Group of Riders

Bill Jewel
886-2215



called on 6/21 – no A250 required

TELEPHONE MESSAGE

While you were out -

To: Dr J.

Mr(s). Nan Cadigan Nan Brown

Of:

Date: Nov 2nd	Time: 12:45
Phone No.:	Extension: 2561

☒ PLEASE CALL	☐ CALLED TO SEE YOU
☒ TELEPHONED	☐ WANTS TO SEE YOU
☐ WILL CALL AGAIN	☐ WISHES AN APPOINTMENT

MESSAGE:

PERSON WHO TOOK MESSAGE

AA-PUR-106

TELEPHONE MESSAGE

While you were out -

To: Bob F.

Mr(s). Denton Canal

Of:

Date: Nov 2nd | Time: 2:50

Phone No.: | Extension:

- [x] PLEASE CALL
- [x] TELEPHONED
- [ ] WILL CALL AGAIN
- [ ] CALLED TO SEE YOU
- [ ] WANTS TO SEE YOU
- [ ] WISHES AN APPOINTMENT

MESSAGE: He is planning on attending Mtg Fri at 1:00 - DeBois & King

PERSON WHO TOOK MESSAGE Grm

AA-PUR-106

TELEPHONE MESSAGE

While you were out -

To: ~~Bob~~ J

Mr(s). Devin Craig

Of: J W Webb

Date: Nov 2nd Time: 10:05

Phone No.: 479-9364 Extension:

☒ PLEASE CALL	☐ CALLED TO SEE YOU
☒ TELEPHONED	☐ WANTS TO SEE YOU
☐ WILL CALL AGAIN	☐ WISHES AN APPOINTMENT

MESSAGE:

class

joint

Tiring

PERSON WHO TOOK MESSAGE Jerm

AA-PUR-106

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

29330
October 31, 1983

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
Environmental Engineering Division
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Reconstruction Project
Progress Report

Dear Bob:

I am writing to summarize our site meeting of October 26, 1983 and to emphasize our serious concerns regarding the project progress and contractor performance. Areas of concern are as follows:

1. Progress: There has been a significant lack of progress which we perceive to be the result of poor planning, lack of proper direction and supervision by the prime contractor, and insufficient man power and equipment.

2. Construction Schedule: Inspite of repeated requests for the contractor to submit a meaningful and reliable construction schedule, we have received none. Lack of a schedule prompts a concern on our part that the contractor has not thought out his construction approach, sequencing and time frame, nor given serious thought to the difficulty of completing the job before the winter season sets in.

3. Submittals: There has been a consistent failure of the contractor to forward submittals on a timely basis or to do so at all. Examples of significant submittals outstanding to date include the construction schedule, the dewatering procedure, additonal embankment samples and tests, and alternate outlet pipe to name a few.

4. Construction Supervision: There appears to be a lack of proper direction and supervision by the contractor to the subcontractor. We are concerned that the subcontractor is proceeding with lack of adequate direction from the contractor.

In addition there are deficiencies with the existing contract documents that must be rectified or addressed immediately by the State as Owner. These are as follows:

1. Completion Date: The completion date in the existing contract documents is past due. A revised, enforceable completion date must be established and added to the contract documents by a change order.

2. Liquidated damages: There is no provision in the contract documents to deal with default or non-performance on the part of the contractor, should it occur. The Owner must decide what to do and how he will deal with the contractor in this event.

3. Winter shut-down: As you know we are concerned that progress will not be sufficient to complete construction this winter. The Owner must address the possibility of a winter shut-down and what the ramifications will be from the perspective of protection of the work, project completion, and or contractor penalties, if any.

4. Construction Easements:, As you know, the construction limits do not extend beyond the States existing property line. It may be warranted to reconsider the practicality and/or necessity of the Owner quickly securing additional construction easements for the purpose of allowing the contractor to install the temporary cofferdam. We are currently reminding the contractor he has no permission to conduct his operations beyond the property line.

We strongly recommend that the Owner call a meeting with the contractor and engineer immediately to address these concerns with the contractor and to demand a substantive improvement in the contractors performance. Please advise us of your desires and intentions after you review this letter.

Very truly yours,

DuBOIS & KING, INC.

Robert J. Wernecke, P.E.
Senior Project Manager

RJW/kln
cc: Fred Costello

DuBOIS & KING, INC.
Engineering Planning
Development Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376 & 3377

LETTER OF TRANSMITTAL

DATE	JOB NO.
11/1/83	29331

ATTENTION Bob Finucane, P.E.

RE: Facilities Engineer

Silver Lake

TO Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, VT 05602

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1		5	Inspection Reports for the period 10/24 -- 10/31

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit_____copies for approval

☐ For your use ☐ Approved as noted ☐ Submit_____copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return_____corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS For your information

COPY TO _____

SIGNED: Robert J. Wemett

If enclosures are not as noted, kindly notify us at once.

Engineering • Planning • Development • Management
P. O. Box 839
RANDOLPH, VERMONT 05060

(802) 728-3376

TO: RJW Files

DUBOIS & KING, INC
FILE 29331 SUBJ. Contr
NOV 1 1983
REF'D. TO RJW ACK. BY
ANS. BY _____ NOTED

DATE 10-31-83 | 29331

PROJECT Silver Lake Dam

LOCATION Barnard VT

CONTRACTOR Denton | OWNER State

WEATHER Sunny/Clear | TEMP. 35 °at 10:30AM 45 °at 3:00 PM

PRESENT AT SITE
Dick Godfrey
Bob Smith Rbt Finucane
Pete Barranco

THE FOLLOWING WAS NOTED:

1. Material being worked while frozen (left side)
2. Embankment material to bottom of old 22"ϕ steel pipe. Two dozers working in fill area; one straddling pipe to attain compaction.
3. Neat Lines not staked in field -- R Godfrey became boisterous when I pointed this out to him.
4. Toe of embankment appears to extend 25'± downstream of neat lines -- impossible to determine for sure since only one stake (of questionable veracity) exists in the field.
5. Trucks dumping stones in embankment fill that measured 2 ft x 18"; I told him that they should be removed.
6. Dump Truck Raised body hit telephone cable. 11:23 am
7. Several compaction tests had very high water content (±4% to 5% above optimum), and compaction was 89% to 93%. I asked for more compaction; rubber tire ~~roller~~ equipment gave it 95% and 13.4% moisture (2.9% above).
8. Pete Barranco requested that schedule 40 pvc with smaller (3/8") holes be used with an acceptable cap be placed for left bank abutment subdrain. fill with a well graded sand & gravel

Took 15 photos

COPIES TO _____

FIELD REPORT

SIGNED John Sebetta

DUBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 10/28/83 JOB NO. 2933 1

PROJECT Silver Lake Dam

LOCATION Barnard, Vt

CONTRACTOR Denton | OWNER

WEATHER Sunny | TEMP. 40 °at 11 AM, 50 °at 4 PM

PRESENT AT SITE Bob Smith (Transport Agency), Dick Godfrey

TO R. W. File

DUBOIS & KING, INC.
FILE ____ SUBJ. ____
OCT 28 1983
REF'D. TO ____ ACK. BY ____
ANS. BY ____ NOTED ____

THE FOLLOWING WAS NOTED:

1. One ft of embakment fill in bottom
2. Muddy material from bottom stockpiled downstream
3. No grade stakes set for end of embankment.
4. Stone wall on left measured at 42 feet upstream of toe. However, bottom of wall rises with embankment neat line and only bottom 1' will contact fill.
5. Godfrey instructed to put sand against wall.
5. Nuclear density tests performed at two places. 95% and 91% compaction. However, moisture content is high.
6. Contractor intercepted hillside drainage with subdrain, and covered same with sand. Subdrain goes along the base of the left abutment along the bottom of the stone wall.
7.

COPIES TO ____

FIELD REPORT

SIGNED John Bilotta

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION - SOILS SUBDIVISION

COMPACTION TEST WORK SHEET
NUCLEAR METHOD

PROJECT Silver Lake Dam
JOB NUMBER
DATE
TAKEN BY E Smith

STANDARD COUNT	DENSITY	MOISTURE
1		
2		
3		
4		
5		
TOTAL		
AV.	2688	601

REMARKS

Test Number	1	2						
Station								
Offset								
Elevation								
Mode & Depth								
Density Count	2054	2345						
Air-Gap Count (If Used)								
Density Count Ratio	.765	.860						
Wet Density PCF	133.7	127.3						
Moisture Count	162	162						
Moisture Count Ratio	.270	.270						
Moisture PCF	15.6	15.6						
Dry Density	118.9	111.5						
% Moisture	13.4	14.2						
Soil Type								
Curve Number								
Max. Obtainable Density	123.5							
Optimum Moisture	10.5							
Field Moisture Condition	2.9 w	3.7 w						
% Relative Compaction	95.0	91.0						

TA 416 Rev. 1M 7/81

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

TO R. Godfrey, Files

DuBOIS & KING, INC.
FILE 29331 SUBJ. Constr
OCT 27 1983
REF'D. TO RJW ACK. BY
ANS. BY NOTED

DATE	JOB NO.
10-26-83	29331
PROJECT: Silver Lake Dam	
LOCATION: Barnard, Vt	
CONTRACTOR: Denton	OWNER: State
WEATHER: Snow/Rain/cold	TEMP. 30 °at 11 AM, 35 °at 3 PM
PRESENT AT SITE: Bruce - (backhoe operator)	
R Wernecke	
R Finucane P Barranco	

THE FOLLOWING WAS NOTED:

Backhoe operating - one truck - bulldozer (3 men)
Removed dam to original ground.
One timber crib wall removed; one left

We told Bruce to clean up sloppy earth on the foundation. Also that the lake should be diverted 50± feet upstream of the concrete wall and also any water near the concrete face should be removed.

NOTE:
I went to Lakota Lake & before I returned R. Wernecke & P. Barranco met with R Godfrey and passed this info on to him.

E. Severance & I surveyed the area (Studia & angle topo) for quantity determination.

COPIES TO _____

FIELD REPORT

SIGNED John B Watts

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 10/25/83	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard, VT	
CONTRACTOR DENTON	OWNER State
WEATHER Cool & Cloudy	TEMP. 40 °at 11 AM, 45 °at 4 PM
PRESENT AT SITE R. Godfrey.	

TO R&W, FILES

DUBOIS & KING, INC.
FILE 29331 SUBJ. Constr.
OCT 27 1983
REF'D. TO RJW ACK. BY ____
ANS. BY ____ NOTED ____

THE FOLLOWING WAS NOTED:

Excavation has exposed Timber Cribs at elevation 84. 22" steel pipe resting on top of timber cribs. Greenish-grey clayey soil exposed on rt bank at elev 1295± and 10' from pipe. Natural ground appears to rise sharply on right bank.

I visited three gravel pits with Dick Godfrey. Two pits are across the White River in Stockbridge; they are the ones from which he has submitted samples. Each one is also about a 10-mile haul. He discovered another one about 1 mile (west) north of the site on Rte 12. I told him to get a sample and have it tested.

I told R Godfrey to submit a plan on how to ~~protect~~ road on downstream section. I also expressed concern about the depth of his excavation and told him to plan on starting to pump flows from upstream.

COPIES TO ____

FIELD REPORT

SIGNED John Bilotta

DUBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

DUBOIS & KING, INC.
FILE 29331 SUBJ. constr
OCT 25 1983
REF'D. TO EJW ACK. BY
ANS. BY NOTED

DATE 10/24/83	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Burnard, VT	
CONTRACTOR Denton	OWNER State
WEATHER Damp, Cloudy	TEMP. 50 °at AM / 5 °at PM
PRESENT AT SITE	

TO RJW Files
Report #2

THE FOLLOWING WAS NOTED:

The excavator has encountered 2 rows of timbers that traverse the dam.
One line of timbers is 45' ± d.s. of concrete face. These timbers are backed with what appears to be plywood, and they appear to be in relatively good condition (the backhoe is having substantial difficulty removing them.
The second row of timbers appears to be much older and in poorer condition.
The excavation is continuing with the bottom level (at approximate elevation 1280. The opening is now about 35 feet from the upstream face. I feel that the contractor is getting too close to the upstream wall to continue at this depth of excavation.
Contractor's submittals coming in slowly.

COPIES TO

FIELD REPORT

SIGNED

DuBOIS & KING, INC.
Engineering * Planning
Development * Management
R. D. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376 & 377

LETTER OF TRANSMITTAL

DATE	JOB NO.
December 21, '83	29330

ATTENTION: Robert Denton

RE: Silver Lake Dam Reconstruction

TO: Denton Construction Corp
1715 Hegeman Ave
Winooski VT 05404

WE ARE SENDING YOU XX Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter XX Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
3	12/21/83	1	Change Order

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit_____copies for approval
☐ For your use ☐ Approved as noted ☐ Submit_____copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return_____corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

Kindly verify the price for the Class B concrete installed for slush grouting of the rocks.

Also, it is imperative that the Rodney Hunt sluice gate be on site this week if it's to be installed before construction ends. All concrete work, including the epoxy grout at the entrance should be completed this month.

Bob, Sign & return to us for processing.

John J. Bilotta, P.E.

COPY TO _____

SIGNED: John J Bilotta

PRODUCT 240-3 NEBS Inc., Groton, Mass. 01471.

If enclosures are not as noted, kindly notify us at once.

2 columns

3 yds @ $10

5 yds @ $15

45
110

450
450
-90

4860

11
4860
3150

8010
9528 0

10329 0

Cons Wernecke 10-3-83

grades elevations, Temporary road plan
placing etc.
pipe submission
de-watering
submissions
Schedule

→ Call Denton ←

Cons Wernecke 10-6-83

2-plans send to Warnecke visit - submission in excavation low level outlet

signing improved

Embankment removed

less | more
more perm

John Balotta-
soils lab

sieved compaction
new bank old bank

seives on granular mtls

Dan .4 samples

2- crushed stone
1- bank run
(- pipe bedding

29330
November 28, 1983

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Construction Progress Report

Dear Pete:

Here is a summary of the progress on the dam to bring you up to date on the construction activities. Work performed during the two weeks beginning November 6, 1983 and ending November 19, 1983, is described in the following narrative.

During this period, the subcontractor, R.R. Godfrey, removed old embankment between the diverted road and the concrete cutoff wall. Several large timbers were encountered and two of them were cut with a chainsaw. All timbers, except those which appeared to be supporting the stone wall, were removed. The subcontractor attempted to remove the pipe by drilling the surrounding concrete full of holes. He has placed a minimum amount of fill on the upstream portion of the dam. The subcontractor excavated the downstream toe in anticipation of placing riprap filter on the downstream toe.

Should you have any comments or questions, feel free to call me and discuss them.

Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/pal
cc: Robert Finucane

29330
November 11, 1983

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: SILVER LAKE DAM CONSTRUCTION PROGRESS REPORT

Dear Pete:

Here is a summary of the progress on the dam to bring you up to date on the construction activities. Work performed during the two weeks beginning October 24, 1983 and ending November 5, 1983, is described in the following narrative.

Excavation of the original structures uncovered timber cribs underlying the dam at elevation 1285. The contractor has installed a subdrain near the left abutment contact line very near the toe of the dam; he has been instructed to remove and reinstall the subdrain using schedule 40 pcv pipe with eight 3/8" holes per foot with a proper cap.

The contractor began to fill the downstream side of the excavation. The contractor had to use high impact tamping equipment, such as a sheepsfoot roller, to obtain compaction and reasonable moisture content. The contractor installed a cofferdam and began pumping the water.

Traffic was diverted over the downstream section of the embankment. About 100 cubic yards of crushed gravel and sand have been used for a roadbed. That material will be removed before the embankment is raised.

Should you have any comments of questions, feel free to call me and discuss them.

Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/kln
cc: Robert Finucane

29330
October 26, 1983

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

COPY

SUBJECT: SILVER LAKE DAM CONSTRUCTION PROGRESS REPORT

Dear Pete:

Here is a summary of the progress on the dam to bring you up to date on the construction activities. Work performed during the last two weeks is highlighted.

Prior to two weeks ago, the lake was dewatered to the level of the low level outlet. The roadbed was excavated to six feet below the crest elevation, and the emergency spillway pipes were removed. Traffic was diverted to one lane across the upstream side of the crest to the downstream side of the concrete retaining wall. RR Godfey, the earthmoving subcontractor had excavated 20% of the material from the downstream face of the dam.

During the past two weeks the earthmoving subcontractor has continued to remove the downstream face to the point where the 60% of the embankment has been removed. The contractor has requested to substitute reinforced concrete pipe, class 5 for the prestressed concrete cylinder pipe for the low level outlet. No progress has been made for the past few days because of equipment malfunctions.

Enclosed for your information are soil samples, aggregate samples, and compaction test results

Should you have any comments or questions, feel free to call me and discuss them.

Very truly yours,

DuBOIS & KING, INC.

John J. Bilotta, P.E.
Resident Engineer

JJB/kln
Enclosure

29330
October 21, 1983

Mr. Robert Denton
Denton Construction Corp.
1715 Hegeman Avenue
Winooski, Vermont 05404

COPY

SUBJECT: Silver Lake Dam Construction - Construction Schedule

Dear Bob:

The construction season is quickly drawing to a close. The nice weather we have been experiencing is slowly turning colder, and we want to ensure that the construction of Silver Lake Dam is completed in a timely manner. Since we are now seeing heavy frosts in the morning, we want to see an expanded construction schedule for the work.

Kindly prepare, and deliver to us by next Friday, a schedule that at least includes the beginning and ending dates of the following items:

Item	Description
2.	Excavation (completion)
4.	Earth Bank
6c.	Rip Rap
8.	36" CMP
9.	30" Concrete pipe
11 a,b,c	Asphalt Paving
12 a,b	Guard Rail
17	Clean Up
18	Sluice Gate
19	Observation Wells

It is imperative that schedules be established and attained. In addition to the timely completion of the work, these estimates can be used to budget payments to you.

Your prompt compliance will insure that the work is carried out in a forthright and complete manner. Feel free to contact me if you have any comments or questions.

Very truly yours,

DuBOIS & KING, INC.

John J. Bilotta, P.E.
Resident Engineer

JJB/kln
cc: Robert Finucane

12/27/83

Denton - 4 change orders to go over.

9 AM Wed 28

Denton, Godfrey, Fravel & Billotta

1 Seep collars
2 Class B Cone) questions
3 Price of pipe OK
4) Comp data change OK

Gath end Feb

P.2

Fred,

Sylvia Called;

Silver Lake Dam Showing

set for 8/26 10-12 Noon

Bid opens 9/2

Bob F

8/18

DuBOIS & KING, INC.
Engineering * Planning
Development * Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376 & 3377

LETTER OF TRANSMITTAL

DATE	JOB NO.
Nov 23, 1983	2933D

ATTENTION: Robt Finucane

RE: Silver Lake Dam
Construction Schedule

TO Agency of Environ. Conservation
Department of Water Resources
Montpelier, VT

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	11/23/83	SL9	Project work schedule.

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS This is the accepted schedule, a copy of which was given to you and to Mr. Alvin Fretz, of the Town on Barnard, on Thursday (11/17/83).

COPY TO Town of Barnard
R. R. Godfrey

SIGNED: John Bilotta

PRODUCT 240-3 NEBS Inc., Groton, Mass. 01471.

If enclosures are not as noted, kindly notify us at once.

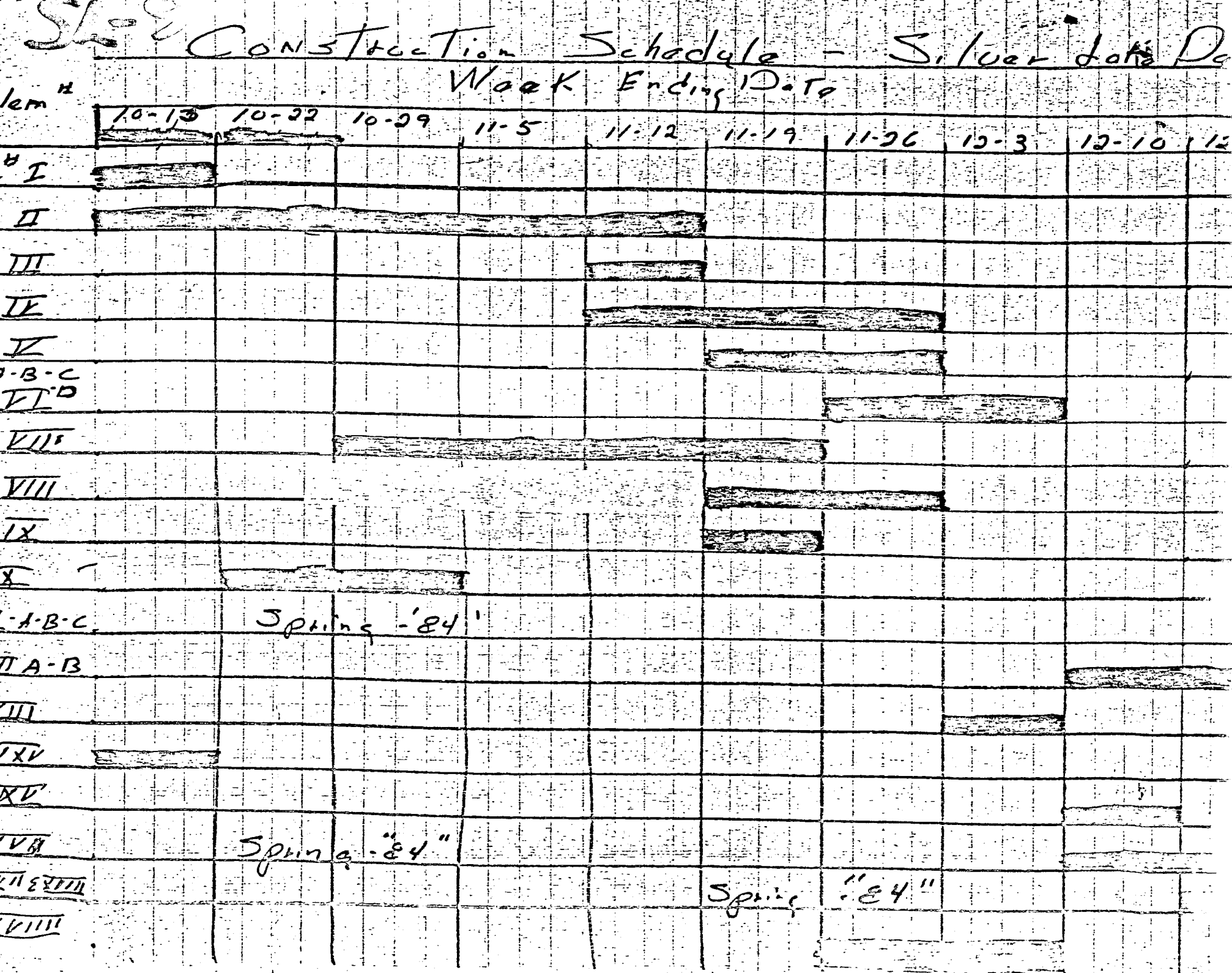
1. C.I. Gate : This year
2. Observ. Well : next year
3 Schedule delayed

11/23/83

Sh-8

Construction Schedule - Silver Lake Dr

Week Ending Date



November 22, 1983

Mr. John Billotta
DuBois & King, Inc.
P.O. Box 339
Randolph, Vermont 05060

Re: Silver Lake Dam
Reconstruction - Barnard,
Vermont

Dear John,

This letter designates John Guilmette as the State's representative during my absence from November 22, 1983 to November 29, 1983. I have a number of additional questions and notes which are listed below:

1. Are the seep collars and the pipe-wall connection to be paid for under item 9 (pipe) or item 12 (miscellaneous concrete)?

2. How is the slush grouting of the stone to be paid for? A Class A or at a price to be negotiated? Will additional material requirements, for example reduced aggregate size or super-plasticizer, be required.

3. Under the terms of our contract with DuBois & King, you are responsible for processing change orders to the point of final approval. You should prepare change orders for the change in the pipe material and pipe-wall connection scheme, seep collar detail changes, change in completion date and so on.

4. The contractor states that he may seek the approval of the selectmen to close the road through the work area for a period of several days in order to facilitate the installation of the low level outlet. If so, a change order should be prepared for this work and approvals obtained and verified by you from the selectmen and the State Highway Department. If this proposal is approved by the town and the highway department, we, as owner, have no objection to closing the road for a period of two or three days.

Thank you.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, P.E.
Chief of Operations

Memo to: The File

From: Robert B Finucane P.E.

Subject: Meeting of 11-4-83 on Silver Lake Dam

At 12:30Pm I met with Russ Snow, Bob Wernekce, John Billotta, and Steve McKenzie to discuss their Problems with this Project. They stated that they "hadn't been lucky" in getting the contractor to comply with their requests and requirements. They list the contractor's failure to submit a Plan for construction, failure to submit a schedule, failure to take advantage of favorable weather, and failure to make formal submittals of materiels ProPosed for use in the construction.

Russ asked if they had made a written request for these things. The consultant said that the requests had been made at the time of the Preconstruction conference and that a written request for aschedule had been made two weeks ago.

I said that I felt that we had adequate authority to shut the Job down and maintain safe conditions overwinter if necessary. I said that, however, we felt that no alternative to successful completion of the job this year was acceptable to the State. I said that we expected D&K to see that specs were followed no matter how adverse the conditions.

At 1:00Pm, Bob Denton and Dick Godfrey showed uP. Mckenzie insisted that Denton Produce a schedule. Denton said he couldn't schedule until his submittals were aPProved. I asked what subittals were holding him uP and he said the lowlevel outlet PiPe was the Problem in Particular and that slowness in decision-making on the Part of D&K was the Problem in General. Denton, Wernecke and Billotta then threshed out the tale of the non-conforming RC PiPe in the Parking lot. Essentially, D&K kePt telling Denton that this tyPe of PiPe could be used under certain circumstances if Denton could show that it was OK. So Denton would try to show that it qualified, asking Griswold, and then hiring Knight Engineering.

During this meeting, McKenzie asked Denton if he was willing to give uP trying to qualify the PiPe. Denton said that as far as he was concerned it did qualify. McKenzie then asked me if I would, on his reccommendation, reject the PiPe in order to get things moving. I rejected the PiPe and suggested using Ductile Iron. Later in the meeting, We found we could get delivery on Possibly usable DI PiPe in a few days. Denton and D&K were going to look into it.

Godfrey said that, as an example of slowness on the Part of D&K to decide things, he had hit the dry stone wall behind the existing dam and had requested instructions from Billotta but hadn't recieved any guidance. Later in the meeting is was agreed that Godfrey anbd Billotta would meet onsite on Saturday to decide what to do.

Godfrey said as a further example of problems with D&K, that Billotta had held him up on the jobsite for 5 hours earlier this week while fooling around with compaction testing. Denton

said that in order to make progress they needed to know the results of compaction testing faster. I reviewed the groundrules for getting testing services from hiway.

I told Denton that if he could get good delivery on the DI pipe and if it was more expensive than the PCCP speced, the state would pay all or part of the difference.

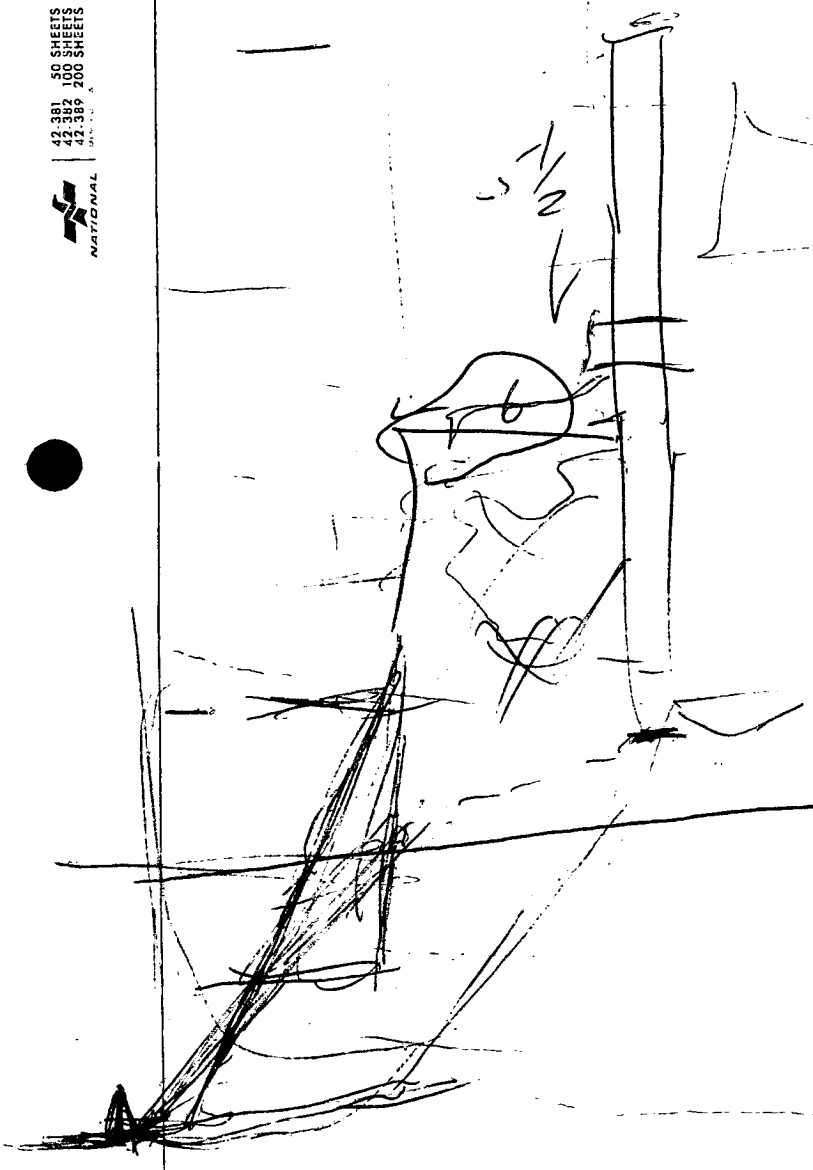
I asked about moving the garage and Denton and Godfrey agreed that it would be best to have Webster move it on account of the was less likely to aggravate the Hirschlands.s

Mtg 11-4-83

Agenda

I need To know pipe

bottom level excavation concrete



faster compaction cardiol

construction plan

pit visit

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

SL-9 Construction Schedule - Silver Lake Dam

Week Ending Date

Item	10-15	10-22	10-29	11-5	11-12	11-19	11-26	12-3	12-10	12-17
I										
II										
III										
IV										
V A-B-C										
VI D										
VII										
VIII										
IX										
X										
XI A-B-C			Spring - '84							
XII A-B										
XIII										
XIV										
XV										
XVI			Spring - '84"							
XVII & XVIII						Spring - '84"				
XVIIII										

DENTON CONSTRUCTION CORP.

1504 HEDGEMAN AVENUE · WINOOSKI, VERMONT 05404 · (802) 655-3612

Agency of Environmental Conservation
Department of Water Resources and Env. Eng.
State Office Buildings
Montpelier, Vermont 05602
Atn: Mr. Robert B. Finucane, P. E.
Facilities Engineer

November 11, 1983

RE: Project #16372-9 Silver Lake Dam Contract #12679C

Dear Mr. Finucane:

We are writing to advise you that we cannot accept the proposed change order #1 dated Nov. 8, 1983 (enclosed unsigned) until such time as we receive detailed drawings from the engineer. We are unable to discern, at this time, exactly what the proposed joining entails.

Very Truly Yours,

Robert D. Denton
President

enc. change order

AGENCY OF ENVIRONMENTAL CONSERVATION
DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING
FACILITIES ENGINEERING

CHANGE ORDER # 1 Dated 11-8-83

Project # 16372-9 Contract # 12679C

Project Silver Lake Dam Owner Water Resources

Contractor Bob Denton Contract Date

Contract for Dam Repair

To: Bob Denton Contractor

You are directed to make the changes noted below in the subject contract:

Owner By

Date 11-8-83

Nature of the Change:
~~Dep~~ Provide and install Ductile Iron Class 52 30" dia pipe for low level outlet instead of PCC Pipe specified. All other provisions of specs relating to installation are unchanged except that the pipe shall be joined to the cutoff wall as directed by the engineer at no extra charge

~~Enclosures~~: no enclosures

The changes result in the following adjustment of Contract Price and Contract Time:

Contract Price Prior to this Change Order	$	95,280.00
Net (Increase)(Decrease) Resulting from this Change Order	$	3150.00
Current Contract Price Including this Change Order	$	98,430.00

Contract Time Prior to this Change Order	Calendar Days
Net (Increase)(Decrease) Resulting from this Change Order	Calendar Days
Current Contract Time Including this Change Order	Calendar Days

The Above Changes are Approved:

Engineer

By

Date

Contractor

By

Date

SILVER LAKE

11/3/83
RH Snow

D&K – Meet 12:30

Comp Date:
Spec – Oct 15 1983
"Order" – given to April 15 1984

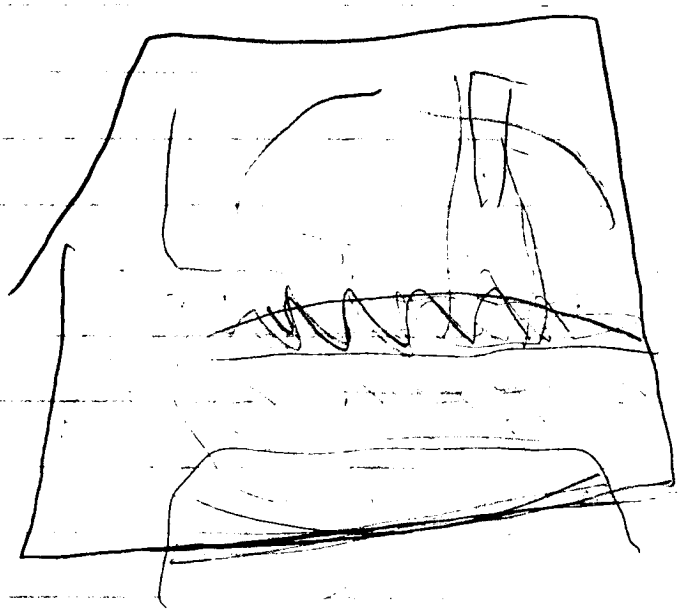
D&K
Agreement of Const Svs till June 30 84
includes winter shut down

Contract
~~Oct~~ Bid opened Sept 2 83
Contract with Denton dated Sept 26 83
includes 90 working days.
Pre-const conference – Sept 19 83

1) Obvious can't complete by Oct 15.
Notes of pre-const do not address
new comp schedule agreed to
with contractor, if any, nor any
discussion about.

2) First notes from D&K inspector dated
Oct 25 – is this when contractor
moved in.

3) 90 working days from Sept 26 (contract
with Denton is ± Jan 27 1984!
∴ Obvious contractor was not
considering the fall completion
∴ How will shut down for winter & keep integrity?



TELEPHONE MESSAGE

While you were out -

To: Bob Finnegan

Mr./Mrs.: Hirschland

Of:

Date: 10/20 | Time: 8:15

Phone No.: 234-9703 | Extension:

- [x] PLEASE CALL
- [ ] CALLED TO SEE YOU
- [x] TELEPHONED
- [ ] WANTS TO SEE YOU
- [ ] WILL CALL AGAIN
- [ ] WISHES AN APPOINTMENT

MESSAGE:

Re Silver Lake

Dam Project

1 days warning of move.

PERSON WHO TOOK MESSAGE

AA-PUR-106

11:30

John Dillota – Bob to process a change order to move garage

Nothing in contract now – administration

Need initiating paperwork – terms, & etc. for D & K to move on.

10/18

Fred

Mr Hirshland

3) about noon

220 D&K

(map) he

Hall

but somewhat

Hirshland Tod

** Diana

48'- 20'

John



Source for PCCP - Collars & pads
~~exactly~~ GHA
Lock 10, Lt
George Bianco
203-666-5110
¿Collar?

Silver Lake Dam
Preconstruction conference notes

0. Intro persons attending
1. important to start ASAP soon!
2. spoil & stockpile @ State Park
   4570 combination lock
   clean up, well & fix roads
   sand pad in culvert & draw
3. Hirschland Property
   clean up - get photos
   save Tree - in general - specific
   stay away from SS wall
4. Hirschland Garage
   outline proposed move
   costing - $500 limit -
Barranco Permit
To
Denton
Bid sheet
To
Lorraine
5. Payment
   monthly percent completion less retainage
6. Submission, certificates & substitutions
   insurance bond
   borrow materials
   granular & embankment
   riprap source
   shop drawing pccp, sluice
   roads
   signs
7. Written change orders

JST
9/19/85

AGENCY OF
ENVIRONMENTAL
CONSERVATION
MONTPELIER

AGENCY MEMORANDUM

SUBJECT

SILVER LAKE DAM

TO:

FROM:

DATE: AUGUST 26, 1983

AEC 5M 1-73

STATE OF VERMONT

DIVISION OF PURCHASING
AGENCY OF ADMINISTRATION
STATE ADMINISTRATION BUILDING
MONTPELIER, VERMONT 05602-2502
802-828-2211

September 12, 1983

Denton Construction Corporation
1715 Hedgeman Avenue
Winooski, VT 05404

Subject: State of Vermont Proposal R-812 - Reconstruction of Silver Lake Dam, Barnard, VT

Gentlemen:

You may consider this letter an indication of our intent to contract with your company for subject project. Such contract will be in conformity with State of Vermont Proposal dated August 19, 1983, and your bid in the amount of $95,280.00 which was publicly opened and read on September 2, 1983, at 11:00 a.m.

In accordance with the requirements of our proposal, enclosed you will find the necessary Performance and Payment bond forms, Certificate as to Corporate Principal and Instruction sheet. Please be advised that our contract will be written upon receipt of said bonds, and certificate of insurance as outlined in General Specifications.

Anything you may do to expedite the submission of these prerequisites, would be greatly appreciated.

Very truly yours,

David G. Carron
Purchasing Agent

DGC/sz
Enc.

cc: Mr. Robert B. Finucane, Facilities Engineer

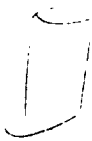
9-2-83

Dear Brian,

95%

4 minutes - paperwork

necessary



Proctor sample

MEMORANDUM

TO: Dave Carron, Purchasing

FROM: Robert B. Finucane, Facilities Engineer

DATE: September 2, 1983

SUBJECT: Silver Lake Dam, Barnard, VT

Please award the contract for reconstruction of Silver Lake Dam to the apparent low bidder:

Denton Construction Corp.
1715 Hegeman Ave.
Winooski, VT 05404

The contract amount is $95,280.00.

Thank you.

RBF/vjb

cc: LaRosa
Barranco
Bob Wernecke
DuBois & King
Box 339
Randolph, VT 05060

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

29330
Janaury 9, 1984

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Reconstruction
Ongoing Construction Activities

Dear Bob:

On Thursday, January 5, 1984 you and I met with Mr. R. Denton and Mr. R. Godfrey at the referenced construction site. At that time we discussed several items, and I would like your confirmation of the facts. The items discussed included the corrugated metal pipe joints, the use of a non-shrink grout and installation of the sluice gate.

The connecting bands for the 36" asphalt coated, corrugated, galvanized metal pipe are the one-piece type. Each connecting band will have a neoprene gasket, spanning both pipe sections, between the pipes and the connecting band. The connection will be secured by four rods and lugs as shown in the detail furnished with the specifications (see attached figure 6-22).

Since the winter weather is upon us, we have recommended that the contractor utilize a grout designed for use at low temperature. When installing the sluice gate, the epoxy grout needs to be capable of transferring the structural loads. An example of this type of grout is DURALITH(R) as described in attached page 2. It is also recommended that other grouts be non-shrink and able to be used at low temperature. The materials to be bonded should be pre-heated to above the manufacturer's recommendation (in the case of DURALITH(R), 30°F) by mechanical means before application of the grout.

Two parameters concerning the sluice gate installation were also discussed at that time. Since the parts for the gate will not be delivered until February 24, the Contractor has scheduled to begin the installation procedure on or about February 27, 1984. We also agreed to raise the bottom elevation of the gate two feet to facilitate installation. In response to this item, I have called Rodney Hunt Company and informed them of these changes which will require a shorter operating rod. They will send a revised drawing to Denton for approval.

In addition, it is my understanding that you have begun negotiations with the contractor for several items that would be included in a second change order. Included therein would be extension of two culverts downstream on the left abutment and furnishing stoplogs.

Your confirmation of these items will be greatly appreciated.

Very truly yours,

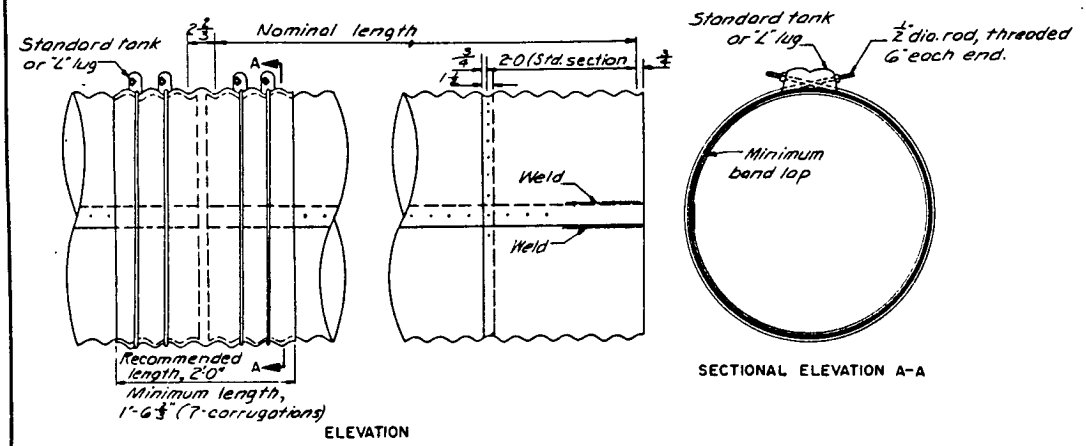
DuBois & King, Inc.

John J. Bilotta

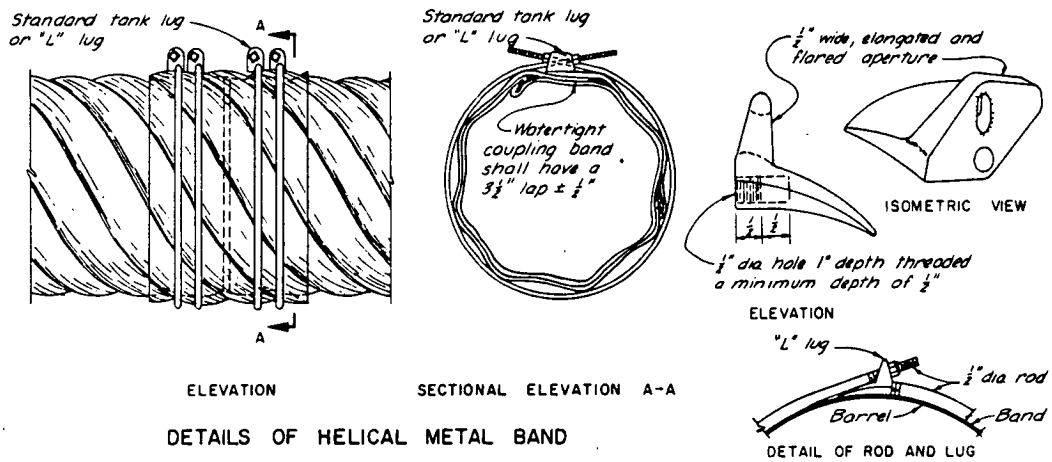
John J. Bilotta, P.E.
Resident Engineer

JJB/pal
Enclosures

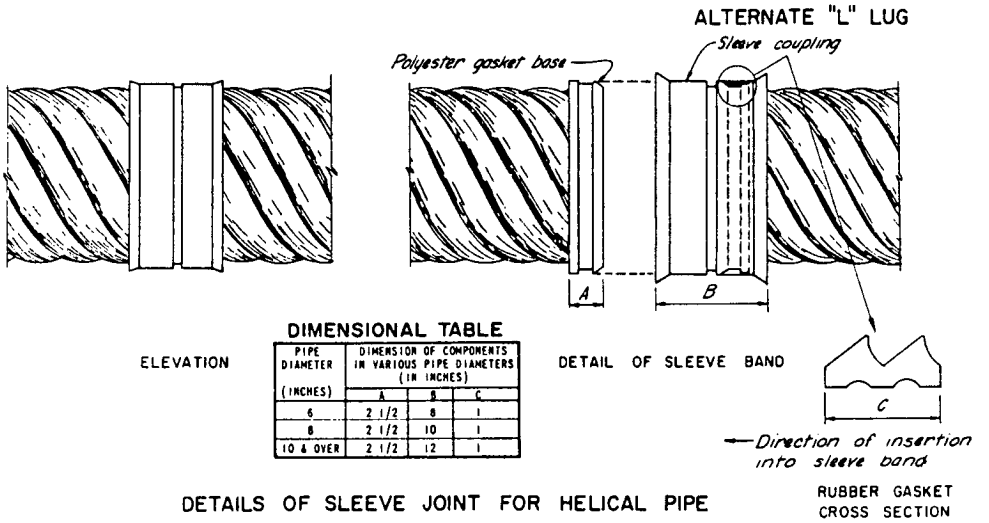
cc: R. Denton
R. Godfrey



DETAILS OF WATERTIGHT COUPLING BAND FOR C.M. PIPE



DETAILS OF HELICAL METAL BAND



DIMENSIONAL TABLE

PIPE DIAMETER (INCHES)	DIMENSION OF COMPONENTS IN VARIOUS PIPE DIAMETERS (IN INCHES)		
	A	B	C
6	2 1/2	8	1
8	2 1/2	10	1
10 & OVER	2 1/2	12	1

DETAILS OF SLEEVE JOINT FOR HELICAL PIPE

DETAILS OF WATERTIGHT COUPLING BANDS FOR HELICAL METAL PIPE

Figure 6-22 Appurtenances for metal pipe drop inlets
(sheet 3 of 3)

DURAL 109: Bonding compound recommended for use as an adhesive for gunite (pneumatically placed concrete) to old or existing concrete or steel. Can be applied by spraying.
Two-component epoxy.

FLOORING

DURAGROUT: Tile adhesive and cement.
Epoxy. Water base.

DURALCAST: Terrazzo binder. Thin-set epoxy. Conforms to N.T.M.A. specifications.
Two-component, 100% solids.

DURALCAST-M: Water base epoxy thin-set terrazzo binder. High strength, chemical resistant. Can be applied on freshly poured concrete structural slabs to yield a monolithic floor.
No waiting time is necessary when DURALCAST-M is applied on new concrete subfloors.

DURALCAST CONDUCTIVE: Conductive terrazzo binder. Thin set epoxy. Conforms to N.T.M.A. specifications.
Two-component, 100% solids.

DURALDECK: (See DURALDECK under MEMBRANE WATERPROOFING).

DURALGUARD: Water-base epoxy flooring system. High strength, chemical resistant, recommended for use in chemical processing plants, food processing plants, bakeries, sewage treatment plants, laboratories, institutional kitchens, and locker shower rooms.

DURALTEX: Epoxy binder used in DURALTEX floor coatings and overlays.

STRUCTURAL ADHESIVES AND OVERLAYS & PATCHING

DURALCRETE: Epoxy adhesive and mortar binder recommended for bonding and patching of structural concrete especially when load transfer is required. Also used for pressure grouting. Designed for use at temperatures above 45°F.
Two-component, 100% solids, high-strength, high modulus, moisture-insensitive epoxy.

DURALCRETE GEL: A non-sag variation of DURALCRETE recommended for use on vertical and overhead repairs of structural concrete.

DURALGUARD MODIFIER–E: Epoxy cement concrete and cement mortar additive. DURALGUARD MODIFIER–E concrete and mortars are resistant to chloride and water penetration and they exhibit higher flexural, tensile, and compressive strengths.
Recommended for use on bridge deck overlays, concrete overlays, and grouting applications.

DURALITH: Epoxy adhesive and mortar binder recommended for bonding, grouting, and patching of structural concrete members, when load transfer is required. Designed for use at low temperatures (as low as 30°F) or when high early strengths are required.
Two-component, 100% solids, high-strength, high-modulus, moisture-insensitive epoxy.

DURALITH GEL: A non-sag variation of DURALITH recommended for use on vertical and overhead repairs of structural concrete.

FLEXOCRETE: Mortar binder recommended for concrete patching and concrete or steel deck overlays and other repairs, when resistance to thermal and mechanical movement is needed. Designed for use at temperatures above 45°F. Also used for pressure grouting where movement is anticipated. Two-component, 100% solids, flexible, low-modulus, stress-relieving, moisture-insensitive epoxy.

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

29330
January 9, 1984

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Construction Progress Report

Dear Pete:

Here is a summary of the progress on the dam to bring you up to date on the construction activities. Work performed during the period beginning November 21, 1983 and ending December 31, 1983, is described in the following narrative.

During this period, the subcontractor, R.R. Godfrey, finished removing all the old embankment, timbers and service spillway pipe. The subcontractor opened a borrow pit of acceptable till material in the state park adjacent to the parking lot. This material, along with drier reclaimed till from original dam were used to reconstruct the dam.

Ducitle Iron pipe (30" diameter) was substituted for the 30" reinforced concrete pressure pipe. The first section was cast-in-place with 36 cubic yards of Class A concrete and the face of the rock wall was fortified with 45 cubic yards of Class B concrete. Two anti-seep collars were installed, one each on the second and third sections of pipe. Each anti-seep collar was reinforced with number 4 bars on 12-inch centers each way.

The downstream face and apron were protected with a sand and gravel blanket, riprap filter and three to six feet of riprap.

During this time frame, the subcontractor was plagued with adverse working conditions attributable to arctic-like weather. Snow, freezing rain and sub-zero temperatures combined to cause equipment failures and deep frost penetration. In the last week of December, two to three feet of frozen ground were removed before the subcontractor could place fill.

There were two instances of heavy flow through the 30" conduit during this period. On December 14th, a combination of rain and snowmelt caused the lake level to rise and breach the upstream cofferdam. Significant erosion occured at the area near the downstream toe. After the water subsided, the area was stripped, filled with granular material and the riprap was replaced and properly set. The second instance occured on December 28th when the subcontractor intentionally breached the upstream cofferdam. That time no noticable damage was done to the riprap, but an eddy occured about 30 feet downstream of the toe. There was severe bank erosion at that point. On both occasions the maximum flow is estimated to have been between 60 and 75 cubic feet per second.

The 24" x 36" sluice gate will be installed at a slightly higher elevation than that of the design drawings. The sill of the sluice gate has been raised two feet to facilitate installation procedures. This change will not affect the hydraulic capacity of the low-level outlet since the original design calculations indicate that the barrel controls the rate of flow. Above elevation 1304 NGVD, flow through the low-level outlet is controlled by outlet conditions and the length of the pipe (see attached figure).

Should you have any comments or questions, feel free to call me and discuss them.

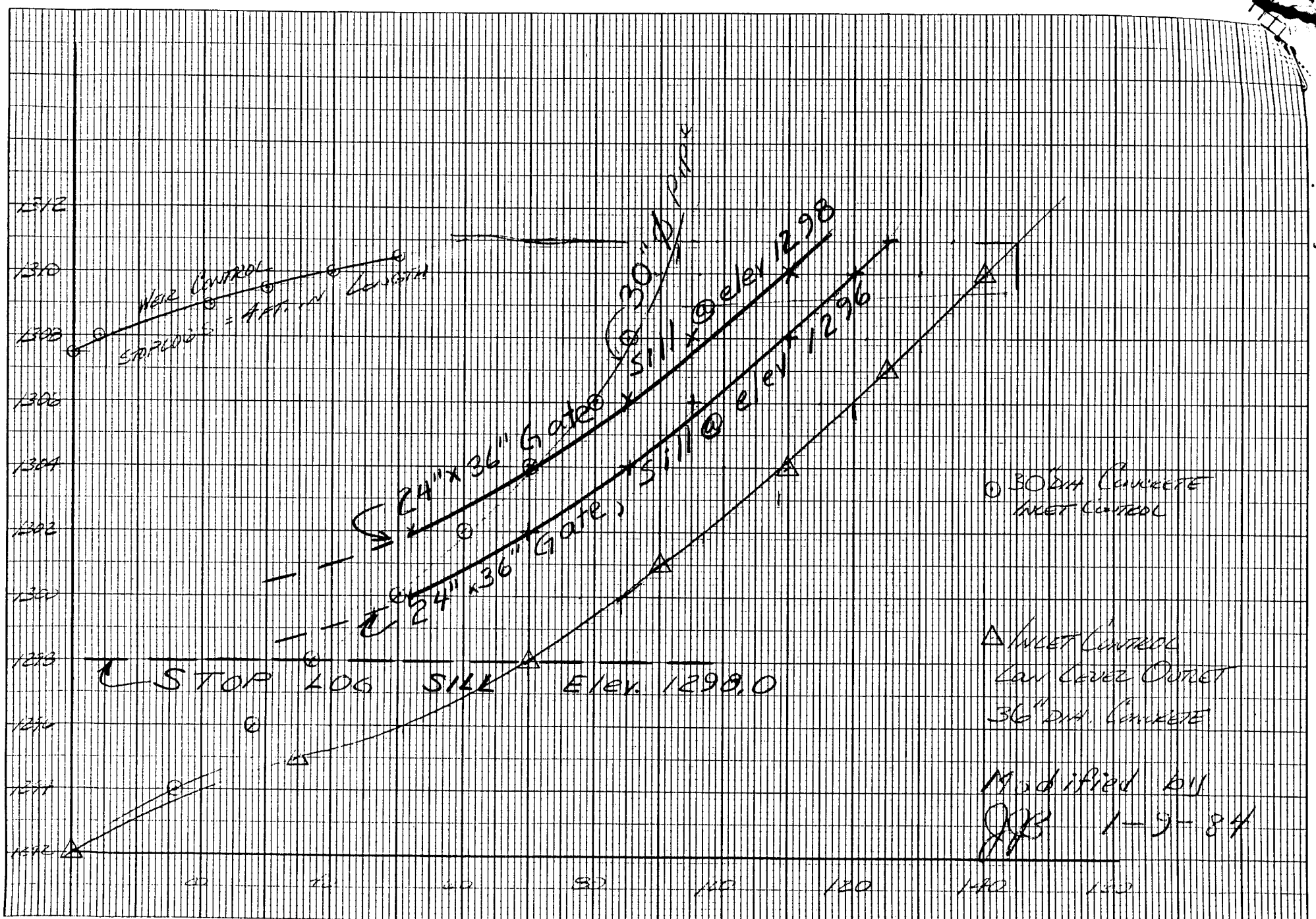
Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/pal
Enclosure

cc: Mr. Robert Finucane


Weir Control
Spillway = 444.4 m³
Low Level
24" x 36" Gates @ Sill @ elev 1298
30" R/C Pipe
24" x 36" Gates, Sill @ elev 1296
30cm Concrete Inlet Control
Inlet Control Low Level Outlet 36" Dia. Concrete
Modified by JKS 1-9-84
STOP LOG SILL Elev. 1298.0
1312
1310
1308
1306
1304
1302
1300
1298
1296
1294
1292
40
80
120
160

14 x 17

area - state park

+ signs

cofferdam after sluice

- cleanup beach

culvert 1/2 sections downstream

emergency spillway and

+ let inlets.

Memo To File

From RBF

Subject: Silver Dam

On 1/31/84 I spoke to Bob Wernecke in AK - worried about RG finishing on-time for Spring Runoff, grouting, lake levels.

Also adjust bill by credit note, ? contract - according to Tucky at AG's

What records to send daily summary plus weekly summary - confidentiality?

Spoke to RG - reluctant to restart - will call back - Rumble on-site ✱ directions unclear balance order due 2/27. Upper pipes - "I'm sure low level outlet will handle runoff."

Galvanizing - Boston

Plank + Culverts underway

90' 30' Class IV RCP #2 ✱ - no.

Telecom Billing Concepts 1/11/84

- not working -

- closing up -

- contractor, selection, how to remove it - D+K -

- go over bill from D+K

Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

TO Ralf Files

DUBOIS & KING, INC.
FILE 29351 SUBJ. Constr
FEB 15 1984
REF'D. TO _____ ACK. BY _____
ANS. BY _____ NOTED _____

2-15-84 | 29351

PROJECT: Silver Lake Dam
LOCATION: Barnard, VT
CONTRACTOR: Denton | OWNER: State
WEATHER: Raining | TEMP. 35 °at 11 AM °at PM
PRESENT AT SITE: 2 workers: Paul & Jack

THE FOLLOWING WAS NOTED:

1. There were saw cuts and a working platform on the north side (outside) of the intake chamber. However, there were no workers at the dam site.

2. Two workers were present at the stockpile area in the state park parking lot. They were loading concrete culvert pipe onto a flatbed truck with a backhoe that wasn't powerful enough to pick up the pipe.

3. We will get together tomorrow morning (Thurs) to ascertain measurements of the thimble position.

COPIES TO _____

FIELD REPORT

SIGNED Ralf Files

Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

TO R. Willey FILE

DuBOIS & KING, INC.
FILE 20330 SUBJ. CODE
FEB 27 1984
RECD. TO ____ ACK. BY ____
ANS. BY ____ NOTED ____

DATE 2-21-84	JOB NO. [illegible]
PROJECT SILVER LAKE	
LOCATION BARNARD, VT	
CONTRACTOR DENTON	OWNER STATE
WEATHER SUNNY	TEMP. 30 °at 11 AM °at PM
PRESENT AT SITE No Activity	

THE FOLLOWING WAS NOTED:

VISITED THE SITE TO TAKE SOME PICTURES AND MEASURE THE OPENING

THE HOLE WAS 34 inches WIDE AND 44 INCHES HIGH. SINCE THE OUTSIDE DIMENSION OF THE FLANGE IS 11½ inches (5¾ inches per side) GREATER THAN THE NOMINAL SIZE (24" x 36"), THE HEIGHT APPEARS TO BE SHY OF THE REQUIRED AMOUNT. THE HOLE SHOULD BE A MINIMUM OF 35" x 47" plus a WORKING TOLERANCE.

THE HOLE IS ON THE NORTH SIDE OF THE INTAKE CHAMBER. IT IS 34½" from the upstream EDGE AND 28" from the wall

- OUTFALL STILL PROTECTED BY ½ CMP
- THE EMERGENCY SPILLWAY PIPES ARE STILL NOT GROUTED. THERE APPEARS TO BE A SMALL AMOUNT OF PATCH CONCRETE STUFFED INTO THE ANULAR SPACE BUT IT DOES NOT APPEAR TO BE WELL BONDED
- THE RIPRAP ON THE FRONT FACE APPEARS UNEVEN. THAT MAY BE THE RESULT OF EITHER SETTLEMENT OR FROST ACTION.

COPIES TO ____

FIELD REPORT

SIGNED J. A. Sidlauskas

Engineering • Planning • Development • agement
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

TO R&W, Files

2-87 | 2933'

PROJECT Silver Lake Dam

LOCATION Barnard. VT

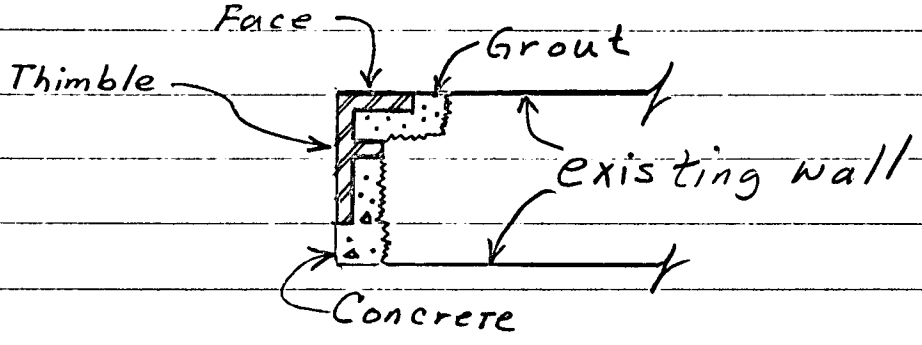
CONTRACTOR Danton | OWNER

WEATHER n.a. | TEMP. ° at AM ° at PM

PRESENT AT SITE TELECON w/ Dick Godfrey

THE FOLLOWING WAS NOTED:

GODFREY HAS DECIDED TO CUT THE HOLE FOR THE SLUICE GATE THIMBLE ON MONDAY (2-13-84). HIS APPROACH IS TO SAW A HOLE ONLY BIG ENOUGH TO ~~PLACE~~ INSERT THE SMALL PART OF THE F-SHAPED THIMBLE IN THE WALL. HE WILL PLACE CONCRETE FROM THE INSIDE OF THE SMALL PART OF THE "F" TO THE INSIDE FACE OF THE WALL. AFTER THAT SETS, HE WILL GROUT AROUND THE INSIDE OF THE FACE PLATE.



COPIES TO

FIELD REPORT

SIGNED J. M. Bilotta

Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 2-16-84 | JOB NO. 2051

PROJECT Silver Lake Dam

LOCATION Barnard, VT

CONTRACTOR Denton | OWNER State

WEATHER Sunny | TEMP. 45 °at 11 AM °at PM

PRESENT AT SITE Two workers Paul & Dan

TO R&W, Files

DUBOIS & KING, INC.
FILE SUBJ
FEB 16 1984
REPD. TO ACK. BY
ANS BY NOTED

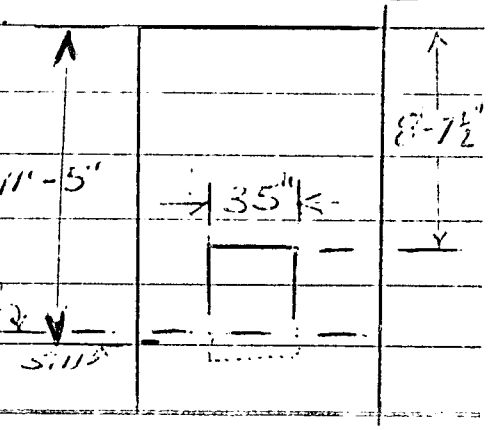
THE FOLLOWING WAS NOTED:

1. Loaded and hauled away seven (7) sections of Reinforced Concrete Culvert pipe. Three (3) sections were still in the yard at the parking lot.

2. Lake appears to be several inches higher than yesterday. However, outflow is still low (estimated to be 3 cfs ±)

3 Measurement of opening, are 35 inches wide, and 8'-7½" down to top of concrete from top of chamber (elevation 1310). It appears to be centered on the north wall. Paul said that they have made ¼" deep scratches, and he thinks they did not run into any steel.

The sill of the slop logs is 11'-5" below the top. Thus the gate will be about 7" lower than the sill.



COPIES TO

FIELD REPORT

SIGNED

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

29930
March 21, 1984

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Reconstruction - Spring Runoff Condition

Dear Bob:

I spoke with Richard Godfrey on March 19, 1984 to discuss his proposed schedule for installing the new low level outlet gate, removal of the coffer-dam, cleaning up the beach area, and to stress the need for getting this work done prior to spring runoff which could begin almost any day now.

The purpose of this letter is to document our concern with the potential consequences if this work is not accomplished immediately. Briefly stated, if the lake is kept drawn down too long there may be insufficient spring runoff left to fill the lake for the recreational season. Alternatively, if the lake is permitted fill (and there may be no choice) before the gate is installed and the clean up is accomplished, it may be necessary to draw it down again to finish this work.

It is our understanding that neither of these conditions are acceptable to the State. However, we believe the risk is great. Therefore, we suggest a meeting on site with the contractor as soon as possible to discuss the measures that should be taken to minimize this risk. I suggest this Friday, March 23, 1984 and will attempt to make arrangements for such a meeting by telephone.

Very truly yours,

DuBois & King, Inc.

Robert J. Wernecke

Robert J. Wernecke, P.E.
Senior Project Manager

RJW/pal
cc: Robert Denton
Richard Godfrey
A. Peter Barranco

Dubois & King, Inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

29330
March 20, 1984

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Construction Progress Report

Dear Pete:

We are furnishing information relative to construction progress during the winter. For the most part, weather has prevented the construction from making any substantial progress. However, some work has been performed, and in accordance with special conditions No. 2 of the permit, we are furnishing this combined report.

In the two week period from January 1 to January 14, 1984, the contractor installed the four corrugated metal emergency spillway pipes. In addition, some riprap was placed at the downstream edge of the emergency spillway.

During the two week period from January 15 to January 28, 1984, no work was performed. The thimble for the gate was delivered and stored in the town garage.

During the two week period between January 29 and February 11, 1984, no work was performed.

During the two week period from February 12 to February 25, 1984, the sub-contractor cut a 34-inch wide by 44-inch high hole in the side of the intake chamber. Some culvert pipe was removed from the state parking lot - construction storage area.

During the two week period between February 26 and March 10, 1984, no work was performed. The sluice gate was delivered and stored in the town garage.

Copies of our notes and our daily field reports are attached for your information.

Special Condition No. 3 states that "construction shall be completed by April 15, 1984". It is our estimate that the contractor will not be completed until May 26, 1984. We look for your guidance in obtaining an extension of the construction completion date.

We expect the subcontractor to begin earnstly working to complete the construction during the next week. We will keep you informed of his progress.

Should you have any comments or questions, feel free to call me and discuss them.

Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/pal
Enclosure

cc: Mr. Robert Finucane

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

29330
October 31, 1983

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
Environmental Engineering Division
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Reconstruction Project
Progress Report

Dear Bob:

I am writing to summarize our site meeting of October 26, 1983 and to emphasize our serious concerns regarding the project progress and contractor performance. Areas of concern are as follows:

1. Progress: There has been a significant lack of progress which we perceive to be the result of poor planning, lack of proper direction and supervision by the prime contractor, and insufficient man power and equipment.

