, Bear Canyon Mine,  
ACT/015/025-93I, Folder #2, Emery County, Utah

Dear Mr. Hagen:

Enclosed please find updated information for the Bear Canyon Mine relative  
to Culvert C-2U, approved September 1, 1993.

Sincerely,

A large, flowing handwritten signature in black ink, appearing to read 'Pamela Grubaugh-Littig'.

Pamela Grubaugh-Littig  
Permit Supervisor

pgl  
Enclosure  
cc/enc: Bill Malencik, PFO



# CO-OP MINING COMPANY

P.O. Box 1245  
Huntington, Utah 84528



(801) 381-5238  
Coal Sales (801) 381-5777

September 10, 1993

Pamela Grubaugh-Littig  
Permit Supervisor  
Utah Division of Oil, Gas & Mining  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

RECEIVED

SEP 16 1993

Ms. Grubaugh-Littig,

*File*

DIVISION OF  
OIL, GAS & MINING

Re: Culvert C-2U Replacement, Co-Op Mining Company, Bear Canyon Mine, ACT/015/025-93I, Emery County, Utah

*#2*

Enclosed are 3 finalized copies of the Amendment 93I, which was approved per Division letter dated September 1, 1993.

If you have any questions, please call Charles Reynolds at (801) 381-2450.

Thank You,

*Wendell Owen*

Wendell Owen,  
Resident Agent

WJO/sr



State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt  
Governor

Ted Stewart  
Executive Director

James W. Carter  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340  
801-359-3940 (Fax)  
801-538-5319 (TDD)

September 1, 1993

Mr. Wendell Owen  
Co-Op Mining Company  
P.O. Box 1245  
Huntington, Utah 84528

Dear Mr. Owen:

Re: Culvert C-2U Replacement, Co-Op Mining Company, Bear Canyon Mine,  
ACT/015/025-931, Folder #2, Carbon County, Utah

The above-noted amendment is approved. Please submit three finalized  
copies by September 20, 1993.

Sincerely,

A handwritten signature in cursive script, reading "Pamela Grubaugh-Littig".

Pamela Grubaugh-Littig  
Permit Supervisor





From the desk of  
**Pam Grubaugh-Littig**

8/27

Joe -

AML

field?

Please let  
me know.  
AKK

DATE: 01 SEP 93

APPLICANT VIOLATOR SYSTEM  
APPLICATION EVALUATION REPORT

TIME: 10:28:27

STATE: UT

APPNO: ACT015025

SEQNO: 0

PAGE: 1

APPLICANT'S ENTITY ID: 089059

APPLICANT'S NAME : CO OP MINING CO

SYSTEM RECOMMENDATION IS BASED ON ENTITY OFT

```

*****
*
* SYSTEM RECOMMENDATION           :           ISSUE           *
* PREVIOUS SYSTEM RECOMMENDATION:   ISSUE(930805)          *
* OSMRE RECOMMENDATION            :           ISSUE(930806)      *
*
*****

```

F2/PROCEED F3/QUIT F4/MAIN F6/REPORT F9/VIEW VIOL F10/VIEW OFT

# CO-OP MINING COMPANY

P.O. Box 1245  
Huntington, Utah 84528



(801) 381-5238  
Coal Sales (801) 381-5777

937

Pamela Grubaugh-Littig  
Permit Supervisor  
Utah Division of Oil, Gas & Mining  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

RECEIVED

August 11, 1993

AUG 16 1993

DIVISION OF  
OIL GAS & MINING

Ms. Grubaugh-Littig,

Re: Culvert C-2U Replacement, Co-Op Mining Company, Bear Canyon Mine, ACT/015/025, Emery County, Utah

93

Enclosed are three copies of a proposal to replace Culvert C-2U, which has been smashed due to heavy traffic, with a steel pipe. Pages have been marked DRAFT to distinguish them from previously approved pages. Upon approval, finalized copies will be submitted.

If you have any questions, please call Charles Reynolds at (801) 381-2450.

