WALKER RESERVOIR DAM

VERNON, CONNECTICUT

#14616

INSPECTION REPORT

PREPARED FOR:

TOWN OF VERNON

JUNE 1998

KARL F. ACIMOVIC, P.E. & L.S.
CONSULTING ENGINEER
588 STONEHOUSE ROAD
COVENTRY, CONNECTICUT 06238

WALKER RESERVOIR DAM

VERNON, CONNECTICUT

#14616

JUNE 1998

KARL F. ACIMOVIC, P.E. & L.S.

CONSULTING ENGINEER

588 Stonehouse Road • Coventry, CT 06238-3138 • TEL (860) 742-9019 • FAX (860) 742-9019

June 29, 1998

Mr. Bruce Dinnie, Director
Vernon Parks and Recreation
120 South Street
Vernon, Connecticut 06066

Re: Engineering Inspection
Walker Reservoir Dam / DEP #14616
Vernon

Dear Mr. Dinnie:

The following report on the inspection of Walker Reservoir Dam contains details of its condition and makes recommendations for improvements and modifications. It is in generally poor to fair overall condition, requiring significant modifications and improvements. Three copies are provided; should you require additional copies, please let me know.

The most severe and immediate problems noted in the inspection comments include a poorly defined and deteriorating spillway, stumps from trees which were recently cut from the embankments, the poor structural condition of portions of the downstream embankment stone wall, seepage along the downstream toe for almost the entire length of the embankment wall, the inadequate spillway capacity for a design storm of 100-year recurrence interval, the poor condition of the low level intake and outlet pipes, the unrestricted and unsafe public access to the site and the lack of a vehicular access for routine maintenance. There are also signs of occasional overtopping, as evidenced by the erosion problems adjacent to the spillway. As with most other dams of this age and construction type, these problems appear to have been present for some time.

The dam does not appear to be in immediate danger of rapid failure; however, a significant storm could overflow the top of the embankment adjacent to the spillway and continue to erode the crest. This could lead to the transport of sediment from embankment soil materials to downstream locations and, by draining the pond, possibly lead to a loss of a significant amount of storm water storage and the recreational use of the area. Because of these potential problems, I would recommend that improvements and modifications be designed for a minimum storm return frequency of 100 years.

Although alternatives were considered, the following recommendations are essential to any repairs, improvements and modifications. Any actions taken with regard to improvements should take into consideration the aesthetic appearance of the site and its features and be in conformity with any historical aspects unique to the locality. This can be accomplished through historical research and input from the local community. In addition, it is important to note that the existing boundary lines of the Town's property are very close to the dam. On the east end, the line corner is directly at the abutment and stone wall. More importantly, however, the property line on the downstream side of the dam is directly at the face of the vertical stone wall; i.e., the Town does not own the toe area of the dam.

Recommendations for the existing site as well as future modifications have been shown on the attached sketch and include the following items:

(1) **Remove Additional Trees** - At the left and right abutment areas, there are trees close to the walls and embankments. The recommended separating distance from tree growth to any portion of the dam, toe or other embankment areas ranges from 20 to 30 feet. Because of extensive and shallow root growth of the trees in this area, I would recommend 30 feet.

(2) **Rebuild the Spillway And Increase Existing Spillway Capacity** - The existing spillway is in very poor condition and passes little of the normal flows across the top of its surface. As detailed in the inspection report and shown in the photos, normal flows pass beneath the stone masonry apron and through the downstream stone wall eroding any soil or small stone binder which may have filled the present void areas. Together with these problems, the hydrologic and hydraulic information available from the Town's Storm Water Management Plan (prepared by SEA Consultants, Inc.) indicates that the existing spillway capacity - prior to overtopping of the dam - is woefully inadequate. Because of the irregular elevations along the dam's crest, the capacity of the spillway prior to overtopping is less than 10% of the flow predicted for the 100-year storm (the design storm). In addition, the embankment appears to have overtopped several times in the recent past. [*See the following section on the storm water management for additional details.*] Prior to any final design, I would recommend a detailed analysis and in-depth review of existing hydrologic and hydraulic data to establish more precise elevations and flows. Based on that analysis, more specific parameters for the size of the spillway can be established. Preliminary indications are that a reconstructed spillway would be either 80 feet long and 5 feet high, or 60 feet long and 6 feet high to pass the 100-year storm. The heights include about one foot of freeboard.

Together with a new spillway, I would highly recommend a bridge over the top of the spillway between the training walls to allow for the passage of a small vehicle (approximately a 10-ton capacity) for future maintenance. In addition, this bridge would serve to guide and channel pedestrian traffic across the dam in a safe and non-hazardous way. Based on the length, it would probably be more economical to have a double span with a central pier; this would mean either two 40-foot spans or two 30-foot spans according to the above recommendations.

If aesthetics are important to the location, alternates here could include the use of form liners to give a stone masonry appearance or using actual stone facing after concrete has been installed. Along with new concrete training walls (i.e., walls along the

side of the spillway channel), I would also recommend the installation of a new upstream cutoff wall. This would serve to cut off direct flow below the spillway that could seep out of the downstream face. Spillway reconstruction would also include downstream channel modifications, namely widening and placement of riprap in the new channel section.