2. Construction Schedule: Inspite of repeated requests for the contractor to submit a meaningful and reliable construction schedule, we have received none. Lack of a schedule prompts a concern on our part that the contractor has not thought out his construction approach, sequencing and time frame, nor given serious thought to the difficulty of completing the job before the winter season sets in.

3. Submittals: There has been a consistent failure of the contractor to forward submittals on a timely basis or to do so at all. Examples of significant submittals outstanding to date include the construction schedule, the dewatering procedure, additonal embankment samples and tests, and alternate outlet pipe to name a few.

4. Construction Supervision: There appears to be a lack of proper direction and supervision by the contractor to the subcontractor. We are concerned that the subcontractor is proceeding with lack of adequate direction from the contractor.

In addition there are deficiencies with the existing contract documents that must be rectified or addressed immediately by the State as Owner. These are as follows:

1. Completion Date: The completion date in the existing contract documents is past due. A revised, enforceable completion date must be established and added to the contract documents by a change order.

2. Liquidated damages: There is no provision in the contract documents to deal with default or non-performance on the part of the contractor, should it occur. The Owner must decide what to do and how he will deal with the contractor in this event.

3. Winter shut-down: As you know we are concerned that progress will not be sufficient to complete construction this winter. The Owner must address the possibility of a winter shut-down and what the ramifications will be from the perspective of protection of the work, project completion, and or contractor penalties, if any.

4. Construction Easements:, As you know, the construction limits do not extend beyond the States existing property line. It may be warranted to reconsider the practicality and/or necessity of the Owner quickly securing additional construction easements for the purpose of allowing the contractor to install the temporary cofferdam. We are currently reminding the contractor he has no permission to conduct his operations beyond the property line.

We strongly recommend that the Owner call a meeting with the contractor and engineer immediately to address these concerns with the contractor and to demand a substantive improvement in the contractors performance. Please advise us of your desires and intentions after you review this letter.

Very truly yours,

DuBOIS & KING, INC.

for Steven E. Mackenzie
Robert J. Wernecke, P.E.
Senior Project Manager

RJW/kln
cc: Fred Costello

DL
RF —

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

29330
Janaury 13, 1984

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Reconstruction
Seasonal Shut-down

Dear Bob:

The contractor is preparing to shut down for the winter season. It is our desire that several items are properly addressed before the contractor's forces and equipment are removed from the site. We discussed these items at our meeting on Thursday, January 12, 1984. In addition to ourselves, attendance at that meeting included A. Peter Barranco and Fred Costello of the Department of Water Resources and Roger Webster, a Selectman from the Town of Barnard.

The following is a summary of the points of discussion during the meeting:

1. All agreed that certain safety precautions shall be taken at the road across the dam. It was suggested that some barrier, more sturdy than what presently exists, should be placed before the subcontractor closes work for the season. For example, barrels filled with sand connected by a snow fence (to deny pedestrian access) on the lake side would be sufficient.

2. The emergency spillway pipes should be grouted as soon as possible, preferrably next week.

3. We prefer to have the cofferdam removal now. A small cofferdam near the gate construction combined with the installation of the stop logs should give the subcontractor the room he needs to complete gate construction.

4. The beach area should be cleaned up as soon as possible. Once the water level goes up the state doesn't want another drawdown, and it won't be acceptable to fix the beach then.

5. Erosion downstream (left bank behind the library, will be addressed in the spring after it can be viewed.

The contractor will be notified of these items so that he can comply.

Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/pal

cc: A.P. Barranco
Denton Construction Company
R.R. Godfrey & Sons

Fred:

Bob Finucane called.

Crew of 4 making average progress. Installing thimble for slide gate. Trying for a tight fit by grouting the annulus around ~~the~~ pipe.

RF will go directly there tomorrow

JD

2:30

3/21/84

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DUBOIS & KING, INC.
FILE
APR 10 1984
SENT TO
REC'D BY
NOTED

DATE 4/6/84 JOB NO 29331 ~~29330~~

Silver Lake Dam
Barnard, VT
Denton VT AEC
WEATHER Partially Sunny 40 AM 2 PM
PERSONS ON SITE Nobody

File, JFB

Water level had risen to within ± 1 ft of emergency pipe inverts. Store owner reported backhoe operator had left @ 1 PM.
It appears that some of the material from the cofferdam had been removed from the site and more had been excavated and stockpiled.
The low level outlet gate was opened slightly.

Geoff Ackerman

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DuBOIS & KING, INC.
FILE _____ SUBJ. _____
APR 05 1984
RFRD. TO _____ ACK. BY
ANS. BY _____ NOTED

File, JJB

DATE 4/5/84 JOB NO 29331
Silver Lake Dam
Barnard, VT
Denton VT AEC
WEATHER Raining TEMP 45° BY 1 AM PM
PRESENT AT SITE
Bob Finucane
Backhoe operator

FILE MAP WAS NOTED

Backhoe still removing cofferdam and stockpiling. Unable to get trucks close enough to load because of mud.

Gate closed. Lake level has ~~be~~ risen 4". Contractor had grouted wall above 30" Low level outlet pipe.



Backhoe operator will pull top 8" stop log before leaving to keep water from rising in area of excavation. They will be excavating again tomorrow.

Considerable oil reside & road dirt entering pond from road and parking lot.

Cofferdam material was still left on the north shore which should be removed.

Robert J Wendel

DuBOIS & KING, INC.
Engineering • Planning • Development • [illegible]gement
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 4/24/84 JOB NO 29331
PROJECT Silver Lake Dam
AT Barnard
FROM Denton TO VT, AEC
WEATHER Overcast TEMP 50 TIME 2 PM
PRESENT AT SITE Backhoe operator

IJB, File

DUBOIS & KING, INC.
RE 29330 STATE CONSTR
APR 04 1984
RPD. TO ACK. BY
BY NOTED

[illegible] NOTED

Stop logs had been placed to within two (2') feet of the emergency pipe inverts. Water was within 10" of going over stoplogs. Gate was still open to provide for minimum flow.

Backhoe operator was removing cofferdam from below water level and stockpiling. He indicated that they would be trucking the material away tomorrow. The cofferdam material was frozen and very difficult to excavate (breakup).

I requested the operator to put up fencing along the face of the dam before he left for the day and he indicated he would.

I recommended to Bob Finucane that we remove 8"-12" of stoplogs to prevent having to work below waterlevel. He will check condition and progress tomorrow and pull if necessary.

Robert J Wernecke

Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

DUBOIS & KING, INC.
FILE 29331 SUBJ. Constr.
MAR 29 1984
REF'D. TO _____ ACK. BY _____
ANS. BY _____ NOTED _____

TO Jeff, Files

DATE 3/29/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard, Vt	
CONTRACTOR Denton	OWNER State
WEATHER - Snow	TEMP. 20 °at 9 AM °at PM
PRESENT AT SITE no one	

THE FOLLOWING WAS NOTED:

The Rodney Hunt sluice gate as installed and it appears to be operational. The gate was open several inches at the bottom and there were four stop-logs in the lock slot. The stop logs appeared to impound the water level on the upstream side of the dam by 2 to 3 feet. The entire gate is submerged.

The water level had risen to almost the same level as the lake and was within one or two inches of going over the stop logs.

I took several photographs with my own personal camera.

There was very little volume removed from the upstream coffer dam, and the structure was substantially the same as it had been.

While I was gone I received a phone message for Godfrey. They said that the backhoe is broken, and Dick will call me this afternoon

COPIES TO _____

FIELD REPORT

SIGNED _____

DUBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

DATE Mar 26, 1984	JOB NO. 2933 1
PROJECT Silver Lake Dam	
LOCATION Barnard VT	
CONTRACTOR Denton	OWNER State
WEATHER Sunny	TEMP. ° at AM 40 ° at 3 PM
PRESENT AT SITE Bob Finucane Richard Godfrey	

TO R. M. Files

DUBOIS & KING, INC.
FILE 2933 1 SUBJ. Constr
MAR 26 1984
RECD. TO ____ ACK. BY ____
ANS. BY ____ NOTED ____

THE FOLLOWING WAS NOTED:

R R Godfrey installed the 24"x36" gate onto the thimble. He was forgoing the bolts at 2:45 pm. He drilled holes for the stem guide and the Operating stand bracket. He was having difficulties seating the anchor bolts in the holes and he had to drill oversize holes.

It looks like he will have the gate operational by tomorrow.

Bob Finucane stated that the parks department employees would begin making stop planks from No 1 White Pine on Thursday or Friday. The work will be performed by force account.

COPIES TO ____

FIELD REPORT

SIGNED John Zelotta

Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

DATE March 23, 1984 JOB NO. 2933/

PROJECT Silver Lake Dam

LOCATION Barnard, VT

CONTRACTOR Denton | OWNER State

WEATHER Overcast | TEMP. 40 °at 10 AM, 50 °at 3 PM

PRESENT AT SITE Bob Finucan, Richard Godfrey

TO RJN, Files

DUBOIS & KING, INC
FILE 2933/ SUBJ. Const.
MAR 23 1984
RCVD. TO _____ ACK. BY _____
INS. BY _____ NOTED _____

THE FOLLOWING WAS NOTED:

The subcontractor placed concrete around the thimble. Concrete was lowered to the work area in buckets and hand-placed (by pouring into the space between the concrete wall and the thimble. The concrete in the forms was worked with a rod to move it into all the spaces.)

I discussed Denton's latest payment request with Bob Finucane. He agreed to change the amt requested to reflect the 5% retainage and he would process the request. We amended it, processed it, and I gave the request to Bob Finucane for payment.

The forms were stripped from the outside face at 2:30 pm and the concrete (with admixtures) appeared to be in good condition. No honeycombing was noted. Also, Godfrey was grouting the face of the emergency spillway pipes - he was not able to grout the bottom of each pipe because of ice & snow.

COPIES TO N.B. The downstream face shall be inspected as soon as

FIELD REPORT

SIGNED John Colatta

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 3/22/84 JOB NO 29931

PROJECT Silver Lake Dam

LOCATION Barnard, VT

CONTACTED Denton INIT. AEC

WEATHER Overcast TEMP 40 DEG AM / PM

PRESENT AT SITE Robert Fiducane
Richard Godfrey

File, JTB

DUBOIS & KING, INC.
FILE 29330 SUBJ. Constr
MAR 22 1984
RET'D. TO _____ ACK. BY
ANS. BY _____ NOTED

FOLLOWING WAS NOTED

1 - 2:30 PM

Contractor was installing low level outlet gate thimble and forming for grouting. He proposes to pour his concrete around the gate 3/23/84, 8:30 AM, install the gate on 3/26/84 and begin clean up by excavating the coffer dam on 3/26 & 3/27. With any success, this line can begin filling 3/30/84.

He proposes to use insulation board to keep concrete warm over the weekend. He was instructed to not place any load on the gate until after 7 days. The insulation board is good.

Richard Godfrey

RECORD OF TELEPHONE CONVERSATION

PROJECT SILVER LAKE DAM RECONSTRUCTION
No. 29330
DATE 3-16-84
TIME 11:45 a.m.
WITH ROBERT DENTON (CONTRACTOR)
BY JOHN JB BILOTTA

Bob Denton requested payment for additional material on site. The Rodney Hunt cast iron sluice gate has been delivered and is housed in the town garage. He estimates that it was delivered on March 2nd. Cost is $4,231. He also mentioned a change order for additional stop planks.

I called Bob back later that afternoon to tell him that we normally would not process such a small invoice. However, if he would submit an invoice for that amount, we would go ahead and process it.
He thanked me, said he would submit a revised invoice, and mentioned that he could get #1 pine for stop planks from a mill in Massachusetts.

JB

29330
April 8, 1984

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam Construction Progress Report

Dear Pete:

During the past two weeks the contractor has made excellent progress installing the sluice gate. Approximately two feet of stop logs have been installed, and the water level behind the dam is now equal to that of the lake.

There is a considerable amount of excavation required to remove the cofferdam on the upstream side of the dam. Also, the site work, clean up, dresing of the riprap, observation wells, and road paving remain to be completed.

Inspectors reports are enclosed for your information.

Should you have any comments or questions, feel free to call me and discuss them.

Very truly yours,

DuBois & King, Inc.

John J. Bilotta, P.E.
Resident Engineer

JJB/pal

cc: Mr. Robert Finucane

M E M O R A N D U M

TO: Robert Wernecke, DuBois & King, Inc.

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: May 21, 1984

In a telephone conversation with Dick Godfrey earlier this week he said and I agreed that probably June 15 would be a better completion dae than May 31.

I have worked up the following partial list of things which still need to be done as follows:

1. Re-excavation of the portion of the dam crest which was too frozen to remove last winter, replacement and compaction.

2. Removal and placement of rip-rap and bedding in the critical areas, replacement.

3. Improve compaction of the dam crest in the area of the upstream face.

4. Install 30' culvert extensions on the highway culverts. Install the fire hydrant.

5. Finish placing material in the crest of the dam, pave, seed and mulch. Remove temporary guard rails. Install the guard rails.

6. Regrout the upstream end of the low level inlet where the existing grout was washed off by the sluice gate jet. The epoxy grout underneath should probably be chipped off to improve bonding.

In the park:

1. Grade off the spoil piles, finish clearing the parking lot and refilling the borrow holes. Seed and mulch.

2. Restore the parking lot to good condition, grading, gravel, ties, turf establishment.

3. Fix the water lines borken in the vicinity of borrow pit.

4. Replace the drain inlet grating in bay 3 of the parking lot, flush the drain system.

In order to assure timely completion of this job please coordinate with the Contractor to prepare a construction schedule. Also, please plan to attend a meeting with the Barnard Town Selectmen on May 29, 1984 at 8:00 A.M. at the Barnard Town Offices to discuss the construction schedule.

Thank you.

RBF:arm
CC: Reginald A. LaRosa, Chief of Operations
Dick Godfrey
R.R. Godfrey and Sons
Upperman Street
Morrisville, VT
6.3

Town of Barnard, Vermont

Chartered July 17, 1761

Barnard, Vermont 05031
(802) 234-9211

5/11/84

Mr. Reginald LaRosa
Div. of Enviromental Engineering
81 River Street
Montpelier, Vermont 05602

Dear Mr. LaRosa:

The subject of this letter is the construction progress of the Silver Lake Dam, Barnard, Vermont.

As you are aware the dam was opened for drain down early in Sept. 1983 with completion scheduled for mid Nov. 1983. As of this date the work is incomplete. This translates in my book to a 6 month delay.

The main reason for this letter is to get clarification on some reported problems related to the dam. They are:

* The removal and replacement of approximately 700 cu. yds. of rip-rap.
* The leak in the sluice gate valve.

We would like a meeting with you, in the Town Clerks office in Barnard, Vermont to clarify these and other problems along with a realistic completion schedule.

Our towns people are also concerned with our childrens safety. The Main Sluice Gate Valve Stem can easily be turned with a pipe wrench. If this is done a vortex would be created, a serious safety hazard. We have alerted Mr. Finucane to this problem and he indicated a locking device would be added to the valve stem.

In conclusion, let me say that we do not take lightly the shambles our town has been in since mid Sept. 1983 and we look for positive results from you before the 1984 summer season starts.

Hoping to hear from you very soon, I remain.

Sincerely

A.W. Fretz, Selectman

cc: R.B. Finucane

AA-PUR 307

STATE OF VERMONT

OFFICE MEMO

TO: Bob Finucane

FROM: Alvin Wolcott

DATE: June 4, 1984

SUBJECT: Construction Construction Corporation

- ☐ APPROVAL
- ☐ NOTE AND SEE ME
- ☒ PER CONVERSATION
- ☐ SIGNATURE
- ☐ NOTE AND RETURN
- ☐ AS REQUESTED
- ☐ COMMENT
- ☐ NOTE AND FILE
- ☐ NECESSARY ACTION
- ☐ REVIEW
- ☐ FOR YOUR INFORMATION
- ☐ GIVE ME THE FACTS
- ☐ PREPARE REPLY FOR MY SIGNATURE
- ☐ SUGGESTIONS REQUESTED
- ☐ YOUR ACTION REQUESTED BY THIS DATE

REMARKS:

Get a copy of the cancelled check! They got the money!

M E M O R A N D U M

TO: Reginald A. LaRosa, P.E., Chief of Operations

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: June 8, 1984

As of 12:00 Noon on Thursday, June 7, 1984, the status of this job is as follows:

1. Re-excavation of the dam crest, replacement and compaction. Promised June 8, 0% complete, expected to complete June 12.

2. Re-excavation and replacement of rip-rap and bedding in the critical areas, complete rip-rapping. Promised June 1, 80% complete, expected to complete June 12.

3. Compaction of dam crest. Promised June 8, 0% complete, expected to complete June 12.

4. Install culvert extensions and fire hydrant. Promised June 1, 30% complete, expected to complete June 12.

5. Final grade, pave, seed, mulch, guardrails. Promised June 15, 0% complete, expected to complete June 15.

6. Regrout low level inlet. Promised June 15, 0% complete, expected to complete June 19.

Work in the park is underway and is expected to be complete on June 22.

The lake level is 1,306.1.

Since our meeting with the Selectmen on May 29, the work has been delayed because of the rains of the last week of May. Operations at the dam site were closed down from 7:00 A.M. to 2:30 P.M. June 7 becuase we were unable to get rip-rap because the quarries were giving flood work priority.

RBF:arm
CC: Al Fretz, Barnard Selectman
R. Godfrey, R.R. Godfrey & Sons
Upper Main Street
Morrisville, VT

M E M O R A N D U M

TO: A. Peter Barranco, Jr., P.E., Dam Safety Engineer

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam - Barnard, Vermont

DATE: March 28, 1984

By Friday, March 30, 1984, I expect to be able to begin reservoir filling operations. As we discussed, it is necessary to begin filling before completion of the project in order to try to catch some spring runoff and ensure that the lake can be filled.

The structural portion of the dam is essentially complete. Some additional downstream rip-rap will be required. The low-level outlet pipe face grouting is scheduled this week. Much paving and clean up is still to be done. The fire hydrant pipe is plugged.

If I don't hear differently from you, I intend to raise the stoplogs to about Elev. ~~1,304~~ 1,304 (about 2' below the emergency spillway weir) this week and to Elev. 1,306 (normal summer pool) as soon as the downstream rip-rap work is complete.

Thank you.

RBF:arm
CC: Reginald A. LaRosa, Chief of Operations

6.2

M E M O R A N D U M

TO: Reginald A. LaRosa, P.E., Chief of Operations

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: June 8, 1984

As of 12:00 Noon on Thursday, June ~~7~~ 14, 1984, the status of this job is as follows:

1. Re-excavation of the dam crest, replacement and compaction. ~~Promised June 8, 0% complete, expected to complete June 12.~~ 100% complete 6/12

2. Re-excavation and replacement of rip-rap and bedding in the critical areas, complete rip-rapping. ~~Promised June 1, 80% complete, expected to complete June 12.~~ 100% complete 100% complete

3. ~~Compaction~~ of dam crest. Promised June 8, ~~0% complete~~, expected to complete June 12.

4. Install culvert extensions and fire hydrant. ~~Promised June 1, 30% complete, expected to complete June 12.~~ 100% complete

5. Final grade, pave, seed, mulch, guardrails. Promised June 15, ~~10~~ 0% complete, expected to complete June ~~15~~ 20. 20% complete

6. Regrout low level inlet. Promised June 15, 0% complete, expected to complete June 19.

Work in the park is underway and is expected to be complete on June 22.

The lake level is 1,306.1.

Since our meeting with the Selectmen on May 29, the work has been delayed because of the rains of the last week of May. Operations at the dam site were closed down from 7:00 A.M. to 2:30 P.M. June 7 becuase we were unable to get rip-rap because the quarries were giving flood work priority.

RBF:arm
CC: Al Fretz, Barnard Selectman
R. Godfrey, R.R. Godfrey & Sons
Upper Main Street
Morrisville, VT

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

DUBOIS & KING, INC.
FILE _____ SUBJ _____
MAY 23 1984
REF'D. TO _____ ACK. BY _____
ANS. BY _____ NOTED _____

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

M E M O R A N D U M

TO: Robert Wernecke, DuBois & King, Inc.

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: May 21, 1984

In a telephone conversation with Dick Godfrey earlier this week he said and I agreed that probably June 15 would be a better completion date than May 31.

I have worked up the following partial list of things which still need to be done:

June 8 1. Re-excavation of the portion of the dam crest which was too frozen to remove last winter, replacement and compaction.

June 1 2. Removal and placement of rip-rap and bedding in the critical areas, replacement.

June 8 3. Improve compaction of the dam crest in the area of the upstream face.

June 1 4. Install 30' culvert extensions on the highway culverts. Install the fire hydrant.

June 15 5. Finish placing material in the crest of the dam, pave, seed and mulch. Remove temporary guard rails. Install the guard rails.

June 15 6. Regrout the upstream end of the low level inlet where the existing grout was washed off by the sluice gate jet. The epoxy grout underneath should probably be chipped off to improve bonding.

June 15 7. Check Stone

In the park:

June 8 1. Grade off the spoil piles, finish clearing the parking lot and refilling the borrow holes. Seed and mulch.

June 15 2. Restore the parking lot to good condition, grading, gravel, ties, turf establishment.

June 15 3. Fix the water lines broken in the vicinity of borrow pit.

June 8 4. Replace the drain inlet grating in bay 3 of the parking lot, flush the drain system.

In order to assure timely completion of this job please coordinate with the Contractor to prepare a construction schedule. Also, please plan to attend a meeting with the Barnard Town Selectmen on May 29, 1984 at 8:00 A.M. at the Barnard Town Offices to discuss the construction schedule.

Thank you.

RBF:arm
CC: Reginald A. LaRosa, Chief of Operations
Dick Godfrey
R.R. Godfrey and Sons
Upperman Street
Morrisville, VT
6.3



S	M	T	W	T	F	S
		29	30	31	1	2
3	4	5	6	7	8	9

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

29330
June 25, 1984

A. Peter Barranco, Jr., P.E.
Department of Water Resources
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam - Construction Progress Report

Dear Pete:

This report covers the period from April 6, 1984 to date. During this period the work on the dam has been substantially completed. The following significant work has been accomplished.

-- Cofferdam has been removed and beach area restored to satisfaction of owner.

-- Riprap bedding material and riprap in the critical areas below the emergency pipes were removed and replaced with more angular material in accordance with the recommendations of GEI.

— Less replacement was accomplished on the left side of the dam than recommended and instead the two road culverts were extended 30 feet.

— In conjunction with the riprap R&R the slopes of the riprap were flattened and all the riprap work completed.

— Emergency pipes were grouted.

-- Road brought up to grade and paved.

— Guard rails installed.

It is anticipated that the work will be entirely completed and final inspection will occur this week.

Inspection reports are enclosed.

Very truly yours,

DuBois & King, Inc.

Robert J. Wernecke, P.E.
Senior Project Manager

RJW/pal
Enclosure

cc: Mr. Robert Finucane

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 6/20/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard VT	
CONTRACTOR Denton	OWNER VT REC
WEATHER Sunny, Clear	TEMP. 70° at 10 AM ° at PM
PRESENT AT SITE R. Godfrey Survey Crew (D&K)	

TO File

THE FOLLOWING WAS NOTED:

Contractor was finishing installation of Guardrail. It was observed that the guardrail was too high so as to block the 6" nozzel of the dry hydrant. Before requiring the contractor to lower it I checked with the Selectmen (Al Fretz) and the assistant Fire Chief (Bugg ?). The assistant Fire Chief indicated that they did not use the large pumper nozzel (do not have an adapter for it) and saw no reason to lower it. R. Godfrey said he would attempt to lower the guard rail 2"-3".

I requested the contractor to use some of the small stone on the rip rap to do additional chinking.

All the work at the dam appears to be complete except for (1) loaming, seeding & mulching, (2) Regrouting of the drop-inlet. The contractor felt he would be completed the end of this week, including the restoration of the park.

Final sections being taken

COPIES TO

FIELD REPORT

SIGNED R. A. Wernick

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 6/15/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard VT	
CONTRACTOR Denton	OWNER VT REC
WEATHER Sunny	TEMP. °at AM 75° at 3 PM
PRESENT AT SITE John Dudley Dick Godfrey	

TO FG

THE FOLLOWING WAS NOTED:

- Base course of pavement being placed; Hydrant installed; Rip rap appears to be complete; Road culvert have been extended; Flashboards all in place and lake level (± 4" above sill) slowly rising.

Discussed most recent payment request w/ Godfrey. Several errors were noted and will be corrected. He requested release of retainage for work in Park, however clean up is still not complete

Bob Fenicon will be on 2wk vacation & John Dudley will cover for him.

COPIES TO

FIELD REPORT

SIGNED

~~SERVICE CONNECTION~~

~~LOCATION~~

DATE 6/5/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard	
CONTRACTOR Denton	OWNER VT AEC
WEATHER Clear	TEMP. °at AM 80° at 2 PM
PRESENT AT SITE R. Godfrey	
R. Finucane	

TO File

THE FOLLOWING WAS NOTED:

Backhoe was redistributing rip rap at toe of dam. Rip rap on Right side of dam was complete and looked good. Some crushed stone rip rap bedding had been placed below emergency pipe.

Water level was 2" above sill.

Chinking was being accomplished by the backhoe and ~~[illegible]~~ hand

R. Finucane requested that Sandblasting of grates and extention of highway Culverts be added to pay request. Copies of proposals for ~~[illegible]~~ attached

COPIED TO [illegible]

~~SERVICE CONNECTION~~

~~LOCATION~~

DATE: June 1, 1984	JOB NO.: 29331
PROJECT: Silver Lake Dam	
LOCATION: Barnard	
CONTRACTOR: Denton	OWNER: UP AEC
WEATHER: Clear	TEMP. °at AM / 65 °at 1 PM
PRESENT AT SITE: R. Godfrey R. Finucane	

TO File

THE FOLLOWING WAS NOTED:

Crushed Stone rip rap bedding was stockpiled on site.

Contractor was still cleaning up parking area at Park

Lake Level had fallen to 1'-2" below emergency pipe sill. Gate was closed.

Gate had done a good job of handling flows during the four days of heavy rain. However, rain has delayed completion date by approximately 1 week

SIGNED R. J. Wenck

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

TO File, JJB

DUBOIS & KING, INC.
RE 29330 SUPPLEMENT
APR 30 1984
REFD. TO _____ ACK. BY _____
RE BY _____ NOTED _____

DATE 4/30/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard, VT	
CONTRACTOR Denton	OWNER VT-AEC
WEATHER Sunny	TEMP. 70 °at 10 AM °at PM
PRESENT AT SITE P. Finucane	
A. Peter Barrancd	
David Shields, GET	

THE FOLLOWING WAS NOTED:

Contractor was placing top soil on beach area and generally cleaning up.

Lake level was 9½" below invert of emergency pipes.

An inspection was made of the Rip rap, Rip Rap bedding material, and the source for the bank run gravel filter material to determine the acceptability of the rip rap and establish what remedial measures if any are indicated. David Shields of GET will prepare a letter report.

Robert J. Kennedy

DuBOIS & KING, INC.
Engineering • Planning • Development & Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 4/2, 84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard	
CONTRACTOR Denton	OWNER VT-AEC
WEATHER Sunny, Clear	TEMP. 60° at 11 AM / ~~60~~° at PM
PRESENT AT SITE Bob Finneane	

TO Files, SJB

DUBOIS & KING, INC.
FILE 29331 SUBJ.
APR 24 1984
REF'D. TO ____ ACK. BY ____
ANS. BY ____ NOTED ____

THE FOLLOWING WAS NOTED:

Purpose was to meet with contractor to discuss Rip rap but he did not show up.

Inspection of stone left down at the park indicates there is some present which meets specs but a great deal more that does not. Contractor will be advised of this and control will be much greater in critical location.

R. Finneane marked a number of stones and debris on the embankment which did not meet specs for removal.

There was additional evidence of small ($\frac{1}{2}$"-3") stones which had washed out from the rip rap on the left side below the road culvert (36"). It was not apparent if this stone was from the culvert, washed off the ~~rip rap~~ ~~and~~ from natural or from the rip rap bedding.

A sample of the rip rap bedding material was taken for analysis ~~that~~ from where the rip rap had not been placed yet.

Stanley Usmen

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 4/18/84	JOB NO. 29330
PROJECT Silver Lake Dam	
LOCATION Barnard	
CONTRACTOR Dentor	OWNER VT-AEC
WEATHER Cloudy	TEMP. °at AM 60 °at 1 PM
PRESENT AT SITE Bob Fineran	

TO File, JJ

DuBOIS & KING, INC.
FILE 29331 SUBJ. CONSTR
APR 18 1984
REF'D. TO _____ ACK. BY
ANS. BY _____ NOTED

THE FOLLOWING WAS NOTED:

1. Contractor was cleaning up and repairing the beach area and was nearly complete.
2. Water level was within 6" of inverts of emergency pipes
3. Bob F. was checking grades on the Riprap slope. Grades appear to be relatively close to finish. Exceptions: a) Toe Beam appears to be 10± ft further downstream b) left side of pipes 2'-3' below grade
4. There still appears to be some settlement of the Rip rap and ice and snow are still in evidence.
5. Additional quantities of small dia stone 1"-3" appear to be in evidence on the toe berm.

Geoff Wellenstein

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

TO RJW, Files

DUBOIS & KING, INC.
FILE 29331 SUBJ. Constr
APR 17 1984
REF'D. TO RJW ACK. BY
ANS. BY NOTED

DATE April 17, '84	JOB NO. 29331
PROJECT Silver Lake Dam, Barnard, VT	
LOCATION Reconstruction	
CONTRACTOR Denton	OWNER State
WEATHER P. Cloudy	TEMP. °at AM, 50 °at 1 PM
PRESENT AT SITE R.R. Godfrey.	

THE FOLLOWING WAS NOTED:

Rbt. Finucane and Fred Castello had been there this morning, but they had left at lunchtime.

Godfrey was placing large stones on the upstream, left bank, lawn area. This action was apparently part of a private agreement between Godfrey and the landowner in exchange for the use of the land during construction.

Dick and I went over the remaining payment items. Things left to be done include;

1) complete Rock rip rap;
2) Complete guardrail;
3) install dry hydrant;
4) Asphalt paving;
5) Turf establishment;
6) Cleanup; and
7) Observation Wells.

I told Dick to give us a submittal on the guard rail and the materials for the observation wells.

COPIES TO

FIELD REPORT

SIGNED John Pelatte

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DATE 4/12/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard	
CONTRACTOR Denton	OWNER VT REC
WEATHER Sunny	TEMP. 50° at 10 AM, 60° at 1 PM
PRESENT AT SITE Bob Finucane; A. Peter Barranco; Backhoe operator	

TO File, JJB

DuBOIS & KING, INC.
FILE 29331 SURNAME
APR 12 1984
REF'D. TO _____ ACK. BY _____
INS. BY _____ NOTED

THE FOLLOWING WAS NOTED:

Material on beach had been removed to the satisfaction of the owner according to operator. Inverts of emergency pipes had been grouted. Contractor was removing temp. PVC pipe from road. Proposed to place hydrant next monday and requested water level not be raised further until after that work.

Close inspection of riprap face indicated that there was a lot of very rounded stone, a stump, too much rounded and small (less than 1') stone on the right side, and that there was still a lot of ice and snow mixed in which should melt before additional material is placed.

R.F., A.P.B. and RJW agreed that the smaller and rounded stone should be picked out and placed in stream below the toe of the riprap to fill in the "hole". Other large rounded stones should be rolled off too. R.F. said he will place grade stakes on the slope next tues. to determine extent of additional Riprap necessary.

Robert J. Wunsch

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060

(802) 728-3376

DuBOIS & KING, INC.
FILE 29330 SUBJ. CODE
APR 10 1984
SPEED TO ____ ACK. BY ____
INS. BY ____ NOTED ____

DATE 4/6/84	JOB NO. 29331 ~~29330~~
PROJECT Silver Lake Dam	
LOCATION Barnard, VT	
CONTRACTOR Denton	OWNER VT AEC
WEATHER Partially Sunny	TEMP. ° at AM; 40 ° at 2 PM
PRESENT AT SITE Nobody	

TO File, JFB

THE FOLLOWING WAS NOTED:

Water level had risen to within ± 1 ft of emergency pipe inverts. Store owner reported backhoe operator had left @ 1 PM.

It appears that some of the material from the cofferdam had been removed from the site and more had been excavated and stockpiled.

The low level outlet gate was opened slightly.

Geoff Wellenkamp

DuBOIS & KING, INC.
Engineering & Environmental Services
RANDOLPH, VERMONT 05060

(802) 728-3376 & 728-3377

LETTER OF TRANSMITTAL

DATE	JOB NO.
6/23/94	29330

ATTENTION: Robert Fitzsimmons

RE: Silver Lake Dam

TO Department of Water Resources
State Office Building
Montpelier, VT 05602

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
3	6/7/94		Periodic Estimate #6

THESE ARE TRANSMITTED as checked below:

☑ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Recommended for payment

Please return one executed copy to us.

COPY TO _____

SIGNED: Robert J. Wemett

PRODUCT 240-3 NEBS Inc., Groton, Mass. 01471.

If enclosures are not as noted, kindly notify us at once.

FCWL
RFK

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

M E M O R A N D U M

TO: Reginald A. LaRosa, Chief of Operations

FROM: John B. Dudley, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: June 22, 1984

As of 8:00 P.M. Thursday, June 21, 1984, the status of the above project is as follows:

1. Final grade, pave, seed, mulch, and guard rails: complete except that one post is not satisfactorily plumb and must be reset.

2. Regrouting of low level inlet. Promised June 15: 100% complete.

3. Secure the sluice gate operator with tack welds as directed by the Engineer: 0% complete.

Work in the park is expected to be complete June 27. Paving is 85% complete and should be completed today.

The lake level is 1306.5 - up 0.4 feet since my last report.

JBD:arm
CC: Al Fretz, Selectman, Town of Barnard
R. Godfrey, R.R. Godfrey & Sons, Morrisville

MEMORANDUM

TO: Ray Harwood

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam

DATE: June 29, 1984

The Silver Lake State Park Ranger has the dam sluice gate operator handle and the key to the lock. I recall Parks requesting that this arrangement be written down for the record.

The sluice gate will be operated only very rarely, during an extreme flood or to lower the dam for maintenance. Lake levels will continue to be varied annually from elevations 1,306 to 1,307.5 by installing and removing stop planks as directed by Peter Barranco.

Thank you for your help and cooperation in this project.

RBF:arm
CC: Allen Hostetler, Park Maintenance Coordinator
Reginald A. LaRosa, P.E., Chief of Operations

6.3

M E M O R A N D U M

TO: Frederick J. Costello, P.E., Director

FROM: Robert B. Finucane, P.E., Facilities Engineer

SUBJECT: Silver Dam Pre-Final Inspection

DATE: June 29, 1984

On June 28, 1984, we had a pre-final inspection. Attending were: Peter Barranco, Robert Wernecke (DuBois & King), Robert Denton (Contractor), Paul Hart (representing Godfrey, the subcontractor), and Virginia Lancaster (Selectman).

The only item remaining in the contract is installation of the observation wells. Denton agreed that he would set this up. Wernecke said we would keep retainage until this was done.

Non-contract items include welding the sluice gate operator locking device and moving the garage. RAy Harwood has agreed to do the welding. We have a separate agreement with Roger Webster to relocate Hirschland's garage. I will keep after Webster.

Lancaster expressed the appreciation of the Selectmen for the nice job of cleaning up done by the Contractor.

RBF:arm
CC: Reginald A. LaRosa, P.E., Chief of Operations

6.1

June 15, 1984

Mr. R. Godfrey
R.R. Godfrey & Sons
Upper Main Street
Morrisville, Vermont 05661

Re: Silver Lake Dam Repair

Dear Mr. Godfrey:

I am currently the Facilities Engineer on the above project while Robert Finucane is on leave. He will return June 25, 1984.

Following is a non-exclusive list of work remaining on the above named project as of noon, June 14, 1984. There may be other work required of you not listed below.

A. At the Dam

1. Final grade, pave, seed, mulch, and install guard rails. ~~Install guard rails to the same depth as the existing~~ even if it requires ~~odd~~ spacing over the emergency spillway culverts.

2. Regrout the low level inlet as approved by the Engineer.

3. At the sluice gate operator, tack weld the chain to the pipe. Also obtain a threaded cap for the pipe and tack weld that to the pipe. Reprime and paint welds with a rust preventive paint approved by the Engineer.

B. At the Park

1. Pave the roadway to the parking ~~area entrance as directed by the Engineer.~~ The pavement is to be 20 ~~(twenty) feet wide~~ and 1 (one) inch thick. The end ~~limits are to be staked by the Engineer.~~

2. The borrow pit is to be graded and ~~topsoiled~~ to a ~~mowable~~ surface.

3. The location between the roadway and the bathhouse disturbed by test pit excavation is to be topsoiled and graded to a smooth condition matching the adjacent lawn area.

4. You are to perform the necessary excavation for the repair of the water lines. Parks Division will perform the plumbing.

5. ~~Two~~ One bays of the parking lot farthest from the beach remain to be repaired. These shall be graded to drain to the appropriate drop inlets and shall have a compacted graveled surface. The broken D.I. grate shall be replaced or repaired as approved by the Engineer.

6. The pile of waste material in one of the parking lot bays shall be removed by a method acceptable to the Engineer. Suggested methods may be to grade the material flat and gravel over it; or haul the material to the borrow pit and grade it into the slope. Other ideas may be performed on the approval of the Engineer.

7. Drainage at the northeast corner of the parking area and adjacent lawn area shall be repaired as directed by the Engineer.

8. The borrow area beyond the parking area shall be regraded and the drainage around said area shall be repaired.

I re-emphasize that this list if non-exclusive and other work may be required of you. If you have any questions or comments please contact me at the project site or at 828-3361.

Sincerely yours,

John B. Dudley, P.E.
Facilities Engineer

JBD:arm
CC: Reginald A. LaRosa, P.E., Chief of Operations
A. Peter Barranco, Jr., P.E., Dam Safety Engineer
Robert Wernecke, DuBois & King, Inc.
6.1

re: Silver Lake

Fred: Report of 6/18/84

Below are
1. Project inspection report
2. Telephone conversation with Bob Wernicke

Project inspection —

I was at the site twice, 8:45 - 9:30 and 11:45 - 12:30. Guard rail is supposed to be delivered this P.M. or tomorrow.

4 men working. 1 at dam gravelling shoulders, others working in park. Moving waste material in parking bay #4 to first borrow area. Handling material excessively. Backhoe bucket to 6 yard truck to pile at toe of pit slope. Picked up by Drott and moved to where small dozer could grade it. Very slow.

I stopped at the outlet structure. It appears that the stoplogs are beginning to seal themselves as leakage is somewhat reduced. A yellowish weed substance has formed in the space between the planks and may be filling the leaks.

The lake level is up to 1306.5 - up 0.4 since 6/14. Still no rain but it was sprinkling when I left the project.

Telephone conversation w/ Bob Wernicko —

1. Contractors partial payment this time very small ($4k - 5k). Over estimated last time. BW wondered if we would consider releasing money for park cleanup. I said no since this work was barely begun

2. He is tentatively scheduling final sections for 6/25 or 6/26

3. He wondered when we might plan to have a final inspection. I told him that so many people need to be coordinated that I could only guess

4. We are both concerned about a potential runoff problem at the low point west of the island. Cloudbursts could erode some material here. We discussed various solutions and I would like to discuss some of our ideas with you.

P.S.: I called Roger Webster re: moving garage. He is to return call and leave message with schedule (Hopefully)

SD 6/18

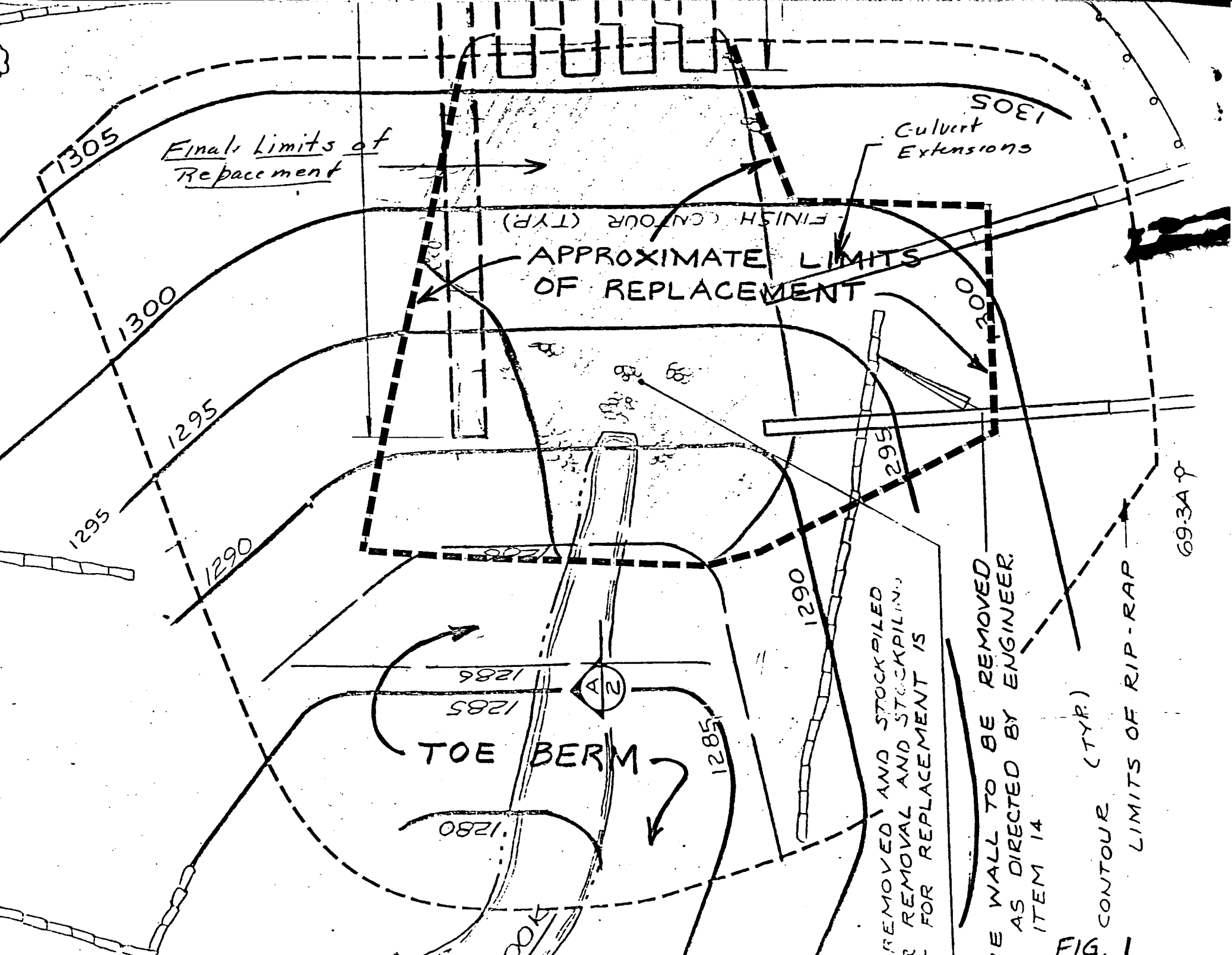

Final Limits of Repacement
Culvert Extensions
FINISH CONTOUR (TYP.)
APPROXIMATE LIMITS OF REPLACEMENT
TOE BERM
1305
1300
1295
1290
1285
1280
A
2
LIMITS OF RIP-RAP
69-34 ℄

FIG. 1

DuBOIS & KING, INC.
Engineering • Planning • Development • Management
P. O. Box 339
RANDOLPH, VERMONT 05060
(802) 728-3376

DATE 6/28/84	JOB NO. 29331
PROJECT Silver Lake Dam	
LOCATION Barnard, VT	
CONTRACTOR Denton	OWNER VT-AEC
WEATHER Sunny	TEMP. 75 °at 9 AM °at PM
PRESENT AT SITE	

TO File

THE FOLLOWING WAS NOTED:

Final Inspection of Dam and Park staging Area

Present:

A. Peter Barranco
Robert Finucane
Robert Denton
Paul Hart – Godfrey
Virginia Lancaster – Selectmen

No deficiencies noted. Clean up complete and Looks good.

The only remaining item of work is the installation of the observation wells.

Some turbidity was noted in the pool below the toe of the dam. This may be as a result of tuesday chinking of stones and washing of culverts. Continued observation is indicated.

Photographs were taken

COPIES TO A. Peter Barranco
Robert Finucane

FIELD REPORT

SIGNED Robert A Wernecke

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376
Telex No. 469141

29330
May 24, 1984

Mr. Robert B. Finucane, P.E.
Facilities Engineer
Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, Vermont 05602

SUBJECT: Silver Lake Dam

Dear Mr. Finucane:

With reference to your letter of May 16, 1984, I have inspected the 4", 1-1/2" and 3/4" crushed stone at the Cooley Websterville Plant. The material seems to be quite satisfactory for the rip-rap bedding and this source is approved.

As I indicated to you during our conversation of May 22, 1984, either one of the mixes you have suggested would appear to be appropriate, subject to a sieve analysis of the actual mix. It is recommended that the mix be prepared at the plant site and analyzed prior to delivery to the project site.

Very truly yours,

DuBois & King, Inc.

Robert J. Wernecke

Robert J. Wernecke, P.E.
Senior Project Manager

RJW/pal

cc: Reginald A. LaRosa
A. Peter Barranco
Frederick J. Costello
Richard R. Godfrey

June 4, 1984

Mr. Curtis Bourdon
Bourdon & Bourdon
Woodstock, Vermont 05091

Dear Mr. Bourdon:

Thank you for your letter of May 30, 1984. It is still my intention to direct the removal of the Hirschlands' Garage to the site prepared as soon as the way is clear.

I have a written agreement with Roger Webster in which he agrees to do the work. I have discussed it with Mr. Webster recently and he has a workable plan and intends to give several days notice before beginning the work.

I now expect that the garage will be moved before the 4th of July. I apologize for the delay and any inconvenience.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, P.E., Chief of Operations
A. Peter Barranco, Jr., Dam Safety Engineer

6.3

June 4, 1984

Mr. R. Godfrey
R.R. Godfrey & Sons
Upper Main Street
Morrisville, Vermont 05661

Re: Silver Lake Dam -
Barnard, Vermont

Dear Mr. Godfrey:

On May 29, 1984, I had a meeting with the Barnard Town Selectmen.

They urged us to complete the Silver Lake Dam Project as soon as possible. I know that you are in agreement with this aim.

They complained about the frequency and duration of closings of the road across the dam crest. I told them that I did not forsee the need to completely close the area to traffic again.

You should not close the road to traffic again without advance specific written permission from the Selectmen.

Thank you for your cooperation in this matter.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, Chief of Operations
A. Peter Barranco, Jr. P.E., Dam Safety Engineer

6.2

FC M
RF X

M E M O R A N D U M

TO: Reginald A. LaRosa, Chief of Operations

FROM: John B. Dudley, P.E., Facilities Engineer

SUBJECT: Silver Lake Dam Completion

DATE: June 15, 1984

As of noon on Thursday, June 14, 1984, the status of the above project is as follows:

1. Re-excavation of the dam crest, replacement and compaction: 100% complete.

2. Re-excavation and replacement of rip-rap and bedding in the critical areas, promised June 1: 100% complete.

3. Compaction of dam crest, promised June 8: 100% complete.

4. Install culvert extensions and fire hydrant. Promised June 1: 100% complete.

5. Final grade, pave, seed, mulch, and guard rails. Promised June 15; 10% complete, expect to complete June 20.

6. Regrout low level inlet. Promised June 15: 0% complete, expect to complete June 19.

Work in the park is expected to be complete on June 22.

The lake level is 1306.1. On June 12 stoplogs were installed to raise the lake to the normal summer pool.

Since last week the work has been delayed due to the following:

1. June 13, the contractor was unable to relocate the existing shut-off valve for the fire hydrant due to a copying error in their tie notes.

2. June 12, the contractor temporarily ran out of road subbase material.

Both resulted in project shutdowns totalling to approximately 4-6 hours lost time.

I am now managing this project while Robert Finucane is on leave. He will return June 25.

I am also drafting letters to the contractor and the consultant containing a non-exclusive list of work remaining to be performed at both the park and the dam.

JBD:arm
CC: Al Fretz, Selectman
Town of Barnard
R. Godfrey, R.R. Godfrey & Sons
Upper Main Street
Morrisville, Vermont

FC
RF

June 15, 1984

Mr. R. Godfrey
R.R. Godfrey & Sons
Upper Main Street
Morrisville, Vermont 05661

Re: Silver Lake Dam Repair

Dear Mr. Godfrey:

I am currently the Facilities Engineer on the above project while Robert Finucane is on leave. He will return June 25, 1984.

Following is a non-exclusive list of work remaining on the above named project as of noon, June 14, 1984. There may be other work required of you not listed below.

A. At the Dam

1. Final grade, pave, seed, mulch, and install guard rails. Install guard rails to the same depth as the existing even if it requires odd spacing over the emergency spillway culverts.

2. Regrout the low level inlet as approved by the Engineer.

3. At the sluice gate operator, tack weld the chain to the pipe. Also obtain a threaded cap for the pipe and tack weld that to the pipe. Reprime and paint welds with a rust preventive paint approved by the Engineer.

B. At the Park

1. Pave the roadway to the parking area entrance as directed by the Engineer. The pavement is to be 20 (twenty) feet wide and 1 (one) inch thick. The end limits are to be staked by the Engineer.

2. The borrow pit is to be graded and topsoiled to a mowable surface.

3. The location between the roadway and the bathhouse disturbed by test pit excavation is to be topsoiled and graded to a smooth condition matching the adjacent lawn area.

4. You are to perform the necessary excavation for the repair of the water lines. Parks Division will perform the plumbing.

5. Two bays of the parking lot farthest from the beach remain to be repaired. These shall be graded to drain to the appropriate drop inlets and shall have a compacted graveled surface. The broken D.I. grate shall be replaced or repaired as approved by the Engineer.

6. The pile of waste material in one of the parking lot bays shall be removed by a method acceptable to the Engineer. Suggested methods may be to grade the material flat and gravel over it; or haul the material to the borrow pit and grade it into the slope. Other ideas may be performed on the approval of the Engineer.

7. Drainage at the northeast corner of the parking area and adjacent lawn area shall be repaired as directed by the Engineer.

8. The borrow area beyond the parking area shall be regraded and the drainage around said area shall be repaired.

I re-emphasize that this list if non-exclusive and other work may be required of you. If you have any questions or comments please contact me at the project site or at 828-3361.

Sincerely yours,

John B. Dudley, P.E.
Facilities Engineer

JBD:arm
CC: Reginald A. LaRosa, P.E., Chief of Operations
A. Peter Barranco, Jr., P.E., Dam Safety Engineer
Robert Wernecke, DuBois & King, Inc.
6.1

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

STATE Vermont

Project Amendment No. 1

AMENDMENT TO PROJECT AGREEMENT

THIS AMENDMENT To Project Agreement No. 50-00362 is hereby made and agreed upon by the United States of America, acting through the Director of the National Park Service and by the State of Vermont pursuant to the Land and Water Conservation Fund Act of 1965, 78 Stat. 897 (1964).

The State and the United States, in mutual consideration of the promises made herein and in the agreement of which this is an amendment, do promise as follows:

That the above mentioned agreement is amended by adding the following:

Project Period

Change from: Date of Approval - August 31, 1984

to: August 19, 1983 - September 15, 1984

In all other respects the agreement of which this is an amendment, and the plans and specifications relevant thereto, shall remain in full force and effect. In witness whereof the parties hereto have executed this amendment as of the date entered below.

THE UNITED STATES OF AMERICA

By Joseph Toland
(Signature)

OUTDOOR RECREATION PLANNER
(Title)

National Park Service
United States Department of
the Interior

Date 13 AUG 1984

8/24/84
CC: Barbara Finneran

STATE

Vermont
(State)

By Stephen B. Sease
(Signature)

Stephen B. Sease
(Name)

Alternate State Liaison Officer
(Title)

NPS 10-902a
(7-81)

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

ORDER APPROVING APPLICATION FOR CONSTRUCTION OR ALTERATION OF A DAM. 10 VSA CHAPTER 43

In accordance with 10 VSA § 1086, the application of

State of Vermont
Department of Water Resources and Environmental Engineering
Montpelier, Vermont 05602

to reconstruct the Silver Lake Dam in the Town of Barnard

has been determined to serve the public good and to provide adequately for the public safety. Accordingly, authorization is hereby granted to carry out the proposed project in strict conformance with the following approved plans and specifications:

State of Vermont, Agency of Environmental Conservation, Department of Water Resources and Environmental Engineering SILVER LAKE DAM, dated March 1982 revised through June 16, 1983, DuBois & King, Inc., Randolph, Vermont, Robert J. Wernecke, P.E. Engineer-of-Record.

This authorization is subject to the following Special and General Conditions:

SPECIAL CONDITIONS

1. Notify the Department (Attn: A. Peter Barranco, Jr.) at least 24 hours prior to commencement of construction.

2. Applicant's supervising engineer shall submit on a bi-weekly basis copies of the supervising engineer's or inspector's daily project reports for the preceeding two weeks. Copies of the results of all soil compaction tests, representative sieve analyses and concrete compressive strength tests shall also be submitted on a bi-weekly basis.

3. Construction shall be completed by April 15, 1984 unless an extension of the construction completion date is approved by the Department.

4. Note in particular General Conditions Nos. 1, 2, 3, 4, and 16.

5. General Condition Number 8 is not in force for so long as the dam is owned by the State of Vermont. General Condition Number 8 is in full force for any heirs, assignees or successors to the State of Vermont.

6. To the extent inflows to Silver Lake and construction requirements permit, sufficient flow shall be passed through the dam during and after construction to insure that some flow is maintained in Pond Brook at all times.

GENERAL CONDITIONS

1. This Order may be appealed to the Water Resources Board by an aggrieved person within thirty (30) days from its date (10 VSA §1099). The applicant may proceed with the authorized project before the expiration of the appeal period at the applicant's own risk.

2. The applicant shall engage a professional engineer registered under Title 26 VSA who has experience in the design and investigation of dams to supervise the construction, alteration or other action authorized by this Order. (10 VSA §1090). The engineer shall

    a. submit construction status reports, results of testing or other reports required by the Special Conditions to the Department,

    b. submit, upon completion of the project, record ("as-built") drawings of the completed work to the Department, and

    c. shall certify in writing to the Department that the project has been completed in accordance with the approved plans and specifications.

3. Any proposed modifications to the approved plans and specifications shall be submitted in writing to the Department. These proposed modifications shall not be made unless approved in writing by the Department.

4. No liquid may be impounded, or the project considered complete, as the case may be, until

    a. the record drawings and certification required by Condition 2 (b) and (c) of these conditions have been received by the Department,

    b. the Department has inspected and approved the completed project, and,

    c. the Department has given its written approval to impound liquid or has given its written acknowledgment that the project has been satisfactorily completed in accordance with this Order.

5. The applicant shall be liable for all damages arising from leakage or overflow of the liquid from or by floods caused by failure of the dam or impoundment.

6. This Order does not grant any exclusive rights or privileges which would impair any rights possessed by other riparian or littoral owners or the State of Vermont. It does not grant any right, title or easement to or over any land not owned in fee by the applicant. Nor does it authorize any violation of Federal, State or local laws or regulations.

7. Nothing in this Order shall relieve the owner or operator of the authorized dam and impoundment from their legal duties, obligations and liabilities resulting from such ownership or operation.

8. No person shall maintain any action for damages sustained through or resulting from the partial or total failure of the dam or impoundment, or of its operation or maintenance against the State, the Department, or any of the employees or agents of the Department by reason of these proceedings or any action taken with respect thereto.

9. The Department or any representative, agent or employee thereof may at any time inspect the dam and impoundment.

10. There shall be no desilting, so called, with respect to the operation and maintenance of the authorized impoundment except upon prior written approval of the Department and upon such terms or conditions as the Department shall specify.

11. The applicant by acceptance of this Order and by the construction or alteration of the authorized dam and impoundment agrees to operate and maintain the impoundment and its appurtenances in a safe and proper manner and in accordance with the directives of the Department when and if issued.

12. This Order may be suspended or revoked at any time upon failure of the applicant to comply with any condition of this Order or of any lawful rule or regulation of the Department or any other Agency of the State of Vermont now or hereinafter promulgated and continuing jurisdiction is reserved for these purposes.

13. The plans and specifications approved herein are considered to provide adequately for the public safety considering current potential for damage and loss of life downstream in the event the dam or impoundment were to fail. Should future downstream development increase the potential for damage or loss of life, the applicant shall be responsible for upgrading the dam and impoundment including modifying its operation, to provide for a greater degree of safety against failure that is commensurate with the increased potential for damage or loss of life.

14. The Department may order the water level in the impoundment lowered or the impoundment drained at any time for purposes of inspection, safety or failure to comply with conditions of this Order.

15. The terms and conditions of this Order are binding upon the applicant and his heirs, assignees and successors.

16. The applicant shall have this Order filed with the land records of the Town of Barnard

Signed this 5th day of August 1983.

John R. Ponsetto, Commissioner



State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Division of Protection
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

November 9, 1981

Dear Sir or Madam,

This letter is to let you know about certain work which the State of Vermont proposes to conduct at the Silver Lake Dam, Barnard, Vermont.

The Army Corps of Engineers has classified the Silver Lake Dam as "Unsafe, non-emergency," and recommended that additional studies be conducted to assess hazard and plan corrective measures. The State and its engineering consultant, DuBois & King, Inc. are following these recommendations.

On November 16, 17, and 18, 1981, test borings will be made in the body of the dam to determine its construction. At the same time an inspection of the downstream slope will be made. Immediately following, the lake level will be drawn down 8'-10' as fast as possible to permit inspection of the upstream face of the dam.

As soon as this is done, the lake level will be returned to winter normal pool elevation. Return to summer normal pool elevation will be made on schedule. No change in summer pool elevations is proposed or expected.

We now project that at the close of the recreation season, Fall 1982, additional construction at the dam and additional extreme fluctuations in lake level will be needed. We hope to keep you advised of the progress of the work.

If you have any questions, please contact me at 828-3361.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: See attached
distribution list

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

DEPARTMENT OF FORESTS, PARKS AND RECREATION

August 30, 1983

Ms. Hazel Davis
Barnard Town Clerk
Barnard, Vermont 05301

Dear Ms. Davis:

Please accept for record the attached land plat of Silver Lake Dam.

Please remit your bill for recording fees to:

Agency of Environmental Conservation
Department of Water Resources and Environmental Engineering
State Office Building
Montpelier, VT 05602

Attn: Robert B. Finucane, P.E.

Thank you.

Sincerely,

Michael E. Raboin

Michael E. Raboin, L.S

MER:rc

CC: R. B. Finucane

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Division of Protection
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Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: See attached
distribution list

DISTRIBUTION LIST

Mr. Reginald A. LaRosa, P.E., Dir.
Environmental Engineering Division
State of Vermont
Montpelier, Vermont 05602

A. Peter Barranco, Jr.
Dam Safety Engineer
Department of Water Resources and
Environmental Engineering
Montpelier, Vermont 05602

Mr. Robert Wernecke
DuBois & King, Inc.
Randolph, Vermont 05060

Mrs. Hazel Davis
Town Clerk
Barnard, Vermont 05301

PROPERTY OWNERS

Asa ~~Properties~~
c/o ~~Thurston~~ Twigg-Smith Jr.
Barnard, Vermont 05301

Nancy A. Mullin
82 Tomoka Blvd
Ormand Beach, Florida 32074

William & Eleanor Austin
RD #1
Middlebury, Vermont 05753

Rolland & Laverna Ackelson
1719 Garfield Avenue
Wyomissing, PA 19610

Barnard Boating & Swimming Club
Box 115
Barnard, Vermont 05301

Robert Beatty
184 L Street
S. Boston, Massachusetts 02127

Robert & Hazel Billings
1205 Carr Road
Wilmington, Delaware 19809

Rilma Buckman
3601 Lynbrook Drive
Toledo, Ohio 43614

Cancelliere & King
15 Murray Road
W. Newton, Massachusetts 02165

Creech & Deckelbaum
Barnard,
Vermont 05301

John & Sylvia Doten
Woodstock
Vermont 05091

Mr. & Mrs. Boynton Camp
Barnard,
Vermont 05301

Anthony & Veronica Fiorillo
5 Stratford Road
Winchester, Massachusetts 01890

Morgan & Shirley Gibbons
3133 Pendelton Avenue
Charlotte, N.C. 28210

Todd & Margaret Hagerah
Box 13
Barnard, Vermont 05301

Florence Hickey
60 Urban Street
Stamford, Connecticut 06905

Ethel Hirschland
295 Newtown Turnpike
Wilton, Connecticut 06897

Richard & Mary Huntley
161 North Main
W. Lebanon, N.H. 03780

Frances Kulp
c/o Johnathan Kulp
Street Road
Chester Springs, PA 19425

Edward & Helen Maynes
Woodstock, Vermont 05091

John & Patricia McCosker
75 Scully Road
Somers, Connecticut 06071

Suzanne Milord
Woodstock,
Vermont 05091

Gary & Landis Mitiguy
115 Woodcress Circle
Milton, Vermont 05408

Clifton & Margorie Morse
Barnard, Vermont 05301

Mrs. Mary F. Parker
129 Cherry Brook Road
Weston, Massachusetts 02193

Roger & Natalie Patrick
Kissell Hill
Bellows Falls, Vermont 05101

Winona James & Ora Paul
Barnard, Vermont 05301

Walter & Jean Reeves
1200 Nicolet Avenue #218
Minneapolis, Minn. 55403

Theodore Clifford
Bethel, Vermont 05032

Eugene & Nancy Roy
61 River Street
Woodstock, Vermont 05091

Lloyd Rudolph
4943 S. Woodlawn
Chicago, Illinois 60615

Stanley Sarnoff
7507 Hampden Lane
Bethesda, MD 20014

John & Eunice Staab
6 Keel Court
Oyster Bay, N.Y. 11771

Allan & Shirley Tibbetts
60 Red Fox Lane
Trumbull, Connecticut 06611

Curtis & Patricia Tuttle
40 High Street
Ipswich, Massachusetts 01938

James & Pearl Watson
Taftsville, Vermont 05073

Olaf & Sophie Wilford
48 Bayview Avenue
Port Washington, N.Y. 11050

George & Evelyn Woodward
11939 82nd Avenue
N. Seminole, Florida 33542

Lucy Young
Box 54
Barnard, Vermont 05301

Richard & Marine Lawrence
Box 222
Hartford, Vermont 05047

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Division of Protection
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering
October 14, 1981

Mr. Roger Webster
Selectman
Town of Barnard
Barnard, Vermont 05301

Re: Silver Lake Dam, Barnard

Dear Mr. Webster:

This letter is to confirm our conversation of September 29, 1981. We discussed these things:

1. The Army Corps of Engineers has classified the Silver Lake Dam as "Unsafe, non-emergency," and recommended certain additional studies be conducted to further assess any hazard and plan corrective measures.

2. The State of Vermont is in the process of following these recommendations. We are in the process of negotiating an agreement with the distinguished engineering consulting firm, DuBois & King, to provide the engineering and design services recommended by the Corps.

3. We expect that on-site investigations will be conducted late this year, that designs and plans for construction, if required, will be available in early 1982, and that construction, if any, will be conducted after the close of the recreation season in Fall 1982.

4. As part of the investigations, we'll have to draw the lake down as low as possible later this year.

On your recommendation, I went to see the Hirschlands who own the "Salvo" house and property. I told them what I told you. In the discussion, the following additional points were made:

1. We expect that the work will be limited to the body of the existing dam and the immediate vicinity. We hope to keep the roadway across the dam open continuously.

2. I emphasized that this project was being undertaken by the State of Vermont and not the Corps of Engineers. The Corps is advising us on this project, the State is paying the bills.

3. I was also asked about the sewage system at the Silver Lake State Park bathhouse. Engineering studies and planning for replacement of the septic tanks, pump station and leach field are underway and State Parks has set aside more than $35,000 to pay for the proposed work.

I will be the project engineer for both the dam and the sewage system projects. I hope to keep everyone informed as the work progresses. If you have any questions please call me at 828-3361.

Thank you.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: H.E. Hirschland
295 Newton Turnpike
Wilton, Connecticut 06897
Reginald A. LaRosa, P.E., Director
A. Peter Barranco, Jr., P.E.
Robert Wernecke, DuBois & King, Inc.

Owner's Copy.

4/C

APPLICATION FOR ZONING PERMIT

Town of Barnard

Application No. 228

The undersigned hereby applies for a Zoning Permit for the following development or use, to be issued on the basis of the representations contained herein, all of which the applicant swears to be true.

1. Name, address, and telephone number of landowner. State of Vermont, Dept. of Water Resources, State Office Bldg., Montpelier, Vt. 05602 828-3361

2. Location of property. Outlet of Silver Lake, Barnard, Vermont

3. Proposed Development or Use: (Check terms which apply) / / agricultural / / new construction / / remodeling / / accessory building / / residence /X/ other Reconstruction

4. Dimensions of building: Length. 100'. Width. 100' Height above finished grade..... No. of stories..... Ground Floor Area.....

5. Development lot size: Length..... Width..... Area.....

6. Setback of building: .....feet from street or road right-of-way.....feet from nearest property line. Lot frontage on street or road.....feet.

WITNESS SIGNATURE: Kenneth M. Fordham APPLICANT SIGNATURE: Robert B. Jr

APPLIC. DATE OF FILING. 7/12/83 FEE PAID: $.15 REC'D BY: LMW

DECISION OF ADMINISTRATIVE OFFICER
(Void if detached from application)

Upon the basis of the representations contained above, which were checked by me on 7/15/83 (date), this application is hereby (found) (~~not found~~) TO MEET THE PROVISIONS of the BARNARD ZONING ORDINANCE, and is hereby (approved) (~~not approved~~).