Thank You,

Wendell Owen,  
Resident Agent

WJO/cr  
Enclosure(s)

Table 7.2-11 Culvert Characteristics

Culvert	Dia in.	Type	Contributing Watersheds	Slope ft/ft	Outlet Condition
C-1U	30 15	CMP & flexible	AU-3, AU-4, AU-5	0.73	Bedrock
C-2U	12	CMP stl pipe	AU-11	0.08	Soil
C-3U	12	CMP	AU-6, AU-7, AU-11	0.05	4" rip-rap
C-4U	12	CMP	AU-8, AU-9	0.05	4" rip-rap
C-5U	12	CMP	AU-8, AU-9, AU-15	0.05	4" rip-rap
C-6U	12	CMP	AU-6, AU-7, AU-11, AU-13, AU-14	0.05	4" rip-rap
C-7U	12	CMP	AU-12	0.05	6" rip-rap
C-8U	18	CMP to RCP	AU-2, AU-3 AU-4, AU-5	0.13	12" rip-rap
C-9U	60	stl pipe	Bear Creek	0.06	48" rip-rap
C-10U	60	RCP	Bear Creek	0.06	48" rip-rap
C-11U	18	CMP	AU-16	0.10	6" rip-rap
C-12U	24	CMP	AU-17	0.04	6" rip-rap
C-13U & C-13aU	16	CMP	misc. road drainage	0.06	3" rip-rap
C-14U	60	CMP	Bear Creek	0.06	48" rip-rap
C-1D	15	CMP, flexible	AD-6, AD-3B	1.00	24" rip-rap
C-2D	15	CMP, RCP, flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	0.40	10" rip-rap
C-3D	20	stl pipe	AD-3A	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5 AD-7, AD-8	0.18	9" rip-rap
C-5D	18	CMP	AD-9	0.08	soil
C-6D	12	CMP	AD-10	0.48	9" rip-rap
C-7D	18	CMP	AD-8	0.55	16" rip-rap
C-8D	18	CMP	AD-3A, AD-5 AD-7	0.05	3" rip-rap
C-9D	18	CMP	See C-8D	0.05	3" rip-rap
C-10D	18	CMP	TIPPLE WASH HOSE	0.03	3" rip-rap

**CULVERT CHARACTERISTICS**

<b>Culvert</b>	<b>Dia (in.)</b>	<b>Type</b>	<b>Contributing Watersheds</b>	<b>Peak Q(cfs)</b>	<b>Slope (ft/ft)</b>	<b>Outlet Condition</b>
C-1U	15	CMP flexible	AU-3, AU-4, AU-4A, AU-5	3.97	0.12 0.73	Bedrock
C-2U	12	CMP stl pipe	AU-11	0.09	0.08	Soil
C-3U	12	CMP	AU-6, AU-7, AU-11	2.20	0.05	4" rip-rap
C-4U	12	CMP	AU-8, AU-9	1.32	0.05	4" rip-rap
C-5U	12	CMP	AU-8, AU-9, AU-15	1.45	0.05	4" rip-rap
C-6U	12	CMP	AU-6, AU-7, AU-11, AU-13, AU-14	2.65	0.05	4" rip-rap
C-7U	12	CMP	AU-12	0.34	0.05	6" rip-rap
C-8U	18	Flexible CMP, RCP	AU-2, AU-3 AU-4, AU-5	4.00	0.13	12" rip-rap
C-9U	60	stl pipe	Bear Creek <sup>(b)</sup>	108.53	0.06	48" rip-rap
C-10U	60	RCP	Bear Creek <sup>(b)</sup>	108.53	0.06	48" rip-rap
C-11U	18	CMP	AU-16	4.92	0.10	6" rip-rap
C-12U	24	CMP	AU-17	3.29	0.04	6" rip-rap
C-13U C-13aU	15	CMP	misc. road drainage	1.00	0.06	3" rip-rap
C-14U	60	CMP	Bear Creek	108.53	0.06	48" rip-rap