Date of Decision 7/15/83 L.W. Winter Sr.
Administrative Officer

If this application is approved by decision of the Administrative Officer, it is a ZONING PERMIT. If it is not approved, a Zoning Permit has been denied and reasons for disapproval are as follows:

(If this application is approved, the Applicant, Administrative Officer, Board of Listers, and Town Clerk shall each receive one copy.)

TWO RIVERS - OTTAUQUECHEE REGIONAL COMMISSION

39 CENTRAL STREET, WOODSTOCK, VERMONT 05091 TEL: (802) 457-3188

July 28, 1983

Mr. Robert Finucane, P.E.
Dept. of Water Resources and
Environmental Engineering
State Office Building
Montpelier, VT 05602

RE: Silver Lake Dam, Application No. 83-4

Dear Mr. Finucane:

The Barnard Planning Commission met on Wednesday evening, July 27, 1983 and discussed the above-referenced application.

I was not present but according to the Commission Chairman, no adverse comments were noted. Furthermore, a decision was reached that no request for a public information meeting would be made to the Dept. of Water Resources and Environmental Engineering.

There was, however, one question which arose and I agreed to contact you on their behalf to get it answered. Apparently, there is a fire hydrant in the vicinity of the dam which serves as a ready supply of water for the Barnard Fire Department. The Commission members would like to know if this hydrant will remain as is or be relocated when the new dam is constructed. Continued access to this water supply was deemed by the Planning Commission to be very important for fire fighting purposes.

Perhaps you could contact Mr. Dwain Manning of the Barnard Fire Department directly, either by telephone at 234-9604 (after 4:30 PM) or at the following address: Mr. Dwain Manning, Barnard, VT 05031. If you send a written reply, please mail our office a copy of the letter.

One last thing - could you send the Barnard Planning Commission a set of the dam reconstruction plans and drawings for their files? They should be mailed to : Mr. Richard Carbin, Chm., Barnard Planning Commission, Barnard VT 05031.

Thanks again for your assistance.

Sincerely,

Kent D. Stevenson
Senior Planner

CC: Dwain Manning
KDS/sl

• FAIRLEE • CORINTH • CHELSEA • BROOKFIELD • BRIDGEWATER • BRAINTREE • BRADFORD • BETHEL • BARNARD

• SHARON • STOCKBRIDGE • STRAFFORD • TOPSHAM • TUNBRIDGE • VERSHIRE • WEST FAIRLEE • WOODSTOCK

• GRANVILLE • HANCOCK • HARTLAND • NEWBURY • PITTSFIELD • PLYMOUTH • POMFRET • RANDOLPH • ROCHESTER • ROYALTON

August 1, 1983

Mr. Dwaine Manning
Barnard Fire Department
Barnard, Vermont 05031

Re: Silver Lake Dam Fire Hydrant, Barnard, VT

Dear Mr. Manning:

This letter is written at the request of Kent Stevenson at the Regional Commission.

Our construction plans for Silver Lake Dam include the removal and replacement of the fire hydrant at approximately the same location and elevation it is in now. The hydrant will necessarily be unavailable for use during construction for about one month of the fall.

If you have any questions, please call me at 828-3361.

Thank you.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, P.E., Director
Kent Stevenson, Two-Rivers - Ottauquechee Regional Commission
39 Central Street
Woodstock, Vermont

August 1, 1983

Mr. Richard Carbin
Chairman
Barnard Planning Commission
Barnard, Vermont 05031

Dear Mr. Carbin:

Enclosed is a set of plans for the reconstruction of Silver Lake Dam in Barnard, Vermont.

If you have any questions or comments please call me at 828-3361.

Thank you.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, P.E., Director
Kent Stevenson

Enc: as noted above

COPY

State of Vermont

ROSIE - cc: Bob Finucane

Hydrology 89

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council

Montpelier, Vermont 0560
Department of Water Resource
and
Environmental Engineeri

MEMORANDUM

TO: A. Peter Barranco, Jr., P.E., Dam Safety Engineer

FROM: Alison M. DesMeules, Environmental Technician AMD

RE: Comments on Notice of Application for Reconstruction of Silver Lake Dam, Town of Barnard

DATE: July 28, 1983

We recommend that an instantaneous stream flow of 0.7 cfs (median August flow, 0.399 csm) or greater be released from the dam at all times when available from inflow to Silver Lake. If inflows fall below .7 cfs, outflows should be maintained at the same rate as inflows. This flow should be maintained during and after construction.

AMD/cp

January 9, 1984

Ms. Hazel Davis
Barnard Town Clerk
Barnard, Vermont 05301

Re: Silver Lake Dam

Dear Ms. Davis:

Please record the attached order approving reconstruction of Silver Lake Dam and bill the State of Vermont for any fees incurred.

The originals and the bill should be returned to:

Agency of Environmental Conservation
Department of Water Resources & Environmental Engineering
State Office Building
Montpelier, Vermont 05602

Attn: Mr. Robert B. Finucane, P.E.

Thank you.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arm
CC: Reginald A. LaRosa, P.E.
Chief of Operations
A. Peter Barranco, Jr.
Dam Safety Engineer

July 23, 1984

Edward F. Lucas, Representative
Box 4
Bridgewater, Vermont 05034

Re: Silver Lake Dam - Barnard

Dear Representative Lucas:

Thank you for your interest in this project. When we spoke on the phone this spring you were concerned about progress, cost and safety. I am pleased to report that the project is substantially complete and that the lake is up to normal summer pool.

When you inquired about cost overruns, I said that as far as we knew, we were over by about 10%, but that it was in the nature of unit price contracting that we could not be sure of the project cost until completion. I said that I would report on project costs to you as soon as I had them.

We estimated this job would cost $150,000.00. The prime contractor bid $95,280.00. Final payment to the contractor will total $114,051.70, an apparent overrun of about $20,000. About $7,000 of overrun was for concrete and culvert which was needed but not forseen. About $8,000 was invested in paving the access road to the State Park. A more detailed explanation is attached.

The project cost a great deal more to build than $114,000 according to my estimate and the contractor's representation. Under the unit price contract system almost all of the additional cost comes out of the contractor.

In my considered opinion as a professional engineer registered in the State of Vermont, the design prepared by the engineering firm of DuBois & King is adequate. I further consider the construction methods and procedures to have been adequate. Overall, I consider the project to be safe under any condition.

If you have any questions, please give me a call.

Sincerely,

Robert B. Finucane, P.E.
Facilities Engineer

RBF:arw
CC: Reginald A. LaRosa, Chief of Operations
A. Peter Barranco, P.E., Dam Safety Engineer

6.1

Job No. 1121-1 Sheet ___ of ___
Project SILVER LAKE DAM Date ___
Subject DAM BREAK - SUMMARY By GK Ch'k. by ___

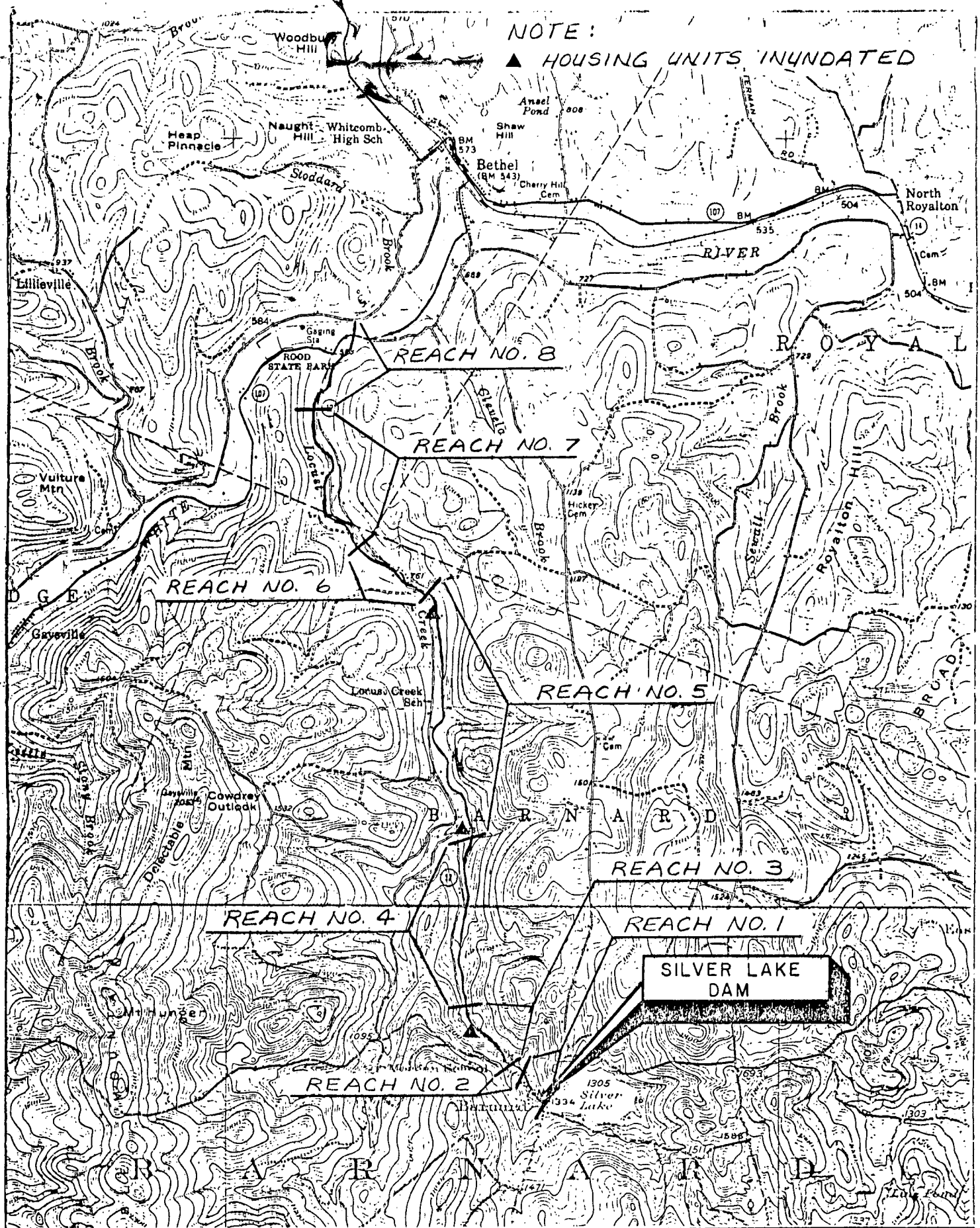
THE DAM BREACH ANALYSIS ON SILVER LAKE DAM WAS PERFORMED UTILIZING THE U.S. ARMY CORPS OF ENGINEERS "RULE OF THUMB" GUIDANCE FOR ESTIMATING ½ DAM FAILURE HYDROGRAPHS, THE SAME PROCEDURE WAS USED IN THE PHASE I DAM INSPECTION REPORT, HOWEVER FOR THIS ANALYSIS MORE DATA WAS COLLECTED ON THE 2½ RIVER REACHES, PROVIDING MORE INFORMATION ABOUT THE POSSIBLE DAMAGE,

NO INUNDATION MAPS WERE DEVELOPED, THE AVAILABLE MAPS (U.S.G.S) WOULD NOT BE ABLE TO SHOW THE INUNDATION FROM THE SILVER LAKE DAM BREACH TO ANY DEGREE OF ACCURACY. THE 2½ REACHES ANALYZED WERE DESIGNATED ON THE AVAILABLE U.S.G.S MAPS ALONG WITH A BRIEF NARRATIVE ABOUT THE REACHES, INCLUDING STAGE & DISCHARGE IN THE REACH AS COMPUTED UTILIZING THE "RULE OF THUMB PROCEDURE" MENTION ABOVE, AND THE POSSIBLE INUNDATION DAMAGE IN THE REACH.

Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date ___
Subject DAM-REACH SUMMARY By GTK Ch'k. by ___

SUMMARY OF DAMAGES FROM DAM-REACH ANALYSIS ON SILVER LAKE DAM UTILIZING THE CORPS OF ENGRS "RULE OF THUMB PROCEDURE"

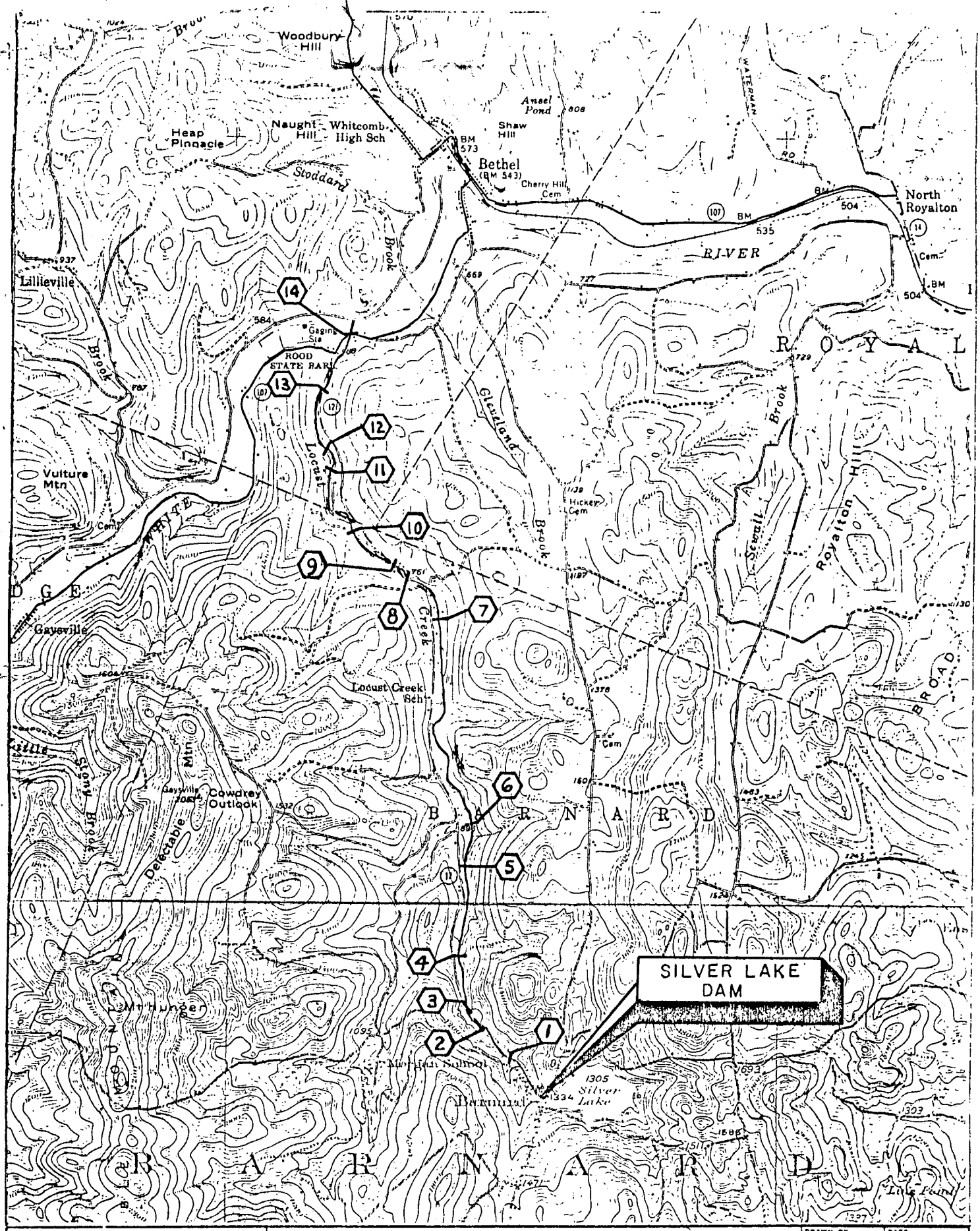
REACH	HOUSING UNITS INUNDATED	STREAM CROSSINGS INUNDATED OR WASHED-OUT	LENGTH OF ROAD INUNDATED (APPROX. FOOTAGE)
REACH No. 1	NONE	1	130 FT
REACH No. 2	NONE	1	200 FT
REACH No. 3	1	2	1200 FT
REACH No. 4	NONE	3	1000 FT
REACH No. 5	2	—	NONE
REACH No. 6	NONE	—	NONE
REACH No. 7	NONE	1 - POSSIBLE	NONE
REACH No. 8	NONE	—	—



DuBois & King inc.
engineering and environmental services
RANDOLPH, VERMONT / CONCORD, NEW HAMPSHIRE

STATE OF VERMONT
DEPARTMENT OF WATER RESOURCES
AND ENVIRONMENTAL ENGINEERING
SILVER LAKE DAM
DAM - BREACH REACHES

DRAWN BY	DATE
CHECKED BY	PROJ. NO.
PROJ. ENG.	DRAW. NO



DuBois & King inc.
engineering and environmental services
RANDOLPH, VERMONT / CONCORD NEW HAMPSHIRE

STATE OF VERMONT
DEPARTMENT OF WATER RESOURCES
AND ENVIRONMENTAL ENGINEERING
SILVER LAKE DAM
STREAM CROSSING LOCATION MAP

DRAWN BY	DATE
CHECKED BY	PROJ. NO.
PROJ. ENG	DRAW. NO.

Job No. 1129-1 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject ___ By CZ Ch'k. by ___

Brief Narrative on Each Reach Analyzed

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-14-81
Subject ___ By ___ Ch'k. by ___

Silver Lake Dam Breach – Summary

The peak discharge from the Silver Lake Dam was calculated using the following equation:

$$Q_p = \frac{8}{27} W_b \sqrt{g}\, y_o^{3/2}$$

W_b = 40% of the Dam Length ≈ 130 Ft = ~~ECFT~~ at mid-height or 1305

y_o = 1311 – 1300

Top of Dam = 1311

U/S Lake Bottom = 1300

Q_p = 3200 cfs = 12% ~~U.S~~

LEF 1/6/82

Pond Brook

Reach No. 1

Reach Length = 1600 Ft

Stage = 7.1 Ft

Discharge from Reach No 1 = 3170 cfs

All of the dwellings along this reach appear to be above flood stages, the living quarters are at least 12 Ft above the streambed. It is obvious that if the Dam fails, the road (the North End Road) crossing over the Dam will be washed away eliminating fire protection to the residences north of Silver Lake.

Job No. 1124/ Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By JR Ch'k. by ___

Reach No. #2

Reach Length = 700ft

From the narrow section on Pond Brook to just D/S of the 1st Stream Crossing, a 6ft dia CMP Culvert. The discharge & stage in this reach is controlled by the Culvert. (Max. Capacity of Culvert before overtopping the road Q_{max} = 325cfs)

Stage = 15.1ft ±

Discharge from Reach No #2 = 3130cfs

No housing units will be inundated in this reach. The Town road over the culvert will be overtopped by 6.1ft probably washing out the road. Pond Brook at this point is very close to Rt. 12, with 6.1ft of water over the culvert it is likely that Rt 12 will be inundated with the possibility of being washed out.

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By CK Ch'k. by ___

Reach No. 3

Reach Length = 3000 FT

The Reach is from the just D/S of the 1st stream crossing (6 FT-Culvert) to the 3rd Stream Crossing, a Concrete Box Culvert. The maximum discharge capacity of the Box Culvert is 800 CFS before over topping the road embankment. The discharge in this Reach is controlled by the Box Culvert.

Stage = 15.5 FT

Discharge from Reach No. 3 = 2955 CFS

One Dwelling will be inundated along with ± 1200 FT of Rt 12 and two Concrete Box Culverts. The one housing unit will have approx. 3 to 5 FT of water above the first floor. Both culverts will be over topped by approx. 5 feet. Which would probably wash out the road (Rt 12)

Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date 12-14-81
Subject ___ By CJK Ch'k. by ___

REACH #4

REACH LENGTH = 6600FT

THE REACH IS FROM JUST D/S OF THE 3RD CULVERT CROSSING POND BROOK TO JUST U/S OF THE CONFLUENCE WITH LOCUST CREEK.

STAGE = 10.6FT

DISCHARGE FROM REACH U/S #4 = 2857CFS

THERE ARE NO HOUSING UNITS IN THE AREAS OF INUNDATION, HOWEVER THERE ARE THREE(3) BRIDGES CROSSING THE STREAM (PRIVATE DRIVES), ALL THREE BRIDGES WILL BE INUNDATED AND PROBABLY WASH OUT. APPROX 1000FT OF RT 12 WILL BE INUNDATED.

Job No. 1124/ Sheet ___ of ___
Project SILVER CREEK DAM Date 12-14-91
Subject ___ By CJL Ch'k. by ___

REACH #5

REACH LENGTH = 10,400 FT

THE REACH IS FROM JUST U/S OF LOCUST CREEK TO JUST U/S OF THE 1ST RT 12 (BRIDGE No. 8) CROSSING LOCUST CREEK (FIRST IN THE D/S DIRECTION FROM SILVER LAKE) IN THIS REACH TWO HOUSING UNITS WILL HAVE 1ST FLOOR FLOODING PROBLEMS, THERE IS ALSO A SUGAR HOUSE IN THE FLOOD PLAIN AT THE LOCUST CREEK CONFLUENCE WHICH WILL BE INUNDATED

STAGE = 5.8 FT

DISCHARGE FROM REACH #5 = 2603 CFS

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By ___ Ch'k. by ___

Reach No. ±6

Reach Length = 3100 ft

The Reach is from just U/S of Bridge No. ±8 to just U/S of Bridge No. ±10

Stage = 5.6 ft
Discharge from Reach #6 = 2562 cfs

In this Reach no housing will be inundated, however, the right overbank (looking D/S) just D/S of Bridge No. ±9 may be over topped. The river bank in this area is 6ft above streambed, if the bank is topped the flood water will inundate Rt 12.

Job No. 1124/ Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By CJK Ch'k. by ___

Reach No. 7

Reach Length = 6250ft

This reach is from just U/S of Bridge No. 10 to just U/S Bridge No. 13.

Stage = 8.0ft

Discharge from Reach 7 = 2490cfs

In this Reach there are no Housing units within 12 feet of the Streambed. No housing units will be inundated. Bridge No. 11 is a perched bridge, (dated 1926)
with a 8ft flood wave the bridge deck may be by-passed in the overbank, however no hard cover measurements were taken at this bridge.

Job No. 1124 | Sheet ___ of ___
Project SILVER LAKE DAM | Date 12-14-81
Subject ___ | By CJK Ch'k. by ___

REACH NO. 3

REACH LENGTH = 3650 FT

NO HOUSING UNITS WILL BE INUNDATED IN THIS REACH. THE CHANNEL CAPACITY OF LOCUST CREEK IN THIS REACH HAS THE CAPACITY TO CONTAIN THE DAM BREACH WAVE GENERATED IN THIS ANALYSIS.

STAGE = 6.6 FT

DISCHARGE FROM REACH 3 = 2424 CFS

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject ___ By JK Ch'k. by ___

"Rule of Thumb Procedure" used to route the flood wave downstream

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By GK Ch'k. by ___

Reach Length = 1600 FT

Breach Q_{P_1} = 3200 cfs ⟶ stage = 7.1 FT

W/ stage at 7.1 FT ⟶ Area = 273 FT² ⟶ Volume = 10.0 AC-FT

Breach Q_{P_2} (trnc) = $3200\left(1 - \frac{10}{109}\right)$ = 3169 cfs ⟶ stage = 7.05 FT

W/ stage = 7.05 FT ⟶ Area = 267 FT² ⟶ Volume = 9.81 AC-FT

Breach Q_{P_2} = $3200\left(1 - \frac{10 + 9.8}{109.2}\right)$ = 3170 cfs

stage = 7.1 FT

At 1st Stream Crossing - 6 FT CMP culvert

Q_{P_1} = 3170 cfs ⟶ stage = 15.2 FT, approx 6.2 FT over the road

At 2nd Stream Crossing - 6'x16' box Culvert

Q_{P_1} = 3170 cfs ⟶ stage = 13.7 FT, approx 4.7 FT over Rt 12, House in flood plain approx 300 FT D/S of this stream Crossing

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-14-91
Subject ___ By CJL Ch'k. by ___

Reach #2 Down to 6ft Culvert

Reach Length = 700ft

Assume Area measurements similar to actual Survey Cross-Section survey by D&K

Q_{P_1} = 3170cfs ——— stage = 15.2ft

W/stage = 15.2' → Area = 825 ft² → Volume = 13.3 ac-ft

Branch Q_{P_2} (trial) = $3170\left(1 - \frac{13.3}{1043}\right)$ = 3130 cfs → stage 15.1ft

W/stage = 15.1ft → Area = 817ft² → Volume 13.1 ac-ft

Branch $Q_{P_2} = 3170\left(1 - \frac{13.3 + 13.1/2}{1043}\right)$ = 3130cfs

stage = 15.1ft

Reach #3 to 10'x 6.5ft Box Culvert under Rt 12

Reach Length = 3000ft

Q_{P_1} = 3130 cfs ——— stage = 15.7ft

W/stage at 15.7ft → Area = 855 ft² → Volume = 58.9 ac-ft

Branch Q_{P_2} (trial) = $3120\left(1 - \frac{58.9}{1043}\right)$ = 2953 → stage = 15.5ft

W/stage = 15.5ft → Area = 837ft² → Volume = 57.6

Branch $Q_{P_2} = 3130\left(1 - \frac{58.9 + 57.6/2}{1043}\right)$ = 2955 cfs

stage = 15.5ft

3.20 Stream Crossing 6.5'x10' Box Culvert, stage approx 15.5ft

approx 5ft of water over Rt 12

Job No. 1124/ Sheet ___ of ___
Project Silver Lake Dam Date 12-Feb-81
Subject ___ By GT Ch'k. by ___

Reach No. 6 Length = 3100 ft (Cross-Section No. 5 Just U/S of Bridge No. 5)

Q_{P_1} = 2603 cfs → Stage = 5.7 ft

W/Stage = 5.7 ft → Area = 232 ft² → Volume = 16.5 Ac-ft

Reach Q_{P_2} (Trial) = $2602\left(1-\frac{16.5}{1043}\right)$ = 2562 cfs → Stage = 5.6 ft

W/Stage = 5.6 ft → Area = 227 ft² → Volume = 16.2 Ac-ft

Reach Q_{P_2} = $2603\left(1-\frac{16.5+16.2/2}{1043}\right)$ = 2562 cfs

Stage = 5.6 ft

Reach No. 7 Length = 6250 ft

Q_{P_1} = 2562 → Stage = 8.2 ft

W/Stage = 8.2 ft → Area = 232 ft² → Volume = 38.3 Ac-ft

Reach Q_{P_2} (Trial) = $2562\left(1-\frac{38.3}{1043}\right)$ = 2480 cfs → Stage = 8.0 ft

W/Stage = 8.0 ft → Area = 225 ft² → Volume = 37.2 Ac-ft

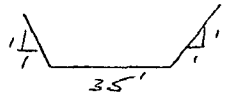
Reach Q_{P_2} = $2562\left(1-\frac{33.3+37.2/2}{1043}\right)$ = 2480 cfs

Stage = 8.0 ft

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 12-17-81
Subject ___ By GR Ch'k. by ___

Reach #8 Length = 3650 ft

Representative Cross-Section



Q_{P_1} = 2480 cfs → Stage = 6.7 ft

W/Stage = 6.7 ft → Area = 283 ft² → Volume = 23.7 ac-ft

Breach Q_{P_2} (trial) = $2480\left(1 - \frac{23.7}{1043}\right)$ = 2424 cfs → Stage = 6.6 ft

W/Stage = 6.6 ft → Area = 277 ft² → Volume = 23.2 ac-ft

Breach Q_{P_2} = $2480\left(1 - \frac{23.7+23.2/2}{1043}\right)$ = 2424 cfs

Stage = 6.6 ft.

This would be the stage on Locust Creek at the confluence with the White River, the White River, at this point has a drainage area of approx 241 mi². Based on a Log-Pearson analysis of the old White River gage in Bethel, Vt. (24-yr of record) the 1-year recurrence interval is 2,755 cfs. Based on this analysis flooding on the White River would be minimal.

Job No. _____ Sheet ___ of _____
Project _____ Date _____
Subject _____ By ___ Ch'k. by _____

Cross-Sections Utilized in Modeling the River Reaches Downstream of the Silver Lake Dam

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject Dam Breach – Routing Hydrograph By GK Ch'k. by ___

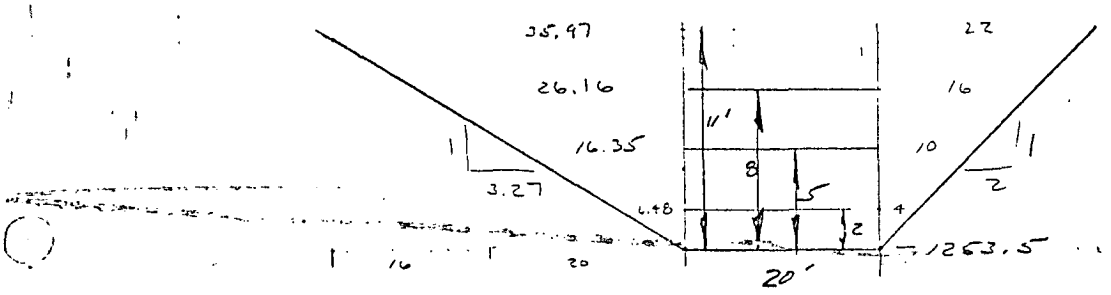
The first 1500 to 2000 ft of reach d/s of Silver Lake is represented by a cross-section surveyed by Dok in October 1981

Reach #1

Reach Length = 1600 ft

S = 0.05

"n" = composite = 0.08



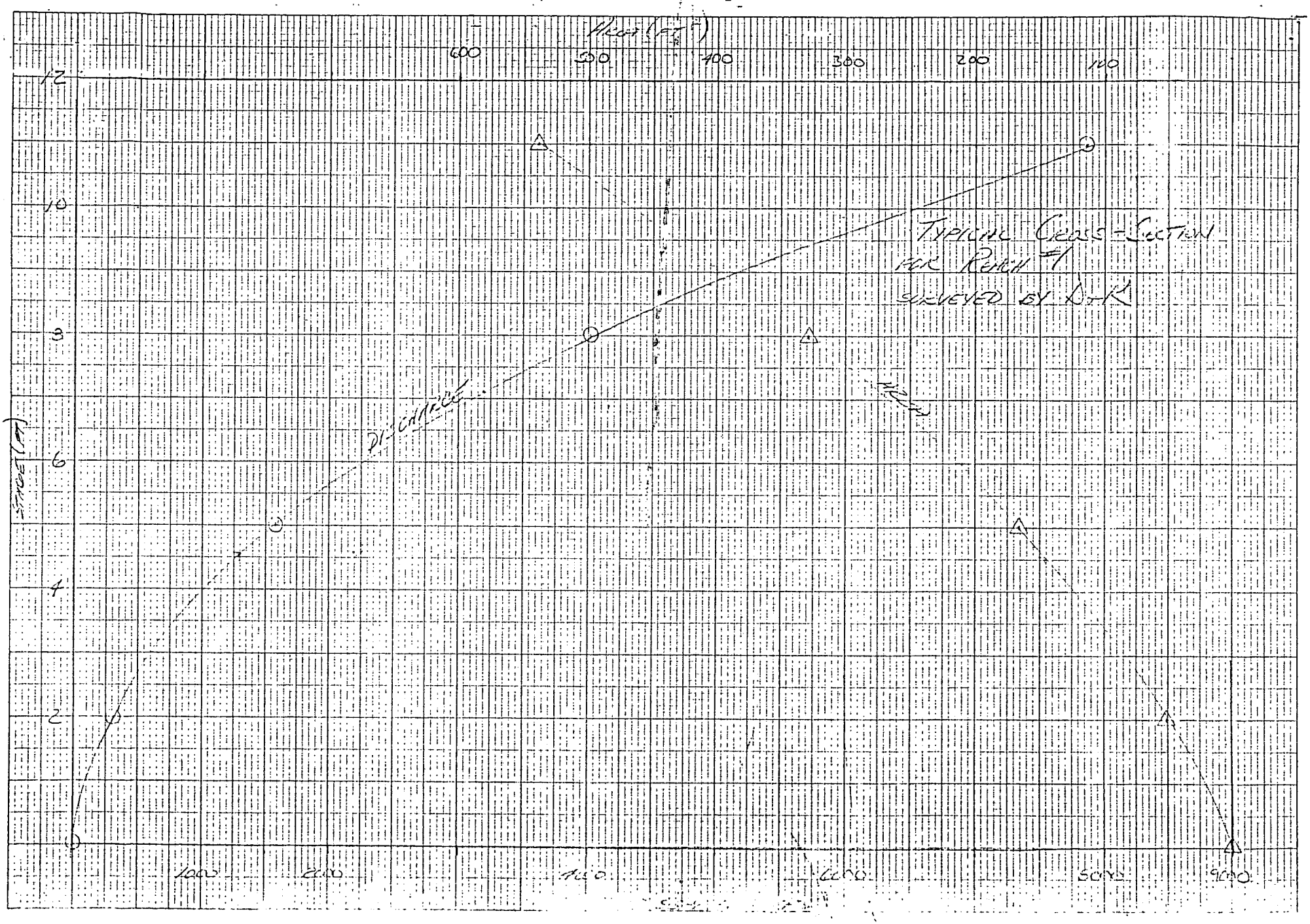
	Y	Area (ft^2)	P_w	$R^{2/3}$	Q (cfs) ($n = 0.06$)	Q cfs ($n = 0.08$)
1255.5	2	50.5	27.5	1.50	420	315
1258.5	5	165.9	48.3	2.28	2098	1572
1261.5	8	328.6	65.2	5.04 2.94	5361	4018
1264.5	11	538.8	82.2	3.50	10,479	7854

$Q = \frac{1.49}{0.06} A R^{2/3} S^{1/2}$ $S = 0.05$ (from U.S.G.S.) "n_1" = composite = 0.06

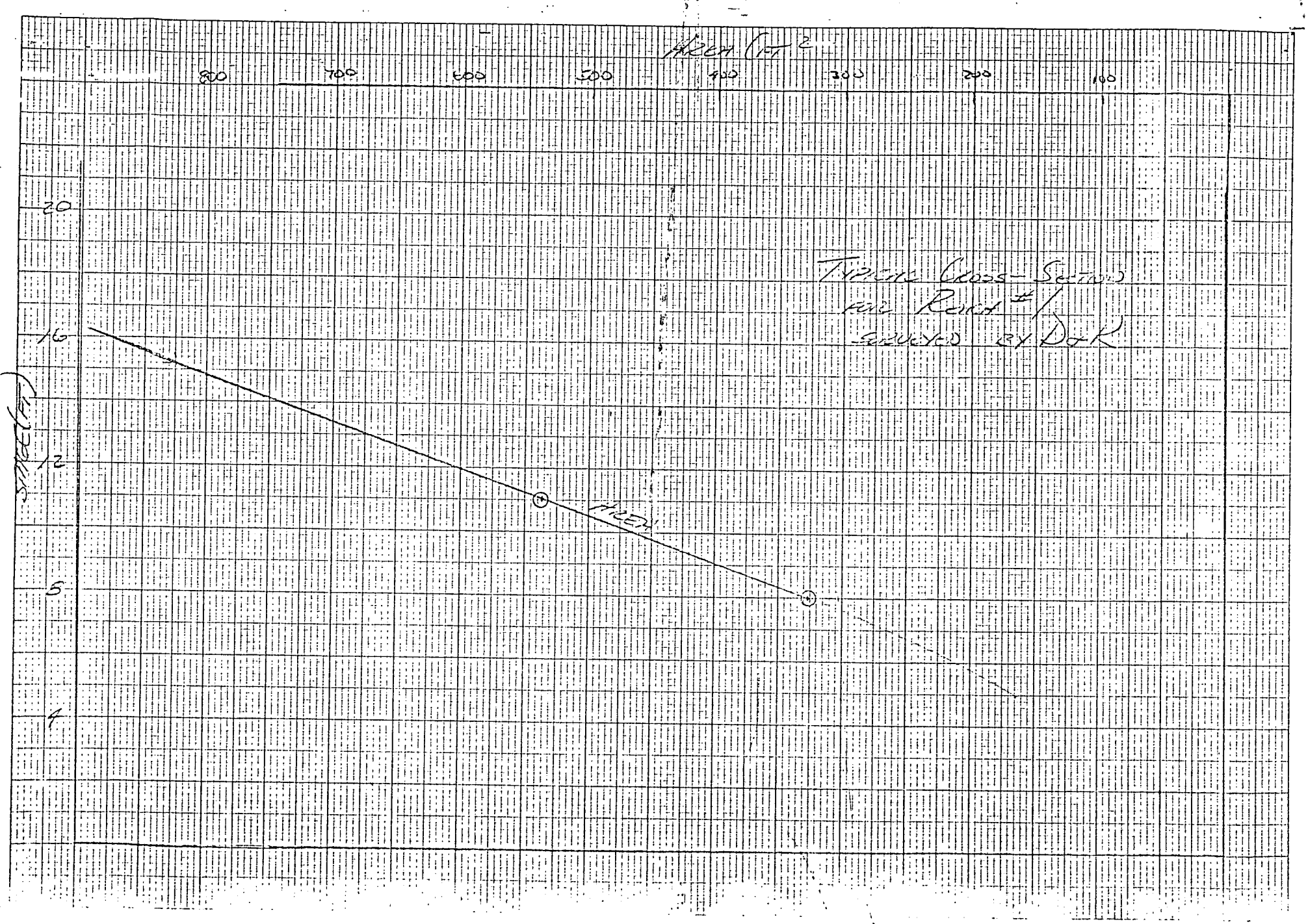
$Q = 5.55 A R^{2/3}$

$Q = 9.16 A R^{2/3}$

K&E 10 X 10 TO ½ INCH 7 X 10 INCHES
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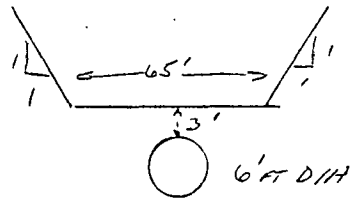


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Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject Dam - Breach - Routing Hydrology By CWK Ch'k. by ___

1st Stream Crossing 1/2 of Dam (Stream Crossing No. 1)
Reach No. 2



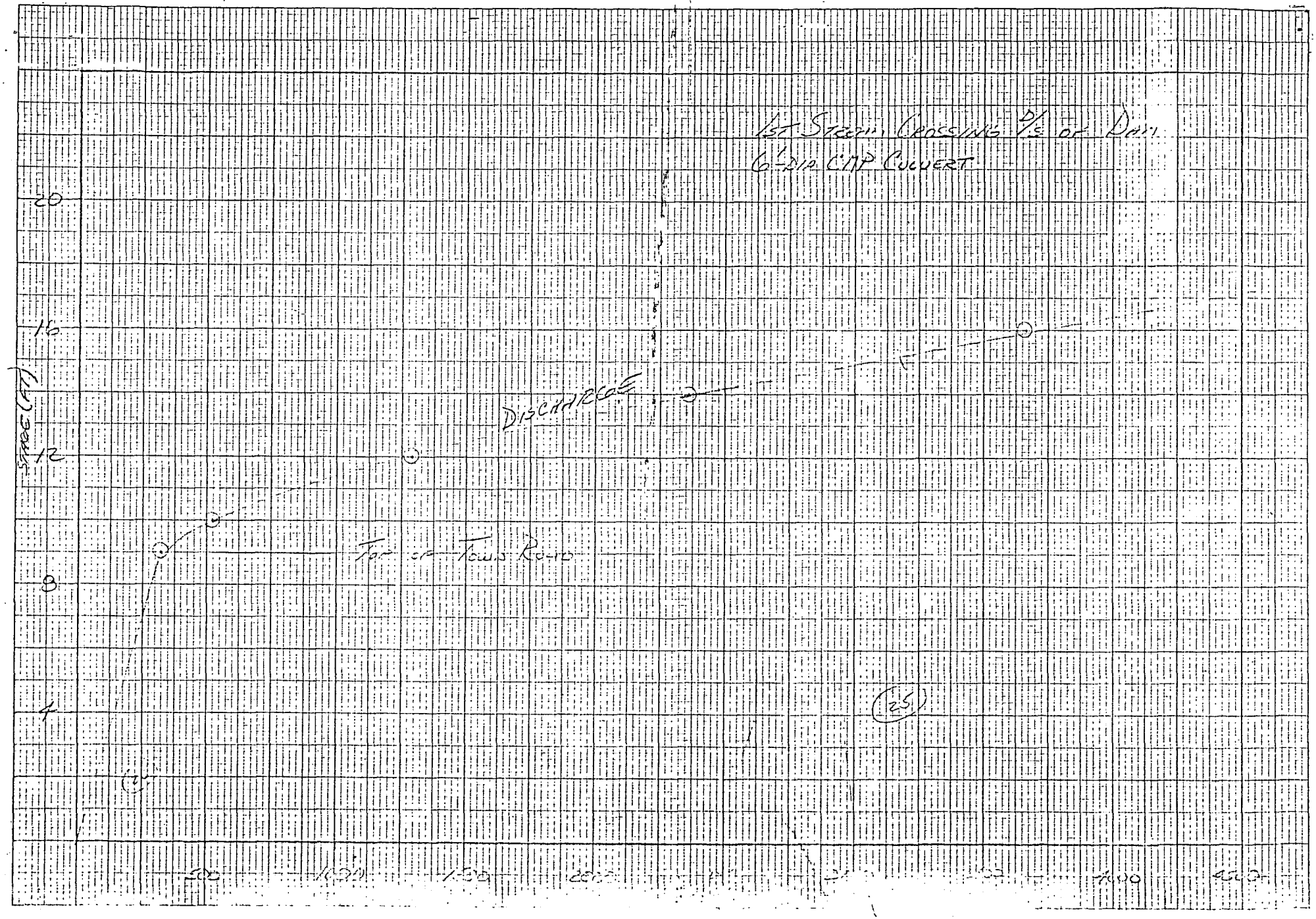
Flow over road modeled as broad crested weir

$Q = CLH^{3/2}$
$C = 2.63$
$Q = 170.95 H^{3/2}$

Culvert - Discharge

Stage	$Q_{culvert}$	H	Q_{weir}	Q_{total}
9	325	0	0	325
10	350	1	171	521
11	375	2	484	859
12	400	3	888	1288
14	450	5	1911	2361
16	500	7	3166	3666
18	550	9	4616	5166

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date ___
Subject ___ By CAK Ch'k. by ___

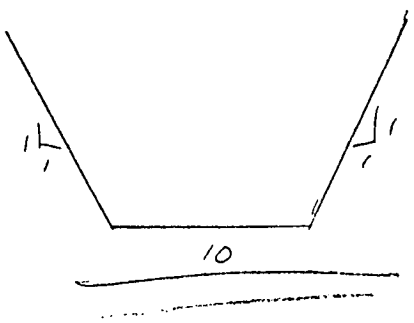
APPROX CROSS-SECTION U/S OF 6' CMP CULVERT

$S = 0.05$

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

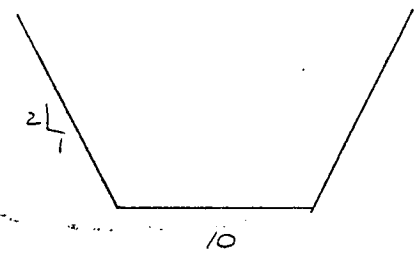
$Q = 4.16 A R^{2/3}$

n = COMPOSITE = 0.08



$A = bd + zd^2$

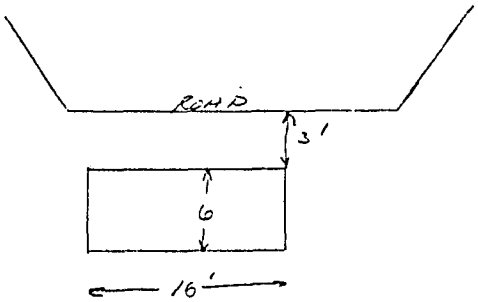
$P_w = b + 2d\sqrt{z^2+1}$



DEPTH	AREA	P_w	$R^{2/3}$	Q CFS
8	144	32.6	2.69	1613
10	200	38.3	3.012	2506
12	264	43.94	3.31	3602
8	112	27.9	2.53	
10				
12	192	40	2.85	2274
14	238	45	3.04	3007

Job No. 11241 Sheet ___ of ___
Project SILLOWAY LAKE DAM Date ___
Subject ___ By CK Ch'k. by ___

2ND STREAM CROSSING D/S OF DAM (UNNAMED CREEK NO. #2)

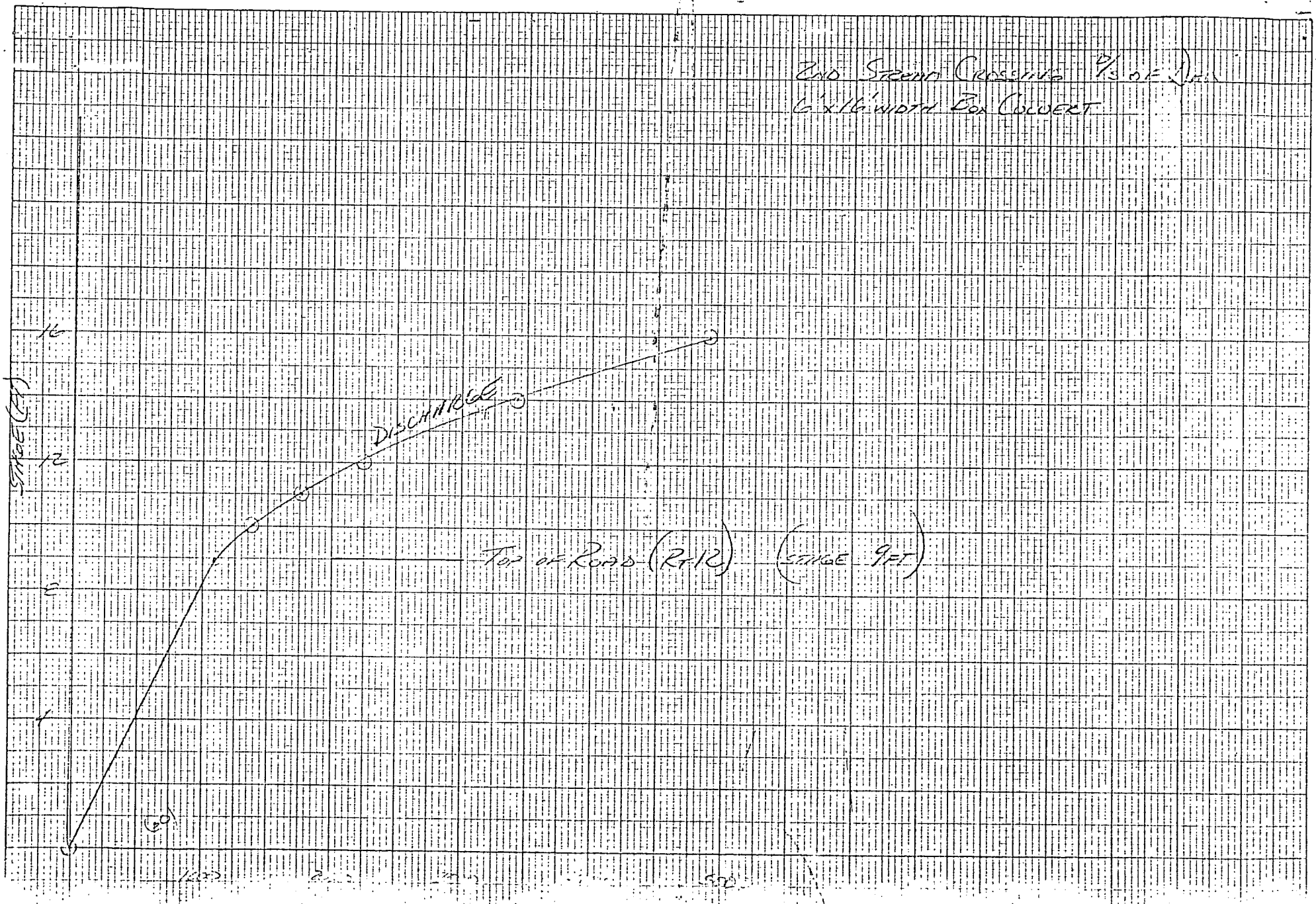


CULVERT DISCHARGE - ASSUMED INLET CONTROLLED

ROAD CRESTED WEIR FOR FLOW OVER RT 12 $Q = CLH^{3/2}$ $C = 2.63$

STAGE (FT)	$Q_{CULVERT}$ CFS		HEAD (FT)	Q_{WEIR} (CFS)	
9	1088		0	0	1088
10	1200		1	171	1371
11	1280		2	484	1764
12	1360		3	888	2248
14	1520		5	1911	3431
16	1728		7	3166	4894

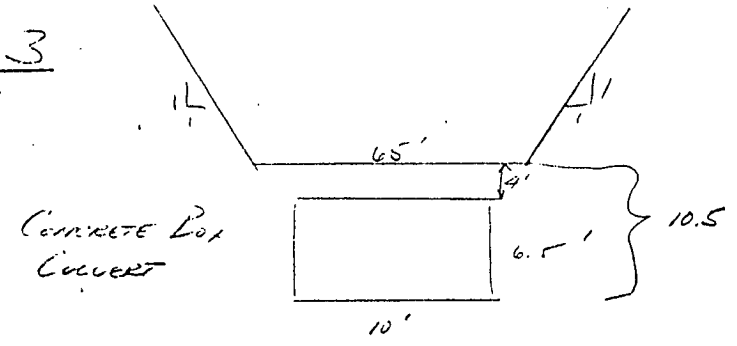
K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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Job No. 11291 Sheet ___ of ___
Project Silver Lake Dam Date 11-30-81
Subject Dam Breach - Routing Analysis By GC Ch'k. by ___

Location - at Rte Stream Crossing (Station Crossing No. 3)

Reach No. 3



Flow over Road (Route 12) - modeled as broad crested weir

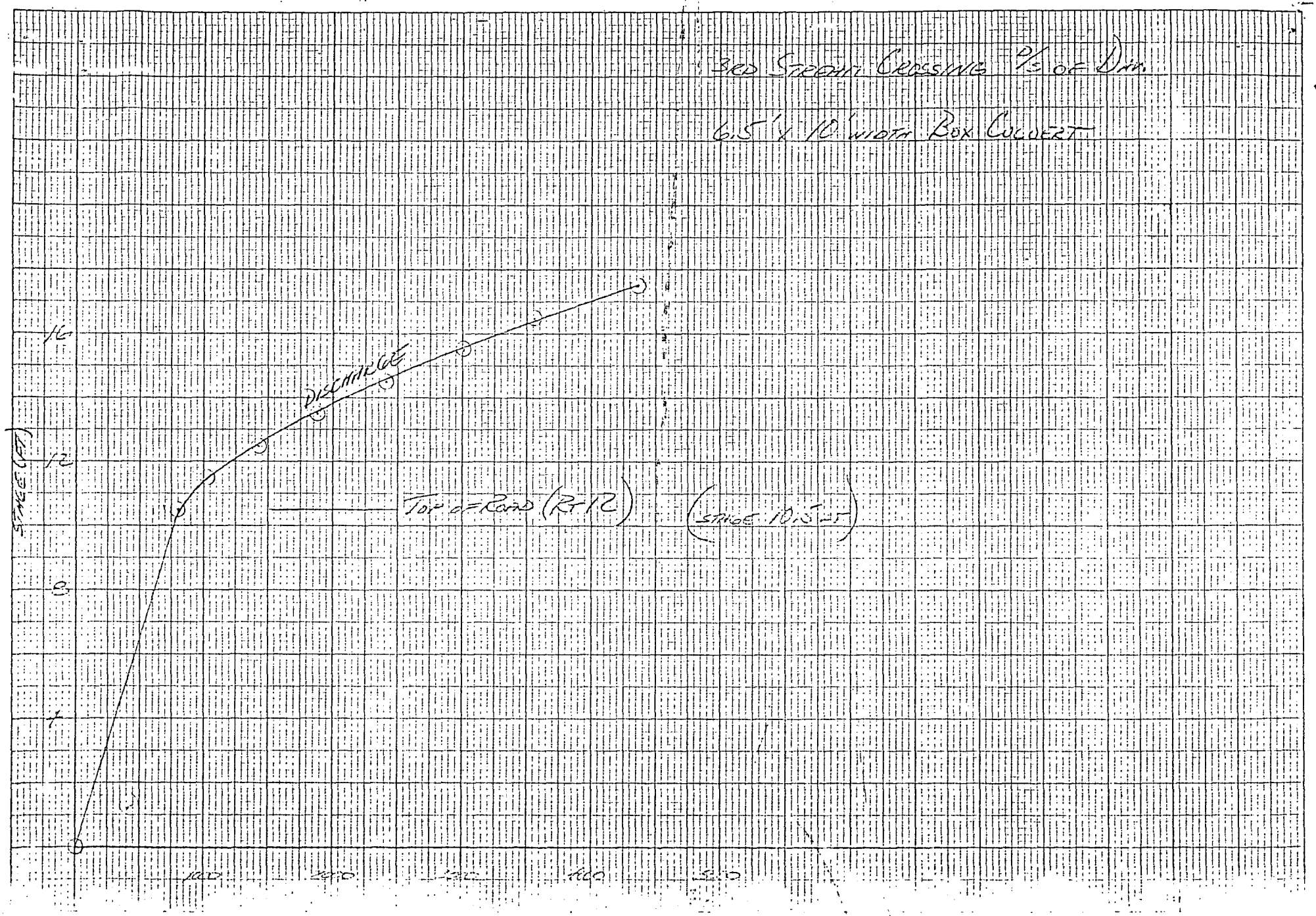
$Q = 2.62 L H^{3/2}$

H (ft)	Q_{WEIR} (cfs)	Stage (ft)	$Q_{CULVERT}$ (Inlet control)	$170.95 H^{3/2}$
1	171	11.5	860	1031
2	484	12.5	950	1434
3	888	13.5	1000	1888
4	1368	14.5	1050	2418
5	1911	15.5	1100	3011
6	2512	16.5	1150	3662
7	3166	17.5	1200	4366
8	3868			Q_{TOTAL}
9	4616			

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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3ED STREAM CROSSING P/S OF DRN.

6.5' x 10' WIDTH BOX CULVERT

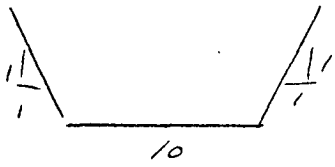


Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject ___ By OK Ch'k. by ___

Reach A

Cross-Section #4 (Natural Valley Section Located Between Bridge No. 4 & 5)

S = 0.026 (U.S.G.S.)



Depth	Area	P_w	$R^{2/3}$	Q
2				
4				
6				
8	144	32.6	2.69	1613
10	208	38.3	3.012	2506
12	264	93.94	3.31	3602

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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Cross Section #4

300 250 200 150 100 50

20 16 12 8 4

STAGE (FT.)

DISCHARGE

0 50 100 150 200 250 300 350 400

Job No. _____ Sheet ___ of _____
Project _____ Date _____
Subject _____ By CK Ch'k. by _____

Page No. 5

FARM BRIDGE (BRIDGE No. "7")

$S = 0.0064$ (FROM U.S.G.S. MAP) $n = 0.05$

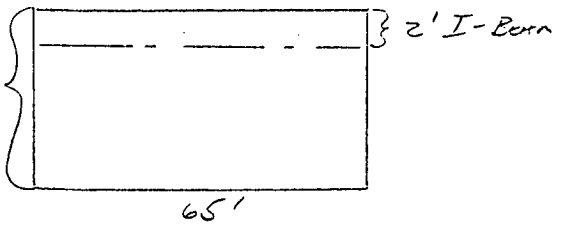
$Q = \frac{1.49}{0.05} A R^{2/3} S^{1/2}$

$Q = 2.284 A R^{2/3}$

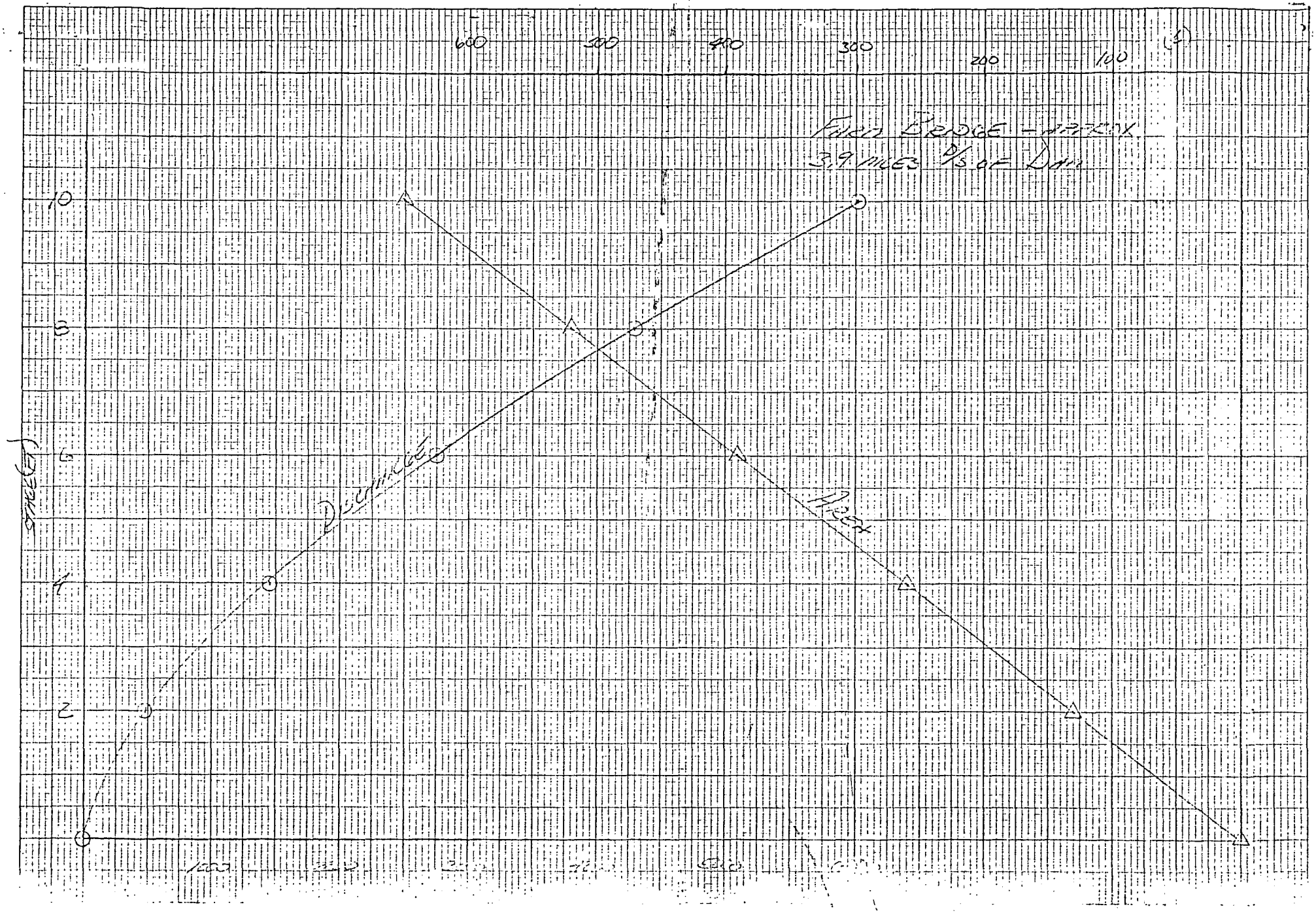
GAGE	A_{net}	P_w	$R^{2/3}$	Q (CFS)
2	130	69	1.53	473
4	260	72	2.33	1446
6	390	77	2.95	2744
8	520	81	3.46	4285
10	650	85	3.88	6019

BRIDGE OPENING

DISCHARGE MUST FLOW THRU OPENING, NO LOW OVERBANKS 12'



K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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Job No. 11241 Sheet ___ of ___
Project Silver Creek Dr. Date ___
Subject ___ By CR Ch'k. by ___

Reach No. 1

Cross-Section #5 (just U/S of Bridge No. 8)

(Natchaug Valley Cross-Section between Bridge No. 7 & 8)

$A = bd + zd^2$

$P_w = b + 2d\sqrt{z^2+1}$



$n_L = 0.05$

$S = 0.019$ (from U.S.G.S)

$Q = \frac{1.49}{0.05} A R^{2/3} (0.019)^{0.5}$

$Q = 4.11 A R^{2/3}$

Stage	Area	P_w	$R^{2/3}$	Q
2				
4	156	46.3	2.25	1441
6	246	51.9	2.82	2852
8	344	57.6	3.29	4655

Reach No. 8

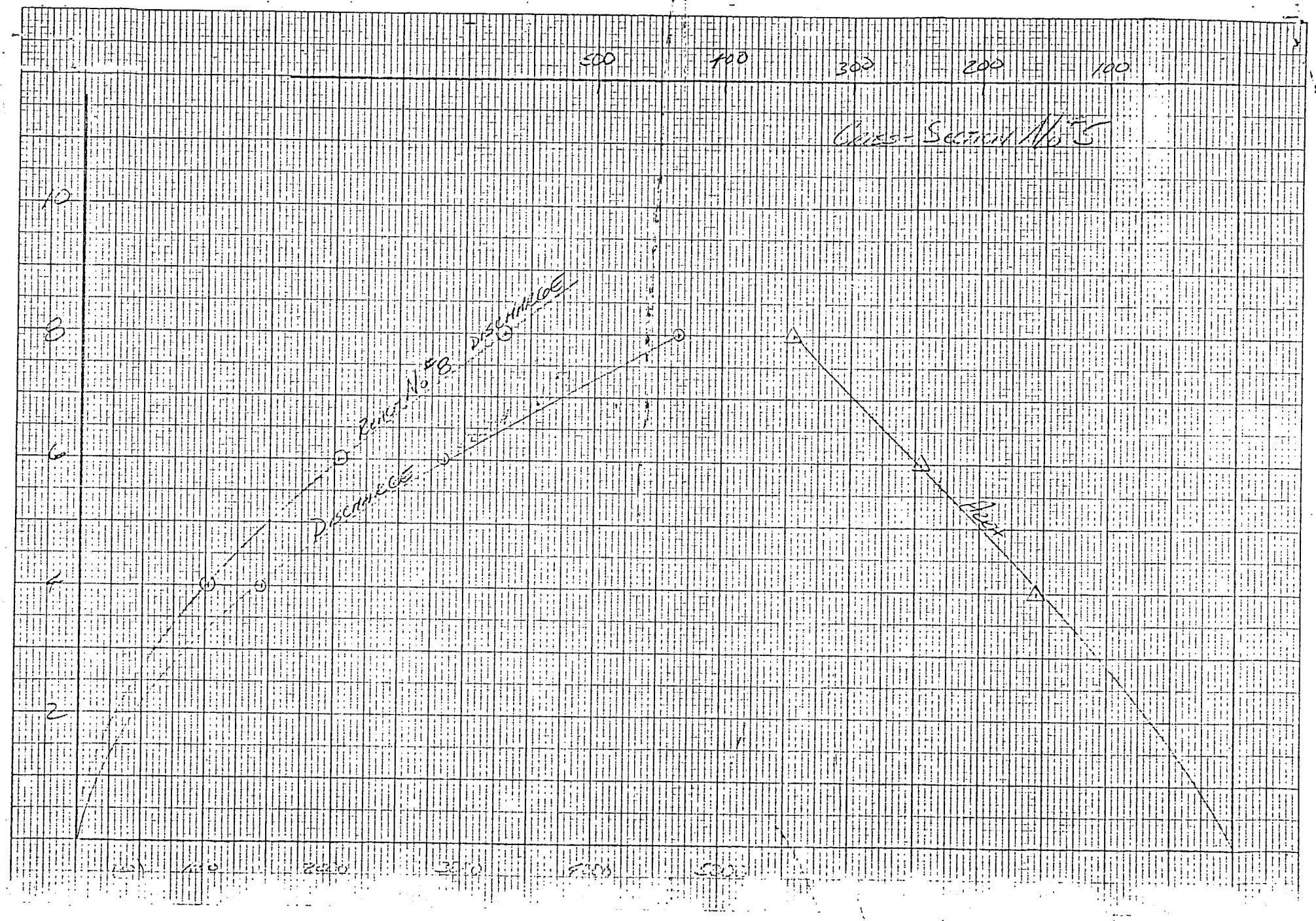
$S = 0.0096$

$Q = 2.92 A R^{2/3}$

This analysis used in Reach No. 8 to represent the last 3,650 ft of Locust Creek

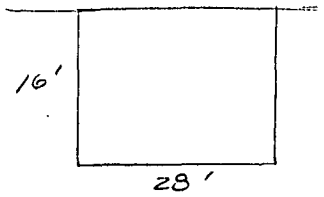
4	156		2.25	1025
6	246		2.82	2026
8	344		3.29	3305

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
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Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date ___
Subject ___ By CJK Ch'k. by ___

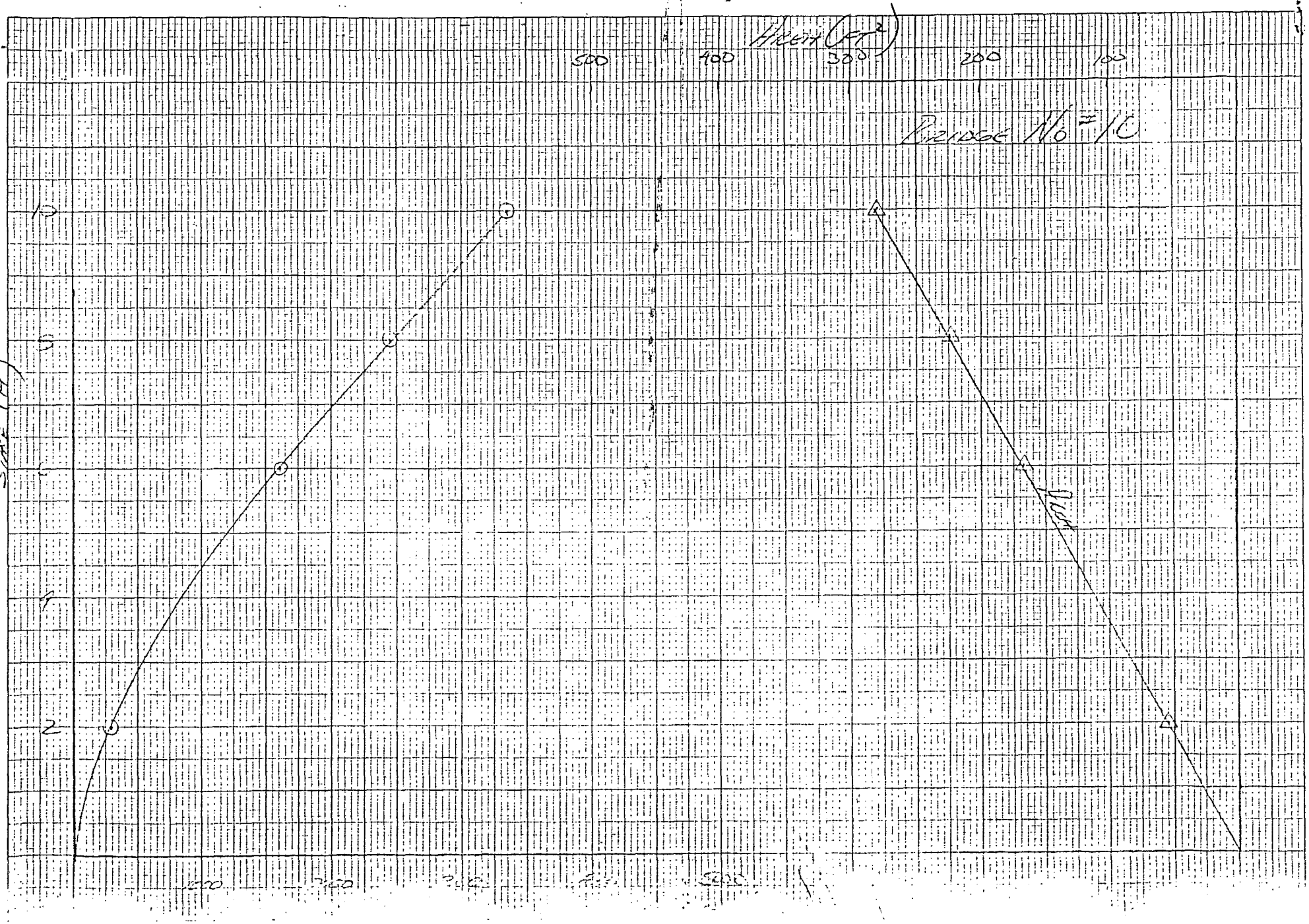
Weir No. 7
Bridge No. 10



$n = 0.05$
$S = 0.015$
$Q = 3.69\ H/2^{3/2}$

Stage	Weir	P_w	$R^{2/3}$	Q
2	56	32	1.45	300
4				
6	165	40	2.60	1615
8	224	44	2.96	2447
10	280	48	3.29	3350

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



DuBois & King INC.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

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11241
December 1, 1981

Mr. Robert B. Finucane, P.E.
Department of Water Resources
and Environmental Engineering
State Office Building
Montpelier, Vermont 05602

SUBJECT: Progress Report - Silver Lake Dam

Dear Mr. Finucane:

The purpose of this letter is to bring you up to date on the status of the Silver Lake Dam project in Barnard, Vermont.

Topographic data of the existing structure was obtained early in October. A blueline of the plan and cross-section view are enclosed.

As you are already aware the geotechnical field investigation took place on October 17 through October 19. During the investigation, four borings were taken; two in the abutments and two in the dam crest. Two observation wells were established in the two borings in the dam crest. The geotechnical analysis of the data obtained in the field has not been completed as of this date.

The hydrologic and hydraulic analyses of the existing structure at Silver Lake now has been completed. The 10, 50, 100 and 500 - Year, flood frequencies were analyzed along with the maximum probable flood and one half of the maximum probable flood.

The following two assumptions were utilized in the analysis of the existing structure: 1) initial pool level prior to each flood event was 1307.5 feet, normal summer recreational pool level (U.S.G.S. datum) 2) the service spillway (low level outlet) was not operational. The results of the analysis are listed in the following attached table. Based on the analyses, Silver Lake Dam can presently accomodate the 100-year flood event with approximately ten inches of freeboard. The Dam can also accomodate the 500-year event, however no freeboard remains.

Upon your completion of the review of the hydrologic and hydraulic analyses, (see attached photocopy of analysis) and the geotechnical evaluation (to be forwarded upon completion) we recommend a brief meeting between the State and DuBois & King, Inc. to discuss the next step in the design phase of the Silver Lake Dam contract.

Very truly yours,

DuBois & King, Inc.

Charles J. Kissel

Charles J. Kissel
Engineer

CJK/pal
Enclosures

Plan View of Site
Cross-Sectional View of Dam
Hydrologic Analysis
Hydraulic Analysis
HEC-1 Computer Printout (photocopy)

Silver Lake Dam
Summary

TABLE 1

Return Period	Inflow Hydrograph Peak Discharge (cfs)	Routed Flood Hydrograph Peak Outfall (cfs)	Max. Storage (AC-FT)	Max Elevation (FT)
10-yr	680	110	1558	1309.2
50-yr	910	170	1612	1309.7
100-yr	1040	200	1649	1310.2
500-yr	1270	231	1707	1310.9
1/2 PMP	2290	1470	1935	1312.5
PMP	4580	3950	2128	1315.7

Return Period	Total Rainfall (inches)	Excess Runoff (inches)
10-yr	3.93	2.11
50-yr	5.08	2.96
100-yr	5.59	3.53
500-yr	6.47	4.41
1/2 PMP	12.48	10.53
PMP	24.48	21.06

SILVER LAKE DAM CREST = 1311.0

DuBois + King studies
11-23-81

NORMAL WINTER
1306.0

NORMAL SUMMER
1307.5

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 11-23-81
Subject Hydrology - Summary By GR Ch'k. by GJW

The hydrologic analysis for the Silver Lake's 1.8 mi^2 drainage area was performed utilizing the U.S. Army Corps of Engineers computer program, HEC-1 (Flood Hydrograph Package). In the process of modeling the drainage area with HEC-1, input data, such as, precipitation, distribution of precipitation & watershed characteristics need to be developed in order to compute the Flood Hydrograph.

The precipitation data for the 10, 50, 100 & 500 - year return periods were taken from the U.S.G.S. Technical Paper #40. The Precipitation data for the PMP was taken from Design of Small Dams. The distribution of the precipitation was based on the following hourly storm sequence: 6, 4, 3, 1, 2, 5, taken from Design of Small Dams (p 76). The actual Precipitation Storm Sequences for the different Return Periods are plotted, see Figures 3 thru 7.

The storm duration used in this hydrologic analysis is 24 hours. (Confirmed thru Telephone Conversation with Pete Baranco 11-21-81)

The Watershed characteristics needed to model this basin are the basin's infiltration rate and its lag time as define by the Synder's synthetic unit hydrograph method. The Infiltration rate was based on the soils in the Basin. The computations for the Lag Time & Infiltration rate are on pages 15 of 17, 16 of 17 & 17 of 17.

Job No. _____ Sheet ___ of _____
Project _____ Date _____
Subject _____ By ___ Ch'k. by RJW

THE FLOOD HYDROGRAPHS COMPUTED FOR EACH FREQUENCY STORM WERE ROUTED THRU THE EXISTING OUTLETS UTILIZING THE MODIFIED PULS METHOD THAT IS INCORPORATED IN THE HEC-1 COMPUTER PROGRAM. THE MODIFIED PULS ROUTING METHOD IS A TECHNIQUE FOR SOLVING THE CONTINUITY EQUATION, GIVEN A UNIQUE RELATIONSHIP BETWEEN OUTFLOW AND STORAGE. THE FLOOD HYDROGRAPHS WERE ROUTED THRU THE EXISTING STRUCTURE ASSUMING THE LAKE LEVEL WAS INITIALLY AT THE NORMAL SUMMER ELEVATION OF 1307.5 AND THAT THE SERVICE SPILLWAY (1.8' DIA. STEEL CULVERT) IS OUT OF SERVICE.

FOR THIS HYDROLOGIC ANALYSIS ON SILVER LAKE NO BASE FLOW WAS ASSUMED. THIS IS A REASONABLE ASSUMPTION, FOR A DRAINAGE AREA EQUAL TO 1.8 mi^2. IF A BASE FLOW OF 10 CFS WAS ASSUMED, THIS WOULD BE 5.6 CFS/mi^2, THIS WOULD BE NEGLIGIBLE, COMPARED TO THE FLOOD HYDROGRAPHS PEAK DISCHARGES.

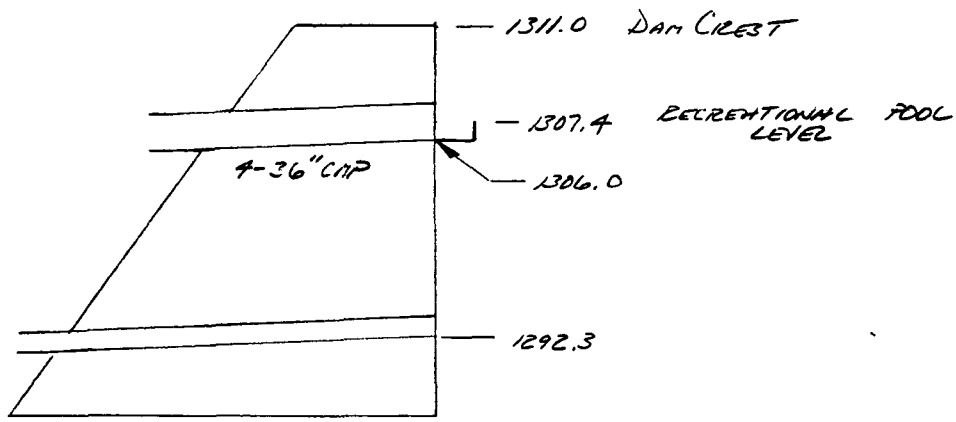
THE RESULTS OF THIS HYDROLOGIC ANALYSIS ARE PRESENTS ON TABLE 1.

Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date ___
Subject SUMMARY By ___ Ch'k. by KJW

TABLE #1

RETURN PERIOD	INFLOW HYDROGRAPH PEAK DISCHARGE (CFS)	ROUTED FLOOD HYDROGRAPH PEAK OUTFLOW (CFS)	MAX. STORAGE (AC-FT)	MAX ELEVATION (FT)	TOTAL RAINFALL (INCHES)	EXCESS RUNOFF INCHES
10-YR	680	110	1558	1309.2	3.93	2.11
50-YR	910	170	1612	1309.7	5.08	2.96
100-YR	1040	200	1649	1310.2	5.59	3.53
500-YR	1270	231	1707	1310.9	6.47	4.41
½ PMP	2290	1470	1935	1312.5	12.48	10.53
PMP	4580	3950	2128	1315.7	24.48	21.06

SILVER LAKE DAM



(NOT TO SCALE)

Job No. 11241 Sheet 1 of 17
Project SILVER LAKE DAM Date
Subject HYDROLOGY By CJK Ch'k. by RJW

FROM TP #40 (U.S.G.S)

ACCUMULATED RAINFALL (OR TOTAL) (INCHES)

DURATION	1-YR	2-YR	10-YR	25-YR	50-YR	100-YR
30 MIN	0.7	0.83	1.33	1.53	1.72	1.93
1-HR	0.86	1.08	1.65	1.92	2.18	2.35
2-HR	1.12	1.35	2.15	2.40	~~2.75~~ 2.72	~~3.1~~ 3.03
3-HR	1.31	1.50	2.4 ?	2.70	~~3.10~~ 3.05	~~3.35~~ 3.43
4-HR	1.38	1.63	2.58	2.93	3.3	3.72
5-HR	1.44	1.72	2.70	3.12	3.50	3.96
6-HR	1.5	~~1.75~~ 1.8	2.8	3.3	3.70	4.2
12-HR	1.85	2.30	3.40	3.9	4.40	4.9
24-HR	2.25	3.4	3.9	4.5	5.10	5.5

RAINFALL FOR 4-HR & 5-HR DURATION TAKEN FROM FIGURE No. 1.

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

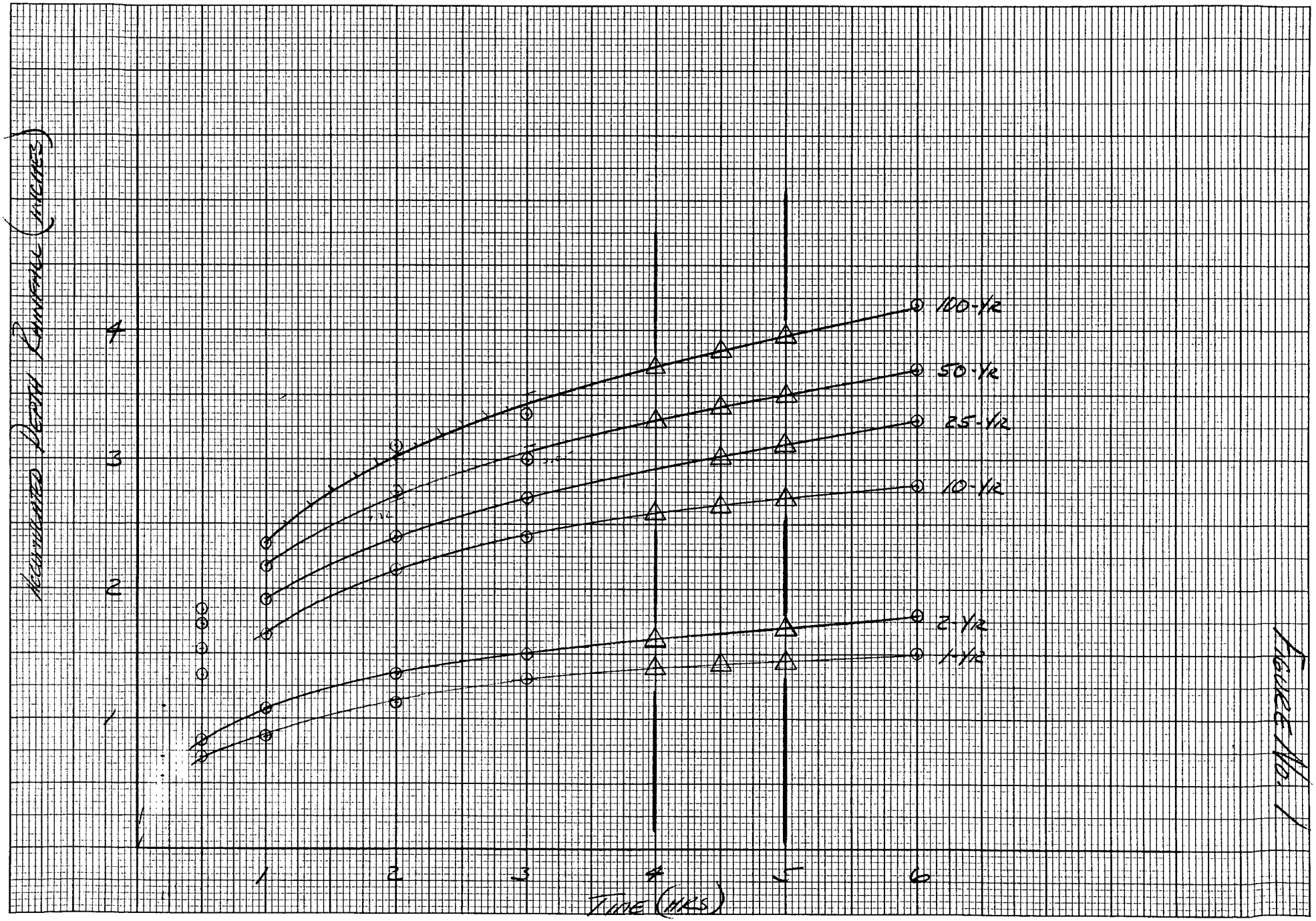


FIGURE No. 1

Job No. 11241 Sheet 3 of 17
Project SILVER LAKE DAM Date 11-4-81
Subject HYDROLOGY By CJK Ch'k. by

TIME (HRS)	TOTAL OR ACCUMULATED RAINFALL (INCHES)	INCREMENTAL RAINFALL	STORM SEQUENCE 6,4,3,1,2,5			
	1-YEAR				2-YEAR	
1	0.86	0.86	0.06	1.08	1.08	0.08
2	1.12	0.26	0.07	1.35	0.27	0.13
3	1.31	0.19	0.19	1.50	0.23	0.23
4	1.38	0.07	0.86	1.63	0.13	1.08
5	1.44	0.06	0.26	1.72	0.09	0.27
6	1.5	0.06	0.06	1.80	0.08	0.09
12	1.85	0.35	0.35	2.30	0.50	0.50
	10-YEAR				25-YR	
1	1.65	1.65	0.10	1.92	1.92	0.18
2	2.15	0.50	0.18	2.40	0.48	0.23
3	2.40	0.25	0.25	2.70	0.30	0.30
4	2.58	0.18	1.65	2.93	0.23	1.92
5	2.70	0.12	0.50	3.12	0.19	0.48
6	2.80	0.10	0.12	3.30	0.18	0.19
12	3.40	0.60	0.60	3.90	0.6	0.60
24	3.90	0.50	0.50	4.50	0.6	0.60
	50-YEAR				100-YEAR	
1	2.18	2.18	0.20	2.35	2.35	0.24
2	2.72	0.54	0.25	3.03	0.68	0.29
3	3.05	0.33	0.33	3.43	0.40	0.40
4	3.30	0.25	2.18	3.72	0.29	2.35
5	3.50	0.20	0.54	3.96	0.24	0.68
6	3.70	0.20	0.20	4.20	0.24	0.24
12	4.40	0.70	0.70	4.90	0.70	0.70
24	5.10	0.70	0.70	5.50	0.60	0.60

Job No. 11241 Sheet 4 of 17
Project SILVER LAKE DAM Date
Subject HYDROLOGY By GTR Ch'k. by

FACTOR	TIME (MINUTES)	1-YR	2-YR	10-YR	25-YR	50-YR	100-YR
0.29	5	0.249	0.313	0.479	0.557	0.632	0.682
0.45	10 *	0.387	0.486	0.743	0.864	0.981	1.058
0.57	15	0.490	0.616	0.941	1.094	1.243	1.3395
0.66	20 *	0.568	0.713	1.089	1.267	1.439	1.551
0.74	25	0.646	0.799	1.221	1.421	1.613	1.739
0.79	30 *	0.679	0.853	1.304	1.517	1.722	1.857
0.84	35	0.722	0.907	1.386	1.613	1.831	1.974
0.88	40 *	0.757	0.950	1.452	1.6896	1.918	2.068
0.92	45	0.791	0.994	1.518	1.766	2.006	2.162
0.95	50 *	0.817	1.026	1.568	1.824	2.071	2.233
0.98	55	0.843	1.058	1.617	1.882	2.136	2.303
1.00	60 *	0.86	1.08	1.65	1.92	2.18	2.35
	1HR	0.86	1.08	1.65	1.92	2.18	2.35

FACTORS TO REDUCE 1-HR DURATIONS TO SHORTER DURATIONS TAKEN FROM SOILS & WATER CONSERVATION ENGINEERING, 2ND EDITION (p 624, APPENDIX A).

Job No. 11241 Sheet 5 of 17
Project Silver Lake Dam Date 11-5-81
Subject Hydrology By GK Ch'k. by

100-YEAR

TIME (MIN)	TOTAL RAINFALL	INCREMENTAL	STORM SEQUENCE 6,4,3,1,2,5	ROUND-OFF
10	1.058	1.058	0.117	0.12
20	1.551	0.493	0.211	0.21
30	1.857	0.306	0.306	0.31
40	2.068	0.211	1.058	1.06
50	2.233	0.165	0.493	0.49
60/1HR	2.35	0.117	0.165	0.17
			Σ 2.35	Σ 2.36
		10-YR		
10	0.743	0.743	0.082	0.08
20	1.089	0.346	0.148	0.15
30	1.304	0.215	0.215	0.22
40	1.452	0.148	0.743	0.74
50	1.568	0.116	0.346	0.35
60/1HR	1.65	0.082	0.116	0.12
			Σ 1.65	Σ 1.66 OK
		25-YR		
10	0.864	0.864	0.096	0.10
20	1.267	0.403	0.1726	0.17
30	1.517	0.25	0.25	0.25
40	1.6896	0.1726	0.864	0.90
50	1.824	0.1344	0.403	0.40
60/1HR	1.92	0.096	0.1344	0.13
			Σ 1.92	Σ 1.95 OK

Job No. 11241 Sheet 6 of 17
Project Date
Subject By CJK Ch'k. by

50-YR

Time (min)	Total Rainfall	Incremental	Storm Sequence	
10	0.981	0.981	0.109	0.11
20	1.439	0.458	0.195	0.20
30	1.722	0.283	0.283	0.28
40	1.918	0.195	0.981	0.98
50	2.071	0.153	0.458	0.46
60/1HR	2.18	0.109	0.153	0.15
			Σ 2.179	Σ 2.18 OK

Job No. 11241 Sheet 7 of 17
Project Silver Lake Hydrology Date 11-20-81
Subject By JK Ch'k. by

500-Yr - Return Period

For return intervals greater than the 100-yr, plot rainfall for the 10, 25, 50, & 100-yr on log-normal paper — the 10-yr values should first be reduced by 0.99 (empirical factor for converting partial duration series to annual duration series) (taken from T.P. No. 40)

Duration	10-Yr (0.99)
1 hr	1.63
2 hr	2.13
3 hr	2.38
4 hr	2.55
5 hr	2.67
6 hr	2.77
12 hr	3.37
24-hr	3.86

FIGURE #2

10-YR
25-YR
50-YR
100-YR
500-YR
1000-YR

24-HR

1-HR

RAINFALL (INCHES)

Job No. 11241 Sheet 9 of 17
Project Silver Lake Dam Date 11-18-91
Subject Hydrology By CJK Ch'k. by

500-Yr

Time (HR)	Rainfall (inches)	Increment (inches)	Storm Sequence
1-HR	2.85	2.85	0.23
2-HR	3.60	0.75	0.34
3-HR	4.05	0.45	0.45
4-HR	4.39	0.34	2.85
5-HR	4.67	0.28	0.75
6-HR	4.90	0.23	0.28
12-HR	5.85	0.95	0.95
24 HR	6.65	0.80	0.80

Time (min)	Rainfall inches	Increment	Storm Sequence 6,4,3,1,2,5	Rounded off
10	1.2825	1.2825	0.1425	0.14
20	1.881	0.5985	0.2565	0.26
30	2.2515	0.3705	0.3705	0.37
40	2.508	0.2565	1.2825	1.28
50	2.7075	0.1995	0.5985	0.60
60 (1-HR)	2.85	0.1425	0.1995	0.20
			Σ = 2.85	Σ 2.85

11-16-81
CTK

Silver Lake Dam

10-Yr Precipitation Storm Sequence

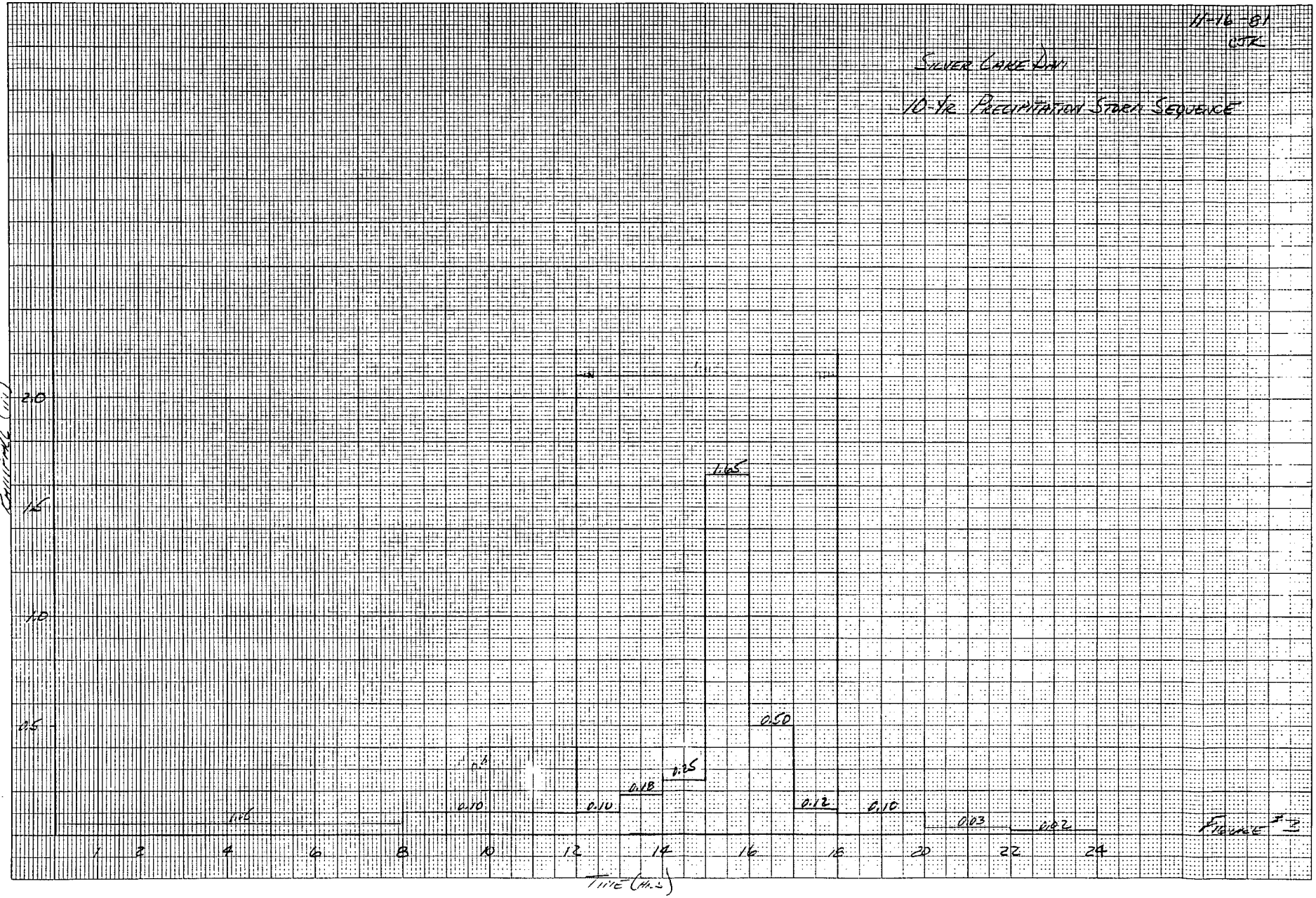
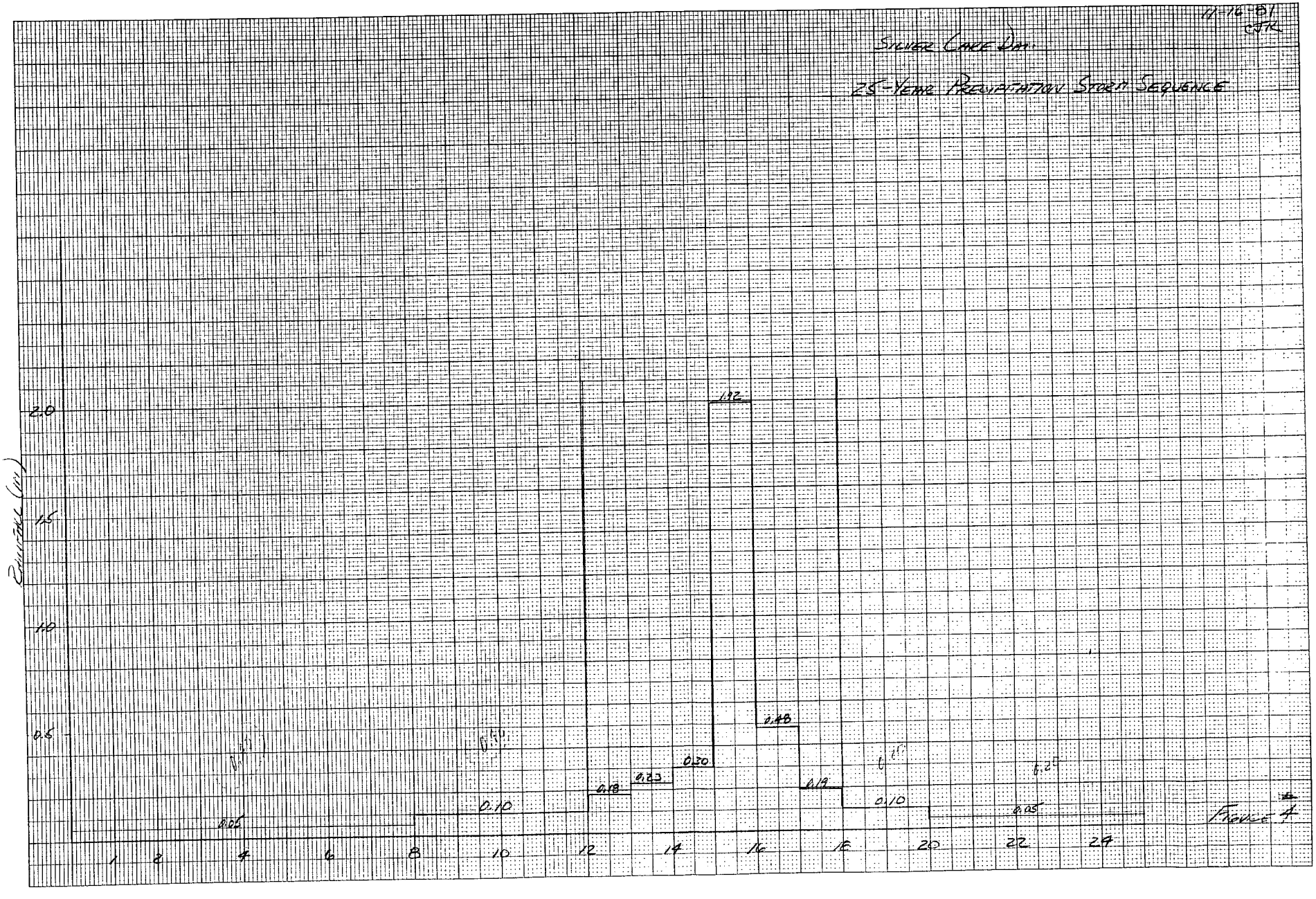


Figure 3-3

47 1320
K&E 10 X 10 TO ½ INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



47 1320
10 X 10 TO ½ INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

11-16-81
GJC

SILVER CREEK DAM

50-YR PRECIPITATION - STORM SEQUENCE

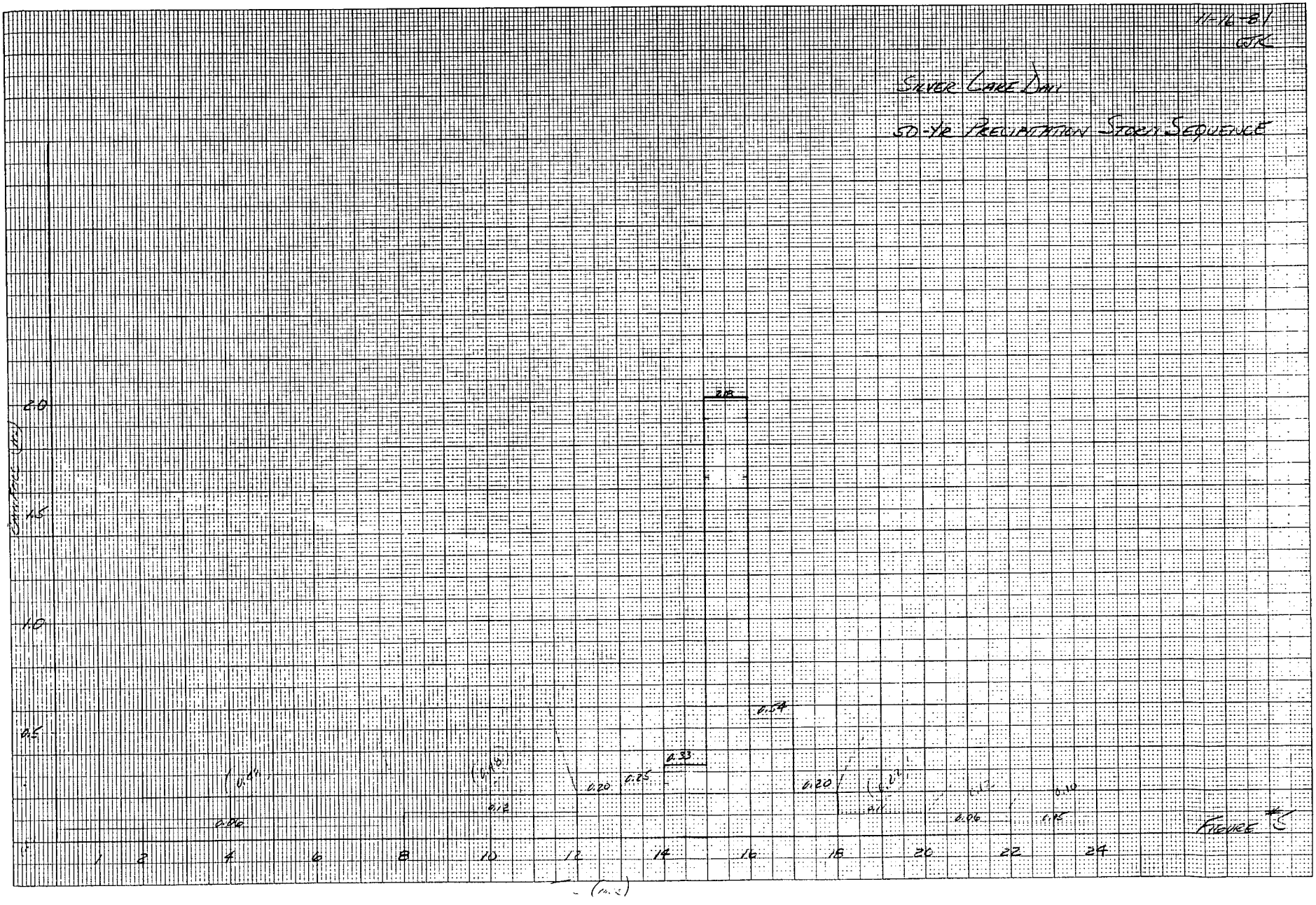
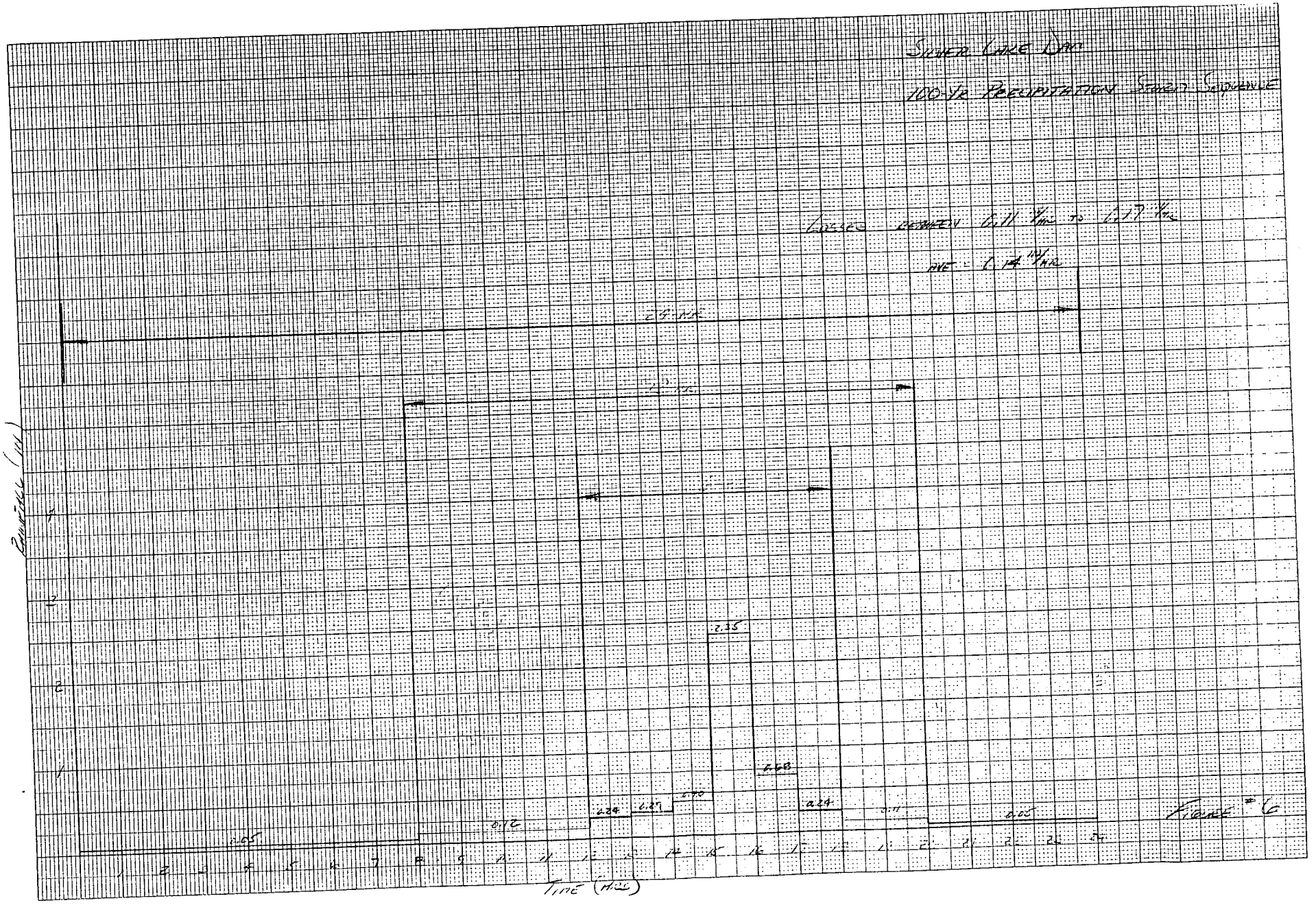


FIGURE #5

47 1320
K•E 10 X 10 TO ½ INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



47 1320
K+E 10 X 10 TO ½ INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

Silver Lake Dam
500-Yr Precipitation Storm Sequence
Cumulative (inches)
Time (hours)
0.07
0.16
0.17
0.23
0.34
0.45
0.85
0.75
0.28
0.15
0.05
Figure #7
47 1320
K&E 10 X 10 TO ½ INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO.

Job No. 1124/ Sheet 15 of 17
Project Silver Lake Dam Date
Subject Hydrology By GK Ch'k. by

SNYDER'S METHOD (Chow p 14-23; Intro. to Hydrology, Viessman, Knapp, Lewis + Harbaugh p 134)

THE HEC-1 COMPUTER PROGRAM REQUIRES T_p (SNYDER'S LAG TIME) + C_p = SNYDER'S PEAKING COEFF.

$$t_p = C_t (L L_c)^{0.3}$$

C_t = COEFF. REPRESENTING VARIATIONS OF WATERSHED SLOPES + STORAGE

L = LENGTH OF MAIN CHANNEL (mi) FROM THE OUTLET TO THE DIVIDE

L_{CA} = LENGTH ALONG THE MAIN CHANNEL TO A POINT NEAREST THE WATERSHED CENTROID (mi)

L = 8800 FT = 1.67 MILES

L_{CA} = 3000 FT = 0.57 MILES

FROM CHOW (p 14-23) THE AVERAGE VALUES FOR THE COEFF C_p + C_t HAVE BEEN FOUND TO BE 0.63 + 2.0, RESPECTIVELY.

$$t_p = 2.0 (1.67 \times 0.57)^{0.3}$$

$$t_p = 1.97 \text{ HRS}$$

Job No. 11241 Sheet 16 of 17
Project SILVER LAKE Date 11-13-81
Subject HYDROLOGY - INFILTRATION By CJK Ch'k. by

SOIL TYPES - TAKEN FROM MORE DETAILED SOILS MAPPING - DATED 2/78

ONLY A SMALL PERCENTAGE OF THE SOIL COVER IS TYPE B SOIL - THE MAJORITY APPEARS TO BE TYPE C + A SOIL TYPE BETWEEN B+C

APPROX 10% OF THE DRAINAGE AREA IS SOIL TYPE D

IF MINIMUM RETENTION RATES FROM DESIGN OF SMALL DAMS WERE UTILIZED:

TYPE C TYPE D

$$90\%\left(0.12\ ^{IN}/_{HR}\right) + 10\%\left(0.04\ ^{IN}/_{HR}\right)$$

INFILTRATION RATE = $0.112\ ^{IN}/_{HR}$

OR

HAVE $0.14\ ^{IN}/_{HR}$

RATE BETWEEN TYPE B + TYPE C TYPE D

$$0.90(0.18) + 0.1(0.04)$$

INFILTRATION RATE = $0.166\ ^{IN}/_{HR}$

THE AVG. INFILTRATION RATE OF $0.14\ ^{IN}/_{HR}$ WILL BE ASSUMED OVER THE BASIN.

Soil Legend

WINDSOR COUNTY, VERMONT

Dec. 1975

Alphabetical

Map Symbol	Soil Name
12	(Berkshire-Lyman) Complex
2	(Belgrade) silt loam
25	Buckland stony fine sandy loam
26	Buckland very stony fine sandy loam
30	Cabot stony loam
31	Cabot very stony loam
15	Colrain stony fine sandy loam
16	Colrain very stony fine sandy loam
35	Groton fine sandy loam
38	Hadley silt loam
14 (B,C,D)	Hinckley and Merrimac soils
45	Hinesburg fine sandy loam
40	Limerick
47	Markey Muck
23	Ondawa fine sandy loam
24	Podunk fine sandy loam
36	Pomfret loamy fine sand
42	Rock outcrops-Woodstock complex
33	Rumney fine sandy loam
41	Saco Mucky loamy fine sand
21	Stowe stony fine sandy loam
22	Stowe very stony fine sandy loam
19	Tunbridge-Colrain fine sandy loam
20	Tunbridge-Rock outcrop complex
1	Unadilla silt loam
29	Walpole fine sandy loam
5	Windsor loamy fine sand
14A	Windsor loamy fine sand, gravelly subsoil variant
39	Winooski very fine sandy loam

Numerical

Map Symbol	Soil Name
1	Unadilla silt loam
2	(Belgrade) silt loam
5	Windsor loamy fine sand
12	(Berkshire-Lyman) complex
14A	Windsor loamy fine sand, gravelly subsoil variant
14(B,C,D)	Hinckley and Merrimac soils
15 (B)	Colrain stony fine sandy loam
16 (B)	Colrain very stony fine sandy loam
19	Tunbridge-Colrain stony fine sandy loam
20	Tunbridge-Rock outcrop complex
21	Stowe stony fine sandy loam
22	Stowe very stony fine sandy loam
23	Ondawa fine sandy loam
24	Podunk fine sandy loam
25 (C)	Buckland stony fine sandy loam
26 (C)	Buckland very stony fine sandy loam
29	Walpole fine sandy loam
30 (C)	Cabot stony loam
31 (C)	Cabot very stony loam
33	Rumney fine sandy loam
35	Groton fine sandy loam
36	Pomfret loamy fine sand
38	Hadley silt loam
39	Winooski very fine sandy loam
40	Limerick silt loam
41	Saco, mucky loamy sand
42	Rock outcrop-Woodstock complex
45	Hinesburg fine sandy loam
47	Markey Muck
49 (D)	Vergennes ~~Silty~~ clay loam

Soil Type

A

RED

BETWEEN B+C SOILS

MAJORITY OF SOILS

GREEN

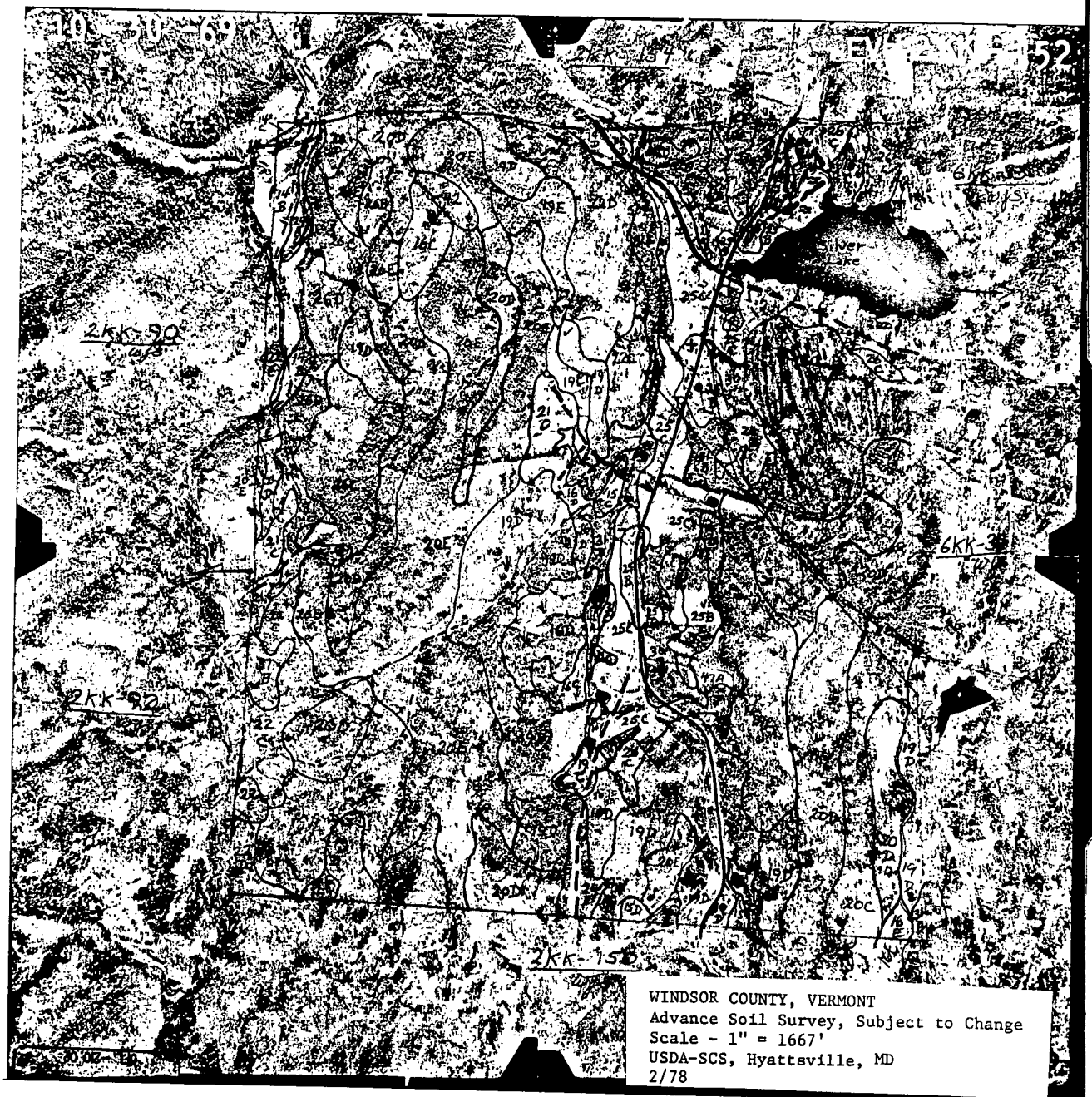
YELLOW

D



WINDSOR COUNTY, VERMONT
Advance Soil Survey, Subject to Change
Scale - 1" = 1667'
USDA-SCS, Hyattsville, MD
2/78


WINDSOR COUNTY, VERMONT
Advance Soil Survey, Subject to Change
Scale - 1" = 1667'
USDA-SCS, Hyattsville, MD
2/78



WINDSOR COUNTY, VERMONT
Advance Soil Survey, Subject to Change
Scale - 1" = 1667'
USDA-SCS, Hyattsville, MD
2/78

Job No. 1124/ Sheet 12 of 17
Project SILVER LAKE DAM Date
Subject HYDROLOGY - INFILTRATION RATES By GK Ch'k. by

SOIL TYPES — TAKEN FROM GENERAL SOIL MAP EAST CENTRAL VERMONT U.S. DEPART. OF AGRICULTURE S.C.S. SCALE 1:335000

THE FOLLOWING SOIL TYPES ARE IN THE SILVER LAKE DRAINAGE AREA.

CALAIS - BUCKLAND ASSOCIATION (WELL TO MODERATELY WELL DRAINED)

COLRAIN - WOODSTOCK - BUCKLAND ASSOCIATION "

CALAIS - GLOVER - BUCKLAND ASSOCIATION (WELL TO MODERATELY WELL DRAINED)

CABOT - TUCK ASSOCIATION (POORLY DRAINED)

HYDROLOGIC SOIL GROUP

CALAIS - B
BUCKLAND - C
COLRAIN - B
CABOT - C

FROM DESIGN OF SMALL DAMS (p64) (ALSO ON p 544)

HYDROLOGIC SOIL GROUP	RECOMMENDED RETENTION RATE
A	0.40 IN/HR
B	0.24 "
C	0.12 "
D	0.04 "

IT CAN ALSO BE ASSUMED THAT APPROX 90% OF THE TOTAL DRAINAGE AREA IS WOODED.

FROM FIG A-2 (p537) IN DESIGN OF SMALL DAMS THE CURVE NO FOR THIS BASIN WOULD BE —

MANTLE DEPTH = 4"
C = COMPACTNESS FACTOR = 2
HC = HYDROLOGIC CONDITION (CASE) = 3.5

CN (FOR AMC II) ≈ 65

GEOLOGICAL SURVEY

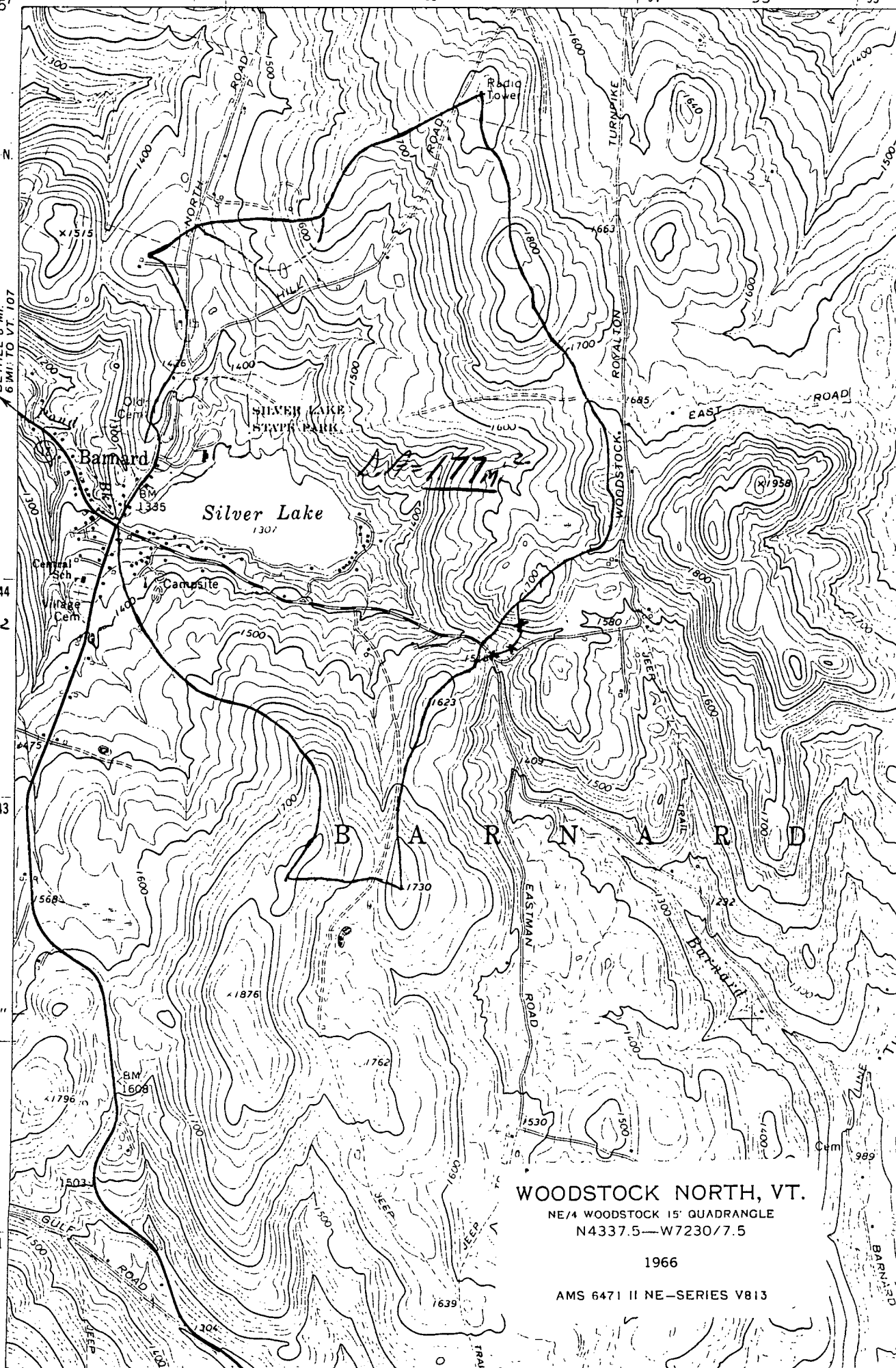
72°37'30"
43°45'
692000m E.
693
694
35'
695
4846000m N.
4844
4843
42'30"
4841

DELINEATION OF DRAINAGE AREA

3243 - 1243
4482 - 1234
5716 - 1234

AVE = 12.34 in²

12.34 in² (0.1435) =
1.75 mi²



WOODSTOCK NORTH, VT.

NE/4 WOODSTOCK 15' QUADRANGLE

N4337.5—W7230/7.5

1966

AMS 6471 II NE—SERIES V813

****
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
****

SILVER LAKE DAM - BARNARD,VT.
1981-HYDROLOGY
BARNARD,VT. - DWR - CONTRACT NO.-0263025

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
144	0	10	1	0	0	0	2	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

SILVER LAKE DAM - BARNARD,VT.--100-YEAR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	1	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	1	1.80	0.00	0.00	0.00	0.000	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
144	0.00	0.00	0.00

PRECIP PATTERN

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.05
0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07
0.12	0.21	0.31	1.06	0.49	0.17	0.12	0.11	0.11
0.11	0.11	0.04	0.04	0.04	0.04	0.04	0.03	0.03
0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00					

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.14	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.97 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= 0.00 QRCSN= -0.10 RTIOR= 1.50

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=13.05 AND R=10.96 INTERVALS

UNIT HYDROGRAPH 66 END-OF-PERIOD ORDINATES, LAG= 1.96 HOURS, CP= 0.63 VOL= 1.00

9.	34.	69.	110.	155.	203.	252.	296.	332.	358.
374.	380.	374.	351.	320.	292.	267.	244.	222.	203.
185.	169.	154.	141.	128.	117.	107.	98.	89.	81.
74.	68.	62.	56.	52.	47.	43.	39.	36.	33.
30.	27.	25.	23.	21.	19.	17.	16.	14.	13.
12.	11.	10.	9.	8.	8.	7.	6.	6.	5.
5.	4.	4.	4.	3.	3.				

END-OF-PERIOD FLOW

	TIME	RAIN	EXCS	COMP Q
1	0 10	0.01	0.00	0.
1	0 20	0.01	0.00	0.
1	0 30	0.01	0.00	0.
1	0 40	0.01	0.00	0.
1	0 50	0.01	0.00	0.
1	0 60	0.01	0.00	0.
1	1 10	0.01	0.00	0.
1	1 20	0.01	0.00	0.
1	1 30	0.01	0.00	0.
1	1 40	0.01	0.00	0.
1	1 50	0.01	0.00	0.
1	1 60	0.01	0.00	0.
1	2 10	0.01	0.00	0.
1	2 20	0.01	0.00	0.
1	2 30	0.01	0.00	0.
1	2 40	0.01	0.00	0.
1	2 50	0.01	0.00	0.
1	2 60	0.01	0.00	0.
1	3 10	0.01	0.00	0.
1	3 20	0.01	0.00	0.
1	3 30	0.01	0.00	0.
1	3 40	0.01	0.00	0.
1	3 50	0.01	0.00	0.
1	3 60	0.01	0.00	0.
1	4 10	0.01	0.00	0.
1	4 20	0.01	0.00	0.
1	4 30	0.01	0.00	0.
1	4 40	0.01	0.00	0.
1	4 50	0.01	0.00	0.
1	4 60	0.01	0.00	0.
1	5 10	0.01	0.00	0.
1	5 20	0.01	0.00	0.
1	5 30	0.01	0.00	0.
1	5 40	0.01	0.00	0.
1	5 50	0.01	0.00	0.
1	5 60	0.01	0.00	0.
1	6 10	0.01	0.00	0.
1	6 20	0.01	0.00	0.
1	6 30	0.01	0.00	0.
1	6 40	0.01	0.00	0.
1	6 50	0.01	0.00	0.
1	6 60	0.01	0.00	0.
1	7 10	0.01	0.00	0.
1	7 20	0.01	0.00	0.

2a = 11

1	7	30	0.01	0.00	0.
1	7	40	0.01	0.00	0.
1	7	50	0.01	0.00	0.
1	7	60	0.01	0.00	0.
1	8	10	0.02	0.00	0.
1	8	20	0.02	0.00	0.
1	8	30	0.02	0.00	0.
1	8	40	0.02	0.00	0.
1	8	50	0.02	0.00	0.
1	8	60	0.02	0.00	0.
1	9	10	0.02	0.00	0.
1	9	20	0.02	0.00	0.
1	9	30	0.02	0.00	0.
1	9	40	0.02	0.00	0.
1	9	50	0.02	0.00	0.
1	9	60	0.02	0.00	0.
1	10	10	0.02	0.00	0.
1	10	20	0.02	0.00	0.
1	10	30	0.02	0.00	0.
1	10	40	0.02	0.00	0.
1	10	50	0.02	0.00	0.
1	10	60	0.02	0.00	0.
1	11	10	0.02	0.00	0.
1	11	20	0.02	0.00	0.
1	11	30	0.02	0.00	0.
1	11	40	0.02	0.00	0.
1	11	50	0.02	0.00	0.
1	11	60	0.02	0.00	0.
1	12	10	0.04	0.02	0.
1	12	20	0.04	0.02	1.
1	12	30	0.04	0.02	2.
1	12	40	0.04	0.02	4.
1	12	50	0.04	0.02	6.
1	12	60	0.04	0.02	10.
1	13	10	0.04	0.02	14.
1	13	20	0.05	0.03	19.
1	13	30	0.05	0.03	25.
1	13	40	0.05	0.03	31.
1	13	50	0.05	0.03	39.
1	13	60	0.05	0.03	47.
1	14	10	0.06	0.04	55.
1	14	20	0.06	0.04	64.
1	14	30	0.07	0.05	73.
1	14	40	0.07	0.05	82.
1	14	50	0.07	0.05	93.
1	14	60	0.07	0.05	104.
1	15	10	0.12	0.10	116.
1	15	20	0.21	0.19	130.
1	15	30	0.31	0.29	150.
1	15	40	1.06	1.04	185.
1	15	50	0.49	0.47	242.
1	15	60	0.17	0.15	320.
1	16	10	0.12	0.10	410.
1	16	20	0.12	0.10	509.
1	16	30	0.11	0.09	613.
1	16	40	0.11	0.09	717.
1	16	50	0.11	0.09	316.
1	16	60	0.11	0.09	900.

1	17	10	0.04	0.02	968.
1	17	20	0.04	0.02	1015.
1	17	30	0.04	0.02	1040.
1	17	40	0.04	0.02	1040.
1	17	50	0.04	0.02	1012.
1	17	60	0.04	0.02	966.
1	18	10	0.03	0.01	915.
1	18	20	0.03	0.01	862.
1	18	30	0.03	0.01	808.
1	18	40	0.03	0.01	755.
1	18	50	0.02	0.00	703.
1	18	60	0.02	0.00	652.
1	19	10	0.01	0.00	602.
1	19	20	0.01	0.00	555.
1	19	30	0.01	0.00	512.
1	19	40	0.01	0.00	471.
1	19	50	0.01	0.00	432.
1	19	60	0.01	0.00	397.
1	20	10	0.01	0.00	363.
1	20	20	0.01	0.00	332.
1	20	30	0.01	0.00	304.
1	20	40	0.01	0.00	278.
1	20	50	0.01	0.00	253.
1	20	60	0.01	0.00	231.
1	21	10	0.01	0.00	211.
1	21	20	0.01	0.00	193.
1	21	30	0.01	0.00	176.
1	21	40	0.01	0.00	161.
1	21	50	0.01	0.00	147.
1	21	60	0.01	0.00	134.
1	22	10	0.01	0.00	122.
1	22	20	0.01	0.00	111.
1	22	30	0.01	0.00	103.
1	22	40	0.01	0.00	99.
1	22	50	0.01	0.00	95.
1	22	60	0.01	0.00	91.
1	23	10	0.01	0.00	88.
1	23	20	0.01	0.00	84.
1	23	30	0.00	0.00	81.
1	23	40	0.00	0.00	78.
1	23	50	0.00	0.00	74.
1	23	60	0.00	0.00	72.
		SUM	5.59	3.53	23363.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1040.	577.	162.	162.	23360.
INCHES		2.98	3.35	3.35	3.35
AC-FT		286.	322.	322.	322.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

Fig 11

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.000	0.00	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
0	0	0	0.000	0.000	0.000	1411.

STORAGE=	1411.	1490.	1540.	1631.	1720.	1765.	1810.	1910.	2010.	2220.
OUTFLOW=	0.	52.	94.	192.	238.	377.	612.	1265.	2097.	5409.

	TIME	EOP STOR	AVG IN	EOP OUT
1	0 10	1411.	0.	0.
1	0 20	1411.	0.	0.
1	0 30	1411.	0.	0.
1	0 40	1411.	0.	0.
1	0 50	1411.	0.	0.
1	0 60	1411.	0.	0.
1	1 10	1411.	0.	0.
1	1 20	1411.	0.	0.
1	1 30	1411.	0.	0.
1	1 40	1411.	0.	0.
1	1 50	1411.	0.	0.
1	1 60	1411.	0.	0.
1	2 10	1411.	0.	0.
1	2 20	1411.	0.	0.
1	2 30	1411.	0.	0.
1	2 40	1411.	0.	0.
1	2 50	1411.	0.	0.
1	2 60	1411.	0.	0.
1	3 10	1411.	0.	0.
1	3 20	1411.	0.	0.
1	3 30	1411.	0.	0.
1	3 40	1411.	0.	0.
1	3 50	1411.	0.	0.
1	3 60	1411.	0.	0.
1	4 10	1411.	0.	0.
1	4 20	1411.	0.	0.
1	4 30	1411.	0.	0.
1	4 40	1411.	0.	0.
1	4 50	1411.	0.	0.
1	4 60	1411.	0.	0.
1	5 10	1411.	0.	0.
1	5 20	1411.	0.	0.
1	5 30	1411.	0.	0.
1	5 40	1411.	0.	0.
1	5 50	1411.	0.	0.
1	5 60	1411.	0.	0.
1	6 10	1411.	0.	0.
1	6 20	1411.	0.	0.
1	6 30	1411.	0.	0.
1	6 40	1411.	0.	0.
1	6 50	1411.	0.	0.
1	6 60	1411.	0.	0.
1	7 10	1411.	0.	0.
1	7 20	1411.	0.	0.
1	7 30	1411.	0.	0.
1	7 40	1411.	0.	0.
1	7 50	1411.	0.	0.
1	7 60	1411.	0.	0.

1	8	10	1411.	0.	0.
1	8	20	1411.	0.	0.
1	8	30	1411.	0.	0.
1	8	40	1411.	0.	0.
1	8	50	1411.	0.	0.
1	8	60	1411.	0.	0.
1	9	10	1411.	0.	0.
1	9	20	1411.	0.	0.
1	9	30	1411.	0.	0.
1	9	40	1411.	0.	0.
1	9	50	1411.	0.	0.
1	9	60	1411.	0.	0.
1	10	10	1411.	0.	0.
1	10	20	1411.	0.	0.
1	10	30	1411.	0.	0.
1	10	40	1411.	0.	0.
1	10	50	1411.	0.	0.
1	10	60	1411.	0.	0.
1	11	10	1411.	0.	0.
1	11	20	1411.	0.	0.
1	11	30	1411.	0.	0.
1	11	40	1411.	0.	0.
1	11	50	1411.	0.	0.
1	11	60	1411.	0.	0.
1	12	10	1411.	0.	0.
1	12	20	1411.	0.	0.
1	12	30	1411.	1.	0.
1	12	40	1411.	3.	0.
1	12	50	1411.	5.	0.
1	12	60	1411.	8.	0.
1	13	10	1411.	12.	0.
1	13	20	1412.	16.	0.
1	13	30	1412.	22.	1.
1	13	40	1412.	28.	1.
1	13	50	1413.	35.	1.
1	13	60	1413.	43.	2.
1	14	10	1414.	51.	2.
1	14	20	1415.	59.	2.
1	14	30	1416.	68.	3.
1	14	40	1417.	78.	4.
1	14	50	1418.	88.	5.
1	14	60	1419.	98.	5.
1	15	10	1421.	110.	6.
1	15	20	1422.	123.	7.
1	15	30	1424.	140.	9.
1	15	40	1426.	167.	10.
1	15	50	1429.	214.	12.
1	15	60	1433.	281.	14.
1	16	10	1437.	365.	17.
1	16	20	1444.	459.	21.
1	16	30	1451.	561.	26.
1	16	40	1460.	665.	32.
1	16	50	1470.	766.	39.
1	16	60	1481.	858.	46.
1	17	10	1493.	934.	55.
1	17	20	1506.	992.	65.
1	17	30	1519.	1023.	77.
1	17	40	1532.	1041.	8?.