**CULVERT CHARACTERISTICS (con't)**

<b>Culvert</b>	<b>Dia (in.)</b>	<b>Type</b>	<b>Contributing Watersheds</b>	<b>Peak Q(cfs)</b>	<b>Slope (ft/ft)</b>	<b>Outlet Condition</b>
C-1D	15	CMP, flexible	AD-6, AD-3B	0.93	1.00	24" rip-rap
C-2D	15	CMP, RCP, flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	1.47	0.40	10" rip-rap
C-3D	20	stl pipe	AD-3A	0.23	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5 AD-7, AD-8	4.43	0.18	9" rip-rap
C-5D	18	CMP	AD-9	0.23	0.08	soil
C-6D	12	CMP	AD-10	0.62	0.48	9" rip-rap
C-7D	18	CMP	AD-8	2.07	0.55	16" rip-rap
C-8D	18	CMP	AD-3A, AD-5 AD-7	2.36	0.05	3" rip-rap
C-9D	18	CMP	See C-8D	2.36	0.05	3" rip-rap
C-10D	18	CMP	TIPPLE WASH HOSE	0.25	0.03	3" rip-rap

Circular Channel Analysis & Design  
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: CULVERT ADEQUACY

Comment: CULVERT C-2U

Solve For Actual Depth

Given Input Data:

Diameter.....	1.00 ft
Slope.....	0.0800 ft/ft
Manning's n.....	0.015
Discharge.....	0.09 cfs

Computed Results:

Depth.....	0.07 ft
Velocity.....	3.60 fps, <i>ok</i>
Flow Area.....	0.02 sf
Critical Depth....	0.12 ft
Critical Slope....	0.0084 ft/ft
Percent Full.....	7.16 %
Full Capacity.....	8.73 cfs
QMAX @.94D.....	9.39 cfs
Froude Number.....	2.88 (flow is Supercritical)

Open Channel Flow Module, Version 3.3 (c) 1991  
Haestad Methods, Inc. \* 37 Brookside Rd \* Waterbury, Ct 06708

Table 7.2-11 Culvert Characteristics

Culvert	Dia in.	Type	Contributing Watersheds	Slope ft/ft	Outlet Condition
C-1U	30 15	CMP & flexible	AU-3, AU-4, AU-5	0.73	Bedrock
C-2U	12	CMP stl pipe	AU-11	0.08	Soil
C-3U	12	CMP	AU-6, AU-7, AU-11	0.05	4" rip-rap
C-4U	12	CMP	AU-8, AU-9	0.05	4" rip-rap
C-5U	12	CMP	AU-8, AU-9, AU-15	0.05	4" rip-rap
C-6U	12	CMP	AU-6, AU-7, AU-11, AU-13, AU-14	0.05	4" rip-rap
C-7U	12	CMP	AU-12	0.05	6" rip-rap
C-8U	18	CMP to RCP	AU-2, AU-3 AU-4, AU-5	0.13	12" rip-rap
C-9U	60	stl pipe	Bear Creek	0.06	48" rip-rap
C-10U	60	RCP	Bear Creek	0.06	48" rip-rap
C-11U	18	CMP	AU-16	0.10	6" rip-rap
C-12U	24	CMP	AU-17	0.04	6" rip-rap
C-13U & C-13aU	16	CMP	misc. road drainage	0.06	3" rip-rap
C-14U	60	CMP	Bear Creek	0.06	48" rip-rap
C-1D	15	CMP, flexible	AD-6, AD-3B	1.00	24" rip-rap
C-2D	15	CMP, RCP, flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	0.40	10" rip-rap
C-3D	20	stl pipe	AD-3A	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5 AD-7, AD-8	0.18	9" rip-rap
C-5D	18	CMP	AD-9	0.08	soil
C-6D	12	CMP	AD-10	0.48	9" rip-rap
C-7D	18	CMP	AD-8	0.55	16" rip-rap
C-8D	18	CMP	AD-3A, AD-5 AD-7	0.05	3" rip-rap
C-9D	18	CMP	See C-8D	0.05	3" rip-rap
C-10D	18	CMP	TIPPLE WASH HOSE	0.03	3" rip-rap