1 17 50	1545.	1026.	100.
1 17 60	1557.	989.	113.
1 18 10	1569.	940.	125.
1 18 20	1579.	888.	136.
1 18 30	1589.	835.	146.
1 18 40	1597.	782.	156.
1 18 50	1605.	729.	164.
1 18 60	1612.	677.	172.
1 19 10	1618.	627.	178.
1 19 20	1624.	579.	184.
1 19 30	1629.	533.	190.
1 19 40	1633.	491.	193.
1 19 50	1636.	451.	195.
1 19 60	1639.	414.	196.
1 20 10	1642.	380.	198.
1 20 20	1644.	348.	199.
1 20 30	1646.	318.	200.
1 20 40	1647.	291.	200.
1 20 50	1648.	266.	201.
1 20 60	1648.	242.	201.
1 21 10	1649.	221.	201.
1 21 20	1649.	202.	201.
1 21 30	1648.	184.	201.
1 21 40	1648.	168.	201.
1 21 50	1647.	154.	200.
1 21 60	1646.	140.	200.
1 22 10	1645.	128.	199.
1 22 20	1644.	117.	199.
1 22 30	1643.	107.	198.
1 22 40	1642.	101.	198.
1 22 50	1640.	97.	197.
1 22 60	1639.	93.	196.
1 23 10	1637.	89.	195.
1 23 20	1636.	86.	195.
1 23 30	1634.	82.	194.
1 23 40	1633.	79.	193.
1 23 50	1631.	76.	192.
1 23 60	1630.	73.	191.
SUM			7547.

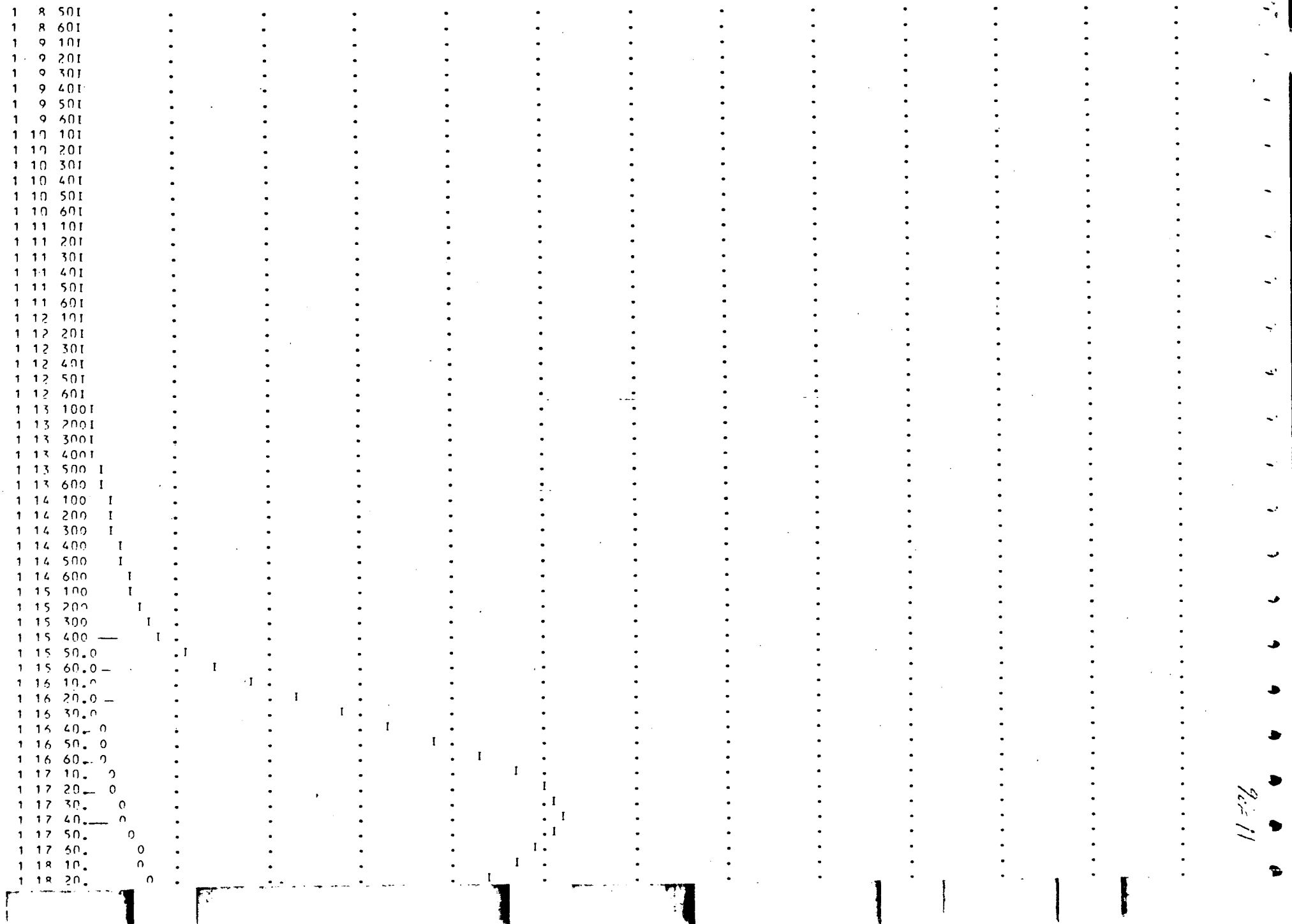
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	201.	188.	52.	52.	7547.
INCHES		0.97	1.08	1.08	1.08
AC-FT		93.	104.	104.	104.

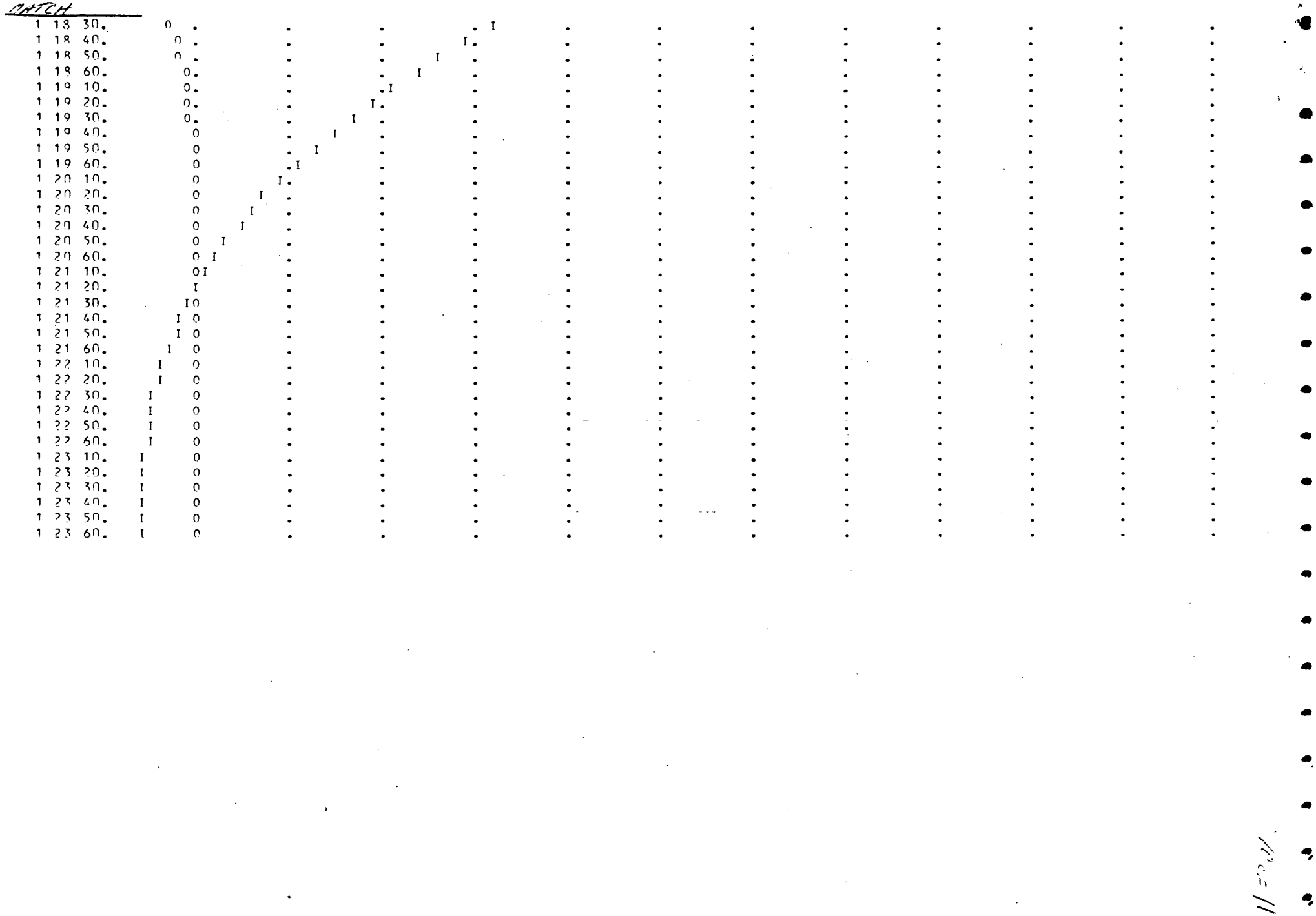
OVF

STATION 0

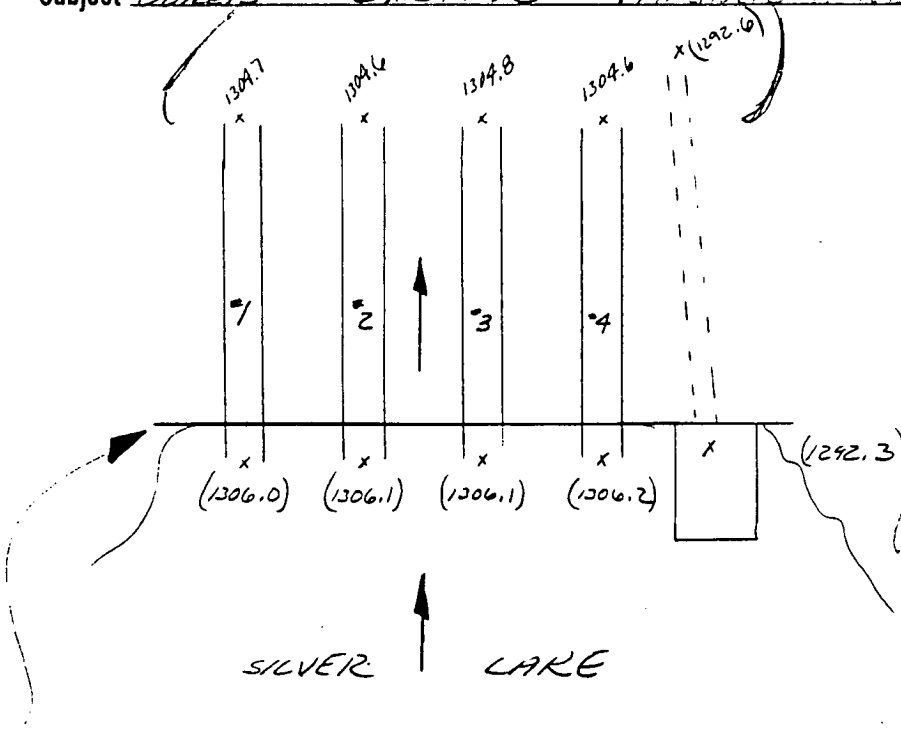
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

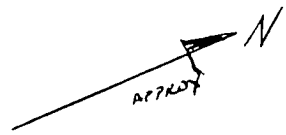
		0.	200.	400.	600.	800.	1000.	1200.	0.	0.	0.	0.	0.	0.
1	0	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	0	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	0	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	0	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	0	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	0	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	1	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	2	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	3	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	4	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	5	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	6	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	40I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	50I	.	.	.	.	.	.	.	.	.	.	.	.
1	7	60I	.	.	.	.	.	.	.	.	.	.	.	.
1	8	10I	.	.	.	.	.	.	.	.	.	.	.	.
1	8	20I	.	.	.	.	.	.	.	.	.	.	.	.
1	8	30I	.	.	.	.	.	.	.	.	.	.	.	.
1	8	40I	.	.	.	.	.	.	.	.	.	.	.	.


1 8 50I
1 8 60I
1 9 10I
1 9 20I
1 9 30I
1 9 40I
1 9 50I
1 9 60I
1 10 10I
1 10 20I
1 10 30I
1 10 40I
1 10 50I
1 10 60I
1 11 10I
1 11 20I
1 11 30I
1 11 40I
1 11 50I
1 11 60I
1 12 10I
1 12 20I
1 12 30I
1 12 40I
1 12 50I
1 12 60I
1 13 100I
1 13 200I
1 13 300I
1 13 400I
1 13 500 I
1 13 600 I
1 14 100 I
1 14 200 I
1 14 300 I
1 14 400 I
1 14 500 I
1 14 600 I
1 15 100 I
1 15 200 I
1 15 300 I
1 15 400 — I
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1 15 60.0 — I
1 16 10.0 I
1 16 20.0 — I
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1 16 60.— 0
1 17 10. 0
1 17 20.— 0
1 17 30. 0
1 17 40.— 0
1 17 50. 0
1 17 60. 0
1 18 10. 0
1 18 20. 0


PATCH
1 18 30.
1 18 40.
1 18 50.
1 18 60.
1 19 10.
1 19 20.
1 19 30.
1 19 40.
1 19 50.
1 19 60.
1 20 10.
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1 21 10.
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1 21 30.
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1 21 60.
1 22 10.
1 22 20.
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1 22 40.
1 22 50.
1 22 60.
1 23 10.
1 23 20.
1 23 30.
1 23 40.
1 23 50.
1 23 60.

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 11-2-81
Subject Outlets - Existing [illegible] By GJK Ch'k. by ___





LENGTH OF CULVERTS
4 - 36" CMP CULVERTS (61 FT)
1 - 1.8' (22" STEEL) CULVERT
73' LONG

[illegible]

TOP OF CONCRETE WALL 1311.0 FT

DISCHARGE CAPACITY OF OUTLETS WITH WEL AT TOP OF DAM ELEVATION 1311.0

STEEL PIPE (DIA = 1.8') = 50 CFS

36" CMP CULVERTS = 4(60 CFS) = 240 CFS

TOTAL DISCHARGE CAPACITY = 290 CFS

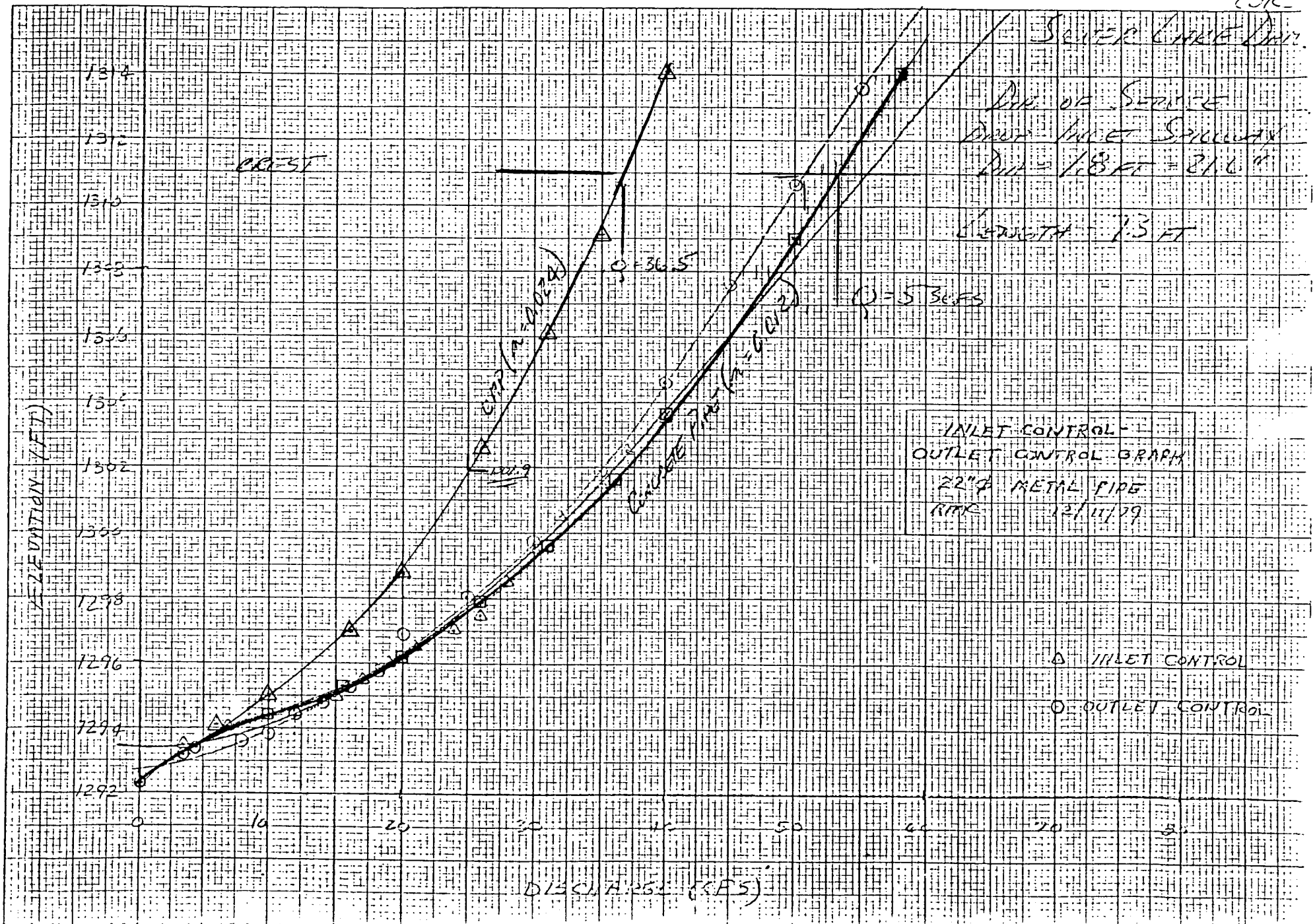
FROM PHASE I DAM INSPECTION DATA

STEEL PIPE (DIA = 1.8') = 50 CFS

36" CMP CULVERTS = 4(53.5 CFS) = 210 CFS

TOTAL CAPACITY = 260 CFS

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



$D_{10} = 1.8' = 21.6"$

SERVICE DEEP INLET SPILLWAY

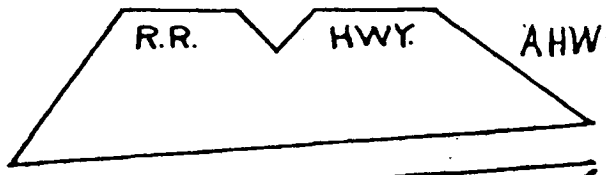
TYPE USED CONCRETE PIPE ($n = 0.012$)

Q_{100} STEEL PIPE N-VALUE = 0.012

Q_{25}

B/R = EL. _____ RIVER MILE _____

HWY. SN. = EL. _____



AHW = EL. _____

EL. 1292.6 S = _____ EL. 1292.3

L = 73

CORPS OF ENGINEERS, U.S. ARMY
OHIO RIVER DIVISION
INSTALLATION ORPED-H
COMPUTED BY CSR
CHECKED BY

SUBJECT SERVICE SPILLWAY
COMPUTATION 11-24

COMPUTATION SHEET
DATE
NUMBER

HEADWATER COMPUTATION

Q	INLET CONTROL			OUTLET CONTROL						CONTROL HEAD WATER
	HW/D	H.W.	EL H.W	d_c	h_o	$\frac{d_c+D}{2}$ or TW.	H	H.W	EL. H.W	
3.2	0.5	0.9	1292.2							
3.8	0.55	0.99	1293.3							
4.4	0.6	1.08	1293.4							
5.9	0.7	1.26	1293.6	0.9		1.35				
7.1	0.8	1.44	1293.7	1.0		1.4				
8.6	0.9	1.62	1293.9*	1.1	0	1.45	0.41	1.86	*1294.2	
10	1.0	1.8	1294.1	1.2		1.5	0.575	2.1	1294.4	
15.5	1.5	2.7	1295.0	1.5		1.65	1.38	3.02	1295.3	
20	2.0	3.6	1295.6	1.6		1.7	2.2	3.9	1296.2	
26	3.0	5.4	1297.7	1.75		1.8	3.8	5.6	1297.9	
31	4.0	7.2	1299.5	1.8		1.8	5.5	7.3	1299.6	
36	5.0	9.0	1301.2	2.0		1.8	7.5	9.3	1301.6	
40	6.0	10.8	1303.1	2.1		1.8	9.5	11.3	1303.6	
50						1.8	14.9	16.7	1309.0	
58						1.8	20	21.8	1314.1	

Dia = 1.8' = 21.6"

SERVICE DROP INLET

TYPE SPILLWAY (CMP, $n = 0.024$

Q_{100}

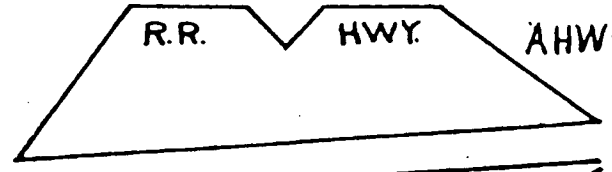
Q_{25}

RIVER MILE _____

B/R = EL. _____

HWY. SN. = EL. _____

Dia = 1.8'



AHW = EL. _____

EL. 1292.6 S EL. 1292.3

S. = _____

L = 73

CORPS OF ENGINEERS, U.S. ARMY
OHIO RIVER DIVISION
INSTALLATION ORPED-H

COMPUTED BY CJT

CHECKED BY

COMPUTATION

SUBJECT SERVICE SPILLWAY

COMPUTATION SHEET

DATE 11/24/

NUMBER

HEADWATER COMPUTATION

Q	INLET CONTROL			OUTLET CONTROL ($HW = H + h_o - LS_o$)						CONTROL HEAD WATER
	HW/D	H.W.	EL H.W	d_c	h_o	T.W.	H	H.W	EL. H.W	
0	0	0	1292.3		$\frac{d_c + D}{2}$					
3.4	0.5	0.9	1293.2							
4.6	0.55	0.99	1293.3							
4.5	0.6	1.08	1293.4							
6.0 ✓	0.7	1.26	1293.6	0.9	1.35	1.98	0.4	1.75	1294.1	
7.1	0.8	1.44	1293.7	1.0	1.4		0.60	2.0	1294.3	
8.5	0.9	1.62	1293.9	1.1	1.45		0.85	2.30	1294.6	
10.0 ✓	1.0	1.8	1294.1	1.2	1.5		1.2	2.7	1295.0	
16.0 ✓	1.5	2.7	1295.0	1.5	1.65		3.0	4.65	1296.95	
20.0	2.0	3.6	1295.6	1.6	1.7		4.8	6.5	1298.8	
26.0	3.0	5.4	1297.7	1.75	1.8		8.5	10.3	1302.6	
31.0	4.0	7.2	1299.5	1.9	1.9		12.0	13.8	1306.1	
35.0	5.0	9.0	1301.3	2.0	1.8		15.0	16.8	1309.1	
40	6.0	10.8	1303.1	2.1	1.8		20.0	21.8	1314.1	

FULL FLOW

CORPS OF ENGINEERS, U.S. ARMY
OHIO RIVER DIVISION
INSTALLATION ORPED-H
COMPUTED BY C.T.C.
CHECKED BY

SUBJECT Symmes Creek 11-24-1
COMPUTATION
DATE
NUMBER

COMPUTATION SHEET

Dia = 36" CMP
Emergency Spillway

Type

Q_{100}

Q_{25}

B/R - El. _____ River Mile _____
Hwy. Sn. = El. _____



AHW = El. _____

El. 1304.68 S_o = 1.42 S_o = 0.023 L = 61 El. 1306.1

HEADWATER COMPUTATION

$HW = H + h_o - LS_o$

Q	INLET CONTROL			OUTLET CONTROL						CONTROL HEAD WATER
	HW/D	H.W.	El H.W.	d_c	h_o	~~T.W.~~ $\frac{d_c+D}{2}$	H	H.W	El. H.W	
11.5	0.5	1.5	1307.6							
13.5	0.55	1.65	1307.8							
16.0	0.6	1.8	1307.9	1.25		2.1				
20.0	0.7	2.1	1308.2	1.40		2.2	0.4	1.18	1307.3	
25.0	0.8	2.4	1308.5	1.60		2.3	0.6	1.48	1307.6	
30.0	0.9	2.7	1308.8	1.75		2.4	0.88	1.86	1307.96	
35.0	1.0	3.0	1309.1	1.85		2.43	1.2	2.21	1308.3	
55.0	1.5	4.5	1310.6	2.40		2.7	2.99	4.27	1310.4	
70.0	2.0	6.0	1312.1	2.60		2.8	4.8	6.18	1312.3	
92.0	3.0	9.0	1315.1	3.0		3.0	8.5	10.1	1316.2	
110.0	4.0	12.0	1318.1	3.0		3.0	12.1	13.7	1319.8	
125.0	5.0	15.0	1321.1	3.0		3.0	15.9	17.5	1323.6	
140	6.0	18.0	1324.1	3.0		3.0	20.0	21.6	1327.7	
60	1.65	4.95	1311.1			2.75	3.55	4.88	1311.0	
80	2.45	7.35	1313.5			3.0	6.4	7.98	1314.1	

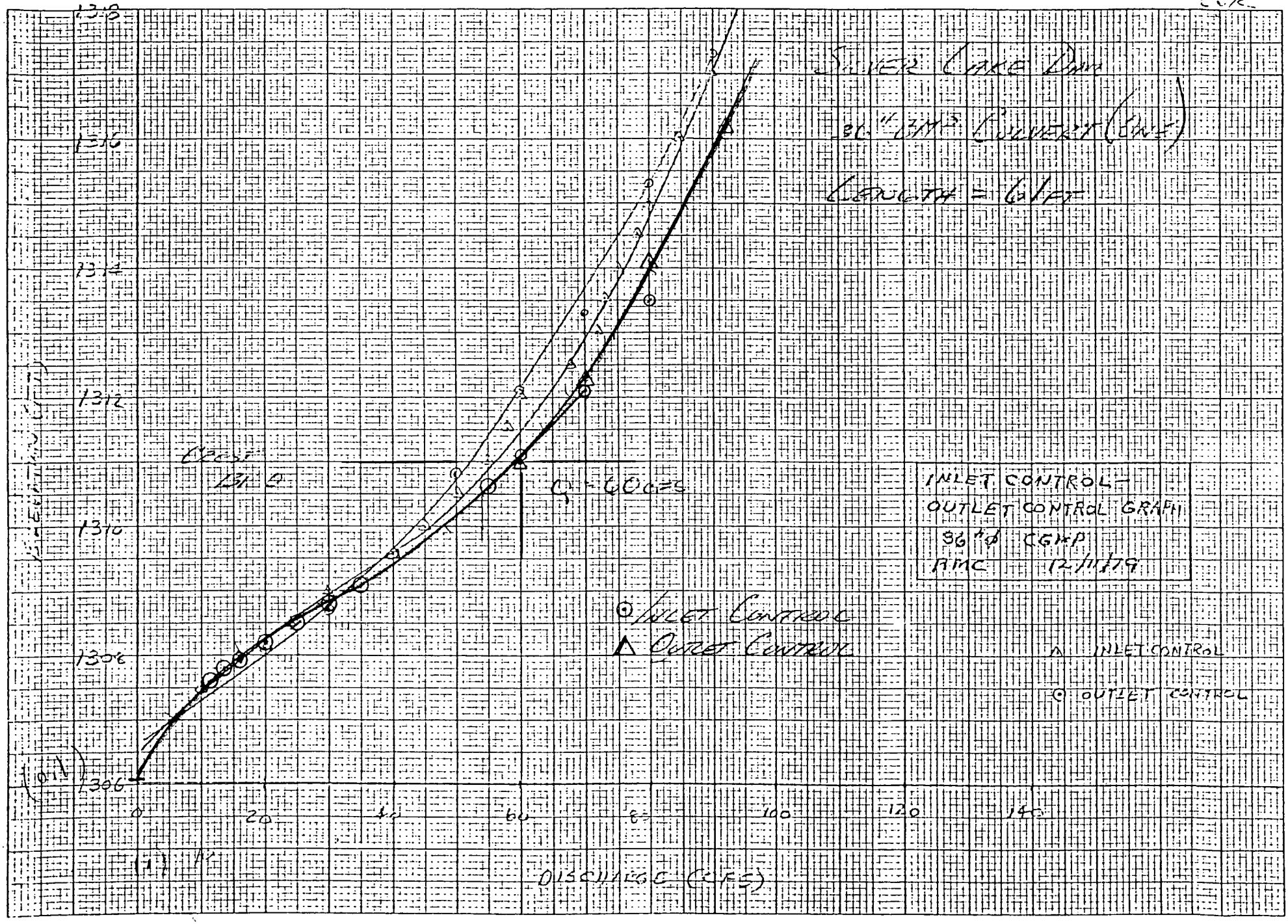
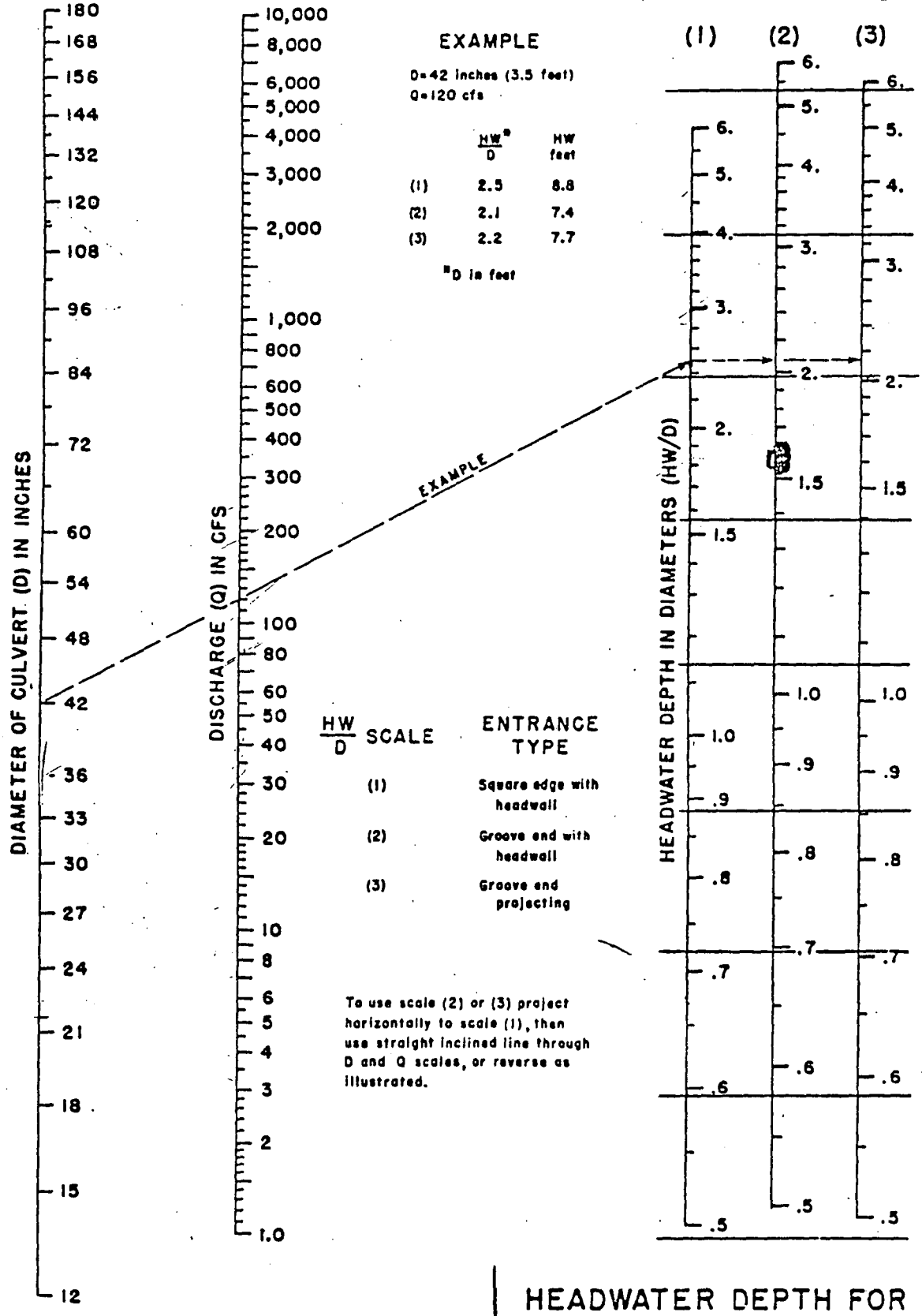

CCK
SHEET LAKE DAM
BC 24" CMP CULVERT (CONT)
CULVERT = CMP
INLET CONTROL
OUTLET CONTROL GRAPH
96" ø CGMP
RMC 12/11/79
Crest
Elev
Q - CFS
ELEVATION (FT)
1310
1308
1306
1312
1314
0
20
40
60
80
100
120
140
DISCHARGE (CFS)
⊙ Inlet Control
△ Outlet Control
△ INLET CONTROL
⊙ OUTLET CONTROL

CHART 2

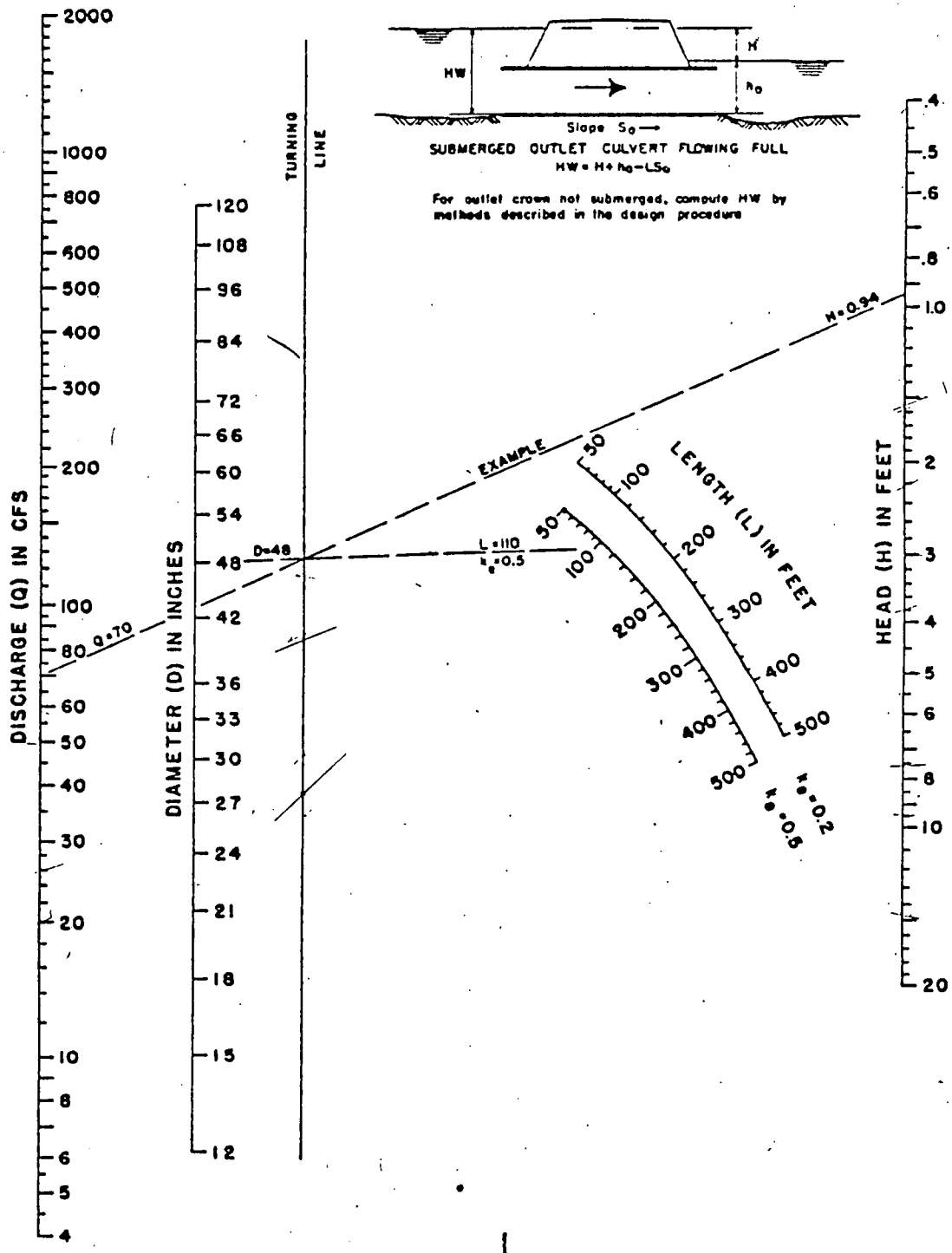


HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

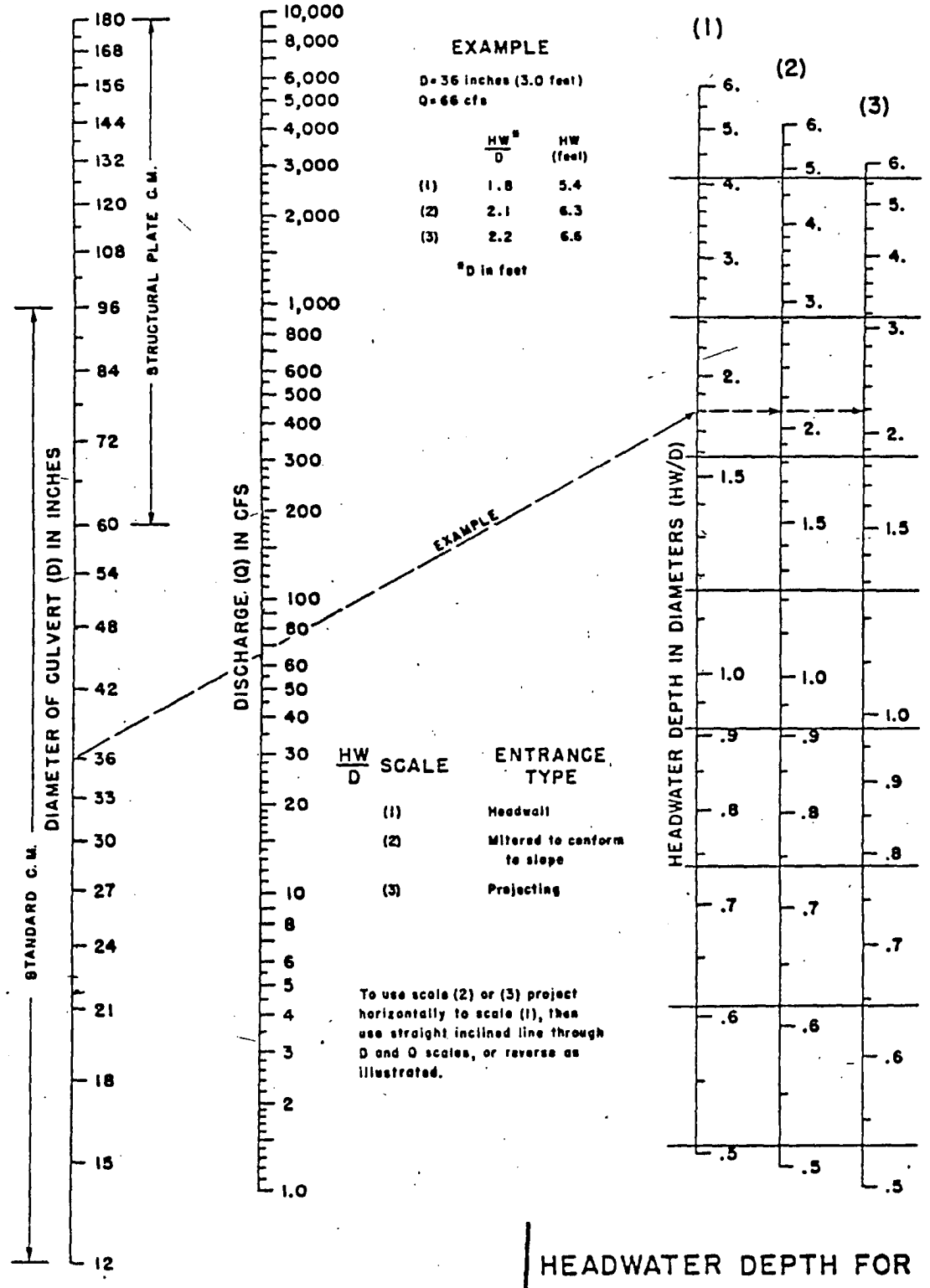
CHART 9



BUREAU OF PUBLIC ROADS JAN. 1963

HEAD FOR CONCRETE PIPE CULVERTS FLOWING FULL n = 0.012

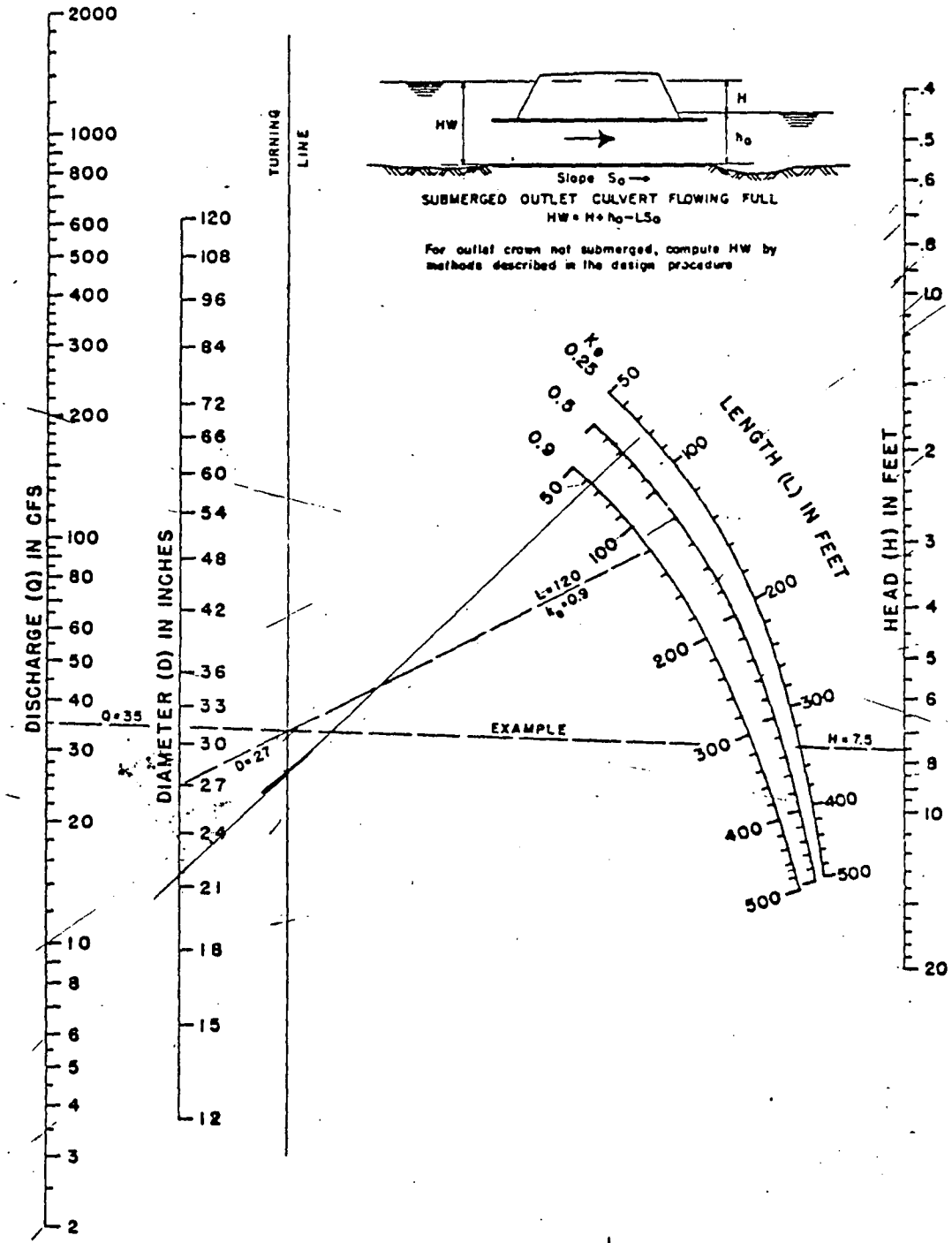
CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

CHART 11



HEAD FOR STANDARD C. M. PIPE CULVERTS FLOWING FULL n = 0.024

BUREAU OF PUBLIC ROADS JAN. 1963

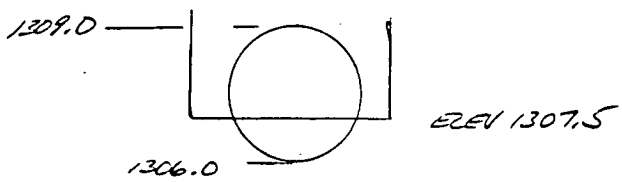
Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date ___
Subject EXISTING OUTLETS By GK Ch'k. by ___

ELEVATION	1.8 FT DIM. DISCHARGE SERVICE SPILLWAY CFS	EMERGENCY CULVERTS (4)	TOTAL DISCHARGE CFS CULVERTS	WEIR FLOW OVER ROAD		WEIR FLOW OVER ROAD AND FLOW THRU 4 - 3 FT CULVERTS (SERVICE SPILLWAY NOT INCLUDED)
1292	2.25			$Q = CLH^{1.5}$		
1294	7.25			$C = 2.63$,		
1295	14.8			$L = 130'$		
1296	19.3					
1297	23.0					
1298	26.3					
1299	29.3					
1300	32.2					
1301	34.7	↓				
1302	37.0					
1303	39.2			↓		
1305	43.2					
1306	45	0	45			
1307	46.7	6 24	71			
1308	48.5	44.5 66	115			
1309	50.0	134	184			
1310	51.7	48 192	244	0		192
1311	53.3	59.5 238 216 (256)	291	0 (121)		238 (377)
1312	54.7	270	325	342		612
1313	56.5	298	355	967		1265
1314	58.0	80 320	378	1777		2097
1315	59.7	42	402	2735		3077
1316	FROM RATING CURVE FOR CONCRETE PIPE	91 364		3823		4187
1317		384		5025		5409

Job No. 11241 Sheet ___ of ___
Project Silver Lake Dam Date 11-2-81
Subject Outlets - By ___ Ch'k. by ___

ANALYSIS OF 4- EMERGENCY SPILLWAY CULVERT WITH STOPLOGS ARE IN PLACE AT ELEV 1307.5

TOP OF DAM 1311.0



WEIR FLOW WILL BE ASSUMED FOR FLOW OVER STOPLOGS $Q = CLH^{1.5}$ ASSUME $C \approx 3.3$

THE NET LENGTH OF WEIR IS 16 FT, HOWEVER THERE ARE (3) ONE FOOT THICK PIERS + (2) ABUTMENT

$$L = L' - 2(NK_p + K_a)H_e \quad \text{(p. 373 Design of Small Dams)}$$

$$L = L' - 0.32 H_e$$

$L_1 = 16$ FT

$N = 3$

$K_p = 0.02$

$K_a = 0.10$

H_e = TOTAL HEAD ON CREST

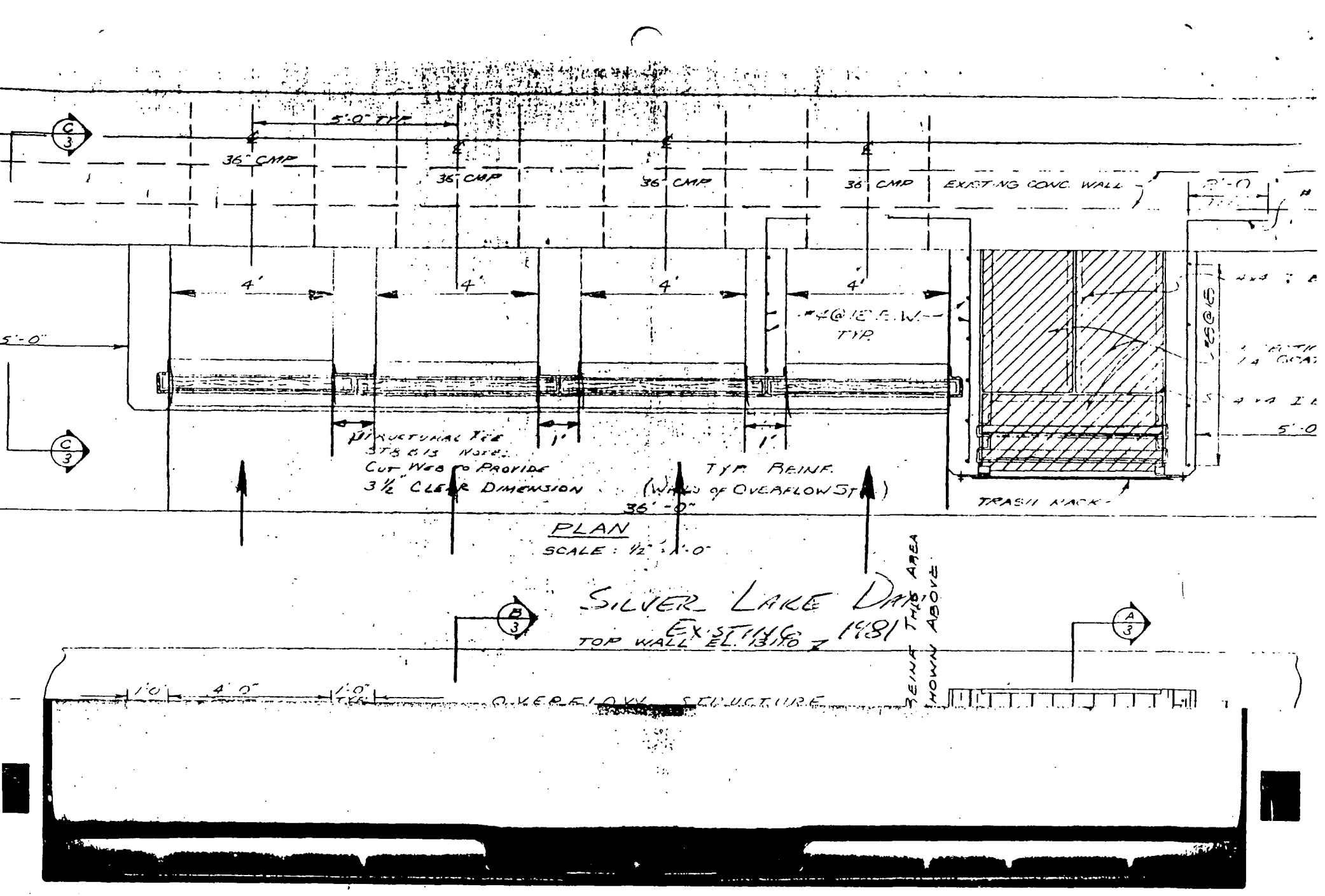
h = HT OF WEIR $\approx$ 1307.5 - 1300
$h \approx 7.5$

$H/L = 3/7.5 = 0.4$

$H/L = 1/7.5 = 0.13$

$C = 3.27 + 0.40\, H/h$ (p. 362 Chow)

ELEVATION	HEAD (FT)	EFFECTIVE LENGTH (FT)	DISCHARGE (CFS)	C COEFFICIENT	
1307.5	0				
1308.0	0.5	15.84	18.5	3.29	WILL ASSUME C = 3.3 (CONSERVATIVE)
1308.5	1.0	15.68	51.7	3.32	
1309.0	1.5	15.52	94.1		
1309.5	2.0	15.36	142.4		
1310.0	2.5	15.20	198.3		
1310.5	3.0	15.04	257.9	3.43	


C/3
5'-0" TYP.
36" CMP
36" CMP
36" CMP
36" CMP
EXISTING CONC. WALL
4'
4'
4'
4'
TYP.
5'-0"
1'
1'
STRUCTURAL TEE
STS 6.13 NOTE:
CUT WEB TO PROVIDE
3½" CLEAR DIMENSION
TYP. REINF.
(WALL OF OVERFLOW STR.)
36'-0"
TRASH RACK
PLAN
SCALE: ½" = 1'-0"
SILVER LAKE DAM
EXISTING
TOP WALL EL. 1316.0 - 1981
B/3
A/3
1'-0"
4'-0"
1'-0" TYP.
OVERFLOW STRUCTURE
BEING THIS AREA
SHOWN ABOVE

nappe profile becomes essentially a function of the Froude number rather than a function of the boundary geometry as described above [4, p. 527].

Many experimental formulas for the discharge over sharp-crested weirs have been developed.[1] Most such formulas can be expressed in the general form.[2]

$$Q = CLH^{1.5} \tag{14-9}$$

where C is the discharge coefficient, L is the effective length of the weir crest, and H is the measured head above the crest, *excluding* the velocity head. The effective length of the weir may be computed by

$$L = L' - 0.1NH \tag{14-10}$$

where L' is the measured length of the crest and N is the number of contractions. For two end contractions, $N = 2$. For one end contraction, $N = 1$. When no contractions are present at the two ends, $N = 0$.

According to a well-known weir formula of Rehbock [10], the coefficient C in Eq. (14-9) is approximately

$$C = 3.27 + 0.40\frac{H}{h} \tag{14-11}$$

where h is the height of weir. Measurements by Rouse [4, p. 532] indicate that this equation holds up to $H/h = 5$ but can be extended to $H/h = 10$ with fair approximation. For H/h greater than about 15, the weir becomes a sill, and the discharge is controlled by a critical section immediately upstream from the sill. The critical depth of the section is approximately equal to $H + h$. By the critical depth–discharge relationship, it can be shown that the coefficient C is

$$C = 5.68\left(1 + \frac{h}{H}\right)^{1.5} \tag{14-12}$$

The transition between weir and sill (between $H/h = 10$ and 15), however, has not yet been clearly defined.

Experiments have shown that the coefficient C in Eq. (14-9) remains approximately constant for sharp-crested weirs under varying heads if the nappe is aerated.

14-2. Aeration of the Nappe. In the preceding article the overfalling nappe is considered aerated; that is, the upper and lower nappe surfaces are subject to full atmospheric pressure. Insufficient aeration below the

[1] For a general description of sharp-crested-weir experiments and formulas, see [3]. For further studies of the discharge characteristics of sharp-crested weirs, see [7] and [8].

[2] The derivation of a theoretical weir-discharge formula can be found in many hydraulics textbooks. The first mathematical analysis on discharge of weirs was performed by Boussinesq [9].

DESIGN OF SPILLWAY DAMS

196. *Discharge Over An Uncontrolled Overflow Ogee Crest.*—(a) *General.*—The discharge over an ogee crest is given by the formula:

$$Q = CLH_e^{3/2} \qquad (3)$$

where:

Q=discharge,
C=a variable coefficient of discharge,
L=effective length of crest, and
H_e=total head on the crest, including velocity of approach head, h_a.

The discharge coefficient, C, is influenced by a number of factors, such as (1) the depth of approach, (2) relation of the actual crest shape to the ideal nappe shape, (3) upstream face slope, (4) downstream apron interference, and (5) downstream submergence. The effect of these various factors is discussed in section 197.

The total head on the crest, H_e, does not include allowances for approach channel friction losses or other losses due to curvature of the upstream channel, entrance loss into the inlet section, and inlet or transition losses. Where the design of the approach channel results in appreciable losses, they must be added to H_e to determine reservoir elevations corresponding to the discharges given by the above equation.

(b) *Pier and Abutment Effect.*—Where crest piers and abutments are shaped to cause side contractions of the overflow, the effective length, L, will be less than the net length of the crest. The effect of the end contractions may be taken into account by reducing the net crest length as follows:

$$L = L' - 2(NK_p + K_a)H_e \qquad (4)$$

where:

L=effective length of crest,
L'=net length of crest,
N=number of piers,
K_p=pier contraction coefficient,
K_a=abutment contraction coefficient, and
H_e=total head on crest.

The pier contraction coefficient, K_p, is affected by the shape and location of the pier nose, the thickness of the pier, the head in relation to the design head, and the approach velocity. For conditions of design head, H_e, average pier contraction coefficients may be assumed as follows:

	K_p
For square-nosed piers with corners rounded on a radius equal to about 0.1 of the pier thickness	0.02
For round-nosed piers	0.01
For pointed-nose piers	0

The abutment contraction coefficient is affected by the shape of the abutment, the angle between the upstream approach wall and the axis of flow, the head in relation to the design head, and the approach velocity. For conditions of design head, H_e, average coefficients may be assumed as follows:

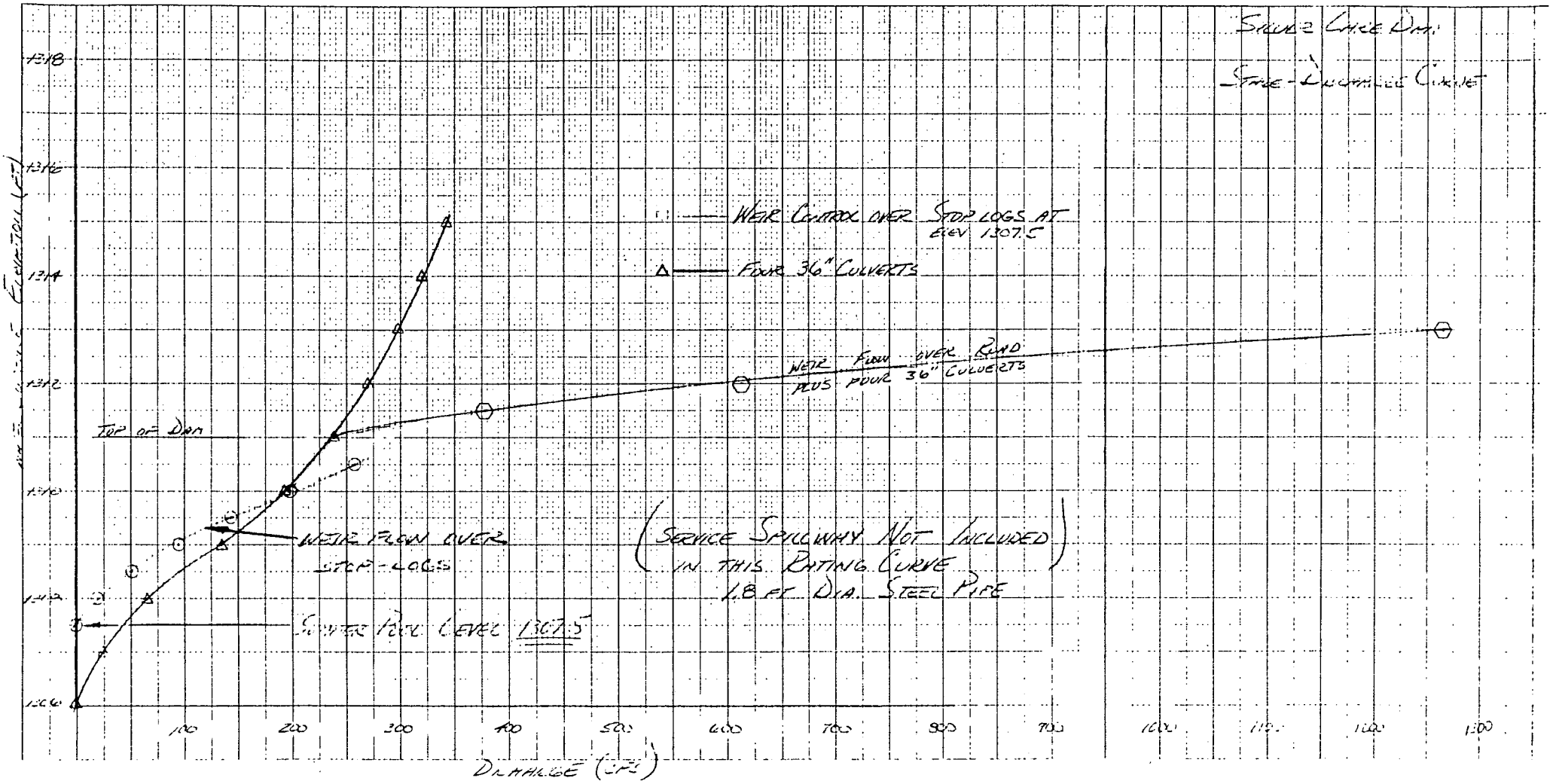
	K_a
For square abutments with headwall at 90° to direction of flow	0.20
For rounded abutment with headwall at 90° to direction of flow, when $0.5H_e \geqq r \geqq 0.15H_e$	0.10
For rounded abutments where $r > 0.5H_e$ and headwall is placed not more than 45° to direction of flow	0.0

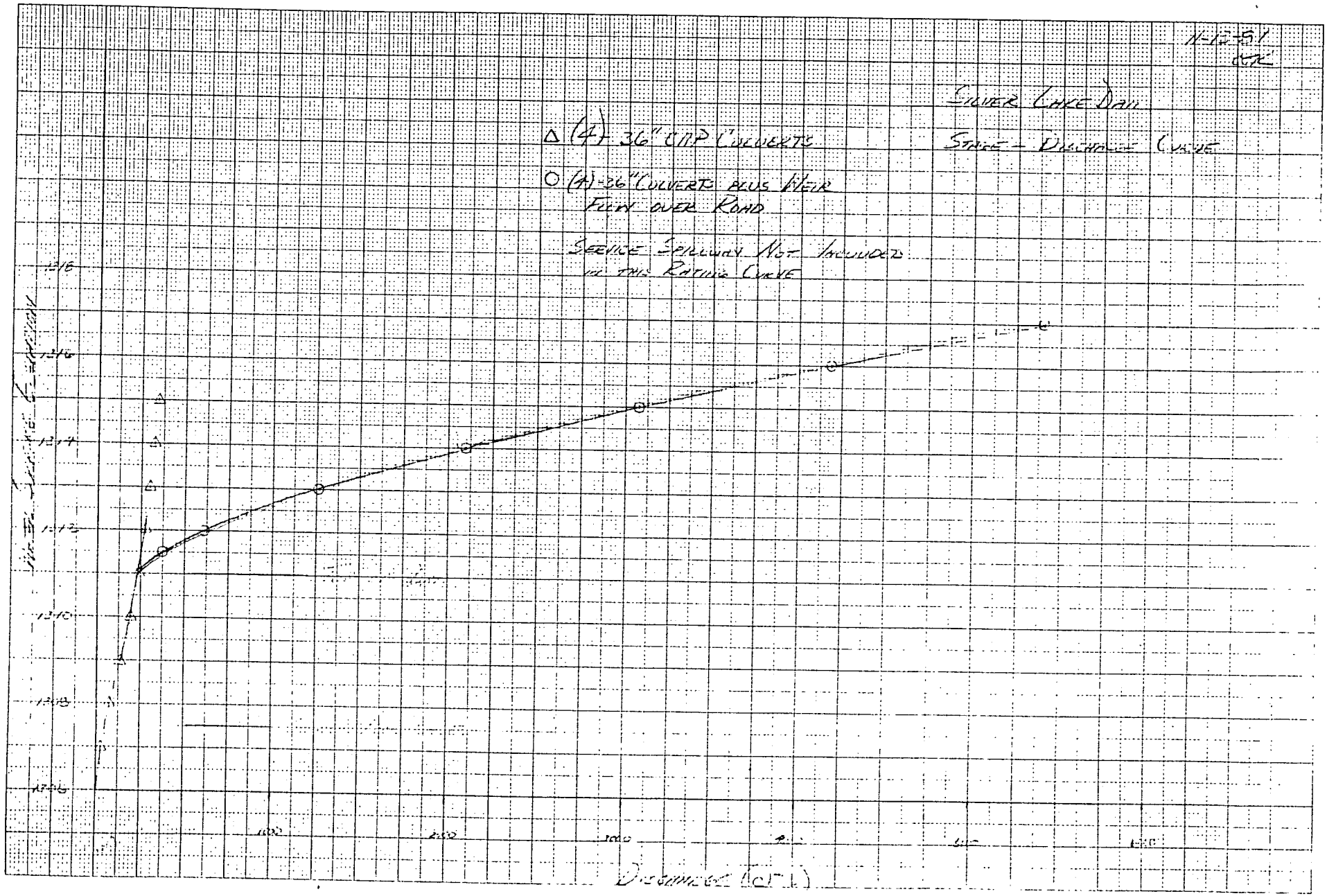
where r=radius of abutment rounding.

197. *Coefficient of Discharge for Uncontrolled Ogee Crests.*—(a) *Effect of Depth of Approach.*—For a high sharp-crested weir placed in a channel, the velocity of approach is small and the under side of the nappe flowing over the weir attains maximum vertical contraction. As the approached depth is decreased, the velocity of approach increases and the vertical contraction diminishes. For sharp-crested weirs whose heights are not less than about one-fifth the heads producing flow over them, the coefficient of discharge remains fairly constant with a value of about 3.3 although the contraction diminishes. For weir heights less than about one-fifth the head, the contraction of the flow becomes increasingly suppressed and the crest coefficient decreases. When the weir height becomes zero, the contraction is entirely suppressed and the overflow weir becomes in effect a channel or a broad-crested weir, for which the theoretical coefficient of discharge is 3.087. If the sharp-crested weir coefficients are related to the head measured from the point of maximum contraction instead of to the head above the sharp crest, coefficients applicable

K·E 10 X 10 TO ½ INCH 7 X 10 INCHES KEUFFEL & ESSER CO MADE IN U.S.A.

K·E 10 X 10 TO ½ INCH KEUFFEL & ESSER CO





47 1320
H·E 10 X 10 TO INCH • KEUFFEL & ESSER CO

Job No. _____ Sheet ___ of _____
Project _____ Date _____
Subject _____ By ___ Ch'k. by _____

STORAGE - DISCHARGE

RELATIONSHIP

Job No. 1129/ Sheet ___ of ___
Project SILVER LAKE DAM Date 11-6-81
Subject STORAGE - DISCHARGE By CWL Ch'k. by ___

STORAGE - DISCHARGE RELATIONSHIP (TAKEN FROM PHASE I DAM INSPECTION REPORT)

ASSUME STOP LOGS ARE AT ELEV. 1306.0

*DISCHARGE = 1.8 FT STEEL CULVERT + 4-3 FT CMP CULVERTS + WEIR FLOW OVER ROAD.

	ELEV	DISCHARGE *	STORAGE
1)	1306	0	1265
2)	1307	71	1355
3)	1307.5		1411
4)	1308	115	1445
5)	1309	184	1540
6)	1310	244	1631
7)	1311	291	1720
	1312	667	1810
	1313	1322	1910
	1314	2155	2010
	1315	3137	2115

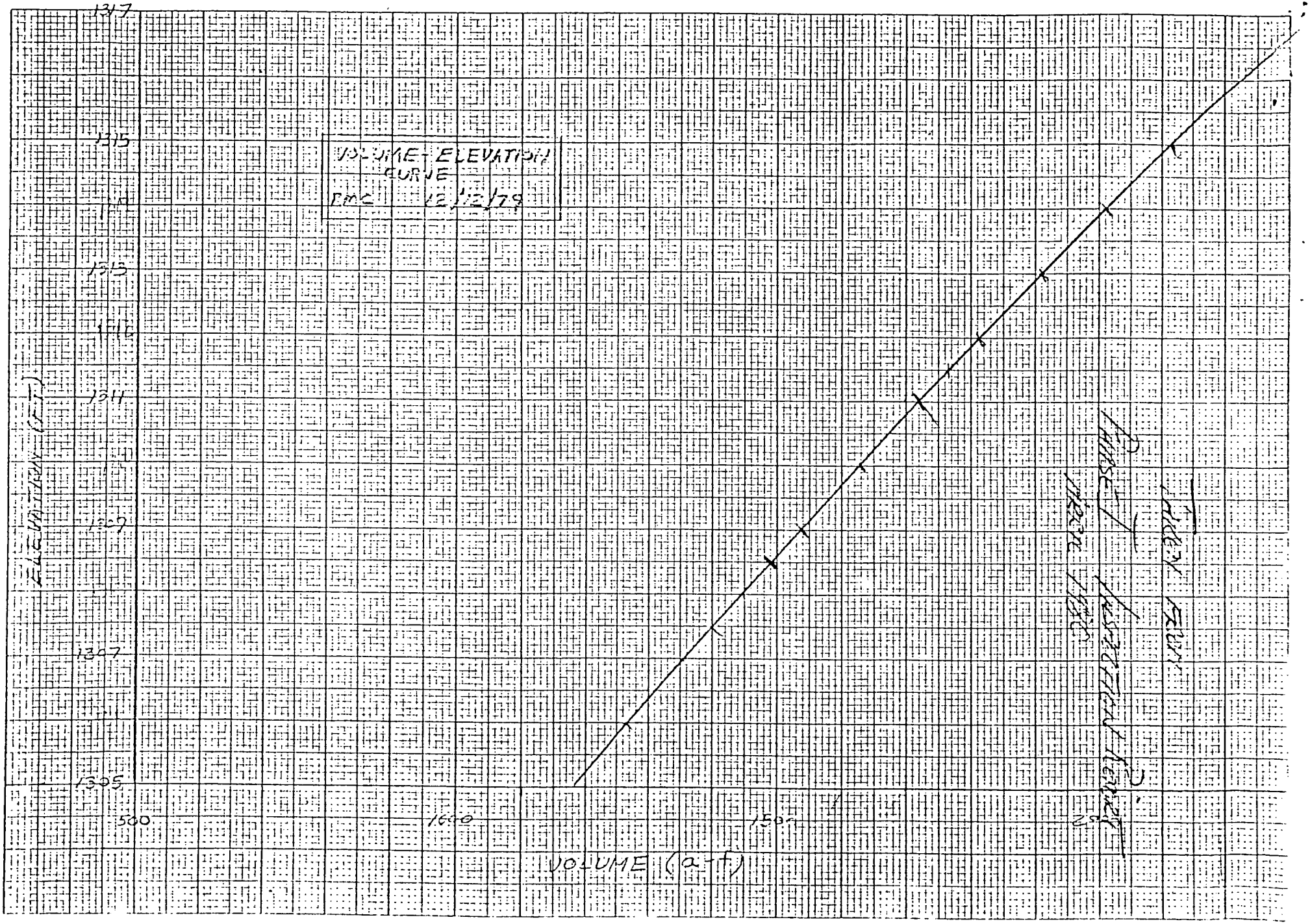
ASSUME STOP LOGS ARE AT NORMAL SUMMER POOL LEVEL = 1307.5

**DISCHARGE = 4-3 FT CMP CULVERTS PLUS WEIR FLOW OVER ROAD.

ELEVATION	DISCHARGE **	STORAGE
1307.5	0	1411
1308.0	19	
1308.5	52	1490
1309.0	94	1540
1309.5	143	
1310.0	192	1631
1311.0	238	1720
1311.5	377	1765
1312.0	612	1810

ELEVATION	DISCHARGE **	STORAGE
1313	1265	1910
1314	2097	2010
1315	3077	
1316	4187	
1317	5409	2220

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Job No. 11241 Sheet ___ of ___
Project SILVER LAKE DAM Date 11-20-81
Subject SCANNING MAP - CORRECTED STAGE - STORAGE By CVK Ch'k. by ___

FOR PETE BARANCO (11-20-81) THE ORIGINAL SCANNING MAP SCALE 1" = 350' — A HORIZONTAL LINE MEASURED 10.14" ACROSS THE SURFACE OF THE LAKE. THE PHOTOCOPY MEASURED 10.21"

THE SCALE ON THE PHOTOCOPY IS:

$$1" = 350' \left(\frac{10.14}{10.21}\right) \text{ or } 347.6'$$

A PHOTOCOPY OF THE ORIGINAL

THE AREAS & VOLUMES WERE CALCULATED FROM DEPARTMENT OF WATER RESOURCES SCANNING MAP DURING THE PHASE I DAM SAFETY INSPECTION PROGRAM, HOWEVER THE AREAS & VOLUMES IN THE PHASE I PROGRAM DID NOT HAPPEN TO BE ADJUSTED FOR THE PHOTOCOPY REDUCTION.

THE REDUCTION FACTOR WOULD BE

$$\frac{(347.6)^2}{(350)^2} = 0.986$$

THE INCREMENTAL VOLUMES ARE ONLY REDUCED BY 1% — THE STORAGE VOLUMES IN THE PHASE I REPORT WERE ALREADY INCORPORATED INTO THE HYDROLOGY PRESENT

THE VOLUME REDUCTION WAS AVAILABLE HOWEVER THE 1% REDUCTION IN STORAGE VOLUME WILL NOT AFFECT THE HYDROLOGY FOR EXISTING CONDITIONS AT SILVER LAKE TO ANY DEGREE.

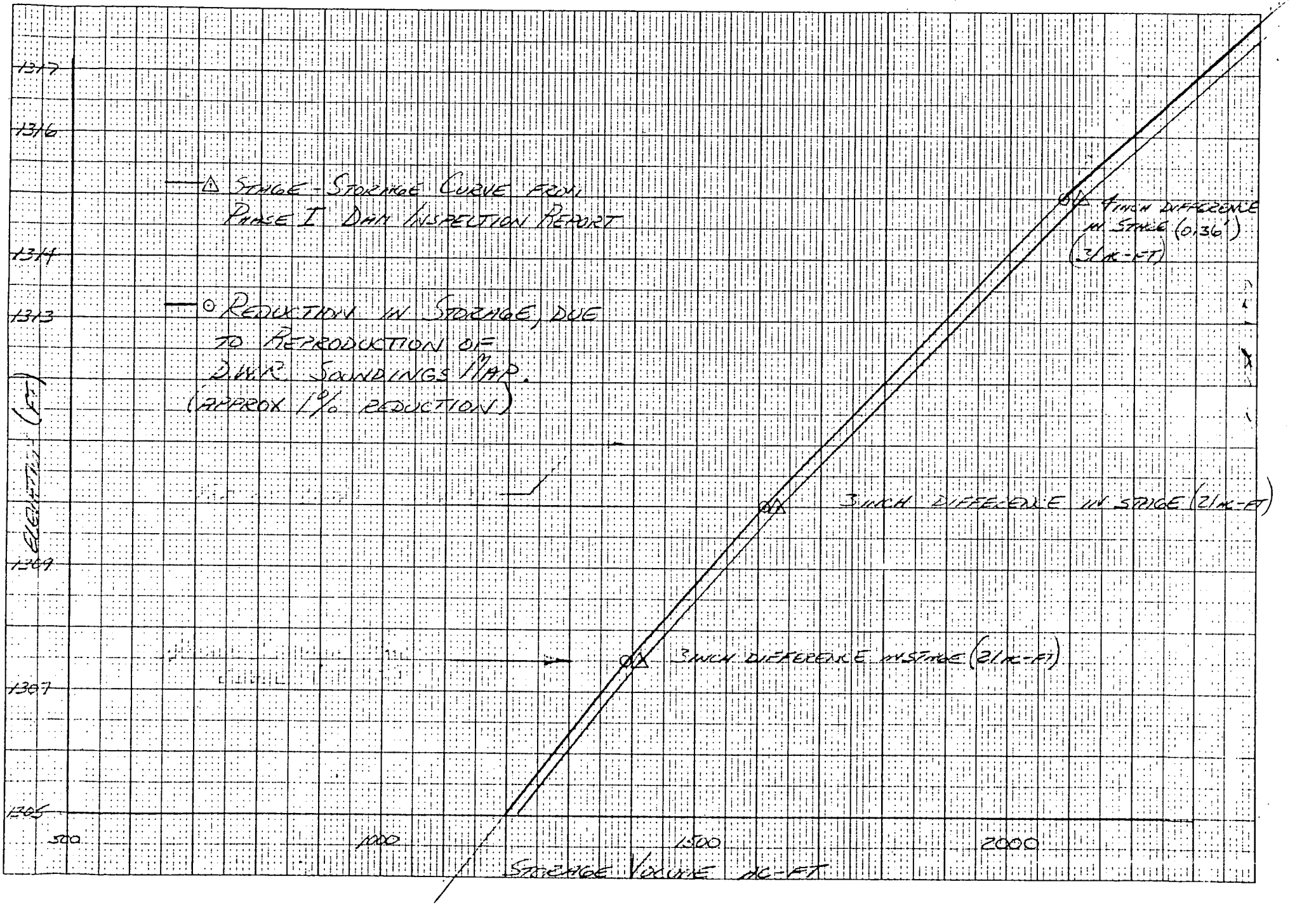
THE REDUCED STORAGE VOLUMES IN SILVER LAKE WILL BE USED FOR THE PURPOSED CHANGES IF CHANGES ARE NECESSARY.

Job No. 1124 Sheet ___ of ___
Project [illegible] LAKE Date ___
Subject [illegible] E By ___ Ch'k. by ___

ACRES (0.986)

ELEVATION	ACRES CORRECTED FOR PHOTOCOPY-REDUCTION			Σ VOLUME AC-FT
1276	0			
		1.5	2.99	
1277.5	3.99			3
		-	52.9	
1282.5	17.17			55.9
			123.05	
1287.5	34.05			183.95
			207.78	
1292.5	49.06			391.7
			275.65	
1297.5	61.20			667.4
			334.23	
1302.5	72.51			1001.7
		5	384.93	
1307.5	82.46			1391.6
		2.5	217.7	
1310.0	90.7			1609.3
		5	454.75	
1315.0	100.2			2094.1
		5	510.72	

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11-20-81

CHECKS ON AREAS MEASUREMENTS

3000
1.71
3171
1.49 1.58
3320
1.49
3469

ELEV = 1277.5

1000
2949 19.49
1945 + 19.46
4894 +
19.43
6837

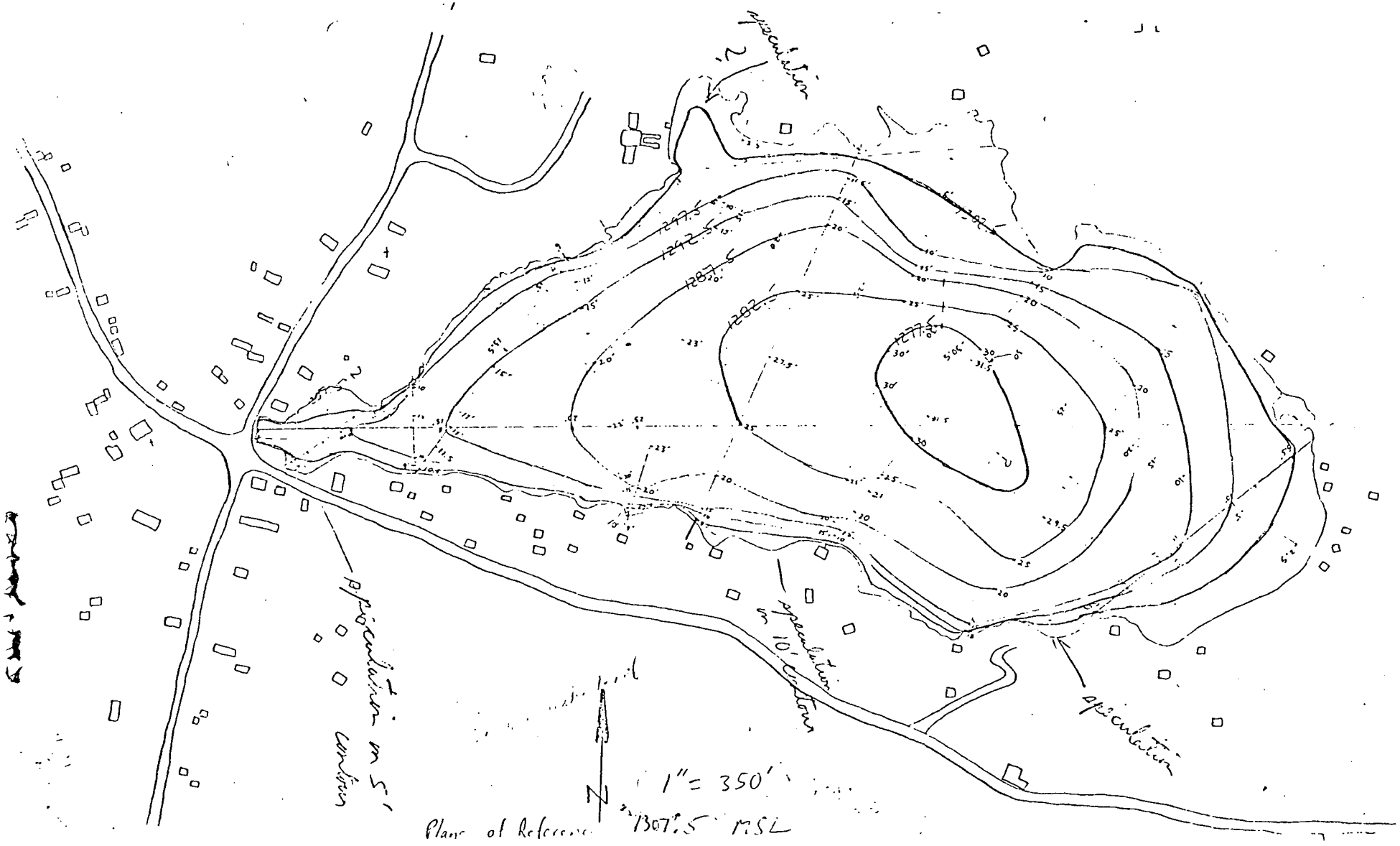
4000
6.20
4620 620 ELEV = 1282.5
6.22
5240
5862

2000
2076 10.76 10.75
4149 10.73

ELEV. 1307.5 = AVE = 30.21

3000
12.35
4235 12.34 12.30
ELEV 1287.5
5469 12.22
6691

1000 ~~124~~ ELE
~24=


1" = 350'
Plane of Reference 1307.5' MSL

SUBJECT Silver Lake [redacted]

Volume, Area vs Elevation Data

COMPUTATION JJB

COMPUTED BY 2/11

3 of

Elev	mi^2	A	ΔEL	ΔV	ΣV			
		ac	ft	ac-ft	ac-ft			
1276		0.00						
			1.5	3.04 ✓				
1277.5	1.44 ✓	4.05			3			
			5.0	53.65 ✓				
1282.5	6.19 ✓	17.41			57			
			5.0	129.85 ✓				
1287.5	12.28 ✓	34.53			187			
			5.0	210.7 ✓				
1292.5	17.69⅓	49.76			397			
			5.0	279.6 ✓				
1297.5	21.07	62.07			677			
			5.0	339.0 ✓				
1302.5	26.15	73.54			1016			
			5.0	395.5 ✓				
1307.5	30.10 ✓	84.65			1411	– summer	low	Level
			2.5	219.2 ✓				
1310.0	n.a	90.7 **			1631			
			5.0	484.8 ✓				
1315.0	n.a	103.2 **			2115			
			5.0	558.7 ✓				
1320.0	1.31 *	120.29			2674			

map scale 1" = 2,000'

* interpolated

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

Box 339
Randolph, Vermont 05060-0339
(802) 728-3376

29330
October 26, 1983

Mr. A. Peter Barranco
Department of Water Resources
Agency of Environmental Conservation
120 State Street
Montpelier, Vermont 05602

SUBJECT: SILVER LAKE DAM CONSTRUCTION PROGRESS REPORT

Dear Pete:

Here is a summary of the progress on the dam to bring you up to date on the construction activities. Work performed during the last two weeks is highlighted.

Prior to two weeks ago, the lake was dewatered to the level of the low level outlet. The roadbed was excavated to six feet below the crest elevation, and the emergency spillway pipes were removed. Traffic was diverted to one lane across the upstream side of the crest to the downstream side of the concrete retaining wall. RR Godfey, the earthmoving subcontractor had excavated 20% of the material from the downstream face of the dam.

During the past two weeks the earthmoving subcontractor has continued to remove the downstream face to the point where the 60% of the embankment has been removed. The contractor has requested to substitute reinforced concrete pipe, class 5 for the prestressed concrete cylinder pipe for the low level outlet. No progress has been made for the past few days because of equipment malfunctions.

Enclosed for your information are soil samples, aggregate samples, and compaction test results

Should you have any comments or questions, feel free to call me and discuss them.

Very truly yours,

DuBOIS & KING, INC.

John J. Bilotta, P.E.
Resident Engineer

JJB/kln
Enclosure

TA 183L Rev. 5C 7/80

AGENCY OF TRANSPORTATION

Dwinell
~~Finucane~~

MATERIALS & RESEARCH DIVISION

Montpelier, Vermont 05602

REPORT ON SOIL SAMPLE

Report 10-14 , 19 83

Laboratory No. E83 0891 Tested By

Name

Identification Marks Silver Lake Dam

Submitted by Denton Const. Title Address Finucane - Env. Cons.

Sampled , 19 Received 10-12 , 19 83

Sample from Stockpile

Quantity represented

Source of Material

Location used or to be used Silver Lake Dam

Examined for MD Curve

TEST RESULTS

SIEVE ANALYSIS

Sieve Size	% Passing Total Sample	% Passing Sand Portion
3"		
1 1/2"	100.0	
3/4"	86.8	
3/8"	81.4	
No. 4	77.6	
No. 10	70.7	
No. 20	64.3	
No. 40	58.6	
No. 60	53.7	
No. 100	43.8	
No. 140		
No. 200	33.2	
No. 270		

HYDROMETER ANALYSIS

Particles Smaller than	% Total Sample
0.05 mm	
0.02 mm	
0.005 mm	
0.002 mm	

LIMITS

Liquid Limit

Plastic Limit

Plasticity Index

MOISTURE-DENSITY

Maximum Density 123.7 P.C.F.

Optimum Moisture 10.5%

CLASSIFICATION

AASHTO Soil Type A-2-4

Soil Description Silty Sand

Apparent Specific Gravity (-#10) 2.71

Unified Soil Classification

COMMENTS:

S. J. Gage, P.E., Chief Engineer

By: R. F. Nicholson

R. F. Nicholson, P.E., Materials & Research Engineer

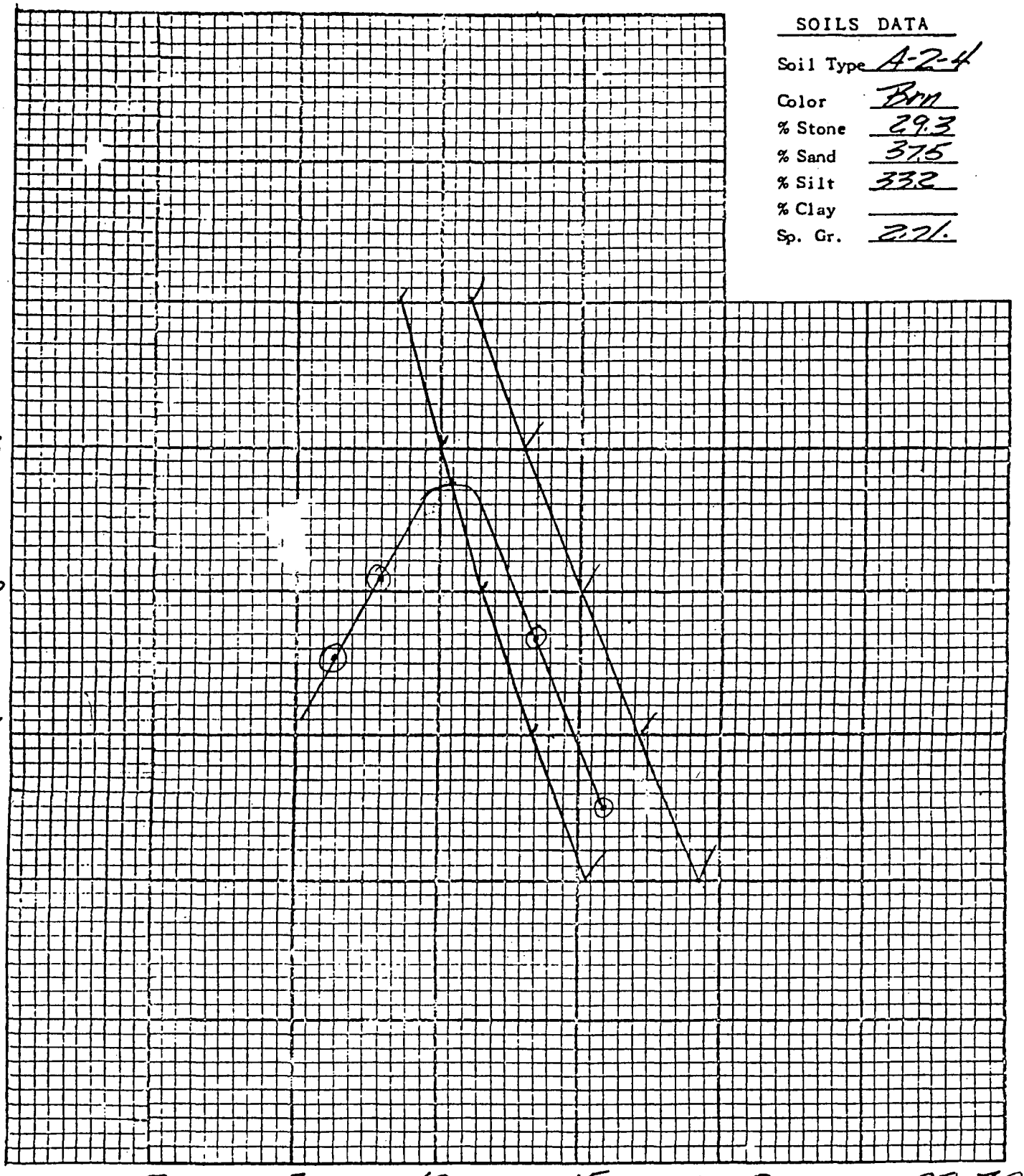
MATERIALS DIVISION
SOILS SECTION
3981
MOISTURE - DENSITY CURVE NO.

Project: Silver Lake Dam Env. Cons.

Description & Source: Silty Sand From Stock Pile

SOILS DATA

Soil Type	A-2-4
Color	Brn
% Stone	29.3
% Sand	37.5
% Silt	33.2
% Clay	
Sp. Gr.	2.72



Max Dens. = 123.7 pcf
Opt. Moist = 10.5 %
@ = 77.2 %

HD 415 1M 8-77

TA 182F Rev. 2M 3/82
Rev. 2M 4/83

Finucane
AEC - Heritage II
CF
Lanza

STATE OF VERMONT
AGENCY OF TRANSPORTATION

MATERIALS & RESEARCH DIVISION
Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

Report 10-17, 19 83

Laboratory No. A83 0971 Tested By Lavin

Name Bank Run Sand & Gravel

Identification Marks Pit #1

Submitted by Denton Title _____ Address _____

Sampled 9-30, 1983 Received 9-30, 19 83 Testing Completed 10-4, 19 83

Sample from _____

Quantity Represented _____

Source of Material Hammell pit

Project Name & Number Silver Lake Dam

Examined for S 103.1

TEST RESULTS

Total Sample Sieve Size	% Passing
4 1/2"	
4"	
3 1/2"	
3"	100
2 1/2"	
2"	
1 3/4"	
1 1/2"	
1"	
3/4"	56
5/8"	
1/2"	
3/8"	
No. 4	38
No. 8	
No. 10	33
No. 16	
No. 30	
No. 40	8
No. 100	
No. 200	2

Sand Portion

Fineness Modulus
% Coarser Than

No. 100	
No. 50	
No. 30	
No. 16	
No. 8	
No. 4	

Fineness Modulus = _____

Color = _____

Comments:

Percent of Wear

AASHTO T3 _____
AASHTO T4 _____
AASHTO T96 _____

Fractured Faces, % _____

Thin & Elongated Pieces, % _____

Soundness, % Loss _____

S. J. Gage, P.E., Chief Engineer

By: R. F. Nicholson 10/17

R. F. Nicholson, P.E., Materials & Research Engineer

TA 182F Rev. 2M 3/82
Rev. 2M 4/83

Finucane
AEC - Heritage II
CF
Lanza

STATE OF VERMONT
AGENCY OF TRANSPORTATION

MATERIALS & RESEARCH DIVISION
Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

Report 10-17, 19 83

Laboratory No. A83 0972 Tested By Lavin

Name Bedding for Rip Rap

Identification Marks

Submitted by Denton Title Address Bob Denton Const. Co. Fort Ethan Allen, Colchester

Sampled 9-30, 1983 Received 9-30, 19 83 Testing Completed 10-4, 19 83

Sample from

Quantity Represented

Source of Material Hammell pit

Project Name & Number Silver Lake Dam

Examined for S 103.4

TEST RESULTS

Sieve Size	Total Sample % Passing
4 1/2"	
4"	
3 1/2"	
3"	
2 1/2"	
2"	
1 3/4"	
1 1/2"	100
1"	
3/4"	3
5/8"	
1/2"	
3/8"	trace
No. 4	trace
No. 8	
No. 10	
No. 16	
No. 30	
No. 50	
No. 100	
No. 200	

Sand Portion

Fineness Modulus
% Coarser Than

No. 100	
No. 50	
No. 30	
No. 16	
No. 8	
No. 4	

Fineness Modulus =

Color =

Comments:

Percent of Wear

AASHTO T3
AASHTO T4
AASHTO T96

Fractured Faces, %

Thin & Elongated Pieces, %

Soundness, % Loss

S. J. Gage, P.E., Chief Engineer

By: R. F. Nicholson RAF
R. F. Nicholson, P.E., Materials & Research Engineer

TA 182F Rev. 2M 3/82
Rev. 2M 4/83

Finucane
AEC - Heritage II
CF
Lanza
Denton Const. Co.

STATE OF VERMONT
AGENCY OF TRANSPORTATION

MATERIALS & RESEARCH DIVISION
Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

Report 10-17, 19 83

Laboratory No. A83 0985 Tested By Lavin

Name Bedding for Rip Rap

Identification Marks

Submitted by Denton Title Address

Sampled 9-30, 1983 Received 9-30, 19 83 Testing Completed 10-6, 19 83

Sample from

Quantity Represented

Source of Material Hammell pit

Project Name & Number Silver Lake Dam

Examined for S 103-4

TEST RESULTS

Total Sample Sieve Size	% Passing
6"	100
4"	
3 1/2"	
3"	76
2 1/2"	
2"	
1 3/4"	
1 1/2"	2
1"	
3/4"	0
5/8"	
1/2"	
3/8"	0
No. 4	0
No. 8	
No. 10	
No. 16	
No. 30	
No. 50	
No. 100	
No. 200	

Sand Portion

Fineness Modulus
% Coarser Than

No. 100	
No. 50	
No. 30	
No. 16	
No. 8	
No. 4	

Fineness Modulus =

Color =

Comments:

Percent of Wear

AASHTO T3
AASHTO T4
AASHTO T96

Fractured Faces, %

Thin & Elongated Pieces, %

Soundness, % Loss

S. J. Gage, P.E., Chief Engineer

By: R. F. Nicholson 1847
R. F. Nicholson, P.E., Materials & Research Engineer

TA 182F Rev. 2M 3/82
Rev. 2M 4/83

~~Finucane~~
AEC - Heritage
CF
Lanza

STATE OF VERMONT
AGENCY OF TRANSPORTATION

MATERIALS & RESEARCH DIVISION
Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

Report 10-17, 1983

Laboratory No. A83 0986 Tested By Lavin

Name Pipe Bedding

Identification Marks Pit #2

Submitted by Denton Title _____ Address _____

Sampled 9-30, 1983 Received 9-30, 1983 Testing Completed 10-6, 1983

Sample from _____

Quantity Represented _____

Source of Material Hammell pit

Project Name & Number Silver Lake Dam

Examined for S 103.3

TEST RESULTS

Total Sample

Sieve Size	% Passing
4 1/2"	
4"	
3 1/2"	
3"	
2 1/2"	
2"	
1 3/4"	
1 1/2"	
1"	
3/4"	100
5/8"	
1/2"	
3/8"	
No. 4	90
No. 8	
No. 10	86
No. 16	
No. 30	
No. 40	22
No. 100	
No. 200	2

Sand Portion _____ _____

Fineness Modulus
% Coarser Than

No. 100	
No. 50	
No. 30	
No. 16	
No. 8	
No. 4	

Fineness Modulus = _____

Color = _____

Comments:

Percent of Wear

AASHTO T3 _____
AASHTO T4 _____
AASHTO T96 _____

Fractured Faces, % _____

Thin & Elongated Pieces, % _____

Soundness, % Loss _____

S. J. Gage, P.E., Chief Engineer

By: R. F. Nicholson 10/27

R. F. Nicholson, P.E., Materials & Research Engineer

VERMONT DEPARTMENT OF WATER RESOURCES

INFORMATION SHEET

Name of Dam Silver Lake Town Barnard

Owner Dept of Water Resources Name of Stream Locust Creek Trib. (Pond Brook)

Address Montpelier Classification 2

Vermont

U.S.G.S. Coordinates: Lat. 43° 43' 43" Long. 72° 37' 9"

U.S.G.S. Map Woodstock North, Vt (7.5) Aerial Photos VT-62-H 38-89,90

U.S.G.S. Elev. @ Spillway 1307

Total Length of Dam 110' Crest Width of Emergency Spillway 20'

Width of Top 30' Maximum Height 13'

Spillway Capacity: Principal _____ Emergency _____

Pond Area _____ Drainage Area _____

Pond Volume: Normal Water Level _____ Design High Water Level _____

Maximum Water Depth: Normal Water Level _____ Design High Water Level _____

Storage Before Emergency Spillway is Used _____

Use of Reservoir Recreation

Description of Dam: Earth fill - SA road passes over dam
Concrete facing upstream side

Description of Spillway(s): PS. Stop planks control structure, 4' planks
ES. 4, 36" CGMP pipes lead under roadway

Designed by Dubois King, Randolph Year Built 1970

Hearing Date April 4, 1968 Order Date June 7, 1968

Additional Remarks:

GEOTECHNICAL ENGINEERS INC.
1017 MAIN STREET · WINCHESTER · MASSACHUSETTS 01890 (617) 729-1625

RICHARD P. FINCH
GONZALO CASTRO

1/25/82

January 22, 1982
Project 81885
File 2.0

Mr. Charles J. Kissel
DuBois & King, Inc.
Route 66
Randolph, VT 05060

Subject: Silver Lake Dam
Barnard, VT

Dear Mr. Kissel:

As requested in our telephone conversation of January 20, 1982, we are sending this letter to respond to questions raised in the letter from Bob Finucane dated January 18, 1982.

Question 1. With respect to piping below the upstream wall, it is our opinion that exit velocities could be high enough to cause piping of soil from below the wall into voids in the earth embankment behind the wall.

It is unlikely that such piping would crack or cause instability of the upstream wall. However, it would raise the seepage line in the embankment which would reduce the stability of the downstream slope, increase the potential for seepage and piping on the downstream slope, and aggravate the existing settlement and sinkhole problem. It is not possible to assess the extent of these detrimental effects because the extent and continuity of void zones in the dam is not known. In our opinion, it would not be prudent to allow this condition to remain.

Question 2. With respect to relocation of the hydrant and water supply pipe located on the embankment, it would be desirable to relocate the pipe since it could create a pathway for seepage if the pipe should develop a leak or break. However, the presence of the pipe is not considered a major problem since it is not a pressure line.

Question 3. With respect to relocation of the drainage culvert at the left abutment of the dam, the culvert could continue to discharge onto the abutment and downstream slope if properly designed riprap and filter layer(s) are installed to protect the slope and abutment.

Please contact us if you have any additional questions.

Sincerely yours,

GEOTECHNICAL ENGINEERS INC.

David R. Shields
Engineer

Steve J. Poulos
Principal

DRS/SJP:ms

cc: Mr. Robert Finucane

STATE OF VERMONT
AGENCY OF ENVIRONMENTAL CONSERVATION

TECHNICAL SPECIFICATIONS
FOR
RECONSTRUCTION OF
SILVER LAKE DAM
BARNARD, VERMONT

AUGUST, 1982

DuBois & King inc.

ENGINEERING • PLANNING • DEVELOPMENT • MANAGEMENT

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6.2 Environmental Damage. The CONTRACTOR is required to inform himself of all applicable State and Federal rules and regulations concerning the maintenance of environmental quality and to conduct his operations in conformance with the intent of such rules and regulations at all times.

In the event that a question of conformance arises, the ENGINEER shall have the authority to order discontinuance of the WORK or activity in contention until resolution satisfactory to State and/or Federal agencies is achieved. The CONTRACTOR shall bear all costs associated with making his work conform, including, but not limited to, cost of corrective repairs or changes in construction procedures.

6.3 Engineer's Office Not Required. The CONTRACTOR will not be required to furnish an office for the ENGINEER.

6.4 Permits.

6.5 Liaison With Utilities. The CONTRACTOR will be required to perform WORK in areas where existing utilities are presently provided. The CONTRACTOR shall plan and confine his operations to that which will provide only the minimum essential interruption of such services. Prior to interrupting services, the CONTRACTOR shall notify the ENGINEER and the utility sufficiently in advance of any planned interruption of such services. The CONTRACTOR is responsible for making all necessary arrangements for coordination with and assistance by utility companies during the execution of this PROJECT. Any costs associated with such coordination or assistance shall be the responsibility of the CONTRACTOR. Any interrupted services shall be done with the approval of the utility involved.

6.6 Interruption of Existing Sewage Flows. The CONTRACTOR is advised that interruption of an existing sewage flow will not be permitted. The CONTRACTOR shall use temporary piping and/or pumping facilities to insure a continuous flow. Ditches will not be permitted as a means of continuing such flow. All expenses incurred by providing temporary means to convey the existing sewage flow shall be borne by the CONTRACTOR.

6.7 Interruption of Driveways. The CONTRACTOR will be crossing driveways in which the accesses are essential to the operation of many businesses or private homes along the construction route. The CONTRACTOR shall coordinate his excavations with the activities of the particular business or private homes in order to minimize the interruption of the use of the driveways.

6.8 Work Within State Highway Rights-of-Way.

Title

1. General
2. Approval
3. Excavation, Backfill, and Surface Restoration

1. GENERAL

The CONTRACTOR shall apply for and obtain Highway Permits prior to the commencement of any construction within a public highway right-of-way. Permits for work within a State Highway right-of-way shall be obtained from the Utilities Engineer, Vermont Department of Highways, Montpelier, Vermont.

A preconstruction meeting will be held prior to the CONTRACTOR beginning WORK. The State Highway District Engineer and/or Utilities Engineer, the CONTRACTOR'S superintendent, a representative from the Town, and the ENGINEER assigned to the PROJECT will be present at this meeting.

Upon completion of the WORK, a final inspection will be held, with the same parties present as at the preconstruction meeting. The CONTRACTOR will be required to restore the highway right-of-way to as good condition as it was prior to his doing the WORK, and to the satisfaction of the District Highway Engineer.

Ten days' WRITTEN NOTICE shall be given to the District Highway Engineer before any WORK is done within a State Highway right-of-way. A copy of such notice shall be furnished to the ENGINEER. Inspection by the Highway Department shall be permitted as construction progresses.

The CONTRACTOR'S WORK shall be performed in such a manner that the roadway, appurtenances, and highway traffic will be safe-guarded.

No blasting will be permitted under or adjacent to the highway unless special permission has been received from, and arrangements made with, the District Highway Engineer.

The CONTRACTOR shall suspend all WORK within the State Highway right-of-way during the period from November 15th to April 15th. Prior to suspension of WORK, the CONTRACTOR shall hold a conference with the ENGINEER, District Highway Engineer, and the OWNER. Any WORK required as a result of this conference shall be accomplished prior to November 15th. All bituminous paved travel ways and parking areas disturbed under this CONTRACT shall be restored to a condition equal to that which existed prior to start of construction. All bituminous paved and gravel surfaced travel ways and parking areas shall be maintained by the CONTRACTOR throughout the suspension of WORK period.

Traffic shall be protected at all times by suitable barricades, warning and advance warning signs, as required to protect the public during the construction period. All construction operations will be conducted so as to cause a minimum of interference with traffic. At least one-way traffic shall be maintained at all times. Two-way traffic shall be maintained at all times when construction operations are not in progress. Uniformed officers shall be provided for the control of traffic when two-way traffic cannot be maintained and at such other times as may be required by the District Highway Engineer for the protection of the public.

2. APPROVAL

Before any construction operations are started, the CONTRACTOR shall submit to the ENGINEER in triplicate a detailed written description of the equipment and methods he proposes to use and acceptable sketches showing details of the proposed operations. If a SUBCONTRACTOR is to be used for the WORK, the name and address of the SUBCONTRACTOR shall be indicated in the written description. No WORK shall proceed until the CONTRACTOR'S plans and schedules have been approved in writing by the OWNER, the ENGINEER, and the District Highway Engineer.

3. EXCAVATION, BACKFILL, AND SURFACE RESTORATION

Maximum dimensions of excavation within the highway right-of-way shall conform in general to details shown on Vermont Department of Highways Standard Drawing D-20. When excavating through portland cement concrete pavements, existing reinforcing shall be cut in the center of the trench, and carefully bent out of the way of excavation operations.

Immediately following installation of the casing and/or pipe, the trench shall be backfilled with approved material in 6-inch layers to the subgrade line. Each layer shall be compacted to not less than 95% of the maximum dry density as it is placed. Subbase of gravel or crushed rock shall be placed on the properly compacted subgrade in 6-inch compacted layers and shall be a minimum depth of 18 inches or as directed by the ENGINEER. Each layer shall be thoroughly and solidly compacted.

At least a temporary pavement shall be provided within 36 hours of the completion of backfilling where an open cut has been made through a roadway subject to vehicular traffic. The temporary pavement shall consist of at least one-inch of thoroughly compacted bituminous concrete. Temporary pavements shall be properly maintained and shall be replaced with permanent pavement prior to completion of the PROJECT or suspension of WORK for the winter season.

Cement concrete pavements shall be replaced with concrete having a minimum thickness of 8 inches, with the top surface shaped to match adjoining pavement. Existing reinforcing is to be bent back and spliced adequately with new cross reinforcement tied to the longitudinal bars. Reinforcing shall be placed with a minimum concrete cover of 2 inches. Concrete shall be thoroughly compacted, struck off to the desired grade and cured for 7 days with moistened sand or burlap covering before being subjected to traffic.

Bituminous pavements shall be replaced with 3 inches of bituminous plant-mixed concrete or the thickness of the existing bituminous pavement, whichever is less, in accordance with Vermont Department of Highways Standard Drawing D-20.

Sidewalk and curbs shall be replaced in kind or in accordance with details shown on the plans.

Existing granite curb may be salvaged and reset.

In areas presently grass covered, turf shall be reestablished in accordance with Section 651, Vermont Department of Highways Standard Specifications for Highway and Bridge Construction, to the satisfaction of the District Highway Engineer. The CONTRACTOR shall be responsible for the turf and grade of the ground surface for one year following the completion of the WORK, or as specified by the District Highway Engineer.

6.9 Stream Crossing(s). As indicated on the DRAWINGS, this CONTRACT includes stream crossing(s). The CONTRACTOR shall comply with the require- ments of the SPECIAL CONDITION entitled, "PERMITS".

In addition, the CONTRACTOR shall submit to the ENGINEER, in triplicate, a detailed, written description, with DRAWINGS if applicable, of equipment and methods he proposes. The CONTRACT DRAWINGS represent the intention of the completed WORK, but do not intend to restrict the CONTRACTOR as to method. If a SUBCONTRACTOR is to be used, his name and address shall be included in the description. In preparing the description, the CONTRACTOR should consider items such as season, method of excavation, minimal disturbance to shoreline, minimal rising and siltation of stream, protection of aquatic life, contingency plans for flash floods, methods of pipe and concrete encasement, testing, erosion control, maintenance of grades, etc.

All areas of disturbed streambanks shall receive riprap bank protection with suitable subbase.

No WORK shall proceed until the CONTRACTOR'S plans and schedules have been approved in writing by the ENGINEER/OWNER.

6.10 Lowering Silver Lake. The CONTRACTOR may lower the water level in Silver Lake to the bottom of the existing 22-inch steel drainage pipe at all times during the construction period.

The rate of lowering Silver Lake shall be approved by the Water Resources Department, such approval and direction shall not be cause for additional compensation to the CONTRACTOR other than that stated in the Proposal, nor shall the CONTRACTOR be relieved of any responsibility of liability in this Contract Agreement because of such approved methods or direction.

Lowering operations shall start after September 1st .

GENERAL SPECIFICATIONS

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7.1 General. The CONTRACTOR shall furnish all materials, labor, tools, and equipment necessary to do all work required for the completion of each item of this CONTRACT as herein specified.

7.2 Definitions. Wherever the words defined in this section or pronouns used in their stead occur in the SPECIFICATIONS, they shall have the meanings herein given.

As Directed, As Required, Etc.

Wherever in the SPECIFICATIONS, or on the DRAWINGS, the words "as directed", "as required", "as permitted", or words of like import are used, it shall be understood that the direction, requirement, or permission of the ENGINEER is intended. Similarly, the wrds "approved", "acceptable", "satisfactory", and words of like import shall mean approved by, acceptable to, or satisfactory to the ENGINEER.

Elevation

The figures given in the CONTRACT DOCUMENTS or on the DRAWINGS after the word "elevation: or abbreviation of ity shall mean the distance i feet above the datum adopted by the ENGINEER.

Rock

The word "rock", wherever used as the name of an excavated material or material to be excavated, shall mean boulders and pieces of concrete or masonry exceeding one cubic yard in volume; or solid ledge rock which, in the opinion of the ENGINEER, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated tool. No soft or disintegrated rock which can be removed with a hand pick or power operated excavator or shovel; no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere; and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed.

Earth

The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material except rock as above defined.

7.3 Abbreviations. Where any of the following abbreviations are used in the SPECIFICATIONS, they shall have the meaning set forth opposite each.

AASHO	- American Association of State Highway Officials
ANSI	- American National Standards Institute
ACI	- American Concrete Institute

AGMA	- American Gear Manufacturers Association
IEEE	- Institute of Electrical and Electronic Engineers
ASME	- American Socity of Mechanical Engineers
ASTM	- American Society for Testing Materials
AWWA	- American Water Works Association
IBR	- Institute of Boiler and Radiator Manufacturers
MCB	- Master Car Builders
NBS	- National Bureau of Standards
NEC	- National Electrical Code, latest edition
NEMA	- National Electrical Manufacturers Assoc.
NFPA	- National Fire Protection Agency
NEWWA	- New England Water Works Association
Federal Specification	- Federal Specification issued by the Federal Supply Service of the General Service Administration, Washington, D.C.
125-lb. American Standard	- American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16.1-1960)
A.W.G.	- American or Brown and Sharp Wire Gage
E.D.R.	- Equivalent direct radiation
O.S. & Y.	- Outside screw and yoke
Stl. W.G.	- U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
W.S.P.	- Working Steam Pressure
NPT	- National Pipe Thread
UL	- Underwriters Laboratories, Inc.

7.4 Materials - Samples - Inspection - Approval. Unless otherwise indicated on the DRAWINGS or specified, only new materials and equipment shall be incorporated in the WORK. All materials and equipment furnished by the CONTRACTOR to be incorporated in the WORK shall be subject to the inspection and approval of the ENGINEER. No material shall be processed for, fabricated for, or delivered to the WORK without prior approval of the ENGINEER.

As soon as possible after the formal execution of the contract, the CONTRACTOR shall submit to the ENGINEER, the names and addresses of the manufacturers and SUPPLIERS of all materials and equipment he proposed to incorporate into the WORK. When SHOP DRAWINGS are required as specified below, such information shall be submitted prior to the submission of the DRAWINGS so that the ENGINEER may consider and approve or disapprove the manufacturer and/or the SUPPLIER as to his or their ability to furnish a product meeting the SPECIFICATIONS, subject to the final approval of the particular material or equipment. As requested, the CONTRACTOR shall also submit data relating to the materials and equipment he proposes to incorporate into the WORK, in sufficient detail to enable the ENGINEER to identify the particular product in question and to form an opinion as to its conformity to the contract requirements. Such data shall be submitted in a manner similar to that specified for SHOP DRAWINGS with the application clearly noted and drawing sheet or specification page reference where it applies.

Facilities and labor for the handling and inspection of all materials and equipment shall be furnished by the CONTRACTOR. Defective materials and equipment shall be removed immediately from the site of the work.

If the ENGINEER so requires, either prior to beginning or during the progress of the WORK, the CONTRACTOR shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the SPECIFICATIONS. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped as directed, at the expense of the CONTRACTOR. The CONTRACTOR shall, at his own expense, furnish approved molds for making concrete test cylinders. Except as otherwise specified, the OWNER shall make arrangements for, and pay for, the tests.

All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, and the name of the building or work and location for which the material is intended, and the name of the CONTRACTOR submitting the sample. To ensure consideration of samples, the CONTRACTOR shall notify the ENGINEER by letter that the samples have been shipped and shall properly describe the samples in the letter. In no case shall the letter of notification be enclosed with the samples.

The CONTRACTOR shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection, testing and approval before the materials and equipment are needed for incorporation in the WORK. Delay resulting from his failure to do so shall not be used as the basis of the claim against the OWNER or the ENGINEER.

In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the CONTRACTOR shall, at his own expense, provide such samples of workmanship of wall, floor, finish, etc., as may be required.

When required, the CONTRACTOR shall furnish to the ENGINEER triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relatiave to materials, equipment performance ratings, and concrete data.

After approval of the samples, data, etc., the materials and equipment used on the WORK shall correspond therewith.

7.5 CONTRACTOR'S Shop Drawings. SHOP DRAWINGS are drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by the CONTRACTOR or any SUBCONTRACTOR, manufacturer, SUPPLIER, or distributor which illustrate how specific portions of the WORK shall be fabricated and/or installed. The CONTRACTOR shall submit SHOP DRAWINGS of concrete reinforcement, structural details, piping layouts, wiring, materials fabricated especially for this CONTRACT, and materials and equipment for which such drawings are specifically requested.

Prior to the submission of the first request for payment, the CONTRACTOR shall submit to the ENGINEER a schedule of major SHOP DRAWING submissions. The CONTRACTOR shall be responsible for the prompt submittal of all SHOP DRAWINGS in accordance with the accepted schedule. Failure of the CONTRACTOR to comply with the schedule shall not constitute a justification for a CONTRACT TIME extension.

The CONTRACTOR shall submit to the ENGINEER one (1) reproducible transparency (sepia) of all SHOP DRAWINGS, prepared on approximately 22 in. x 34 in. sheets, except those which are made by revision of existing standard SHOP DRAWINGS. If considered by the ENGINEER to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of drawings. When submitted in this manner, the CONTRACTOR shall furnish six (6) copies of the SHOP DRAWINGS. All submittals shall be clearly referenced with the DRAWING or SPECIFICATION to which they apply, and shall be marked with the names of the OWNER, CONTRACTOR, building, equipment, or structure.

The CONTRACTOR shall utilize a SHOP DRAWING approval stamp or otherwise indicate on each shop drawing a statement containing the following wording to stipulate to the OWNER and ENGINEER that:

> "The Contractor represents that he has determined and verified all field measurements and quantities, field construction criteria, materials, catalog numbers and similar data, and has reviewed and coordinated the information in the shop drawings with the requirements of the work and the contract documents."

It shall also indicate if the SHOP DRAWING submitted is an initial or corrected submission, and shall be dated and signed by an authorized CONTRACTOR'S representative. SHOP DRAWING submittals that do not conform to this requirement will be rejected and returned.

Upon receipt of the SHOP DRAWINGS submittal, the ENGINEER shall review and return a marked-up reproducible transparency (sepia) or three copies of the manufacturer's catalog or specification sheets, noted with one of the following:

Accepted
No revision will be required and fabrication of the items covered by the submittal may proceed in accordance therewith.

Accepted As Corrected
Formal revision of the submittal will not be required. The CONTRACTOR, after making the corrections noted on his copy, may proceed with fabrication of the items covered by the submittal and in accordance therewith.

Rejected, Revise and Resubmit
The CONTRACTOR shall revise the submittal and shall resubmit one (1) revised reproducible transparency (sepia) or six (6) revised copies, as appropriate.

Rejected - Unacceptable

The CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by the ENGINEER on RESUBMITTED SHOP DRAWINGS.

The CONTRACTOR shall neither purchase nor fabricate any materials and equipment, as shown on the SHOP DRAWINGS, nor shall he proceed with any portion of the WORK which is dependent on SHOP DRAWINGS, until such drawings are accepted by the ENGINEER.

The ENGINEER'S acceptance of SHOP DRAWINGS shall not relieve the CONTRACTOR from his responsibility for any deviations from the requirements of the CONTRACT DOCUMENTS unless the CONTRACTOR has, in writing, called the ENGINEER'S attention to such deviation at the time of submission and the ENGINEER has given written acceptance of the specific deviation, nor shall any acceptance by the ENGINEER relieve the CONTRACTOR from responsibility for errors or omissions in the SHOP DRAWINGS.

It shall be understood that Shop Drawing Submittals processed by the Engineer are not Change Orders; that the purpose of Shop Drawing Submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.

If deviations, discrepancies or conflicts between Shop Drawings and Specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Engineer, the design Drawings and Specifications shall control and shall be followed.

7.6 Inspection of Work Away from the Site. If work to be done away from the construction site is to be inspected on behalf of the OWNER during its fabrication, manufacture, or testing, or before shipment, the CONTRACTOR shall give notice to the ENGINEER of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the ENGINEER in ample time so that the necessary arrangements for the inspection can be made.

7.7 Handling and Distribution. The CONTRACTOR shall, at his own expense, handle, haul and distribute all materials and surplus materials on the different portions of the WORK, as necessary. He shall provide suitable and adequate storage room for materials and equipment during the progress of the WORK and be responsible for loss of, or damage to, materials and equipment furnished by him, until the final acceptance of the WORK.

Storage charges and demurrage charges by transportation companies and vendors, which result from delays in handling, shall be borne by the CONTRACTOR.

7.8 Storage of Materials and Equipment. All excavated materials, construction equipment, and materials and equipment shall be placed so as not to injure the WORK and so that free access can be had at all times to all parts of the WORK and to all public utility installations in the vicinity of the WORK. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining tenants.

7.9 Planning and Progress Schedules. Before starting the WORK and from time to time during its progress, as the ENGINEER may request, the CONTRACTOR shall submit to the ENGINEER a written description of the methods he plans to use in doing the work and the various steps he intends to take.

The CONTRACTOR shall prepare and submit to the ENGINEER, within 15 days after the date of starting WORK, a planning and progress schedule that conforms to the Sample Schedule, Standard Detail 800-1. The schedule shall be subject to review and change from time to time during the progress of the WORK.

7.10 Standard Drawings. Standard Drawings which apply to this CONTRACT are bound in the back of the SPECIFICATIONS.

7.11 Safety Precautions. The CONTRACTOR shall bear primary responsibility for the adherence of adequate safety precautions during the execution of all WORK under this CONTRACT. If at any time, in the opinion of the ENGINEER, the WORK is not properly lighted, barricaded, and in all respects safe in regard to public travel, persons on or about the WORK, or public or private property, the ENGINEER shall have the right to order such safeguards to be erected and such precautions to be taken as he deems advisable, and the CONTRACTOR shall comply promptly with such orders. If, under such circumstances, the CONTRACTOR does not or cannot immediately put the WORK in the safeguards into proper and approved condition or if the CONTRACTOR or his representative is not upon the site of the WORK so that he can be notified immediately of the insufficiency of safety precautions, the ENGINEER may put the WORK into such a

condition that it shall be, in his opinion, in all respects safe. The CONTRACTOR shall pay all expenses for such labor and mateials as may have been used for this purpose by him or by the ENGINEER. Such action of the ENGINEER, or his failure to take such action, shall in no way relieve the CONTRACTOR of the entire responsibility for any cost, loss, or damage sustained on account of the insufficiency of the safety precautions taken by him or by the ENGINEER acting under authority of this action.

7.12 Sanitary Regulations. The CONTRACTOR shall provide adequate sanitary conveniences for the use of those employed on the WORK. Such conveniences shall be made available when the first employees arrive on the WORK, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points, and in such manner as may be required or approved.

The CONTRACTOR shall maintain the sanitary facilities in satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the WORK, on the lands of the OWNER, or on adjacent property.

The OWNER and the ENGINEER shall have the right to inspect any building or other facility erected, maintained, or used by the CONTRACTOR to determine whether or not the sanitary regulations have been complied with.

7.13 Intoxicating Liquors. The CONTRACTOR shall not permit the introduction or use of intoxicating liquors upon or about the WORK under this contract.

7.14 Closing Up Trenches. The CONTRACTOR shall provide adequate warning signs and other measures to protect the public at no additional expense to the OWNER for all trench excavations that are open. The CONTRACTOR shall not permit such excavations to remain open on weekends, legal holidays or other periods when work is not being performed.

7.15 Traffic Control. The CONTRACTOR shall utilize adequate warning signs, lights, and barricades in accordance with the Federal Highway Manual and the Vermont Highway Department to safely control traffic at all times. The CONTRACTOR should make reference to Standard Detail E-8 bound in the back of these SPECIFICATIONS. At the close of WORK each day, the CONTRACTOR willinspect the WORK and see that no unreasonable hazards exist and that all obstructions and/or hazards to traffic left overnight are adequately warned and marked.

The CONTRACTOR shall leave the roadway clear of obstruction or hazard on weekends, legal holidays, or other periods during which work is not being performed.

For control of moderate traffic, the CONTRACTOR shall provide an adequate number of flagmen employed at his expense.

The CONTRACTOR shall 24 hours in advance, notify the Police and Fire Departments in writing, with a copy to the ENGINEER, if the closure of a street is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and, at his expense, shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

Whenever and wherever, in the opinion of the ENGINEER, traffic is sufficiently congested or public safety is endangered, the CONTRACTOR, as required, shall furnish uniformed special officers to direct traffic and to keep traffic off the highway area affected by his construction operations. Such officers shall be in addition to the flagmen required under other provisions of the CONTRACT.

In the event the OWNER elects to furnish traffic officers on regular duty with the Police Department, the CONTRACTOR shall not be required to pay for such officers.

The employment or presence of traffic flagmen, special officers, or police shall in no way relieve the CONTRACTOR of any responsibility or liability which is his under the terms of the CONTRACT.

7.16 Obstruction of Vehicular and Pedestrian Traffic. The CONTRACTOR shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street or private way shall be rendered unsafe by the CONTRACTOR'S operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the ENGINEER.

Streets, roads, private ways, and walks not closed shall be maintained passable by the CONTRACTOR at his expense, and the CONTRACTOR shall assume full responsibility for the adequacy and safety of provisions made.

Reference is made to Section 7.15 entitled "Traffic Control."

7.17 Dimensions of Existing Structures. Where the dimensions and locations of existing structures are of critical importance in the installation or connection of new WORK, the CONTRACTOR shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

7.18 Work to Conform. During its progress and on its completion, all WORK shall conform truly to the lines, levels, and grades indicated on the DRAWINGS or given by the ENGINEER and shall be built in a thoroughly substantial and workmanlike manner, in accordance with the DRAWINGS and SPECIFICATIONS and the directions given from time to time by the ENGINEER. In no case shall any WORK in excess of the requirements of the DRAWINGS and SPECIFICATIONS be paid for unless ordered in writing by the ENGINEER.

7.19 Pipe Location and Elevation. Pipe will be located substantially as indicated on the DRAWINGS, but the right is reserved to the OWNER, acting through the ENGINEER, to make such modifications in locations and/or elevations as may be found desirable to avoid interference with existing structures or for other reasons.

7.20 Limits of Normal Excavation. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be indicated on DRAWINGS.

7.21 Computation of Quantities. For estimating quantities in which the computation of areas by geometric methods would be comparatively laborious, it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.

It is further stipulated and agreed that the computation of the volume of prismoids shall be by the method of average end areas.

7.22 Precautions During Adverse Weather. During adverse weather and against the possibility thereof, the CONTRACTOR shall take all necessary precautions so that the WORK may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other approved means.

During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by approved means which will result in a moist or a dry atmosphere according to the particular requirements of the WORK being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

The ENGINEER may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather may be, in any season.

7.24 Electrical Energy. The CONTRACTOR shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of this CONTRACT during its entire progress. The CONTRACTOR shall provide and pay for all temporary poles, wiring, switches, connections, and meters.

There shall be sufficient electrical lighting so that all WORK may be done in a workmanlike manner when there is not sufficient daylight.

7.25 Water Supply. The CONTRACTOR shall, at his own expense, provide all water for construction purposes.

7.26 Cutting and Patching. The CONTRACTOR shall leave all chases or openings for the installation of his own or any other CONTRACTOR'S or SUBCONTRACTOR'S work, or shall cut the same in existing WORK, and shall see that all sleeves or forms are at the WORK and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult with the ENGINEER and the CONTRACTORS and SUBCONTRACTORS concerned in reference to this WORK.

In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the WORK to be done. In no case shall piers or structural members be cut without the consent and approval of the ENGINEER.

The CONTRACTOR shall carefully fit around, close up, repair, patch, and point around the WORK specified herein to the entire satisfaction of the ENGINEER.

All of this WORK shall be done by careful workmen competent to do such WORK and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the ENGINEER, the type of tool proposed can be used without damage to the structure beyond the limits of the WORK and without inconvenience or interference with the operation of the facilities.

The CONTRACTOR shall not himself, and shall not permit any SUBCONTRACTORS, to cut or alter the WORK of any other SUBCONTRACTOR except with the consent of the SUBCONTRACTOR involved, given in writing or in the presence of the ENGINEER.

All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the CONTRACTOR or any SUBCONTRACTOR shall be done by the CONTRACTOR or SUBCONTRACTOR who constructed the WORK, but such cutting and repairing shall be done at the expense of the CONTRACTOR.

7.27 Replacing Damaged Pipes. The CONTRACTOR may be required to perform excavation or new trenching in close proximity to existing sewers, water mains, gas lines, conduits, and structures. The DRAWINGS and subsurface exploration data depict existing conditions within the accuracy of construction documents. The CONTRACTOR shall repair or replace any utilities damaged as a result of his construction methods, at his own expense. This WORK may include testing and inspecting as required.

The CONTRACTOR should consider no existing underground utilities to be abandoned unless so informed by the ENGINEER.

7.29 Dust Control. The CONTRACTOR shall employ measures to prevent and control dust within the area affected by the PROJECT, suitable for the conditions present. No additional compensation will be paid to the CONTRACTOR for general dust control measures unless there are specific items in the BID which apply.

7.30 Cleaning Up. The CONTRACTOR is expected to conduct his activities in a neat and workmanlike manner and to keep the job site in acceptably presentable condition throughout the life of this CONTRACT. Basic clean-up must closely follow construction disturbance. In the event of his failure to do so, the OWNER may initiate clean-up work at the expense of the CONTRACTOR.

7.31 Occupying Private Land. The CONTRACTOR shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the OWNER. A copy of the written consent shall be given to the ENGINEER.

7.32 Lines, Grades, and Measurements. The CONTRACTOR shall establish all lines, elevations, reference marks, batter boards, etc. needed by the CONTRACTOR during the progress of the WORK; and from time to time, he shall verify such marks by instrument or other appropriate means.

The ENGINEER shall be permitted at any time to check the lines, elevations, reference marks, batter boards, etc. set by the surveyor employed by the CONTRACTOR; and the CONTRACTOR shall correct any errors in lines, elevations, reference marks, batter boards, etc. disclosed by such check. Such a check shall not be construed to be an approval of the CONTRACTOR'S WORK and shall not relieve the CONTRACTOR of the responsibility for the accurate construction of the entire WORK.

The CONTRACTOR shall make all measurements and check all dimensions necessary for the proper construction of the WORK called for by the DRAWINGS and SPECIFICATIONS. During the prosecution of the WORK, he shall make all necessary measurements to prevent misfitting in said WORK, and he shall be responsible for the accurate construction of the entire WORK.

CLEARING, GRUBBING, AND STRIPPING

SECTION S100

	Title	Page
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S100.2	Clearing	S100-1
S100.3	Grubbing	S100-1
S100.4	Stripping.	S100-1

S100.1 General. The Contractor shall do all clearing, grubbing, and stripping, necessary to permit construction of the work within the limits of the property or easement lines or as directed by the Engineer. No clearing, grubbing, or stripping shall be done outside the indicated limits.

S100.2 Clearing. The Contractor shall take extreme care not to damage or cut trees outside property or easement lines and shall be responsible for all damage done outside these lines. Removal of any trees inside or outside these lines shall be done only after receiving written permission from the Engineer.

Where the work is in easements, the property owners shall have the right to cut and remove any wood in advance of the Contractor's operations. All other wood shall become the property of the Contractor.

S100.3 Grubbing. Grubbing shall consist of removing all stumps and all roots to a sufficient depth below the surface of the ground as directed by the Engineer.

S100.4 Stripping. The unsuitable materials to be removed by stripping shall include all surface boulders and loose rock; debris; topsoil; vegetable matter, including stumps and roots; and all other perishable and objectionable materials that are unsuitable for use in the permanent construction required under these specifications or that might interfere with the proper bonding of the embankment with the foundation, or the proper compaction of the materials in the embankment, or that may be otherwise objectionable as determined by the Engineer.

All suitable materials, as determined by the Engineer, stripped away from the ground surface shall be stockpiled and later utilized in construction.

EMBANKMENT EXCAVATION AND BACKFILL/FILL

SECTION S101

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S101.1	General.	S101-1
S101.2	Separation of Surface Materials.	S101-2
S101.2a	Excavated Materials.	S101-2
S101.3	Drainage	S101-2
S101.4	Excavation Near Existing Structures.	S101-3
S101.5	Protection of Existing Structures.	S101-3
S101.6	Care and Restoration of Surfaces	S101-3
S101.7	Unauthorized Excavation.	S101-3
S101.8	Preparation of Foundation.	S101-4
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S101.10	Preparation of Subgrade.	S101-4
S101.11	Embankment Construction - General.	S101-5
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S101.1 General. All excavation required for the dam and appurtenant works shall be made to the lines, grades, and dimensions shown on the drawings or where directed, shall be to a firm formation or to an otherwise suitable foundation as determined by the Engineer/Owner.

During the progress of the work, it may be found necessary or desirable to vary the slopes, grades, or the dimensions of the excavations from those specified herein. Any increase or decrease of quantities excavated as a result of such variations will be included in the estimates. However, if the Engineer/Owner determines that the contractor's costs of performing the work will be increased by reason of such variations, an equitable adjustment will be made to cover such increased costs. Otherwise, the work will be paid for at the unit price bid therefore in the schedule regardless of such variations.