**CULVERT CHARACTERISTICS**

<b>Culvert</b>	<b>Dia (in.)</b>	<b>Type</b>	<b>Contributing Watersheds</b>	<b>Peak Q(cfs)</b>	<b>Slope (ft/ft)</b>	<b>Outlet Condition</b>
C-1U	15	CMP flexible	AU-3, AU-4, AU-4A, AU-5	3.97	0.12 0.73	Bedrock
C-2U	12	CMP stl pipe	AU-11	0.09	0.08	Soil
C-3U	12	CMP	AU-6, AU-7, AU-11	2.20	0.05	4" rip-rap
C-4U	12	CMP	AU-8, AU-9	1.32	0.05	4" rip-rap
C-5U	12	CMP	AU-8, AU-9, AU-15	1.45	0.05	4" rip-rap
C-6U	12	CMP	AU-6, AU-7, AU-11, AU-13, AU-14	2.65	0.05	4" rip-rap
C-7U	12	CMP	AU-12	0.34	0.05	6" rip-rap
C-8U	18	Flexible CMP, RCP	AU-2, AU-3 AU-4, AU-5	4.00	0.13	12" rip-rap
C-9U	60	stl pipe	Bear Creek <sup>(b)</sup>	108.53	0.06	48" rip-rap
C-10U	60	RCP	Bear Creek <sup>(b)</sup>	108.53	0.06	48" rip-rap
C-11U	18	CMP	AU-16	4.92	0.10	6" rip-rap
C-12U	24	CMP	AU-17	3.29	0.04	6" rip-rap
C-13U C-13aU	15	CMP	misc. road drainage	1.00	0.06	3" rip-rap
C-14U	60	CMP	Bear Creek	108.53	0.06	48" rip-rap

**CULVERT CHARACTERISTICS (con't)**

<b>Culvert</b>	<b>Dia (in.)</b>	<b>Type</b>	<b>Contributing Watersheds</b>	<b>Peak Q(cfs)</b>	<b>Slope (ft/ft)</b>	<b>Outlet Condition</b>
C-1D	15	CMP, flexible	AD-6, AD-3B	0.93	1.00	24" rip-rap
C-2D	15	CMP, RCP, flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	1.47	0.40	10" rip-rap
C-3D	20	stl pipe	AD-3A	0.23	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5 AD-7, AD-8	4.43	0.18	9" rip-rap
C-5D	18	CMP	AD-9	0.23	0.08	soil
C-6D	12	CMP	AD-10	0.62	0.48	9" rip-rap
C-7D	18	CMP	AD-8	2.07	0.55	16" rip-rap
C-8D	18	CMP	AD-3A, AD-5 AD-7	2.36	0.05	3" rip-rap
C-9D	18	CMP	See C-8D	2.36	0.05	3" rip-rap
C-10D	18	CMP	TIPPLE WASH HOSE	0.25	0.03	3" rip-rap

Circular Channel Analysis & Design  
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: CULVERT ADEQUACY

Comment: CULVERT C-2U

Solve For Actual Depth

Given Input Data:

Diameter.....	1.00 ft
Slope.....	0.0800 ft/ft
Manning's n.....	0.015
Discharge.....	0.09 cfs

Computed Results:

Depth.....	0.07 ft
Velocity.....	3.60 fps, <i>ok</i>
Flow Area.....	0.02 sf
Critical Depth....	0.12 ft
Critical Slope....	0.0084 ft/ft
Percent Full.....	7.16 %
Full Capacity.....	8.73 cfs
QMAX @.94D.....	9.39 cfs
Froude Number.....	2.88 (flow is Supercritical)

Open Channel Flow Module, Version 3.3 (c) 1991  
Haestad Methods, Inc. \* 37 Brookside Rd \* Waterbury, Ct 06708