All necessary precautions, including control of blasting, shall be taken to preserve the material below and beyond the established lines of all excavation in the soundest possible condition. Whenever, in the opinion of the Engineer/Owner, further blasting might injure the material upon or against which concrete is to be placed, the use of explosives shall be limited to light loads, and the excavation shall be completed by light blasting, wedging, barring, channeling, line drilling and broaching, or other suitable methods approved by the Engineer/Owner. Any damage to the work due to the contractor's operations, including shattering of the material beyond the required excavation lines, shall be repaired at the expense of and by the contractor. Slopes shattered or loosened by blasting shall be taken down at the expense of and by the contractor.

All excavation for embankment and structure foundations shall be performed in the dry. No excavation shall be made in frozen materials without written approval. No additional allowance above the unit prices per cubic yard bid in the schedule for excavation will be made on account of any of the materials being wet or frozen.

S101.2 Separation of Surface Materials. From areas within which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated without additional compensation.

S101.2a Excavated Materials. So far as practicable, as determined by the Engineer/Owner, all suitable materials from excavations shall be used in the permanent construction required under these specifications.

Excavated materials which are unsuitable for or are in excess of dam embankment or other earthwork requirements, as determined by the Engineer/Owner, shall be wasted as provided in section S101.9.

The contractor's blasting and other operations in excavation shall be such that the excavations will yield as much suitable material for such construction as practicable, and shall be subject to the approval of the Engineer/Owner. Where practicable, as determined by the Engineer/Owner, suitable materials shall be excavated separately from the materials to be wasted and the suitable materials shall be segregated by loads during the excavation operations. The suitable materials shall be placed in the designated final locations directly from the excavation, or shall be placed in temporary stockpiles and later placed in the designated locations as directed by the Engineer/Owner.

Excavated materials which, have a moisture content greater than that required for placement and compaction in the dam embankment, the material shall be placed temporarily in stockpiles and allowed to drain or dry until the moisture content is reduced sufficiently to permit it to be placed in the embankment.

Should cobbles, boulders, or rock fragments having maximum dimensions of more than 10 inches be found in otherwise approved excavated materials, they shall be removed by the contractor either at the site of the excavation or after being transported to the temporarily stockpile areas but before the materials are rolled and compacted. Such rock materials shall be placed in other portions of the dam embankment or wasted, as directed.

S101.3 Drainage. At all times during construction, the Contractor shall provide and maintain ample means and devices with which to remove promptly and dispose properly of all water entering trenches and other excavations and keep said excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.

All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work or damage to pavements, other surfaces, or property. Suitable temporary channels shall be provided for water that may flow along or across the site of the work. It shall be solely the Contractors responsibility to ascertain whether a discharge permit is required, and to obtain said permit, when working in or around waters of the State of Vermont.

S101.4 Excavation near Existing Structures. The program of excavation and dewatering shall be carried out in such a manner as to eliminate any possibility of undermining or disturbing any existing structure or any work previously completed under this contract.

As the excavation approaches pipes or other underground structures, digging by machinery shall be discontinued and the excavation shall be done manually, as directed. Such manual excavation, when incidental to normal excavation, shall be done without additional compensation.

The borings indicate that the upstream wall may be founded about 2 ft above the top of the glacial till. If the wall is founded above the glacial till, the excavation does not have to be carried down to the till immediately behind the wall. A small bench of the existing material above the till should be left in place adjacent to the downstream side of the wall to avoid undermining the wall. This bench should be 2 ft wide and sloped downward at 1-1/2H:1V.

S101.5 Protection of Existing Structures. All existing pipes, poles, wires, fences, curbings, property line markers, and other structures which, in the opinion of the Engineer, must be preserved, shall be carefully supported and protected from injury by the Contractor; and in case of injury, they shall be restored by him, without compensation therefore, to at least as good condition as that in which they were found immediately prior to the start of the work.

The restoration of structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

S101.6 Care and Restoration of Surfaces. On paved surfaces, the Contractor shall not use or operate tractors, bulldozers, or other power operated equipment, the treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.

All surfaces which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.

The restoration of all surfaces shall be done as promptly as practicable and shall not be left until of the construction period.

S101.7 Unauthorized Excavation. Any and all excess excavation taken out beyond the limits indicated on the drawings for the convenience of the contractor for any purpose or reason, except as may be ordered in writing by the Engineer/Owner, and whether or not due to the fault of the contractor, shall be at the expense of the contractor. Where required to complete the work, all such excess excavation and overexcavation shall be refilled with materials furnished and placed at the expense of and by the contractor as directed by the Engineer/Owner: Provided, that payment will be made for cement used in concrete placed to refill such excess excavation or over-excavation unless such excavation or overexcavation is caused by careless excavation or is intentionally performed for the convenience of the contractor to facilitate his operations, as determined by the Engineer/Owner.

S101.8 Preparation of Foundation. If, in the opinion of the Engineer/Owner, the material at or below the lines, grades and dimensions of the excavation shown on the drawings is unsuitable for foundation, it shall be removed to such widths and depths as directed or shall be removed and replaced with a suitable material as directed by the Engineer/ Owner.

The bottom and side slopes of excavation in common material upon or against which concrete is to be placed shall be prepared by moistening and tamping or rolling with suitable tools and equipment to form a firm foundation for the concrete structure. If, at any point in common material, the natural foundation material is disturbed or loosened, for any purpose or reason, it shall be consolidated by tamping or rolling, or where directed, it shall be removed and replaced with selected earthfill material moistened and thoroughly compacted in 6-inch layers by tamping or rolling.

The foundation for the earthfill, shall be prepared by leveling, moistening, and rolling so that the surface materials of the foundation will be as compact and will provide as satisfactory a bonding surface with the first layer of the earthfill as specified for the subsequent layers of the earthfill.

Immediately prior to placing the first layer of earthfill, all surfaces upon or against which the earthfill portions of the dam embankment are to be placed shall be cleaned of all loose and objectionable materials in an approved manner by handwork, barring, picking, brooming, sluicing, or by other effective means. Such surfaces shall have all water removed from depressions and shall be properly moistened and sufficiently clean to obtain a suitable bond with the earthfill.

The finished foundation surfaces shall be a firm formation or to an otherwise suitable foundation as determined by the Engineer/Owner.

The cost of all work required in removing unsuitable foundation material, below the lines, grades and dimensions shown on the drawing's shall be included in the applicable unit price bid in the schedule for excavation.

S101.9 Disposal of Excavated Material. So far as practicable, as determined by the Engineer/Owner, all suitable materials from excavation required under these specifications shall be used in the permanent construction. Excavated materials that are unsuitable for or are in excess of permanent construction requirements shall be wasted.

If the materials are not needed on other work, the surplus excavation materials shall become the property of the Contractor and shall be disposed of away from the site of the work.

All unsuitable excavated materials shall be disposed of off site unless otherwise approved by the Engineer.

S101.10 Preparation of Subgrade. Areas upon which backfill is to be placed the Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc. The subgrade shall be suitably shaped as indicated on the drawings or as directed and shall be so prepared by forking, furrowing, or plowing so that the new material placed shall be firmly bonded to it.

S101.11 Embankment Construction - General. For the purpose of these specifications, the term "dam embankment" includes all portions of the material downstream of the concrete cutoff wall to the toe of the dam. The suitability of each part of the foundation for placing embankment materials thereon, and of all materials for use in embankment construction, will be determined by the Engineer/Owner. No embankment material shall be placed in the embankment when either the material or the foundation or embankment on which it would be placed is frozen.

No brush, roots, sod, or other perishable or unsuitable materials shall be placed in the embankment.

Each load of the material placed in the embankment, whether from excavation for other parts of the work, from borrow pits or stockpile areas, shall be placed in the location designated by the Engineer/Owner, and the contractor shall be entitled to no additional allowance above the unit prices bid in the schedule on account of this requirement.

In any separate portion of dam embankment being constructed, each layer of each material shall be constructed continuously and approximately horizontal for the width and length of such portion at the elevation of the layer.

The contractor shall maintain the embankment in an approved manner, including maintaining surfaces free of excess water, weeds or other vegetation, until final completion and acceptance of all the work under the contract.

Materials having maximum dimensions of more than 10 inches shall not be placed in the earthfill. Should materials of such size be found in otherwise approved earthfill materials, they shall be removed by the contractor either at the site of excavation, stockpile area, or after being transported to the earthfill but before the materials in the earthfill are rolled and compacted. Such materials shall be placed in the other portions of the dam embankment or wasted as approved by the Engineer/Owner.

The distribution and gradation of the materials throughout the earthfill shall be such that the fills will be free from lenses, pockets, streaks, or layers of material differing substantially in texture, gradation, or moisture from the surrounding material. The combined excavation, separation, and operations shall be such that the materials when compacted in the earthfill will be blended sufficiently to secure the best practicable degree of compaction and stability. Successive loads of material shall be dumped on the earthfill so as to produce the best practicable distribution of the material, subject to the approval of the Engineer/Owner and for this purpose the Engineer/Owner may designate the locations in the earthfill where the individual loads shall be deposited, to the end that the most impervious materials shall be placed on the downstream side of the existing concrete cutoff wall and the more pervious materials shall be placed so that the permeability of the fill will be gradually increased from the existing concrete cutoff wall to the downstream slope of the earthfill.

The material shall be placed in the earthfill in continuous, approximately horizontal layers gradually scoping away from existing concrete cutoff wall, not more than 12 inches or as listed in section S101.14, in thickness after being compacted. If, in the opinion of the Engineer/Owner, the surface of the prepared foundation on the compacted surface of any layer of earthfill is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and/or worked with harrow, scarifier, or other suitable equipment, in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of earthfill material is placed. If, in the opinion of the Engineer/Owner, the compacted surface of any layer of the earthfill in place is too wet for proper compaction of the layer of earthfill material to be placed thereon, it shall be removed; allowed to dry; or be worked with harrow, scarifier, or other suitable equipment to reduce the moisture content to the required amount; and then it shall be recompacted before the next succeeding layer of earthfill material is placed.

The earthfill on each side of the concrete cutoff walls, conduits, foundations, gate structure and at the abutments shall be kept at approximately the same level as the placing of the earthfill progresses, and the walls, conduits, foundations, gate structure and abutment shall be protected against displacement or other damage.

Earthfill shall not be placed against any concrete cutoff walls, conduits, foundations, gate structure or abutment until the structure has been approved by the Engineer/Owner.

If the Contractor desires to utilize an alternate backfill/fill method other than that specified above, the Contractor shall be required prior to approval, to conduct density tests at the Contractor's own expense to demonstrate that the alternate method of compaction of the soil used for backfill/fill will achieve the density specified in Section 101.14. All approvals of alternate backfill/fill methods will be in writing.

S101.14 Compaction Control and Testing. Density control of compacted earthfill shall be such that the dry density of the compacted material, as determined by tests performed by the Engineer/Owner, shall conform to the following limits:

Material	Minimum Acceptable Compaction	Maximum Thickness of Compacted Lift
Re-used embankment soil	90%	12 inches
Bank-run sand and gravel filter layer	90%	12 inches
Pipe bedding	95%	8 inches
Roadway subbase	95%	8 inches
Rip-rap bedding	not compacted	---
Rip-rap	not compacted	---

Material represented by samples having a dry density less than the listed percent of its Proctor maximum dry density will be rejected. Such rejected material shall be recompacted until a dry density equal to or greater than the listed percent of its Proctor maximum dry density is obtained. Material shall be tested by the Modified Proctor maximum density method (ASTM D1557-78, Method C).

Compaction shall be limited immediately behind the new (1968) portion of the upstream wall where it extends above the old masonry portion that has been cut off. Heavy compaction equipment shall not be permitted within 4 ft of the new wall. This zone shall be compacted by hand-operated compaction equipment to 90% of the Modified Proctor maximum density.

The Contractory shall submit samples of borrow materials (100 lb min.) at least two weeks prior to use to allow time for grain-size analyses and laboratory compaction tests.

ROCK EXCAVATION AND DISPOSAL

SECTION S102

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S102.6	Preparation of Rock Surfaces	S102-2
S102.7	Removal of Boulders	S102-2
S102.8	Disposal of Excavated Rock	S102-2

S102.1 General. The Contractor shall excavate rock (as defined in the General Specifications and/or the Special Conditions), if encountered, to the lines and grades indicated on the drawings or as directed. All excavated materials shall be dealt with in accordance to Section S101.21.

The Contractor's attention is directed to the General Specifications, Section 7, and/or the Special Conditions for additional requirements regarding rock. In particular, the Contractor's work shall conform to the sections entitled "Definitions" and "Limits of Normal Excavation."

S102.2 Explosives. The Contractor shall keep explosives on the site only in such quantity as may be needed for the work under way and only during such time as they are being used. He shall notify the Engineer/Owner, in advance, of his intention to store and use explosives. Explosives shall be stored in a secure manner and separate from all tools. Caps or detonators shall be safely stored at a point over 100 feet distant from the explosives. When the need for the explosives has ended, all such material remaining on the work shall be promptly removed from the premises.

In addition to observing all municipal ordinances and State and Federal laws relating to the transportation, storage, handling, and use of explosives, the Contractor shall conform to any further regulations which the Engineer/Owner may think necessary in this respect. In the event that any of the above-mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work and shall permit examination thereof by the Engineer/Owner or other officials having jurisdiction.

S102.3 Blasting Precautions. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing

pipes or other structures and property above or below ground. Rock shall be well covered with logs, mats, or both, when required. Sufficient warning shall be given to all persons in the vicinity of the work before a charge is exploded.

All blasting shall be completed within a distance of 50 feet before any portion of a masonry structure is placed or any pipe is laid.

S102.4 Excessive Rock Excavation. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer/Owner, the excessive excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.

If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer/Owner considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled as directed by the Engineer/Owner. All such removal and backfilling shall be done by and at the expense of the Contractor.

S102.5 Blasting Records. The Contractor shall keep an accurate record of each blast. The record shall show the general location of the blast, the depth and number of drillholes, the kind and quantity of explosive used, the time and date of the blast, and other data required for a complete record. All records shall be legible. A copy of all such records shall be kept at the site for inspection by the Engineer/Owner. Upon request, the Contractor shall furnish a copy of any or all blasting records to the Engineer/Owner.

S102.6 Preparation of Rock Surfaces. Whenever so directed during the progress of the work, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly, using steam to melt snow and ice, if necessary. Water in depressions shall then be removed as required so that the whole surfacae of the designated area can be inspected to determine whether seams or other defects exists.

The surfaces of rock foundations shall be left sufficiently rough to bond well with the masonry and embankments to be built thereon and, if required, shall be cut to rough benches or steps.

Before any masonry or embankments are built on or against the rock, the rock shall be scrupulously freed from all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means may be used to clean the rock surface.

S102.7 Removal of Boulders. Piles of boulders or loose rock encountered within the limits of earth embankments shall be dealt with in accordance to Section S101.21.

S102.8 Disposal of Excavated Rock. Excavated rock shall be disposed of in accordance with Section S101.9

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GRANULAR MATERIALS

SECTION S103

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S103.3	Pipe Bedding	103-1
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S103.5	Installation	103-2

S103.1 General. Unless otherwise specified or indicated on the drawings, granular backfill around structures and pipes and granular fill shall conform as herein specified. Percentages are by dry weight.

S103.2 Bank-Run Sand and Gravel Filter Layer. Bank run sand and gravel layer shall be uniformly graded and shall consist of hard, durable sand and gravel, free of organic matter, plastic fines (clay) and debris.

Gradation:		
	Percent passing 10-inch size	= 100
	Percent passing 3-inch size	= 85 - 100
	Percent passing 3/4 inch size	= 65 - 100
	Percent passing No. 4 sieve	= 40 - 90
	Percent passing No. 10 sieve	= 20 - 75
	Percent passing No. 40 sieve	= 0 - 35
	Percent passing No. 200 sieve	= 0 - 8

Bank-run sand and gravel filter shall be obtained from an approved source.

S103.3 Pipe Bedding. Pipe bedding shall be uniformly graded and shall consist of hard, durable sand and gravel, free of organic matter, plastic fines (clay) and debris.

Gradation:		
	Percent passing 3 inch size	= 100
	Percent passing 3/4 inch size	= 65 - 100
	Percent passing No. 4 sieve	= 40 - 90
	Percent passing No. 10 sieve	= 20 - 75
	Percent passing No. 40 sieve	= 0 - 35
	Percent passing No. 200 sieve	= 0 - 8

Pipe bedding shall be obtained from an approved source.

S103.4 Crushed Stone Bedding for Rip-Rap. Crushed stone bedding for rip-rap shall be uniformly graded and shall consist of hard, durable, angular crushed stone, free of organic material, plastic fines (clay) and debris.

Gradation:	Percent passing 10 inch size	= 100
	Percent passing 6 inch size	= 75 - 100
	Percent passing 3 inch size	= 50 - 100
	Percent passing 1-1/2 inch size	= 30 - 75
	Percent passing 3/4 inch size	= 10 - 45
	Percent passing 3/8 inch size	= 0 - 25
	Percent passing No. 4 sieve	= 0 - 10

Crushed stone bedding for rip-rap shall be obtained from an approved source.

103.5 Installation. All granular materials shall be placed and compacted per Section 101, Embankment Excavation and Backfill/Fill.

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DUMPED RIPRAP
SECTION S105

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S105.1 Materials. Rock used for dumped riprap shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, shale, and organic material; and shall meet the gradation requirements specified in this Section. Neither breadth nor thickness of an individual rock fragment should be less than one-third its length. Rounded stone or boulders will not be accepted. Shale and rock with shale seams are not acceptable. The minimum unit weight of the rock shall be 155 pounds per cubic foot (bulk-saturated-surface-dry basis, AASHO Test T 85).

The sources from which the rock will be obtained shall be selected well in advance of the time when the rock will be required in the work.

If in the opinion of the Engineer/Owner it appears that the durability of the rock may not meet the project requirements, the resistance to disintegration shall be determined by the following tests:

1. Abrasion test in the Los Angeles machine (AASHO Test T 96) - the rock shall have a percentage loss of not more than 40 after 500 revolutions.

2. Freezing and thawing test (AASHO Test 103 for ledge rock procedure A) - the rock shall have a loss not exceeding 10 percent after 12 cycles of freezing and thawing.

If testing is required, suitable samples of rock shall be taken in the presence of the engineer at least 25 days in advance of the time when the placing of riprap is expected to begin. The tests shall be performed by a qualified testing laboratory approved by the Owner/Engineer and shall be provided by the contractor at no additional cost to the Owner. The approval of some rock fragments from a particular quarry site shall not be construed as constituting the approval of all rock fragments taken from that quarry.

Each load of riprap shall be reasonably graded within the following limits:

Percentage	Size of Rock Fragments	
	Weight (lbs)	Equivalent Spherical Diameter (ft)
Maximum size	5500	4
50 percent larger than	2300	3
Less than 10 percent smaller than	100	1

Control of gradation will be by visual inspection. Any difference of opinion between the engineer and the contractor shall be resolved by dumping and checking the gradation of two random truck loads of riprap. Mechanical equipment, a sorting site, and labor needed to assist in checking gradation shall be provided by the contractor at no additional cost to the Owner.

Existing riprap and other rock materials at the site that meet the requirements of this section may be stockpiled and reused as dumped riprap. At the discretion of the Engineer/Owner, existing riprap and rock materials that do not meet the requirements of this section may be reused as dumped riprap in noncritical areas. Noncritical areas are defined as areas that are not subjected to flow from the spillway pipes, low-level outlet pipe, or drainage culverts.

S105.2 Placement. Crushed Stone Bedding for Riprap shall be placed on the slope below the riprap as shown on the drawings.

Dumped riprap shall be placed on the prepared slope in a manner which will produce a reasonably graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone shall conform with the lines, grades, and thicknesses shown on the plans. Riprap shall be placed to its full thickness in one operation and in such a manner as to avoid displacing the underlying material. Placing of riprap in layers, or by dumping into chutes, or by similar methods likely to cause segregation will not be permitted.

The larger stones shall be well distributed and the entire mass of stone shall conform to the gradation specified in Section S105.1. All material going into the riprap layer shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sizes of stone.

It is the intent of these specifications to produce a fairly compact riprap layer in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stone by mechanical equipment may be required.

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MISCELLANEOUS EARTH EXCAVATION

SECTION S108

	Title	Page
S108.1	General.	S108-1

S108.1 General. The Contractor shall dig and backfill test pits and test holes ahead of the work as directed for the purpose of locating underground structures and shall make all other miscellaneous excavations in earth which shall be ordered by the Engineer/Owner. If required, miscellaneous excavations shall be backfilled immediately after their purpose has been accomplished, and the Contractor shall thereafter maintain the ground surface in a safe and satisfactory condition for travel until the earth excavation reaches the pit or until the surface has been repaired as specified elsewhere.

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HANDLING FLOWS DURING CONSTRUCTION

SECTION S115

	Title	Page
S115.1	General	S115.1
S115.2	Diversion of Stream and Care of Water	S115.1
S115.3	Removal of Water From Foundations	S115.2
S115.4	Responsibility of Contractor	S115.2

S115.1 General. The Contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, sumps and/or other temporary diversion and protective works; shall furnish all materials required therefore; and shall furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work, for protecting the works from damage by the elements, and for maintaining the foundations and other parts of the work free from water. After having served their purpose, all cofferdams or other protective works downstream from the dam shall be removed from the stream bed or leveled to give a sightly appearance, so as not to interfere in any way with the operation or usefulness of Silver Lake Dam and in a manner approved by the Engineer/Owner. All cofferdams or other protective works constructed upstream from the dam and not a part of the permanent dam embankment shall be removed or leveled and graded to restore the lake bed to its original configuration. The Contractor shall be responsible for and shall repair at his expense any damage to the foundations, structures, or any other part of the work caused by floods, water, or failure of any part of the diversion or protective works.

S115.2 Diversion of Stream and Care of Water. The contractor shall not interrupt nor interfere with the natural flow of the stream through the damsite for any purpose without the written approval of the Engineer/Owner.

The contractor's construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, watercourses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sewage effluent, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution. Sanitary wastes shall be disposed of on land by burial at approved sites or by other approved methods.

Unwatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or watercourses shall be conducted in a manner to prevent muddy water and eroded materials from entering the streams or watercourses by construction of intercepting ditches, bypass channels or conduits, barriers, settling ponds, or by other approved means.

When necessary to perform required construction work in the stream channel the contractor shall perform the required work in the shortest practicable time period. This required construction work may include such work as diversion of a stream, construction or removal of cofferdams, specified earthwork in or adjacent to a stream channel, and construction of turbidity control structures. Mechanized equipment shall not be operated in flowing water except as necessary to construct crossings or to perform the required construction.

All construction activities shall be conducted in a manner to prevent muddy water and eroded materials from entering the stream or watercourses by construction of intercepting ditches, bypass channels or conduits, barriers, settling ponds, or by other approved areas.

S115.3 Removal of Water from Foundations. The Contractor's method of removal of water from foundation excavations shall be subject to the approval of the Engineer/Owner.

The Contractor shall take care of all other surface water and groundwater so as to render the foundation dry and suitable for placing concrete or backfill.

S115.4 Responsibility of Contractor. At a reasonable time in advance of the construction work, the Contractor shall submit, for the approval by the Engineer/Owner, the general methods and details he proposes to use for the control of water at, onto, or through the construction site.

Whatever method is adopted, the construction of diversion or protective works, the maintenance and operation of the same, and all other operations connected therewith, shall be carried out in a satisfactory manner; and the Engineer/Owner may at any time require the Contractor to increase the precautions taken or to take additional steps to make the diversion or protective works adequate, substantial and secure. Such directions or instructions given from time to time by the Engineer/Owner, shall in no way relieve the Contractor from the whole responsibility for the efficiency and safety of these works. The Contractor shall form his own estimates of the probable flood flows and of the necessary size and strength of the stream control works, and shall assume all expenses and losses which may result from their inadequacy or from failure due to any cause whatsoever; and if destroyed or damaged he shall replace the damaged portion of the work or structure in a satisfactory manner.

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CONNECTION TO EXISTING STRUCTURES

SECTION S120

	Title	Page
S120.1	General.	.S120-1
S120.2	Cutting and Patching	.S120-1
S120.3	Construction Methods	.S120-1

S120.1 General. The Contractor shall cut suitable openings into existing structures to accommodate the pipe or structure, shall make the necessary connections to existing pipe lines or structures and do all miscellaneous work for each complete connection, as indicated on the drawings, as herein specified, or as directed.

S120.2 Cutting and Patching. Wherever necessary to connect to existing structures or lines, the Contractor shall remove the minimum amount of existing work for the installation of the necessary piping or new work. All cutting shall be confined to the smallest amount possible consistent with the work to be done, but so as to provide an acceptable connection with first class workmanship.

After new pipes or works are installed, the Contractor shall carefully fit around, close up, and repair the pipes and miscellaneous work in such a manner as is satisfactory to the Engineer/Owner. All such work shall be done by careful workmen competent to do such work with the proper tools.

All new work to be incorporated into the connections to existing structures or pipelines shall be made with new materials. No old or used materials will be permitted in making the connection unless approved by the Engineer/Owner.

S120.3 Construction Methods. The Contractor shall submit for approval details of the methods and materials he proposes to use for making all connections to existing structures, pipelines, etc.

No work shall be started on connections until the Contractor has assembled all tools, material and equipment necessary to complete the work in the shortest possible time. Once the connection work is started the Contractor shall work continuously on the connection so that the work is completed. No unfinished work shall be left for completion at a later time or date unless approved by the Engineer/Owner.

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MISCELLANEOUS APPURTENANT WORK

SECTION S122

	Title	Page
S122.1	General	S122-1
S122.2	Removal and Replacement of Portions of the Existing Structure and Appurtenances.	S122-1
S122.3	Foundation for the Concrete Cutoff Wall	S122-1
S122.4	Steel Beam Guard Rails.	S122-2
S122.5	Observation Wells	S122-2

S122.1 General. The Contractor shall furnish all materials, labor, tools and equipment necessary to do all miscellaneous appurtenant work required for the completion of each item of this Contract as herein specified and as indicated on the drawings.

S122.2 Removal and Replacement of Portions of Existing Structure and Appurtenances. The existing low-level outlet, 22-inch diameter steel pipe shall be removed and replaced by 30-inch diameter prestressed concrete cylinder pipe as indicated on the drawings and as directed. Due to the unknown condition of the original masonry at the entrance to the low-level outlet, additional reinforced concrete work may be necessary, as determined by the Engineer/Owner. The cost of the additional reinforced concrete work for connecting the new work to the existing structure shall be included in the applicable unit price bid.

The four existing 36-inch CGMP emergency spillway pipes shall be removed and replaced by four new 36" CGMP, as indicated on the drawings and as directed.

The existing dry hydrant and water line shall be removed as indicated on the drawings and as directed. The existing dry hydrant shall be properly stored and then re-installed at the same location with new 10-inch ductile iron water main, thickness class 50. Attach anti-seep collars as indicated on the drawings.

All removed portions of the structure that are not specified for reuse including concrete work and pipes shall become property of the Contractor who shall dispose of these materials off the site of the work at a location of his own choice and responsibility.

S122.3 Foundation for the Concrete Cutoff Wall. During the excavation phase of the construction the Owner/Engineer shall be given a reasonable amount of time to examine the foundation conditions of the concrete cutoff wall. Upon completion of the examination, as determined and directed by the Owner/Engineer, additional work may be required to insure the performance and stability of the structure. If the Engineer/Owner determines that the contractor's costs of performing the work will be increased due to the additional work to insure the performance and stability of the structure, an equitable adjustment will be made to cover such increased costs. Otherwise the work will be paid for at the unit price bid.

Any openings in the downstream side of the original masonry upstream wall should be sealed by mortaring or slush grouting to prevent intrusion of fines from the earthen embankment.

S122.4 Steel Beam Guard Rails. The existing steel beam guard rail on the south side of the North Road, shall be carefully removed and temporarily stored until time to reinstall at original location, as indicated on the drawings or as directed. Materials damaged or lost shall be replaced with new materials by the Contractor without additional compensation. The new materials shall be equal to or better than the material of the existing guard rail.

A new standard steel beam guard rail shall be furnished and installed on the north side of the North Road as indicated on the drawings or as directed by the Engineer/Owner. The steel beam guard rail shall conform to all the requirements of the "Standard Steel Beam Guard Rails with Steel Posts" as described in the Vermont Specifications for Highway and Bridge Construction dated March 1976, or latest revision, under Section 621.

S122.5 Observation Wells. A total of two (2) groundwater observation wells shall be installed to a depth of 25 ft at the locations shown on the drawings, or as directed by the Engineer/Owner. The wells shall be installed in cased boreholes advanced by conventional wash boring drilling techniques.

The following materials will be required for installation of an observation well:

a. Clean, uniform, MEDIUM SAND - 3% passing 200 mesh sieve, coefficient of uniformity = 2.5, grain size approximately 0.4 to 2 mm or Standard Ottawa Sand (ASTM Designation C190).

b. Clean, well graded, COARSE to FINE SAND - 3% passing 200 mesh sieve.

c. BENTONITE BALLS - Volclay KWK No. 33 or equal.

d. SLOTTED PIPE - 1-1/2 in., Schedule 80, flush joint PVC pipe, with slot width of 0.020 in., as manufactured by Hydrophilic Industries Inc. or equal.

e. RISER PIPE - 1-1/2 in., Schedule 80, flush joint PVC pipe.

f. SURFACE ROAD BOX - cast iron gate-box with bolted cover of the type used for roadway installation of water valves.

Materials to be used must be approved by the Engineer/Owner.

The observations wells shall be installed in cased boreholes using casing with a 3-in. minimum I.D. The cased boreholes shall be advanced by driving the casing to the required depth and washing out the casing with approved drilling bits. Drilling bits for cleaning out the casing may be chopping bits, tricone

(roller) bits, or auger bits, all with side discharge. The hole shall be flushed with water until the drill water return is clear and void of any cuttings. Downward jetting, drill water return outside the casing, and use of drilling mud shall not be permitted. (See Figure 1)

The installation of the observation well shall proceed as follows:

a. Pour enough MEDIUM SAND or Standard Ottawa Sand into the casing to equal one foot of thickness and wait until it settles to the bottom of the borehole. Bump out the casing an amount equal to the thickness of sand placed.

b. Lower the slotted pipe (10-ft length, plugged at the bottom) and riser pipe into the borehole and allow it to rest on the sand cushion described in a. above. The riser pipe should extend 18 in. above the ground surface. It must be noted that special care should be taken to ensure that all connections are watertight.

c. Pour MEDIUM SAND or Standard Ottawa Sand into the borehole between the casing and the riser pipe in increments of 6 to 12 in. bumping back the casing after each increment. Continue this procedure to a height of 12 to 18 in. above the slots in the PVC pipe; agitate and allow the sand to settle.

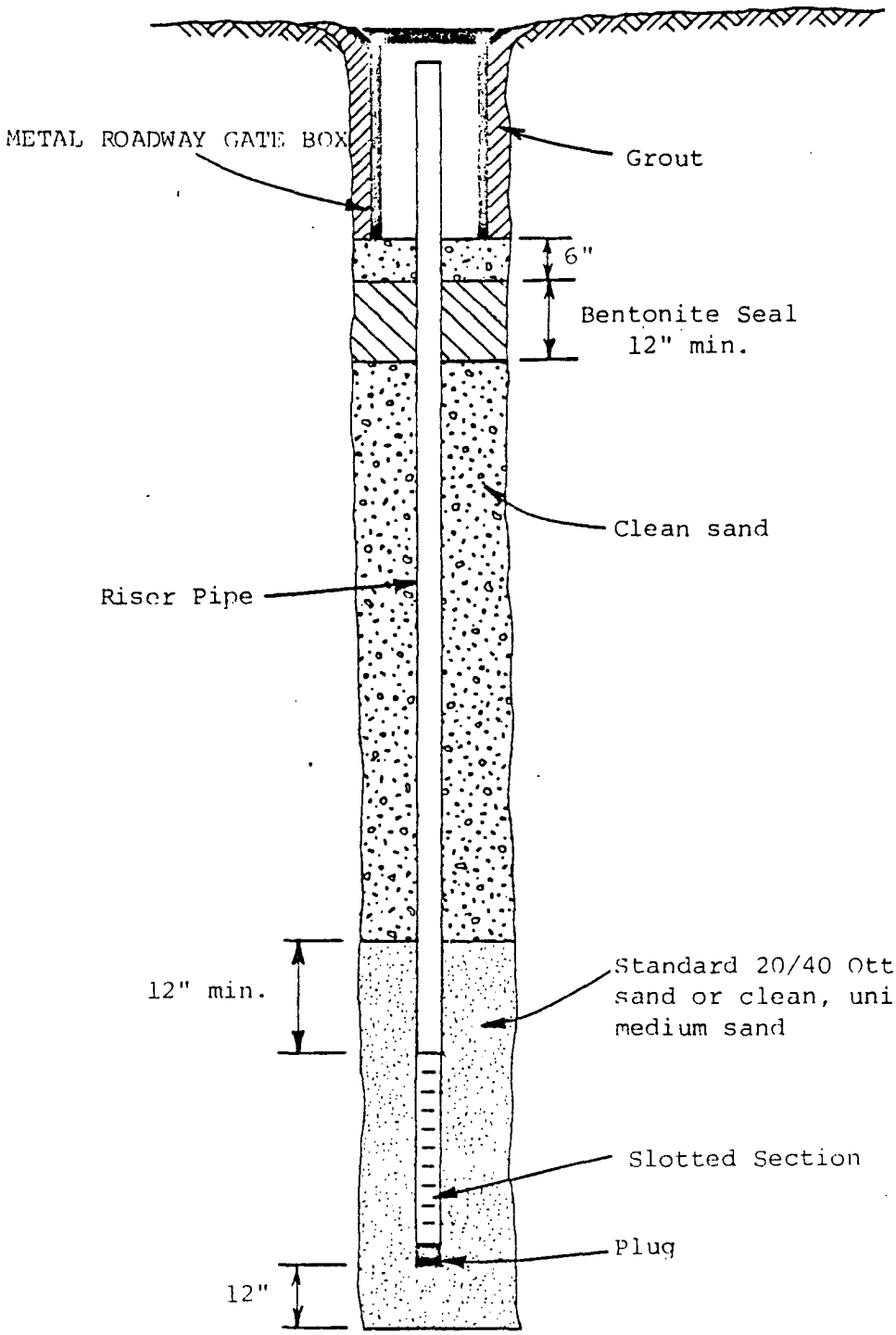
d. Backfill the remainder of the borehole with the same material as in c. above or with COARSE to FINE SAND. Simultaneous "bumping" back of casing shall take place in no greater than 12-in. increments unless otherwise approved by the Engineer. Tamp the sand in 3-ft intervals with a drilling rod or approved equivalent to increase compaction.

e. A seal consisting of a layer of BENTONITE BALLS shall be placed as shown in the drawing to prevent surface water from entering the observaton well.

f. The remaining casing shall then be removed and the SURFACE ROAD BOX grouted into place. (Note: Special care should be taken to prevent any material entering the riser pipe.)

g. The operation of each observation well shall be tested by filling the well with water and taking readings with time until the equilibrium water level is reached. Testing shall be performed in the presence of the Engineer/Owner and a record of the test (water level readings and time of reading) shall be submitted to the Engineer/Owner.

* * * *



NOT TO SCALE

DuBois & King, Inc. Randolph, Vermont	Silver Lake Dam Barnard, Vermont	GROUNDWATER OBSERVATION WELL
GEOTECHNICAL ENGINEERS INC WINCHESTER • MASSACHUSETTS	Project 81885	April 21, 1982 Fig. 1

CONCRETE AND REINFORCING

SECTION 201

	Title	Page
201.1	General	201-1
201.2	Codes	201-1
201.3	Concrete	201-1
201.4	Reinforcement	201-2
201.5	Forms	201-2
201.6	Placement	201-2
201.7	Curing	201-2
201.8	Finish	201-2
201.9	Mix Design	201-2
201.10	Field Testing	201-3

201.1 General. The Contractor shall furnish all labor and materials to complete the installation of the cast in place concrete as indicated on the drawings and as herein specified.

201.2 Codes. All concrete work shall comply with the appropriate American Concrete Institute (ACI) Codes and Portland Cement Association (PCA) recommendations.

201.3 Concrete. All concrete shall be produced in a ready-mix plant conforming to ASTM C94. All concrete shall be made using Type II, (Max. C_3A content of the Portland Cement in Concrete in contact with sewage or effluent shall be 8 percent). Portland Cement conforming to American Society of Testing Materials (ASTM) C150. All water shall be potable and all aggregates conforming to ASTM C260 shall be used in all concrete to obtain a 5 + 1% air content (as determined by ASTM C173). No other chemical admixture shall be used without the Engineer's written approval. The water content of the mix shall be adjusted to maintain a minimum slump of 3 inches and a maximum slump of 5 inches (as determined by ASTM C143). The following classes of concrete shall be required as indicated on the drawings (Class A concrete shall be used if not otherwise indicated on the drawings):

Class A Concrete shall have a minimum ultimate compressive stress of 3,750 psi at 28 days; minimum cement content 6 sacks/cy.

Class B Concrete shall have a minimum ultimate compressive stress 3,000 psi at 28 days.

Class C Concrete shall have a minimum ultimate compressive stress 1,500 psi at 28 days.

201.4 Reinforcement. All reinforcing bars shall be new billet steel conforming to ASTM A615 with a minimum yield of 60,000 psi. All welded wire fabric shall conform to ASTM A82 and ASTM A185 with a minimum yield of 70,000 psi. All reinforcing shall be placed and securely tied in accordance with accepted standard practice. The Contractor shall submit for approval, cutting and bending drawings and schedules for all reinforcement furnished by him. This requirement may be waived on small projects with the Engineer's written permission.

201.5 Forms. Forms shall be substantially built, tied, properly aligned and clean in accordance with the appropriate ACI Code. Form surfaces in contactwith concrete must be treated with an effective bond-breaking form coating in accordance with ACI 347. The use of 4-foot wide forms are recommended in order to reduce the amount of required finishing work.

Shores shall not be removed until concrete has attained at least 67% of the specified design strength and also sufficient strength to support safely its own weight and the construction live loads. Beams and girders shall be reshored as directed by the Engineer.

201.6 Placement. To prevent segregation, concrete should not be allowed to drop more than 5-feet vertically or through a cage of reinforcing steel. Placing should be carried on in such a manner that the concrete in the form is still plastic and can be integrated with the fresh concrete. As soon as possible after depositing, concrete should be consolidated in an approved manner.

201.7 Curing. All curing methods require the Engineer's approval. The curing method shall retain the moisture in the concrete (plus additional water as directed by the Engineer) for a period of 48 hours with high-early strength cement and 7 days for regular cement. Curing shall commence immediately following initial set or completion of surface finishing. The temperature of the concrete shall be maintained between 50 and 90 degrees F during the curing period. Concrete shall not be placed on frozen ground.

201.8 Finish. Finishing of formed and unformed surfaces shall be as specified by ACI 301, sections 10.4 and 11.8, titled Unspecitied Finish, unless otherwise noted on the drawings or as indicated below.

Exposed formed surfaces shall be finished as specified by ACI 301, section 10.3.1, titled Smooth Rubbed Finish.

201.9 Mixing Design. A testing laboratory acceptable to the Owner and Engineer shall be retained by the Contractor for the purpose of design and testing of trial concrete mixes for each class of concrete required. The testing shallbe in accordance with ACI 318-71, Part 3, Chapter 4 - Concrete Quality.

The Contractor shall submit a detailed report in duplicate prepared by the testing laboratory of the results of each test series. No concrete shall be placed unti the concrete mix has been approved by the Engineer. The Contractor shall pay all expenses affiliated with the process of obtaining an approved design mix.

201.10 Field Testing. A testing laboratory shall be retained and paid for by the owner to perform the following services:

1. Taking and testing of specimen cylinders taken from concrete actually placed in the work. Four test cylinders shall be taken during the progress of the work for every 50 cubic yards of concrete placed or any smaller amount placed in any one day. Test cylinders shall be made, stored and tested in accordance with ASTM C31. Two of the cylinders shall be tested after 7 days and two after 28 days.

2. Inspecting operations at the ready-mix plant and pouring operations in the field. The inspector shall regularly determine and maintain a log of the slump, air content, unit weight and temperature of the concrete being placed each day. The Contractor shall notify the laboratory in advance of all contemplated pours.

3. Submit reports promptly in duplicate to the Engineer and a single copy to the Contractor. The report shall include the source of concrete, design strength, date of pour, where concrete was placed (i.e., footings for south wall) unit weight, slump, air content, temperature, age at break, compressive strength, and any other pertinent remarks.

In the concrete fails to meet the specified standards, the Engineer may order tests on the hardened concrete in accordance with ACI 301. If after additional testing the concrete does not meet the specified standards, the contractor shall make all corrections, including replacement, as recommended by the Engineer. All correctional work and additional testing shall be paid for by the Contractor.

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CONSTRUCTION AND EXPANSION JOINTS

SECTION 203

	Title	Page
203.1	General.	203-1
203.2	Waterstop.	203-1
203.3	Premolded Joint Filler	203-1
203.4	Liquid Joint Sealant	203-2
203.5	Bearing Pad.	203-2

203.1 General. Construction and expansion joints shall be of the type and size indicated on the drawings. Joints shall be constructed only in such places as are indicated on the drawings or otherwise directed or approved. It is the Contractor's responsibility to insure that the joint is constructed in such a manner as to function as designed.

203.2 Waterstop. Waterstop shall be polyvinyl chloride (PVC) and shall conform to the Corps of Engineers Specification CRD-C-572.

Waterstop for construction joints shall be as manufactured by the W.R. Grace & Co., Servicised/Durajoint Type No. 14 or W.R. Meadows, Inc. Sealtight PVC Waterstop No. 9380, or approved equal.

Waterstop for expansion joints shall be as manufactured by W.R. Grace & Co., Servicised/Durajoint Type No. 62 or W.R. Meadows, Inc. Sealtight DUO-PVC No. 9532-D or Nail-On DUO-PVC No. 9532-ND, or approved equal.

Waterstop shall be installed in the longest practicable lengths. All waterstop joints, both horizontal and vertical, shall be butt-fused with equipment specifically designed for that operation.

Waterstop placement shall be planned to insure that wherever possible, joints in the waterstop do not coincide with construction or expansion joints.

The Contractor shall insure that each butt-fused joint is sound and watertight prior to inclusion in the work.

Waterstop shall be held securely in place by split forms or any proper method that will insure correct positioning and permit proper embedment of the waterstop while the concrete is being placed. Concrete shall be thoroughly vibrated around waterstop to avoid honeycombs or voids and to insure complete bonding of the concrete to the waterstop ribs.

For the second pour, the waterstop shall be secured with copperclad steel anchors and No. 16 gauge tie wire to the form or reinforcing steel.

203.3 Premolded Joint Filler. Premolded joint filler shall be self-expanding cork conforming to Federal Specification HH-F-341e. Joint filler shall be as manufactured by W.R. Grace & Co., Servicised Self-Expanding Cork, Code No. 4324 or W.R. Meadows, Inc., Sealtight Self-Expanding Cork Expansion Joint Filler, or approved equal.

Self-expanding cork shall be ordered in the required width, length, and thickness indicated on the drawings. Cutting or fabricating from a slab shall not be attempted at the job site. Care shall be taken to avoid removal of the factory wrapping more than 24 hours prior to installation in the joint. If conditions are such that excessive moisture is present and in contact with the cork, the self-expanding cork shall not be unwrapped more than 4 hours prior to placing the joint.

203.4 Liquid Joint Sealant. Joint sealing compound for expansion joints shall be a two-component polysulfide liquid sealant conforming to Federal Specification TT-S-227e.

Joint sealant shall be as manufactured by W.R. Grace & Co., Vertiseal, Thiokol Two-Component Polysulfide Sealant, Code 2382-Grey with Code 2379 Primer, or W.R. Meadows, Inc., CM-60 Two Park Polysulfide Sealant with C17-60 Underwater Primer or approved equivalent.

Services of a manufacturer's representative are required.

Prior to installation of the joint sealant compound, the joint faces shall be cleaned by sandblasting or power driven wire brush.

A bond breaker such as a PVC strio shall be placed between the self-expanding cork joint filler and the joint sealant.

203.5 Bearing Pad. Bearing pad shall be of neoprene with a 60 Durometer hardness conforming to AASHO requirements. The bearing pad shall be as manufactured by W.R. Grace & Co., Servicised Neoprene Bearing Pads, Code 3340, or ACME Highway Products Corp., Johnson Rubber Co., Middlefield, Ohio or approved equivalent. Size and shape shall be as indicated on the drawings.

Bearing pad shall be fixed in place as indicated on the drawings with adhesive as recommended by the bearing pad manufacturer.

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EMERGENCY SPILLWAY PIPE

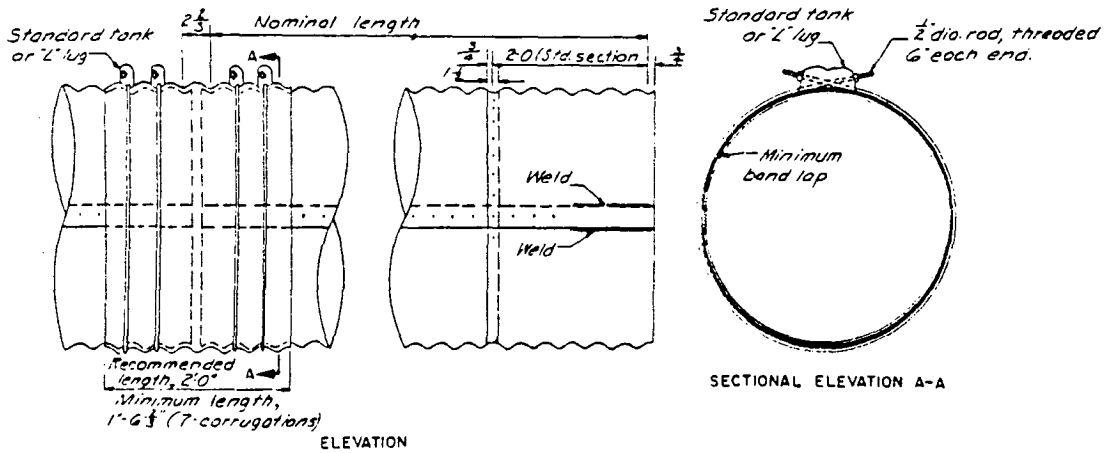
SECTION S400A

	Title	Page
S400A.1	General	S400A-1
S400A.2	Corrugated Metal Pipe	S400A-1

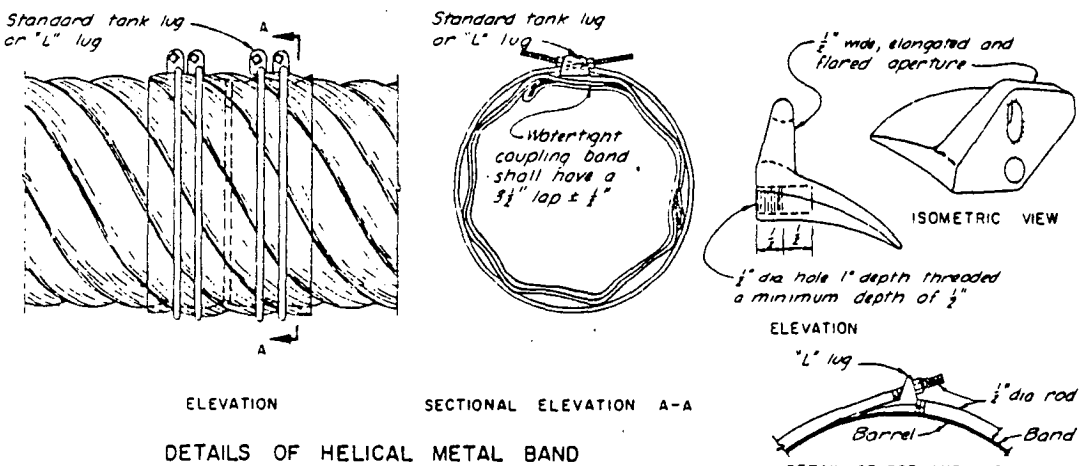
S400A.1 General. The Contractor shall furnish and install the emergency spillway pipes of the type and size indicated on the drawings. Included shall be the furnishing and/or constructing of such joints and special pipe and fittings and such connections to existing pipes and structures as may be required to complete the work.

S400A.2 Corrugated Galvanized Metal Pipe. Corrugated galvanized metal pipe, asphalt coated corrugated metal pipe, and fittings shall be of the sizes indicated on the drawings and shall conform to the requirements of the American Association of State Highway Officials (AASHO) Designation M-136. Asphalt coated corrugated metal pipe shall be fully asphalt coated both inside and outside to a minimum thickness of 0.05 inches in accordance with AASHO Designation M-190. Corrugated metal pipe shall be joined by butting the ends together and joining the sections with a band made of the same material as the pipe. Watertight couplings shall be made as shown on the attached figure.

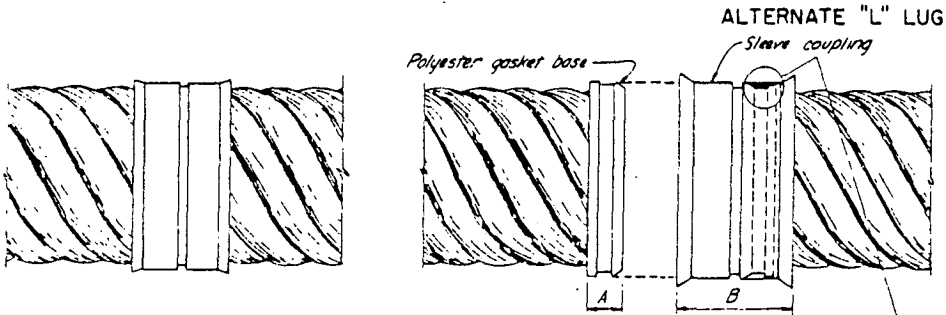
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DETAILS OF WATERTIGHT COUPLING BAND FOR C.M. PIPE



DETAILS OF HELICAL METAL BAND



DIMENSIONAL TABLE

PIPE DIAMETER (INCHES)	DIMENSION OF COMPONENTS IN VARIOUS PIPE DIAMETERS (IN INCHES)		
	A	B	C
6	2 1/2	9	1
8	2 1/2	10	1
10 & OVER	2 1/2	12	1

DETAILS OF SLEEVE JOINT FOR HELICAL PIPE

DETAILS OF WATERTIGHT COUPLING BANDS FOR HELICAL METAL PIPE

PRESTRESSED CONCRETE CYLINDER PIPE

SECTION S400B

	Title	Page
S400B.1	General	S400B-1
S400B.2	Pipe and Fitting	S400B-1
S400B.3	Shop Drawings	S400B-2
S400B.4	Jointing Pipe and Fittings	S400B-3
S400B.5	Installing Pipe and Fittings	S400B-3
S400B.6	Anti-Seep Collar	S400B-4

S400B.1 General. The Contractor shall furnish all labor, material, tools, and equipment and shall construct the prestressed concrete cylinder pipe outlet as indicated on the drawings and as herein specified.

S400B.2 Pipe and Fittings. Pipe manufactured in sizes 16-inches through 48-inches shall be prestressed concrete lined cylinder pipe and pipe 54-inches and larger shall be prestressed concrete embedded cylinder pipe. All pipe shall be manufactured in accordance with the latest revision of AWWA C301, and be as manufactured by Interpace Corporation spec. SP-5 and SP-12, or the equivalent by Price Bros. Co., or approved equal. The pipe shall have the following principal features: a watertight welded steel cylinder with steel joint rings welded to its ends; a core consisting of a lining of concrete within the steel cylinder; or the cylinder embedded in an envelope of concrete, whichever is appropriate; reinforcement consisting of high tensile wire wound around the outside of the core at a predetermined stress and securely fastened at its ends; a coating of dense mortar covering the core and wire except for the necessarily exposed surface of the joint rings; a self centering joint with a preformed rubber gasket, so designed that the joint will be watertight under all conditions of service. The pipe shall be designed for the maximum trench loading with class "C Modified Bedding" which shall be applied after the backfill is in place, plus an allowance of 20 psi. surge pressure. In no case will the design earth load be less than that due to six feet of cover with Class "C Modified Bedding". Where the pipe is to be laid under a roadway, it shall be designed to withstand a live load equal to American Association of State Highway Officials H-20 loading.

Pipe diameters 126-inches and larger will be furnished in maximum lengths of 12-feet. Pipe diameters 120-inches and smaller may be furnished in maximum standard lengths of 20-feet.

The size of the high-tensile wire and the spacing and tension under which it is wound shall be such that the conditions required by the design methods in Appendix A of AWWA C301 are met. The design shall fully recognize all losses due to elastic and inelastic deformation, such as relaxation of the wire and plastic strains in the concrete.

The average gross wrapping stress in the high tensile wire shall not exceed 75 per cent of the minimum ultimate tensile strength of the wire. The wire shall not be smaller than 8 gage. The minimum centerline spacing of the wire shall be that which produces a clear distance of 3/16-inch between wires on the barrel of the pipe. The centerline spacing of the wire shall not exceed 1-1/2 inches. The contractor shall submit design calculations, which must be approved by the engineer prior to the manufacture of any pipe for this project. Upon delivery the contractor shall submit a certificate of compliance for all pipe and fittings.

Prestressed concrete cylinder pipe shall be used where shown on the drawings or as directed by the engineer.

Cement shall be type II.

All surfaces of the steel joint rings exposed in finished pipe shall be protected from corrosion by means of a coating of factory applied metallic zinc not less than 0.002-inch thick.

In addition to straight pipe, the contractor shall furnish all bends, tees, closure pieces, wall fittings, test plugs, eccentric reducers and other fittings which are shown on the plans or required to complete the work. Except as modified herein, the design and mnaufacture of fittings shall be governed by the same requirement as the connecting piping. Fittings shall conform to the requirements of AWWA C301 type B latest revision.

Each pipe or fitting shall have plainly and permanently marked thereon the pipe class, date of manufacture, manufacturer's name or trademark, and on bends the angle turned thereby.

Identification of specials shall be made to show proper location in the line, and on beveled pipe, the amount of bevel and point of maximum bevel.

The prestressed concrete cylinder pipe and fittings for the 30-inch outlet shall be manufactured for a minimum design working pressure of 10 psi.

Joints shall be of the flexible restrained type consisting of bolts factory installed in the bell end of the pipe. Joints shall be designed to remain watertight with an extension of 1/2 inch at each joint.

External loading on the pipe shall be the maximum depth of cover or a combination of shallow depth of cover and an ASSHO H-20 truck loading, or the rip-rap loading, whichever is critical.

S400B.3 Shop Drawings. The Contractor shall submit to the Engineer for approval, shop drawings prior to the fabrication of the pipe, showing pipe lengths, joint and special fittings details, flexible restrained joints if required, and other pertinent data. All pipe furnished under the contract shall be fabricated in accordance with the approved details.

The manufacturers shall submit to the engineer prior to the shipment of pipe to the site in affidavit of compliance certifying that the pipe has been manufactured in accordance with the requirements of AWWA C301 (Latest revision).

S400B.4 Jointing Pipe and Fittings. Pipe and fittings shall be jointed in accordance with the latest detailed instructions of the manufacturer. The ends of the pipe and the rubber gasket shall be satisfactorily cleaned just before the laying of the pipe and shall be thoroughly lubricated as recommended by the manufacturer.

Where recommended by the manufacturer, the Contractor shall furnish coupling pullers for jointing the pipe. Gasket feeler gauges shall be available for use by the pipe layer and the Engineer for checking the position of the rubber gaskets in the completed joint, if so directed by the Engineer.

Rubber and steel joints shall be externally mortared after jointing.

The gasket sealing the joint shall be made of rubber or special composition having a texture to assure a watertight and permanent seal. The gasket shall be a continuous ring of circular cross-section and of such size as to completely fill the groove on the spigot joint ring when the pipes are laid. The gasket shall be the sole element depended upon to make the joint watertight and shall have smooth surfaces free of pitting, blisters, porosity, and other imperfections.

Rubber for the gasket shall meet the following physical requirements when tested in accordance with appropriate sections of "methods of physical tests and chemical analysis for rubber goods" (Federal Specifications ZZ-R-601A). Rubber shall contain not less than 65 percent by volume of first-grade natural crude rubber: the remainder shall consist of suitably pulverized fillers. The tensile strength shall be at least 3,000 psi. The elongation at rupture shall be such that 2-inch gage marks shall stretch to not less than 10-inch. The specific gravity shall be between 1.16 and 1.22. The percent of cold flow, computed as 100 times the change in thickness divided by the original thickness, shall not exceed 10 percent when tested by subjecting a disc of the material 1/4-inch thick by 3/4-inch in diameter to a pressure of 600 psi. Using a spring pressure device placed in an air oven at a temperature of 158°F for 24 hours. The tensile strength of the compound after being subjected to an accelerated aging test for 96 hours in air at 158°F shall not be less than 80 percent of the tensile strength before aging.

S400B.5 Installing Pipe and Fittings. No defective pipe or fitting shall be installed. Any piece discovered to be defective after having been laid shall be removed and replaced with a sound piece.

Each pipe and fitting shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.

Each pipe shall be handled into its position in the trench only in such manner, and by such means, as the Engineer approves as satisfactory. The Contractor will be required to furnish slings, straps, and other approved devices to permit satisfactory support of all parts of the pipe when it is lifted. The use of lifting holes will not be permitted.

The pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and to bring the inverts continuously to the required grade.

Each length of pipe shall be shoved home against the pipe previously laid and held securely in position. Joints shall not be "pulled" or "cramped" without approval of the Engineer.

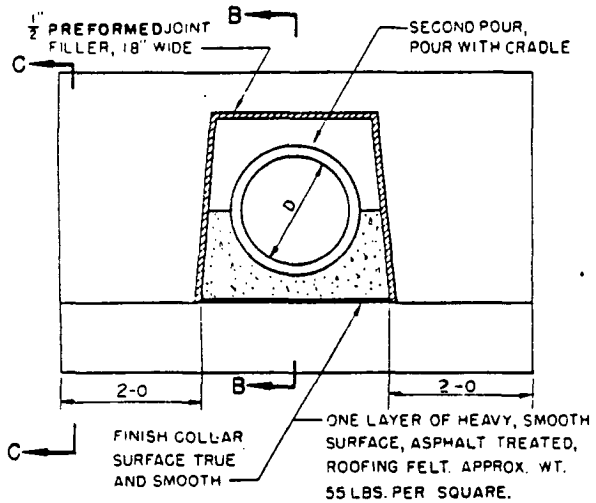
Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.

Pipe or fittings shall not be left permanently supported on saddles or blocking, but shall be supported by an envelope of select material.

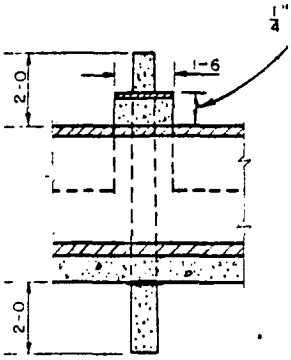
Each pipe shall be firmly bedded in an envelope of select material. The bedding material shall be thoroughly compacted under the pipe to obtain a substantially unyielding bed. After each pipe has been properly bedded, enough select material shall be placed between the pipe and the side of the trench, and thoroughly compacted to hold the pipe in correct alignment. Holes provided for jointing shall be filled and compacted and then select material shall be placed and compacted to complete the envelope and bedding.

The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench.

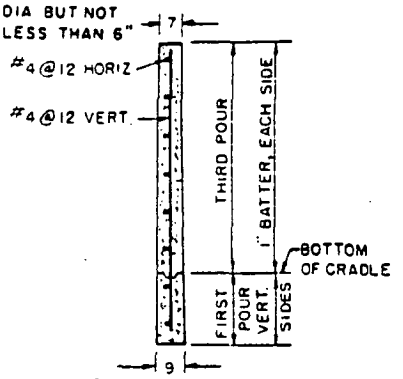
S400B.6 Anti-Seep Collar. Anti-seep collars shall be placed around the low level outlet at the locations shown on the drawings and in accordance with the attached detail.



DETAIL SHOWN FOR EARTH FOUNDATION. FOR ROCK FOUNDATION, FOUND BOTTOM OF CRADLE ON ROCK LINE AND KEY COLLAR 6" INTO ROCK.



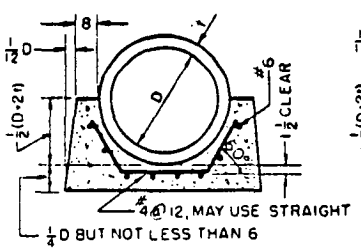
SECTION B-B



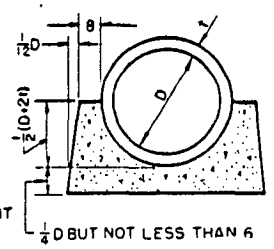
SECTION C-C
(SHOWING STEEL)

SIDES OF ANTI-SEEP COLLARS TO BE FORMED ABOVE BOTTOM OF CRADLE. MAX SPACING OF COLLARS = 25'

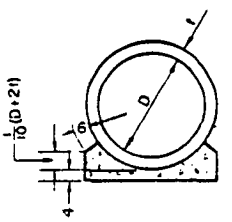
DETAIL OF ANTI-SEEP COLLAR



A1. CRADLE



A2 CRADLE



B1 BEDDING

SLUICE GATES

SECTION S438

	Title	Page
S438.1	General	S438-1
S438.2	Material and Construction of Sluice Gates	S438-1
S438.3	Shop Drawings	S438-2

S438.1 General. The Contractor shall furnish, install, and place into satisfactory operation all sluice gates as specified herein, indicated on the drawings, or otherwise required for a complete installation. The specifications and drawings call attention to certain features but do not purport to cover all details entering into the design of the equipment.

The sluice gates shall be as manufactured by Rodney Hunt Company, Orange, Massachusetts, or approved equal. The sluice gates shall be for an opening 24" wide by 36" high series 240-L with a Model S-5002 Crank-operated floorstand.

S438.2 Material and Construction of Sluice Gates. The sluice gates shall conform to AWWA Standard C501.

Sluice gates shall be cast iron, fully bronze-mounted with side wedges for seating head conditions where necessary, and bottom and top wedges for unseating head conditions. Machined surfaces shall be finished to exact dimensions. Disks and frames shall have machined dovetail grooves into which the bronze seat facings shall be driven and securely fastened. Reinforcing ribs shall be cast opposite the grooves in the disk. All holes for bolts and studs shall be drilled. Frames shall be of the flat or flange frame type as indicated on the drawings, having the rear face machined and drilled for bolting directly to cast-iron wall thimbles set flush with the concrete wall. Wall thimbles shall be type F section and shall be made of one-piece cast-iron construction of adequate thickness to withstand the stress of operation and installation. Front flanges shall be machined and shall be provided with drilled and/or tapped holes for installation of bolts of studs as necessary. Large rectangular thimbles shall be provided with holes in the invert to allow satisfactory concrete placement beneath the thimble. The entire stem, including extension stem, if any, of the sluice gates shall be of type 304 stainless steel. The stem shall be fitted with a stop to prevent over-closing of the gate. Stems shall be designed to transmit at least 2-1/2 times the rated output of the floorstand in compression. Stem guides shall be provided and installed in accordance with the manufacturer's recommendations.

The sections of extension stems shall be joined together by solid, manganese-bronze, or stainless-steel couplings to match the stems, and threaded and keyed to the stems. All couplings of the same size shall be interchangeable. Stems shall be furnished with adjustable, bronze-bushed, stem guides, spaced as necessary or as indicated on the drawings. Guides shall be supported by cast-iron brackets bolted to the concrete.

Operators of the type indicated on the drawings and herein specified shall be provided with each sluice gate.

The operator shall be crank-operated with a removable crank.

The operator shall be mounted on a wall bracket, bolted through the wall to a plate on the opposite side.

The stem cover shall be galvanized steel. A dial position indicator shall be included.

All exposed surfaces shall be finished with the manufacturer's standard coating for the indicated conditions of operation.

S438.3 Shop Drawings. As required by the General Specifications, the Contractor shall submit shop drawings for approval. The drawings shall show the materials to be furnished, component parts, and method of anchorage.

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CLEANING

SECTION S701

	Title	Page
S701.1	General	S701-1
S701.2	Safety Requirements	S701-1
S701.3	Cleaning Materials	S701-1
S701.4	Cleaning During Construction	S701-1
S701.5	Final Cleaning	S701-2

S701.1 General. The Contractor shall maintain the work area and adjacent areas in a neat sanitary condition for the duration of the Project.

S701.2 Safety Requirements. The Contractor shall maintain the Project in accordance with U.S. Department of Labor, Safety and Health Regulations, CFR 20 Part 1926 and all subsequent amendments.

Store volatile wastes in covered metal containers.

Prevent accumulations of wastes which create hazardous conditions.

Provide adequate ventilation during use of volatile or noxious substances.

Conduct cleaning and disposal operations to comply with local and state ordinances and anit-pollution laws and as approved by the Engineer/Owner.

Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

Do not dispose of wastes into streams or waterways.

S701.3 Cleaning Materials. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

S701.4 Cleaning During Construction. Execute cleaning to insure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.

Wet down dry materials and rubbish to lay dust and prevent blowing dust.

Clean site and public properties, and dispose of waste materials, debris and rubbish daily.

Dispose of waste materials, debris and rubbish as approved by the Engineer/Owner.

Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

S701.5 Final Cleaning. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces.

Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

Broom clean paved surfaces; rake clean other surfaces of grounds.

Remove snow and ice from building access.

Tear down, remove and dispose of all temporary buildings and structures as approved by the Engineer/Owner.

Upon removal of temporary toilet facility, remove, disinfect, and cover all organic matter as approved by the Engineer/Owner.

Remove all tools, equipment, machinery and surplus materials from the Project.

Restore to a condition equal to the original condition all portions of the site not designated for alteration and all public and private property that was damaged.

Maintain cleaning until Project or portion thereof, is occupied by Owner.

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LOAMING AND SEEDING

SECTION S702

	Title	Page
S702.1	General.	S702-1
S702.2	Loaming.	S702-1
S702.3	Fertilizing and Rolling.	S702-2
S702.4	Seeding.	S702-2
S702.5	Temporary Cover Crop	S702-2
S702.6	Inspection and Acceptance.	S702-2

S702.1 General. The Contractor shall furnish all labor, materials, and equipment necessary to do all loaming and seeding as indicated on the drawings and as herein specified.

The Contractor shall be responsible for obtaining a good, healthy growth of lawn quality grass on all areas that are specified to be seeded or areas that the Engineer/Owner directs the Contractor to loam and seed.

The areas to be seeded shall be properly conditioned by fine grading and raking to remove all sticks, stones, rocks, and other objectionable material to form a finely pulverized seed bed. The ground surface shall be graded as indicated on the drawings and/or as specified by the Engineer/Owner.

The Contractor may desire, but is not expressly required, to obtain the recommendations of the local agricultural agent as to type and quantities of soil conditioners, fertilizers, and seed mixtures that should be applied for a dense, rigorous growth of perennial lawn quality grass.

S702.2 Loaming. After approval of the rough grading, the Contractor shall place loam on all areas indicated on the drawings, on other grassed areas damaged by his operations, and as directed by the Engineer/Owner.

Loaming of areas other than established lawns disturbed during the process of construction shall not be required unless, in the opinion of the Engineer/Owner, the area to be seeded is of such composition that it is unsuitable for vegetation. If required by the Engineer/Owner, the area to be seeded shall be covered with two (2) inches of loam, compacted in place. Disturbed established lawn area shall have a loam cover at least equal to that which was disturbed but not less than two (2) inches, compacted in place.

Loam shall be a natural, fertile, friaable soil, typical of productive soils in the vicinity, obtained from naturally well drained areas, neither excessively acid nor alkaline, and containing no substances harmful to grass growth.

All loam from stripping which is not used at the job site shall be removed from the site and deposited as directed.

Loam shall not be delivered to the site in frozen or muddy condition.

S702.3 Fertilizing and Rolling. While the surface is still loose, approved soil conditioners and fertilizers shall be spread and thoroughly worked into the loam. The loam shall then be raked until the surface is finely pulverized and smooth and shall be compacted with rollers, weighing not over 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines and grades.

S702.4 Seeding. Seed shall be of an approved mixture of the most recent year's crop, clean, high in germinating value, and low in weed seed. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates relative to mixture purity and germinating value.

Seeding operations may be carried on from the time the ground becomes workable in the spring until October 15, unless otherwise directed by the Engineer/Owner.

If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

Seed shall be sown at the approved rate, on a calm day, and preferably by machine but if by hand, only be experienced workmen. Water seeding will not be permitted.

One-half the seed shall be sown in one direction and the other half at right angles. Seed shall be raked lightly into the soil to a depth of 1/4 inch and rolled with a roller weighing not more than 100 pounds per linear foot of tread.

Wherever poor germination occurs in areas larger than three square feet, the Contractor shall reseed, roll, and water as necessary to obtain proper germination.

S702.5 Temporary Cover Crop. If there is insufficient time in the planting season to complete the seeding, fertilizing and permanent seeding may be left until the following planting season, at the option of the Contractor or on order of the Engineer/Owner. In that event, a temporary cover crop of buckwheat, domestic rye grass, or other approved seed shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized, and the permanent seed crop shall be sown as specified.

S702.6 Inspection and Acceptance. At the beginning of the next planting season after that in which the permanent grass crop is sown, the seeded areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The lawns shall be watered, weeded, cut, and otherwise maintained until the end of that planting season when they will be accepted.

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PAVEMENT AND PAVEMENT REPLACEMENT

SECTION S703

	Title	Page
S703.1	General	.S703-1
S703.2	Replacing State Highway Pavements	.S703-1
S703.3	Preparation for Surfacing - State and State Aid Highways	.S703-2
S703.4	Preparation for Surfacing - Other than State Highways	.S703-2
S703.5	Bituminous Concrete Pavement	.S703-2
S703.6	Portland Cement Concrete Pavement (DELETED)	.S703-2
S703.7	Blade Mix	.S703-2
S703.8	Double-Tack Coat (DELETED)	.S703-2
S703.9	Maintenance of Pavement	.S703-2
S703.10	Gutters and Curbs	.S703-2
S703.11	Gravel Surfaces	.S703-2
S703.12	Temporary Pavement	.S703-3
S703.13	Time for Placing Permanent Pavement	.S703-3

S703.1 General. The Contractor shall do all work and shall furnish all labor, materials, and equipment necessary to replace all pavement removed or damaged by his operations.

Where operations of the Contractor have resulted in removal or damage to pavement, pavement foundation, or appurtenances, the affected portions thereof shall be removed to the extent ordered by the Engineer and replaced so that the whole roadway will have a true and uniform surface and will conform to the proper grade and cross section. All pavement to be removed shall be cut neatly with as little damage as possible to adjoining pavement. Bituminous concrete surface and concrete pavement shall be broken out with a pavement breaker to a distance of twelve inches outside the limits of the actual excavation. Where possible, reinforcing steel in concrete pavement shall be cut and bent back to allow excavation. All Portland Cement concrete pavement, and bituminous concrete pavement over Portland Cement concrete pavement, and bituminous concrete pavement 3-1/2 inches thick or less shall be replaced in kind to a thickness equal to the existing pavement. Bituminous concrete pavement greater than 3-1/2 inches thick shall be replaced with 2-inch thick base and 1-1/2-inch thick surface courses of bituminous concrete pavement.

All work in State Highways shall conform to the applicable sections of the latest State of Vermont Department of Highways, Standard Specifications for Highway and Bridge Construction.

S703.2 Replacing State Highway Pavements. Nothing contained herein shall relieve the Contractor from carrying out all orders given by State Highway officials in connection with the replacement of pavement which is part of the State Highway System or State Aid Roads. Prior to doing any work which will affect a State Highway, a permit shall be obtained from the State of Vermont Department of Highways.

S703.3 Preparation for Surfacing - State and State Aid Highways. All trench backfill material shall be thoroughly compacted with mechanical tampers as described in the Vermont Highway Specifications under Item 601.10. All loose or damaged material in the existing paving shall be removed, and the existing surface course trimmed back, as directed by the Engineer, so as to ensure a satisfactory bond between it and the new surfacing.

S703.4 Preparation for Surfacing - Other than State Highways. The trench shall be backfilled as stated in Section 101 of these specifications and a gravel base course having a thickness of not less than 12 inches after compaction shall be placed before resurfacing. The base course shall be placed in layers of not over six inches and shall be thoroughly compacted. The base course shall be constructed of materials approved by the Engineer. All loose or damaged material in the existing pavement shall be removed and the existing surface course trimmed back, as directed by the Engineer.

S703.5 Bituminous Concrete Pavement. The Contractor shall prepare the trench area and base course for repaving as previously specified. The new surface shall be bituminous concrete pavement meeting Vermont State Highway Department Specifications for Item 406, Bituminous Concrete Pavement. The thickness shall be equal to the existing pavement or as directed by the Engineer.

S703.6 Portland Cement Concrete Pavement. DELETED.

S703.7 Blade Mix. The Contractor shall prepare the trench area and base course as previously specified. The new surface shall consist of two applications of approved bituminous material applied on the prepared sub-base, followed by a blade mix seal of pea stone and stone grits. The blade mix surface shall conform in materials and construction to the Vermont State Highway Department Specifications for Item 404, Type V.

S703.8 Double-Tack Coat. DELETED.

S703.9 Maintenance of Pavement. The Contractor shall maintain pavement placed under this contract until the expiration of the guarantee period and shall promptly fill with similar material all depressions and holes that may occur so as to keep the pavement in a safe and satisfactory condition for traffic.

S703.10 Gutters and Curbs. All gutters and curbs which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration and shall be subject to approval by the Engineer.

S703.11 Gravel Surfaces. Gravel surfaces disturbed by the Contractor's operations shall be restored to a condition at least equal to that which existed before his operations began. Care shall be taken to ensure compaction of materials so that subsequent settlement does not result.

S703.12 Temporary Pavement. The Contractor shall place temporary pavement in areas specifically designated by the Engineer. The temporary pavement shall be approved bituminous concrete pavement one inch minimum thickness and shall be placed as soon as practical after the trenches have been backfilled.

The Contractor shall maintain in satisfactory condition the temporary pavement placed under this contract until the permanent pavement is constructed and shall repair any damaged or deteriorated sections promptly as directed by the Engineer. All temporary pavement shall be removed and disposed of prior to placing permanent pavement.

Temporary paving will not necessarily be designated for all paved areas which are disturbed by the Contractor's operations. Areas not specifically designated for temporary paving shall be maintained in satisfactory conditions as specified at the Contractor's expense.

S703.13 Time for Placing Permanent Pavement. Permanent pavement shall not be constructed until after the trenches have set a minimum of thirty (30) days. If it is not possible for the Contractor to schedule his operations so that this may be accomplished prior to the completion date, as stated in the contract, an extension of time will be granted to complete this work.

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DUST CONTROL

SECTION S706

	Title	Page
S706.1	General.	S706-1
S706.2	Materials.	S706-1
S706.3	Dust Control with Water.	S706-1
S706.4	Dust Control with Calcium Chloride	S706-1

S706.1 General. This work shall consist of treating the project area to control dust in accordance with this specification and to the satisfaction of the Engineer/Owner.

S706.2 Materials. All water used shall be reasonably clear and free of harmful amounts of oil, salt, acids, alkalies, sugar, organic matter or other substances injurious to the finished product, plant life or the establishment of vegetation.

Where the source of water is relatively shallow, the intake shall be maintained at such a depth and so enclosed silt, mud, grass and other foreign materials.

Calcium chloride shall conform to the requirements of AASHTO M 144. Either regular flake calcium chloride, Type 1, or concentrated flake, pellet or other granular calcium chloride, Type 2, may be used.

S706.3 Dust Control with Water. Water shall be applied to such sections of the project area as the Engineer may designate. The number of applications and the amount of water used shall be based upon field and weather conditions and as ordered by the Engineer/Owner.

The equipment for water application shall be equipped with an adequate shut-off valve control in the cab and shall be approved by the Engineer/Owner. The equipment shall be available at all times in readiness to perform the work at any time including Sundays and Holidays upon order of the Engineer/Owner.

S706.4 Dust Control with Calcium Chloride. Calcium chloride shall be applied in such a manner and by such devices that uniform distribution is obtained over the entire area on which it is ordered by the Engineer/Owner.

Unless otherwise ordered by the Engineer/Owner, 0.5 pound of calcium chloride shall be applied per square yard for dust control.

It shall not be used on surfaces on which bituminous material will be applied, unless directed by the Engineer/Owner.

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SOIL EROSION AND SEDIMENTATION CONTROL

SECTION S707

	Title	Page
S707.1	General	S707-1
S707.2	Quality Assurance	S707-1
S707.3	Submittals	S707-1
S707.4	Clean-up and Approval	S707-1
S707.5	Erosion Control Measures	S707-1-6

S707.1 General. The Contractor shall furnish all labor, materials and equipment necessary to complete and maintain all the erosion control measures as indicated on the drawings, as herein specified, or as directed. No site work shall take place on the job without the required control measures in place, in good condition, and approved by the Engineer.

The Contractor shall keep disturbed areas to a minimum. Temporary and/or permanent cover shall be installed as soon as possible after area has been disturbed. No area which has been disturbed by construction shall be left untreated from October 15 to April 15.

S707.2 Quality Assurance. Contractor shall be responsible for monitoring all temporary control measures for the duration of the project. All permanent control measures shall be maintained for the normal contract warranty period. The Contractor shall be responsible for the replacement of any measure which fails during these periods at his own expense and to the satisfaction of the Engineer.

S707.3 Submittals. Contractor may submit alternative soil erosion and sedimentation control measures to the Engineer for approval prior to construction if they meet or exceed items indicated herein.

The Contractor is to provide timely, advance submittals of seed samples, nursery certificates for vegetative covers, and plantings he intends to use.

S707.4 Clean-up. All temporary control measures shall be removed and disposed of in a manner approved by the Engineer, when in the opinion of the Engineer the permanent control measures are sufficiently established.

S707.5 Erosion Control Measures. The following erosion control measures shall apply to this project: No's 1, 4, 5 & 6. Many of these items were obtained from the Erosion and Sediment Control Handbook for Connecticut, 1976, which was prepared in part by the United States Soil Conservation Service.

EROSION CONTROL MEASURE NO. 1

PERMANENT VEGETATIVE COVER

General - This measure shall apply to all areas disturbed during construction unless otherwise indicated on the drawings or directed by the Engineer.

Site Preparation -

a. Site grading shall be completed and approved prior to seeding.

b. All cultural operations shall be performed parallel to the contours of the slope.

c. At least four inches of topsoil shall be provided over extremely adverse soil conditions. Surfaces compacted by construction machinery should be disked or chisled before topsoil is added.

d. Apply lime at the rate of two tons of ground limestone per acre (100 lbs. per 1,000 square feet.)

e. Apply fertilizer as follows:

-Spring seeding. Work deeply into soil, before seeding, 300 lbs. of 10-10-10 fertilizer per acre (seven lbs. per 1,000 square feet); seed; then six to eight weeks later apply on the surface an additional 300 lbs. of 10-10-10 fertilizer per acre.

-Fall seeding. Work deeply into soil, before seeding, 600 lbs. of 10-10-10 fertilizer per acre (14 lbs. per 1,000 square feet).

Establishment -

a. Smooth and firm seedbed with cultipacker or other similar equipment prior to seeding (except when hydroseeding).

b. Select adapted seed mixture from the following table. Note seeding dates.

c. Apply seed uniformly according to rate indicated in the table by broadcasting application (drilling or hydraulic application may be used in areas approved for such applications by the Engineer.)

d. Cover grass and legume seeds with not more than 1/4 inch of soil with suitable equipment (except when hydroseeding).

e. Mulch immediately after seeding. Refer to mulch measures.

PERMANENT GRASS AND LEGUME SEEDING

SEED MIXTURES, RATES, AND DATES

Seed Mixture[5,6]	Percent by Weight	Seeding Rates in Lbs.[1] 1000 sq. ft.	Seeding Rates in Lbs.[1] Acre	Seeding Dates	Special Adaptation
KY 31 Tall Fescue Red Fescue	50 50	1½	50	April 1 - June 15 Aug. 15 - Sept. 1	Droughty Areas
KY 31 Tall Fescue [2] Annual Ryegrass	80 20	1½	50	April 1 - June 15 Aug. 15 - Sept. 1	Heavy Use Area
Red Fescue [4] Crownvetch	60 40	1	40	April 1 - June 15	No Mow Areas Droughty Areas
Crownvetch Perennial Ryegrass	60 40	½	25	April 1 - June 15	No Mow Areas Droughty Areas
Reed Canary Grass Redtop	80 20	1	50	April 1 - June 15 Aug. 15 - Sept. 1	Wildlife or Wet Areas
Red Fescue[3] Kentucky Blue grass Perennial Ryegrass	70 20 10	2	80	April 1 - June 15 Aug. 15 - Sept. 1	High Maintenance (lawns)
KY 31 Tall Fescue Birdsfoot Trefoil	70 30	1	40	April 1 - June 1	No Mow Areas Wet Areas

[1] These are minimum seeding rates and should be increased if adverse conditions exist

[2] Straight KY 31 tall fescue may be used for soccer or football fields (minimum 150# up to 250# per acre.)

[3] 10% of birdsfoot trefoil may be added to this mixture.

[4] Ky 31 tall fescue may be used in place of red fescue.

[5] May add 5% of perennial ryegrass for quick fall cover.

[6] Contractor may use seed mixtures other than those specified if submitted and approved for use by the Engineer.

EROSION CONTROL MEASURE NO. 4

MULCHING

General - Apply plant residues or other suitable materials, not produced on the site, to the surface of the soil where indicated on the drawings or as directed by the Engineer.

Application - See the following tables for materials and application rates.

MULCHING MATERIALS AND APPLICATION RATES

Mulch Material	Quality	Application Rates		Installation
		Per 1000 Sq. Ft.	Per Acre	
*Hay or straw	Air dried, free from undesirable seeds	75-100 lbs. or 2-3 bales	1.5-2 tons 90-110 bales	Spread uniformly by hand, leave 10-20% of the ground exposed
Wood Fiber Cellulose (partly digested wood fibers)	Air dried, non-toxic and no growth inhibiting factors	25-40 lbs.	0.5 - 1.0 ton	Apply with hydro-mulcher
Gravel or Crushed Stone	Washed Size 1" to 2-½"	9 cu. yds.		Spread uniformly
Wood Chips	Free from coarse material	500 lbs. dry; to 900 lbs. wet	10 tons dry; to 20 tons wet	Spread uniformly at at a depth of 4"

*To be utilized with erosion control measures no's. 1 & 2 unless otherwise indicated.

EROSION CONTROL MEASURE NO. 5

JUTE, EXCELSIOR AND POLYPROPYLENE MATTING

General - A loosely woven netting of jute yarn, wood excelsior, or polypropylene placed on bare soil to minimize erosion during the establishment of vegetation. Netting shall be installed as indicated herein, and where indicated on the drawings or as directed by the Engineer.

Material - Jute mat shall be cloth of a uniform plain weave of undyed and unbleached single jute yarn, 48 inches in width plus or minus one inch and weighing an average of 1.2 pounds per linear yard of cloth with a tolerance of plus or minus five percent. The yarn should be of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one half its normal diameter.

Excelsior mat shall be wood excelsior, 48 inches in width plus or minus one inch, and weighing 0.8 pounds per square yard plus or minus 10 percent. The excelsior material should be covered with a netting to facilitate handling and to increase strength.

Polypropylene mat shall be a uniform 1" x 2" mesh of extruded and formed, UV green polypropylene, 48 inches in width and weighing .02 pounds per square yard plus or minus 10 percent.

Staples for anchoring soil stabilization shall be made of six to ten inch lengths of No. 8 plain iron wire.

Installation -

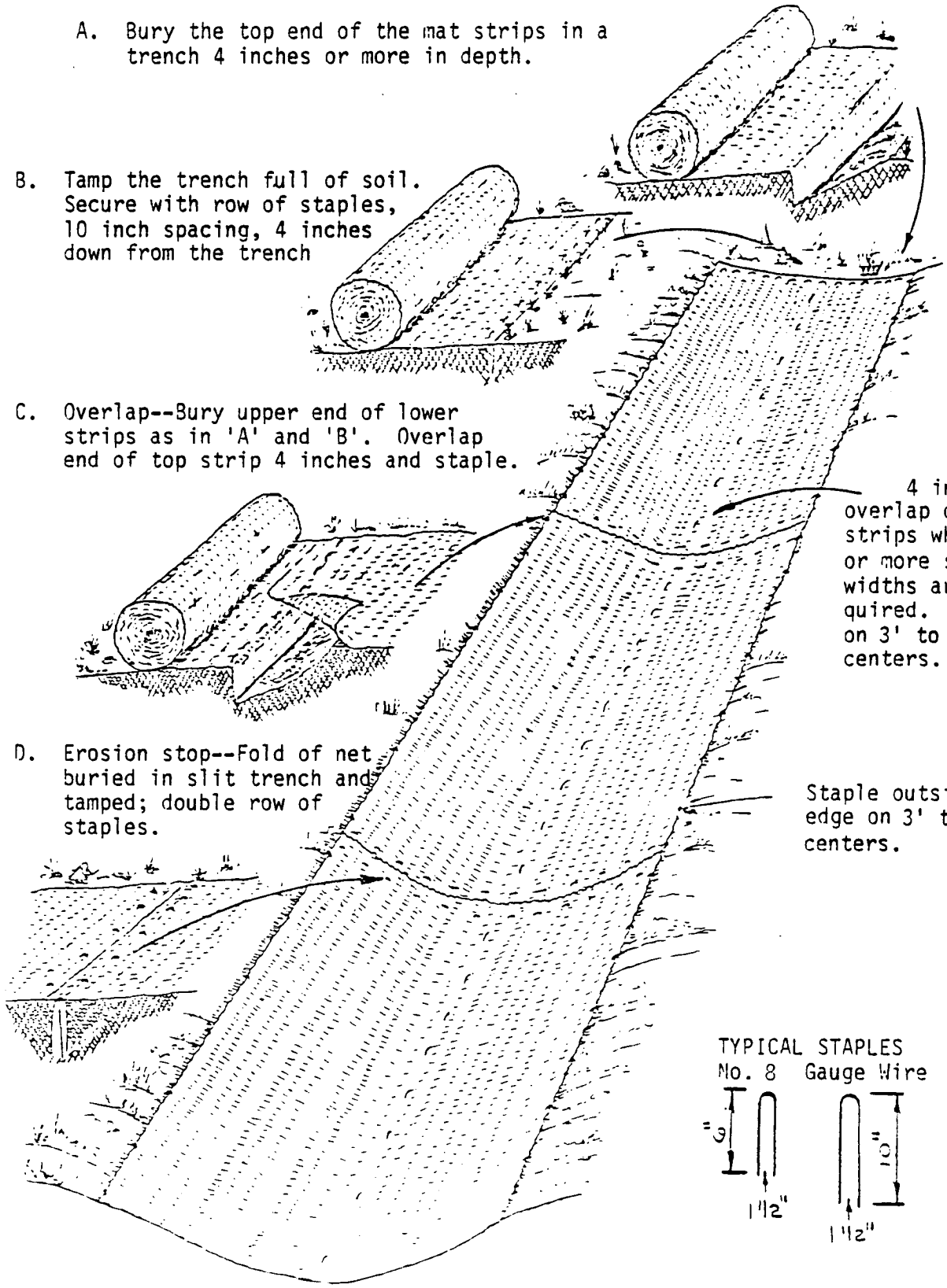
1. Site Preparation - Shape and grade the waterway, channel or area to be protected.

Remove rocks, clods greater than 1½ inches in diameter, sticks, and other material that will prevent contact of the mat with the soil surface.

2. Seeding - Lime, fertilize and seed the existing soil in accordance with the applicable seeding standard. Do Not Cultipack.

3. Laying the Matting - Start laying the matting from the top of the channel or slope, and unroll downgrade so that one edge of the strip coincides with the channel center. Lay a second strip parallel to the first on the other side of the channel and allow at least a two-inch overlap for jute matting. Excelsior matting may be butted. See attached sketches.

DETAIL FOR STABILIZING WATERWAYS WITH MATTING



NOTE: Similar for installation of matting on slopes.

4. Securing the Matting - Bury the top end of matting strips in a trench four inches or more deep. Tamp the trench full of soil. Reinforce with a row of staples driven through the mat about four inches downhill from the trench. These staples should be about 10 inches apart. Then staple the overlap in the center of then channel. These staples should be three to four feet apart. The outside edges may be stapled similarly at any time after the center has been stapled. Closer stapling along the sides is required where concentrated water may flow into the channel.

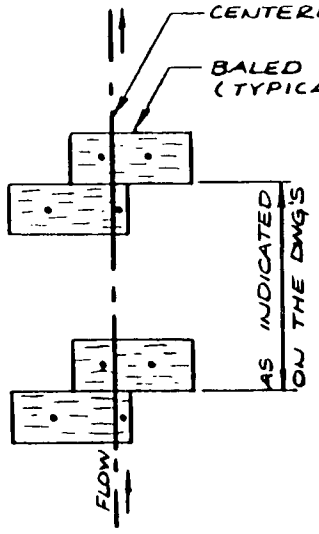
Succeeding strips of matting, farther down the channel or slope, are secured in a similar manner.

Where one roll of matting ends and another roll begins, the end of the top strip overlaps the trench where the upper end of the lower strip is buried. Make the overlap at least four inches and staple securely. Rolls of excelsior matting may be butted at the ends and securely stapled.

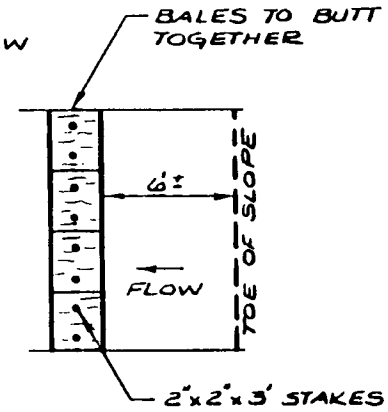
5. Erosion Stops - At any point matting may be folded for burying in silt trenches and secured as were the upper ends. This checks water flow and erosion that may begin under the matting. It also gives improved tie-down. The procedure is required on steep slopes of sandy soil and gentler slopes subject to seepage. Spacings vary from 25 to 100 feet.

6. Diversions - Where diversions outlet into a waterway, the outlet should be protected with matting used in the same manner as in the main channel. The matting for the outlet is laid first so that matting in the main channel will overlap the outlet strip.

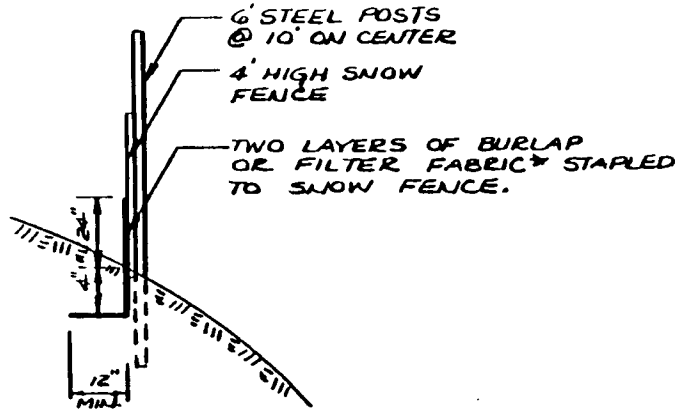
7. Matting Soil Contact - Induce contact between matting and soil by rolling, after laying, stapling and seeding is complete. Perfect contact is vital to keep waterflow over, not under the matting.



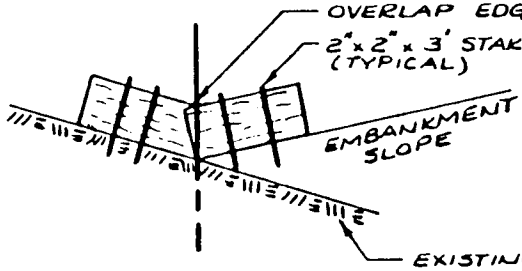
PLAN
NO SCALE



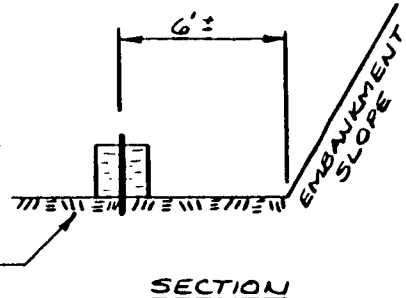
PLAN
NO SCALE



SECTION
NO SCALE
TYPE C



SECTION
NO SCALE
TYPE A



SECTION
NO SCALE
TYPE B

NOTE:

* FILTER FABRIC SHALL BE MIRAFI: 140 AS MANUFACTURED BY "CELANESE FIBERS MARKETING COMPANY." "DUPONT" EQUIVALENT OR APPROVED EQUAL.

NOTES

1) EROSION CHECKS SHALL BE INSTALLED AS INDICATED IN THE DETAILS SHOWN AND WHERE DESIGNATED ON THE DRAWINGS.
2) EROSION CHECKS SHALL REMAIN IN PLACE UNTIL PERMANENT EROSION CONTROL MEASURES HAVE BEEN ESTABLISHED AND ARE APPROVED BY THE ENGINEER.
3) CHECKS SHALL BE PERIODICALLY INSPECTED TO INSURE THEY ARE IN GOOD CONDITION AND THAT AN EXCESSIVE BUILD UP OF SILT AND DEBRIS HAS NOT OCCURRED.

DuBois & King Inc.
engineering and environmental services

EROSION CONTROL MEASURE NO 6

EROSION CHECKS (SILT BARRIERS)

SOMA	FEB '81
JRB	MISC.
JMR	E-1693
SPEC. S707	

S707-9

PROJECT CLOSEOUT

SECTION 799

	Title	Page
799.1	General	799-1
799.2	Substantial Completion	799-1
799.3	Final Inspection	799-3
799.4	Reinspection Costs	799-3
799.5	Deleted	799-3
799.6	Instruction	799-4
799.7	Evidence of Payments and Release of Liens	799-4
799.8	Final Application for Payment	799-4
799.9	Final Certificate	799-4
799.10	Post Construction Inspection	799-4

799.1 General. This section provides instructions to the Contractor, the Engineer, and the Owner in scheduling the sequence of events and requirements leading to final acceptance of the Project, and occupancy by the Owner; and the responsibilities of the respective parties.

799.2 Substantial Completion. The Contractor is advised that Substantial Completion must be attained at a reasonable time prior to the Contract Completion Date and attaining Final Completion. Generally, this shall be at least 45 to 60 days prior to the Contract Completion Date to allow for the Contractor to complete all punch list and outstanding work items and arrange for a final completion inspection by the Engineer and/or government agencies as appropriate.

The Contractor shall:

1. Submit written certification to the Engineer, that the Project or designated portion of the Project, is substantially complete.

2. Submit a written request for a Substantial Completion inspection by the Engineer.

The Engineer will make an inspection within ten days after receipt of certification, together with Owner's Representative.

Should the Engineer consider that Work is substantially complete:

1. The Engineer will prepare and issue a Certificate of Substantial Completion, containing:

   a. Effective date of Substantial Completion.

   b. Engineer's punch list of items to be completed or corrected.

   c. The time within which Contractor shall complete or correct work of listed items.

   d. Time and date Owner will assume possession of Work or designated portion thereof.

e. Responsibilities of Owner and Contractor for:

(1) Insurance.

(2) Utilities.

(3) Operation of mechanical, electrical and other systems.

(4) Maintenance and cleaning.

(5) Security.

(6) Warranties (list exceptions if any)

f. Signatures of:

(1) Engineer.

(2) Contractor.

(3) Owner.

2. For Owner occupancy of Project or Designated Portion of Project:

a. The Contractor shall:

(1) Perform final cleaning in accordance with Section 701.

(2) Furnish and fill all vessels that are required to be filled with the appropriate materials. The materials and method of filling shall be as recommended by the manufacturer and as approved by the Engineer. These vessels include, but are not limited to the following:

(a) Storage Tanks. (Chemicals, petroleum products, etc)

(b) Process Tanks.

(c) Fuel Tanks.

(d) Reservoirs.

(e) Lagoons.

(f) Barrels.

(g) Gas Cylinders.

b. The Owner will occupy the Project under provisions stated in the Certificate of Substantial Completion.

Should the Engineer consider that Work is not substantially complete:

1. He will promptly notify the Contractor in writing, stating the reasons.

2. The Contractor shall complete the Work, and send second written notice to the Engineer, certifying that the Project, or designated portion of the Project, is substantially complete and request reinspection.

3. The Engineer will reinspect the Work.

799.3 Final Inspection. The Contractor shall submit written certification that:

1. Work has been completed in accordance with Contract Documents.

2. Equipment and systems have been tested in presence of Owner's Representative and are fully operational.

3. Project is completed, and ready for final inspection.

The Engineer will make final inspection within ten days after receipt of the certification.

Should the Engineer consider that work is finally complete in accordance with requirements of the Contract Documents, he will request the Contractor to deliver Project Closeout submittals.

Should the Engineer consider that work is not finally complete:

1. He will notify the Contractor in writing, stating the reasons.

2. The Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that the Work is complete.

3. The Engineer will reinspect the Work.

799.4 Reinspection Costs. Should the Engineer be required to perform second inspections because of failure of Work to comply with original certifications of the Contractor, the Owner will compensate the Engineer for additional services, and deduct amount paid from final payment to the Contractor.

799.5 DELETED

799.6 Instruction. The Contractor shall instruct Owner's personnel in operation of all systems, mechanical, electrical and other equipment.

799.7 Evidence of Payments and Release of Liens. The Contractor shall submit:

1. Contractor's Affidavit of Payment of Debts and Claims.

2. Contractor's Affidavit indemnifying the Owner or Owner's agents harmless from all claims as stated in the General Conditions.

799.8 Final Application for Payment. The Contractor shall submit final application in accordance with requirements of General and Supplementary Conditions.

799.9 Final Certificate for Payment. The Engineer will issue final certificate in accordance with provisions of General Conditions.

799.10 Post-Construction Inspection. Prior to expiration of one year from Date of Substantial Completion, the Engineer will make visual inspection of Project in company with Owner and Contractor to determine whether correction of Work is required, in accordance with provisions of the General Conditions.

For Guarantees beyond one year, the Engineer will make inspections at request of the Owner after notification to the Contractor.

The Engineer will promptly notify the Contractor, in writing, of any observed deficiencies which shall be promptly corrected by the Contractor at his expense.

* * *

MEASUREMENT AND PAYMENT

SECTION 801

	Title	Page
801.1	General	801-1
801.2	Item 1 - Lowering the Lake & Handling All flow During Construction.	801-1
801.3	Item 2 - Excavation and Stockpile	801-2
801.4	Item 3 - Rock Excavation and Stockpile.	801-2
801.5	Item 4 - Earth Embankment	801-2
801.6	Item 5 - Select Borrow for Earth Embankment	801-3
801.7	Item 6 - Riprap, Stone, and Granular Embankment Materials.	801-3
801.8	Item 7 - Removal of Existing Outlet Pipes 4-36-inch CGMP and 1-22-inch steel pipe.	801-3
801.9	Item 8 - 36-inch Corrugated Galvanized Metal Pipe.	801-3
801.10	Item 9 - 30-inch Low-Level Outlet	801-3
801.11	Item 10 - Temporary Road	801-4
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801.13	Item 12 - Steel Beam Guard Rails.	801-4
801.14	Item 13 - Miscellaneous Reinforced Concrete	801-5
801.15	Item 14 - Miscellaneous Earth Excavation and Backfill.	801-5
801.16	Item 15 - Dry Hydrant Removal and Reinstallation.	801-5
801.17	Item 16 - Loaming and Seeding	801-5
801.18	Item 17 - Clean-up.	801-6
801.19	Item 18 - ADD ON - Cast Iron Sluice Gate 24" x 36"	801-6
801.20	Item 19 - Add-on Observation Wells.	801-6

801.1 General. The following sections describe the measurement of and the payment for work to be done under the respective items listed in the Proposal.

Each unit or lump sum price stated in the Proposal shall constitute full compensation for each completed Item of the work as indicated on the drawings and as specified.

801.2 Item 1 - Lowering the Lake and Handling All Flow During Construction. The lump sum price for this Item shall constitute full compensation for all pumping, sheeting, cofferdams, channels, flumes, drains, surveys and/or other temporary diversion and protective works necessary to lower the lake during the construction period and to handle and care for the flow of water from Silver Lake at the project site while reconstruction of the dam is in progress, all as specified.

801.3 Item 2 - Excavation and Stockpile. The quantity of material to be measured for payment under this Item shall be the actual number of cubic yards of earth excavated and stockpiled, measured in place before excavation. The unit price shall include the entire cost of excavating earth to the designated widths and depths as directed, segregating materials by loads, draining or drying suitable materials, transportation of materials to disposal areas and to temporary stockpile, removal of oversize materials from otherwise suitable materials, disposing of oversize materials if unsuitable or stockpiling if suitable for use in the permanent structure and disposal of excavated waste materials. The unit cost for this Item shall constitute full compensation for all labor, tools, equipment and materials necessary for the required work.

801.4 Item 3 - Rock Excavation and Stockpile. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Engineer, unless in the opinion of the Engineer, satisfactory measurement can be made in some other manner.

The quantity of rock to be paid for under this item shall be the number of cubic yards of rock measured in place before excavation within the limits of normal excavation as indicated on the drawings, unless rock excavation beyond such limits has been authorized by the Engineer in writing; in which case measurement shall be made to the authorized limits.

Excavated rock which has not been disposed of shall not be included for payment. Reinforced concrete, in excess of one cubic yard, is eligible for payment under this item. Other pavements and pavement bases shall not be measured for payment under this item.

The bidder shall include in his bid for other items involving excavation the cost of doing the entire excavation as earth. The price for this item being intended to cover the difference between the cost of rock excavation and the cost of earth excavation. The price for this item shall be paid in addition to that paid for earth excavation under other appropriate items.

The price for this item shall include compensation for rock excavation to the designated widths and depths as directed, segregating materials by loads, transportation of materials from the excavation site to points of final use, to disposal area onto temporary stockpile areas, removal of unsuitable materials and disposal of excavated waste materials.

801.5 Item 4 - Earth Embankment. The quantity of material to be measured for payment, under this item, shall be the actual number of cubic yards of material measured in place in the completed embankment to the lines, grades, slopes, and thicknesses shown on the drawings or as established by the Engineer/Owner. The cross-sections obtained by surveys made after completion of excavation for dam embankment foundation will be used in computing the quantity of embankment placed. No allowance will be made in measurement for payment for settlement, shrinkage, and consolidation of the foundation or of the material in the embankment. In measuring embankment for payment, the volume of structures, riprap, crushed stone bedding, granular filters, pipe bedding materials, and of other work for which items for payment are provided in the contract, will be deducted.

Payment under this item shall include the cost; of transportation from stockpile area to the embankment, preparing the embankment foundations, placing and compacting the material, supplementary wetting on the fill, if necessary, and any additional work required on the embankment to accomplish uniform moisture application, preparing bonding surfaces, and all other operations required to secure adequate bond between embankment in place and embankment to be placed.

Payment for this item will be in addition to payment made for excavation of the materials.

801.6 Item 5 - Select Borrow for Earth Embankment. The quantity of select borrow to be paid under this item shall be the number of cubic yards actually furnished, as ordered, measured inplace after compaction. The unit price for this item shall include compensation for furnishing and transporting the material. Placing and compacting the select borrow will be paid for under Item 4, Earth Embankment.

801.7 Item 6 - Rip-rap, Stone, and Granular Embankment Materials. The quantity of materials to be paid for under the subdivision of this item shall be the number of cubic yards actually placed, as ordered, measured in place after compaction. The unit prices for the subdivisions of this item shall include compensation for furnishing, transporting, placing, and compacting the materials.

Payment shall be made at the price per cubic yard for the following:

Item 6a - Bank-run sand and gravel filter layer.
Item 6b - Crushed stone bedding for rip-rap.
Item 6c - Dumped rip-rap.
Item 6d - Pipe bedding.

801.8 Item 7 - Removal of Existing Outlet Pipes, 4-36" CGMP and 1-22" Steel Pipe. The lump sum price for this item shall constitute full compensation for all labor, materials and equipment involved in removing the four 36-inch CGMP and the 22-inch steel pipe as indicated on the drawings and as directed. The bid shall include the cost of removal and disposal of the existing pipe outlets.

No excavation paid for under other items shall be included in the measurement for this item.

801.9 Item 8 - 36-inch Corrugated Galvanized Metal Pipe. The lump sum price for this item shall constitute full compensation for all labor, materials and equipment involved in furnishing, placing, and installing in place the 36-inch CGMP emergency spillway pipes, including all bedding preparation, and necessary connections to the existing structure as indicated on the drawings or as directed.

801.10 Item 9 - 30-inch Low Level Outlet. The lump sum price for this item shall constitute full compensation for all labor, materials, and equipment involved in furnishing, placing and installing in place the 30-inch diameter reinforced concrete pipe, including bedding preparation and all incidental work shown on drawings or as directed.

801.11 Item 10 - Temporary Road. The lump sum price for the temporary road shall constitute full compensation for all labor, tools, materials, and equipment necessary to construct and remove the temporary road as indicated on the drawings and as directed.

The bidder shall include in his bid the cost to construct the temporary road, maintain temporary road in safe working conditions throughout duration of the project, provide necessary means to control traffic, removal of temporary road upon completion of the project, and restoring affected areas to their existing condition, as indicated on the drawings and as specified.

801.12 Item 11 - Pavement Replacement. The quantity of pavement replaced shall be measured by the square yard of completed pavement. Limits of payment shall be as indicated on the contract drawings or as directed by Engineer.

The quantities of pavement measured shall be paid for at the unit prices per square yard for the appropriate subdivisions of this item, which prices shall constitute full compensation for furnishing all labor, materials, tools, and equiment necessary for replacing the pavements complete as specified.

Payment shall be made at the price per square yard for the following:

Item 11a - Bituminous concrete pavement replacement, 2 inches thick or greater

Item 11b - Bituminous concrete pavement replacement, less than 2 inches thick.

Item 11c - Temporary pavement replacement.

Pavement damaged or removed by the Contractor for his own convenience of operation or outside the construction limits shall not be measured for payment, but shall be replaced by the Contractor at his own expense.

801.13 Item 12 - Steel Beam Guardrails. The unit prices for the subdivisions of this item shall constitute full compensation for all labor, tools, materials, and equipment necessary to furnish and install and/or remove and reinstall steel beam guard rais as indicated on the drawings and as directed.

Payment shall be made at the unit price per linear foot for the following:

Item 12a - Furnish and install new steel beam guard rail.

Item 12b - Remove, stockpile, and reinstall existing steel beam guard.

Guard rail damage by the Contractor outside the construction limits shall not be measured for payment, but shall be replaced by the Contractor at his own expense.

801.14 Item 13 - Miscellaneous Reinforced Concrete - Class A Concrete Including Steel Reinforcement. The quantity of Class A concrete masonry including steel reinforcement to be measured for payment under this item shall be the actual amount of concrete placed to the neat lines as indicated on the drawings or as directed.

The unit price for the concrete masonry and reinforcement shall include compensation for furnishing and placing concrete, reinforcing, furnishing and placing concrete forms, all joints, finishing concrete for all concrete work indicated on drawings or as directed.

No payment will be made for concrete used to backfill unauthorized excavation.

801.15 Item 14 - Miscellaneous Earth Excavation and Backfill. Under this item the Contractor shall be paid for additional and miscellaneous earth excavation and backfill ordered by the Engineer. The unit price for this item shall include compensa- tion for the work of excavating and backfilling and all work incidental thereto, including drainage.

Miscellaneous earth excavation and backfill will include such items as excavation and backfill for test pits, test holes, existing rip-rap, removal of existing stone walls, and disposal of unsuitable material, all as directed by the Engineer. The unit price for this item shall include compensation for backfilling as required, with material from the excavation.

801.16 Item 15 - Dry Hydrant - Removal and Reinstallation. The lump sum price for this item shall constitute full compensation for all labor, materials, and equipment involved in removing the existing dry hydrant and 10-inch water line, properly store the hydrant, and then reinstall at the same location with new 10-inch ductile iron water pipe, as directed by the Engineer/Owner or as indicated by the drawings.

New dry hydrant installation shall be tested and approved before payment.

801.17 Item 16 - Loaming and Seeding. The quantity of loaming and seeding to be measured for payment under this item shall be measured in square yards of the work done within the prescribed limits indicated on the drawings and as specified.

The unit price for this item shall include compensation for placing loam to the required depth, furnishing additional loam as necessary, grading, fertilizing, seeding, and all work incidental to establishing a satisfactory growth of grass.

Loaming and seeding paid under other items shall not be measured for payment under this item.

801.18 Item 17 - Clean Up. The lump sum price for this item shall constitute full compensation for cleaning up all debris and construction materials not incorporated into the finished structures and removal of this debris and materials from the site of the work.

The price for this item shall include full compensation for furnishing all labor, materials, tools, and equipment necessary to accomplish all miscellaneous work necessary to restore to a condition equal to the original condition all portions of the site not designated for alteration and all public and private property that was damaged.

801.19 Item 18 - ADD-ON 24" x 36" Cast Iron Sluice Gate. The lump sum price for this item shall constitute full compensation for all labor, materials and equipment involved in furnishing, placing, installing and testing in place a 24" x 36" cast iron sluice gate, operator, and appurtenant work, as indicated on drawings or as specified.

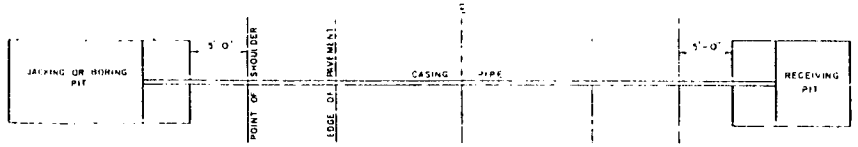
801.20 Item 19 - ADD-ON Observation Wells. The lump sum price for this item shall constitute full compensation for all labor, materials and equipment involved in furnishing, placing and installing two groundwater observation wells as indicated on the drawings and as specified.

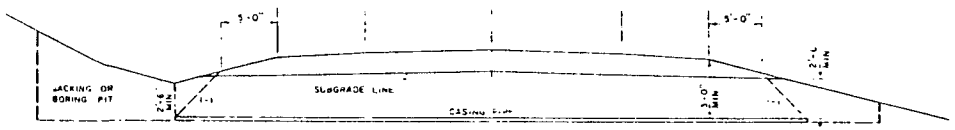
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STANDARD DETAILS

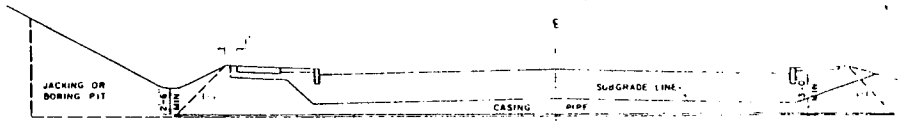
D-20	Highway Crossings for Underground Utilities
E-8	Typical Approach Signs Sheets 1 and 2
800-1	Sample Schedule

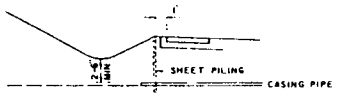
DETAIL 'A'
JACKING OR BORING
RURAL TYPICAL





DETAIL 'B'
JACKING OR BORING
URBAN TYPICAL



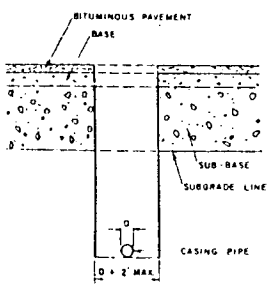


USING SHEET PILING

OPEN CUT AND PAVEMENT REPLACEMENT
APPLICABLE ONLY WHEN SPECIFICALLY AUTHORIZED BY HIGHWAY PERMIT

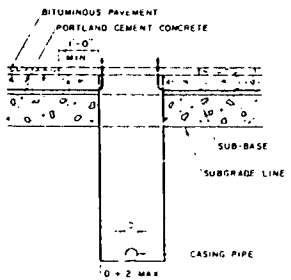
DETAIL 'C'
OPEN CUT WITH
BITUMINOUS CONCRETE PAVEMENT

BITUMINOUS TREATED BASE MATERIALS TO BE REPLACED WITH BITUMINOUS CONCRETE



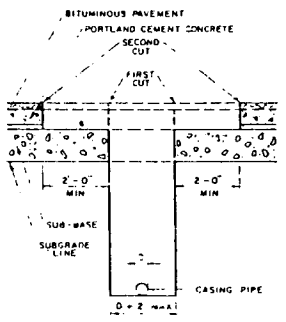
DETAIL 'D'
OPEN CUT WITH
PORTLAND CEMENT CONCRETE PAVEMENT

LONGITUDINAL STEEL TO BE CUT AND BENT BACK TO ALLOW FOR TRENCH EXCAVATION. REINFORCING BARS TO BE BENT BACK IN PLACE, SPLICED AND NEW CROSS REINFORCING STEEL TO BE TIED TO THE LONGITUDINAL BARS PRIOR TO REPLACING THE PORTLAND CEMENT CONCRETE



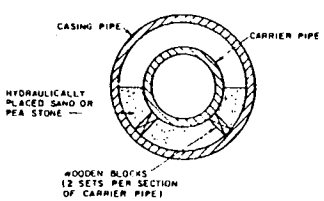
DETAIL 'E'
OPEN CUT WITH
PORTLAND CEMENT CONCRETE PAVEMENT

THE FIRST CUT WILL BE TO THE DESIRED WIDTH OF THE TRENCH. BACKFILL IS TO BE MADE TO THE ROAD SURFACE. THE SECOND CUT WILL THEN BE MADE AND ALL MATERIAL REMOVED TO THE BOTTOM ELEVATION OF THE CONCRETE SLAB. THE SUB-BASE WILL THEN BE RE-COMPACTED AND THE PORTLAND CEMENT CONCRETE REPLACED

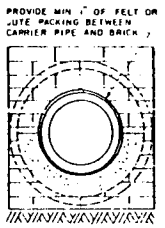


IN THE EVENT THAT AN ADJACENT TRANSVERSE JOINT IS LESS THAN FOUR FEET FROM THE FIRST CUT, THE PAVEMENT SHALL BE REMOVED TO THAT JOINT

DETAIL 'F'
CASING AND CARRIER PIPE



OTHER METHODS OF SUPPORTING THE CARRIER PIPE MAY BE USED WHEN APPROVED BY THE ENGINEER



WALL TO BE CONSTRUCTED AT ENDS OF CASING PIPE OR AS DIRECTED BY THE ENGINEER

CONSTRUCT WALL OF BRICK OR OTHER SUITABLE MATERIAL ON UNDISTURBED FOUNDATION

GENERAL NOTES

1 SHEET PILING MAY BE DRIVEN VERTICALLY FIVE (5) FEET OUTSIDE [illegible] POINT, OR ONE (1) FOOT BACK OF SIDEWALK, TO ALLOW FOR A SLOPE [illegible]

2 EARTH BACKFILL TO BE MADE IN SIX (6) INCH LIFTS AND COMPACTED [illegible] LESS THAN 95% MAX. DRY DENSITY

3 SEE DETAIL 'A' OR 'B' FOR DETERMINING SLEEVE LENGTH

4 IN THE EVENT THAT PERMISSION IS GRANTED TO CUT AN EXISTING [illegible] CEMENT CONCRETE OR BITUMINOUS PAVEMENT, ALL CUTS, IF PERMITTED, MADE WITH A SAW TO A MINIMUM DEPTH OF 11/2"

5 BITUMINOUS PAVEMENTS TO BE REPLACED WITH BITUMINOUS CONCRETE. [illegible] CEMENT CONCRETE AND SUB BASE TO BE REPLACED IN KIND. MATERIAL FOR SUBGRADE TO BE REPLACED WITH EXCAVATED MATERIAL OR AS DIRECTED BY HIGHWAY ENGINEER

6 SUB BASE TO BE REPLACED IN SIX (6) INCH COMPACTED LAYERS.

7 PORTLAND CEMENT CONCRETE PATCHES SHALL BE PROPERLY CURED [illegible] DAYS BEFORE BEING SUBJECTED TO TRAFFIC LOADS.

WHEN HIGH EARLY STRENGTH CEMENT IS USED, PROPER CURING [illegible] DAYS SHALL BE REQUIRED BEFORE BEING SUBJECTED TO TRAFFIC. [illegible] WHEN A HIGH STRENGTH, QUICK SETTING CONCRETE PATCHING [illegible] APPROVED IT SHALL BE PROPERLY CURED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS BEFORE BEING SUBJECTED TO TRAFFIC LOADS

REVISIONS AND CORRECTIONS

A. 1975 — CARRIER PIPE AND PORTLAND CEMENT NOTES REVISED

APPROVED

December 23, 1974
DATE

Elliot Richay
CHIEF ENGINEER

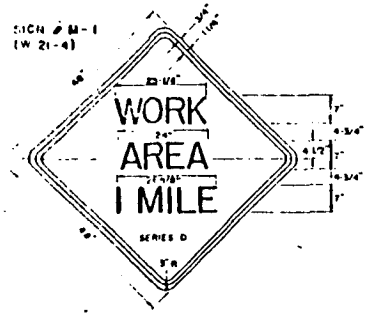
R O Munn
ASST. CHIEF ENGINEER

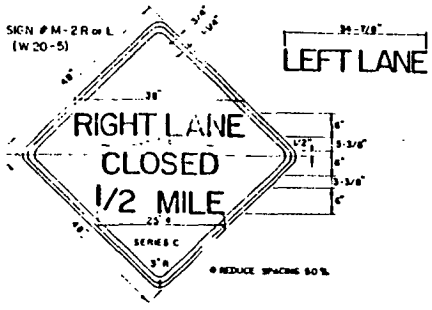
G. M. Lane
HIGHWAY ENGINEER

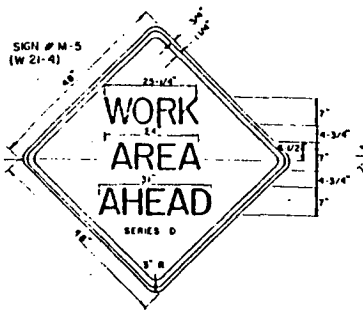
HIGHWAY CROSSINGS FOR UNDERGROUND UTILITIES

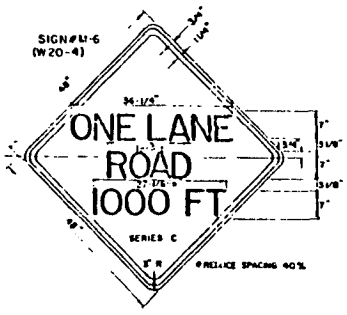
VERMONT DEPARTMENT OF HIGHWAYS STANDARD

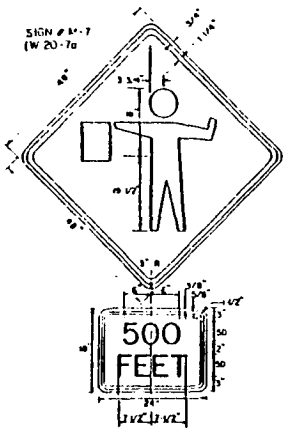
D-2

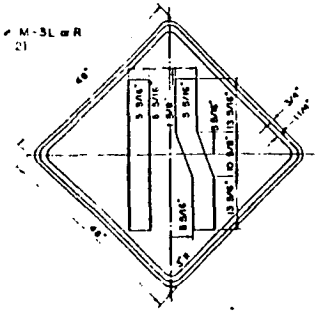


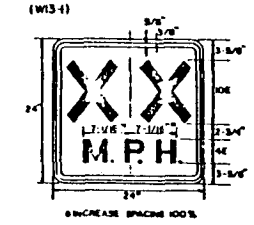


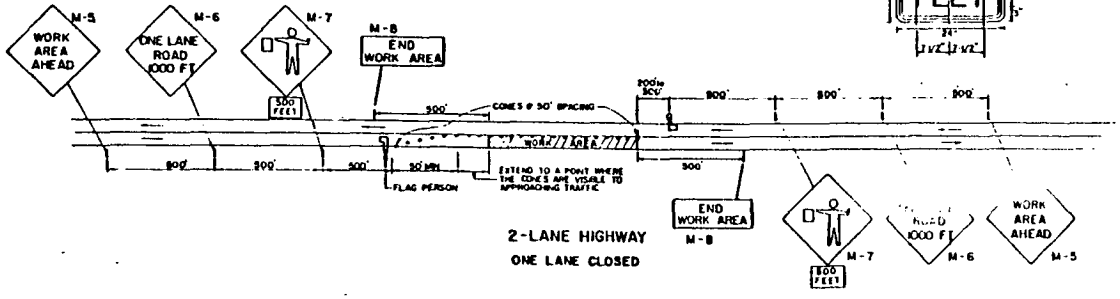




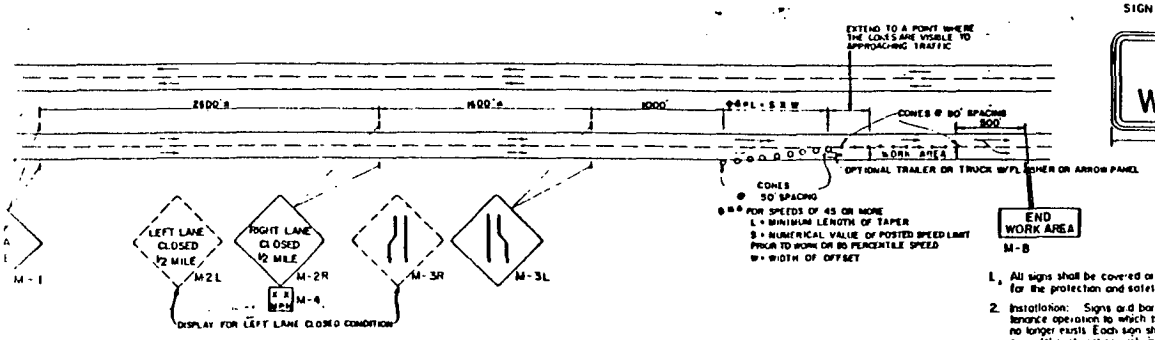








2-LANE HIGHWAY
ONE LANE CLOSED



4-LANE DIVIDED HIGHWAY
ONE LANE CLOSED



NOTES

1. All signs shall be covered or removed at the end of the working day unless required for the protection and safety of the traveling public.
2. Installation: Signs and barricades shall be in place prior to the start of the maintenance operation to which they apply and shall be removed promptly when the need no longer exists. Each sign shall be erected in a neat and workmanlike manner on wood or metal posts set securely in the ground, or on portable supports for temporary use, or on barricades when appropriate. As a general rule, roadside signs shall be 5 feet above road level with the nearest edge at least 6 feet outside the shoulder point. The installation of all signs and barricades shall be subject to the approval of the Engineer.
3. Numbers in parenthesis indicate M.U.T.C.D. sign designations.
4. "ROAD WORK" or "BRIDGE WORK" may be substituted as the appropriate legend for signs # M-1 or M-5.

Reflectorization
All reflectorized material shall consist of encapsulated lens reflective sheeting.
The text and borders may be screened, lettering film, or hand painted.
Cones used for traffic control at night shall have a minimum 6" wide reflectorized material.

Colors
The warning signs shown on this sheet shall have black text, border, and symbols on a reflectorized orange background. The orange shall conform with the standard colors adopted by the American Association of State Highway and Transportation Officials and approved by the US Department of Transportation Federal Highway Administration.

Text Design
Letters, digits, spacing, and text dimensions shall conform with the standard alphabets and designs prescribed in the manual on Uniform Traffic Control Devices.

Specifications
Warning signs shall meet the standard state specifications for traffic signs.

Sign Base Material:
The sign base material used for the warning signs on this sheet may be of any of the following, with minimum thickness as noted:

Flat sheet aluminum	0.125	Inches
High density overlayed plywood	3/4	Inches
Galvanized sheet steel	12	Gage

5. On town, city and incorporated village highway systems the minimum number of signs is as follows:
MINIMUM NUMBER OF SIGNS REQUIRED ARE M-8 AND M-7
MINIMUM SIZE OF THE SIGNS SHALL BE 36" x 36"
THE SIGN SIZE REDUCTION IS FOR DAYTIME MAINTENANCE OPERATIONS OF SHORT DURATION

VISIONS & CORRECTIONS
ADDED UNDER DIRECTION OF FEDERAL
ADMINISTRATION
FLECTIVE MATERIAL CHANGE.
ECTIVE MATERIAL NOTE CHANGED
S REFERENCED TO NUMBERS IN M.U.T.C.D.
E NUMBERS.
PERSONS SIGN CHANGED TO SYMBOL
ADDED FOR REVISED NUMBER AND SIZE OF SIGNS
ADDED FOR REVISED SIGN PER FHWA
AREA" LEGEND AND NOTES ADDED, GENERAL SIGN
NS

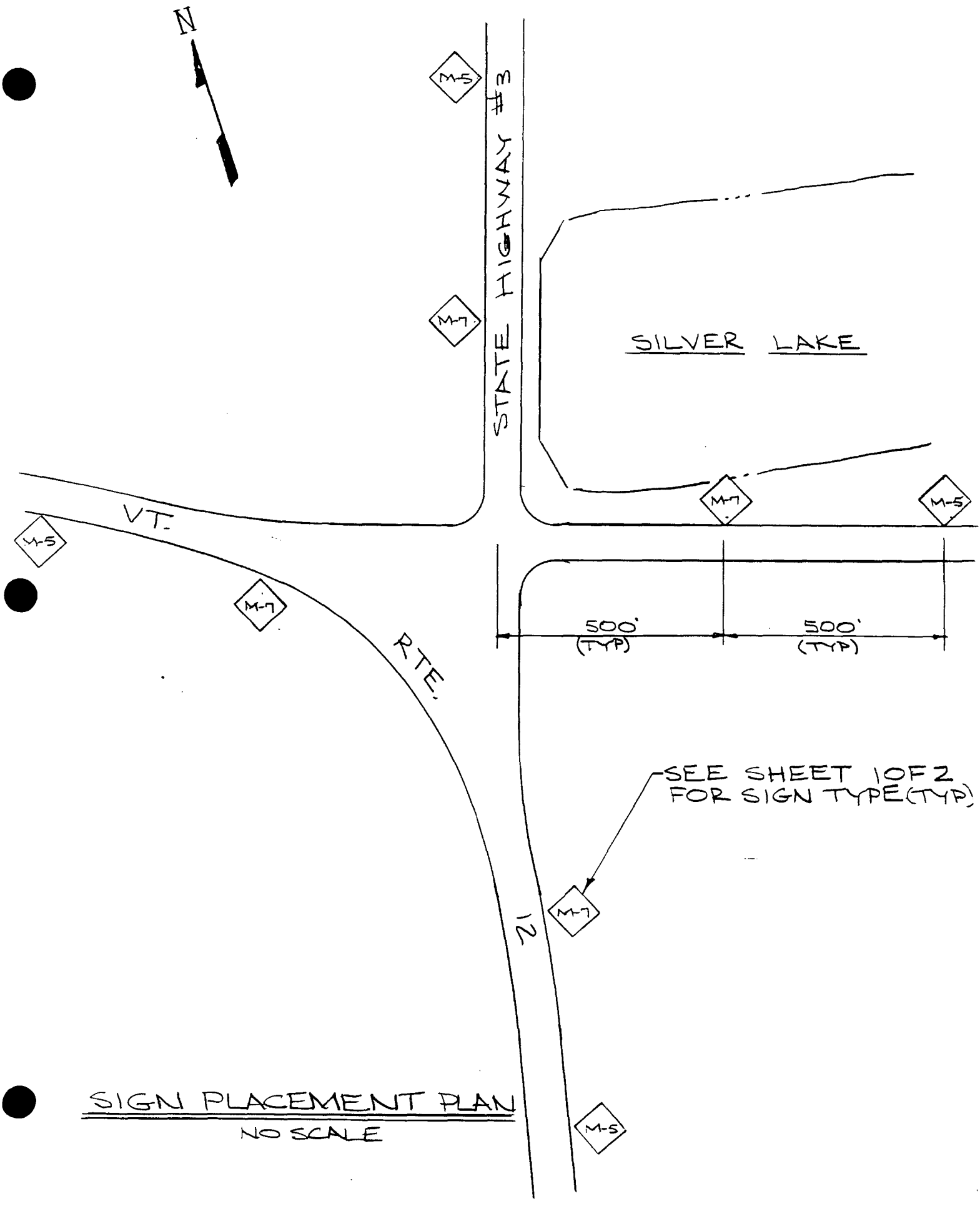
APPROVED: Jan. 26, 1972
DATE
CHIEF ENGINEER
ASST. CHIEF ENGINEER
HIGHWAY ENGINEER

TYPICAL MAJOR MAINTENANCE OPERATION
(BRIDGE AND ROADWAY) APPROACH SIGNS

VERMONT AGENCY OF TRANSPORTATION

STANDARD E-2

SHT. 1 OF 2



SIGN PLACEMENT PLAN

NO SCALE

PROJECT: (NAME AND DESCRIPTION) FERNDALE, W.W.T.F.

CONTRACTOR: L. D. SWETT, INC.

ITEM NO.	ITEM DESCRIPTION	SCHEDULE VALUE	YEAR 1977 SEPT.	OCT.	NOV.	DEC.
	SITE WORK					
1	CLEARING & GRUBBING	1000	0 — 100			
2	PAVEMENT	500				
3	FENCING	700				
4	LOAMING & SEEDING	300				
5	LANDSCAPING	500				
6	ETC.					
	CONTROL BUILDING					
7	CONCRETE	4000		0 — 100		
8	BLOCK MASONRY	2000				
9	BRICK MASONRY	2000				100
10	STAIRS	500				0
11	DOORS AND WINDOWS	1000				
12	ROOFING	2000			0 — 100	100
13	ELECTRICAL	1000		0 — 15		15
14	PLUMBING	500		0 — 10		
15	VENTILATING	300				
16	HEATING	400				
17	ETC.	100				
	PROCESS TANKS					
18	CONCRETE	1000		0	— 75	
19	RAILINGS	800				
20	GRATING	300				
21	ETC.	200				
	TOTAL	19100				
ANTICIPATED MONTHLY VALUE OF WORK			1000	3400	2950	1950
ACCUMULATED MONTHLY VALUE OF WORK			1000	4400	7350	9300
ACCUMULATED SCHEDULED PROGRESS %			5.1	23.0	38.5	48.7
NET PAYMENTS DUE			900	3060	2655	1755

PERCENT COMPLETE AT THE START AND FINISH OF ACTIVITY PERIOD.

REMARKS: RETAINAGE ASSUMED AT 10 %

DuBois & King Inc.
engineering and environmental services
RANDOLPH, VERMONT / CONCORD, NEW HAMPSHIRE

SAMPLE SCHEDULE

DRAWN BY	DATE
RLB	3/76
CHECKED BY	PROJ. NO.
JHW	MISC
PROJ. ENG.	DRWG. NO.
LP	800-1

STANDARD DETAIL