(3) **New Intake / Outlet Structure** - The existing intake pipe, outlet structure and low level outlet pipe are in relatively poor, inaccessible and unmaintained condition. They are inadequate and need to be replaced with a new intake chamber and low level outlet pipe. This structure should be in an accessible upstream location, attached directly to the spillway training wall. It would be simple in design, with an upstream trash rack and weir board slots at the intake and a sluice gate with a stem that could be operated from the top of the structure. Along with the construction of both this outlet and the spillway, new safety railing and / or fencing would also be installed along the edges of the structure and along the spillway training walls.

(4) **Embankment Reconstruction and Toe Drain Installation** - Because of the poor embankment conditions, the stumps, brush and other vegetation should be removed no matter what action is taken for future improvements. Until such improvements are initiated, regular maintenance should include mowing or weed removal of the embankments at least twice a year so that the condition of the dam can continue to be monitored. Placement of impervious material on the upstream slope connecting with the newly proposed cutoff walls at the new spillway, along with riprap protection, is highly recommended; this slope should be a minimum of 2H:1V.

For the downstream side, although the wall appears in apparently good condition, it is sitting on a saturated soil base, has many capstones missing and has numerous voids along the wall where soil has slowly washed out over the years. I would recommend construction of a new earth embankment composed of a pervious gravel material to achieve a 3H:1V (loamed and seeded) grass slope. This slope material and grade would increase the factor of safety for stability of the dam and greatly facilitate maintenance at the site. To the greatest extent possible, the stone wall would be salvaged and the stones reused as both upstream embankment and downstream channel riprap. New toe drains must also be installed both to prevent seepage through the toe area and to maintain unsaturated conditions along the new slopes and abutment areas.

(5) **Site Ownership and Access** - As previously noted, the Town does not own the toe area below the vertical downstream wall. In order to carry out the recommendations noted above, a parcel of land must be acquired, sufficient in size to provide for the improvements and to allow for future maintenance. The acquisition costs have not been included in the following construction cost estimate.

Other than a pedestrian hiking trail, there is no vehicular access from Reservoir Road to carry out routine maintenance at this site. There is a potential approach at the westerly abutment, but it would necessitate construction of an access road (approximately 15 feet wide) for a distance of about 400 feet from Reservoir Road. Although it is not included in the estimate of construction cost, I feel it is essential for maintenance of the existing as well as the recommended facility.

(5) **Storm Water Management / Hydrology & Hydraulics** - Because of its position in the upper reaches of the Tankerhoosen River watershed, this reservoir area presents a good potential for storm water storage. In the storm water management plan prepared by SEA Consultants, Inc. in 1989 and 1990, the reservoir was identified as a potential storm water impoundment area. The following are some important facts concerning the dam, impoundment and watershed area used in the evaluation of the area's potential to retard and control excessive flows.

Watershed Area:	2.8 square miles
Watershed Characteristics:	A mixture of residential (mostly south of I-84) and commercial and industrial areas (mostly north of I-84).
Time of Concentration:	1.35 Hr.
100-Year Outflow (SCS TR-20 Program):	1959 cfs
Impoundment (Reservoir) Area: [At spillway crest elevation]	24.8 Acres (Both East & West ponds)
Spillway Crest Elevation (Existing & Proposed):	501
Embankment Low Point / High Point (Existing):	502 / 504
Top of Embankment (Proposed):	507
Elevation vs. Storage Curve:	[See attached diagram.]
Elevation vs. Outflow Curve: [Proposed 60-foot wide spillway, 6 ft. high]	[See attached diagram.]

As can be noted from the attached diagrams, the newly proposed dam configuration (using a 60-foot wide spillway, 6 feet high) will provide for a significant increase in the storage of storm water flows. At the present time, the 100-year storm level is at 504.3 ft. and provides for about 95 ac.-ft. of storage, while basically overtopping the entire length of the dam. By raising the top of the embankment to 507 feet and maintaining the existing water surface elevation, the storage increases by an additional 57 ac.-ft. for the new 100-year level (one foot of freeboard) and by an additional 90 ac.-ft. to the new top of the dam for events greater than the 100-year storm. Two items should, however, be noted. First, by changing the configuration of the dam, the new 100-year outflow will change (i.e., decrease); for ease of comparison, the existing flow has been used as an approximation. Secondly, the present 100-year water surface elevation just floods Reservoir Road, whose high point is also 504.3. The newly raised embankment may create flooding over the present road for a lesser frequency storm (e.g., a 50-year event). This will necessitate either closing of the road during extreme storm events, or raising the road and installing a new culvert to avoid flooding. As previously mentioned, I would recommend a more in-depth analysis to refine these numbers.

A preliminary construction cost estimate for the work noted above would be in the range of $460,000., not including any property acquisition costs, access road construction or raising Reservoir Road and installing a new culvert. Adding about 20% for engineering and inspection and about 15% at this stage for contingencies, brings the total to about $598,000. Water would have to be lowered during the construction period, which I would estimate at approximately six months - depending upon time of year.

Prices are based on recent projects of a similar nature; actual cost to you could be reduced by performing some of the work with your own forces and making use of some of the existing materials from removals - namely stone.

Should you be interested in meeting to discuss this report or its recommendations or if you have any questions or concerns about any of the findings, please contact me at your convenience.

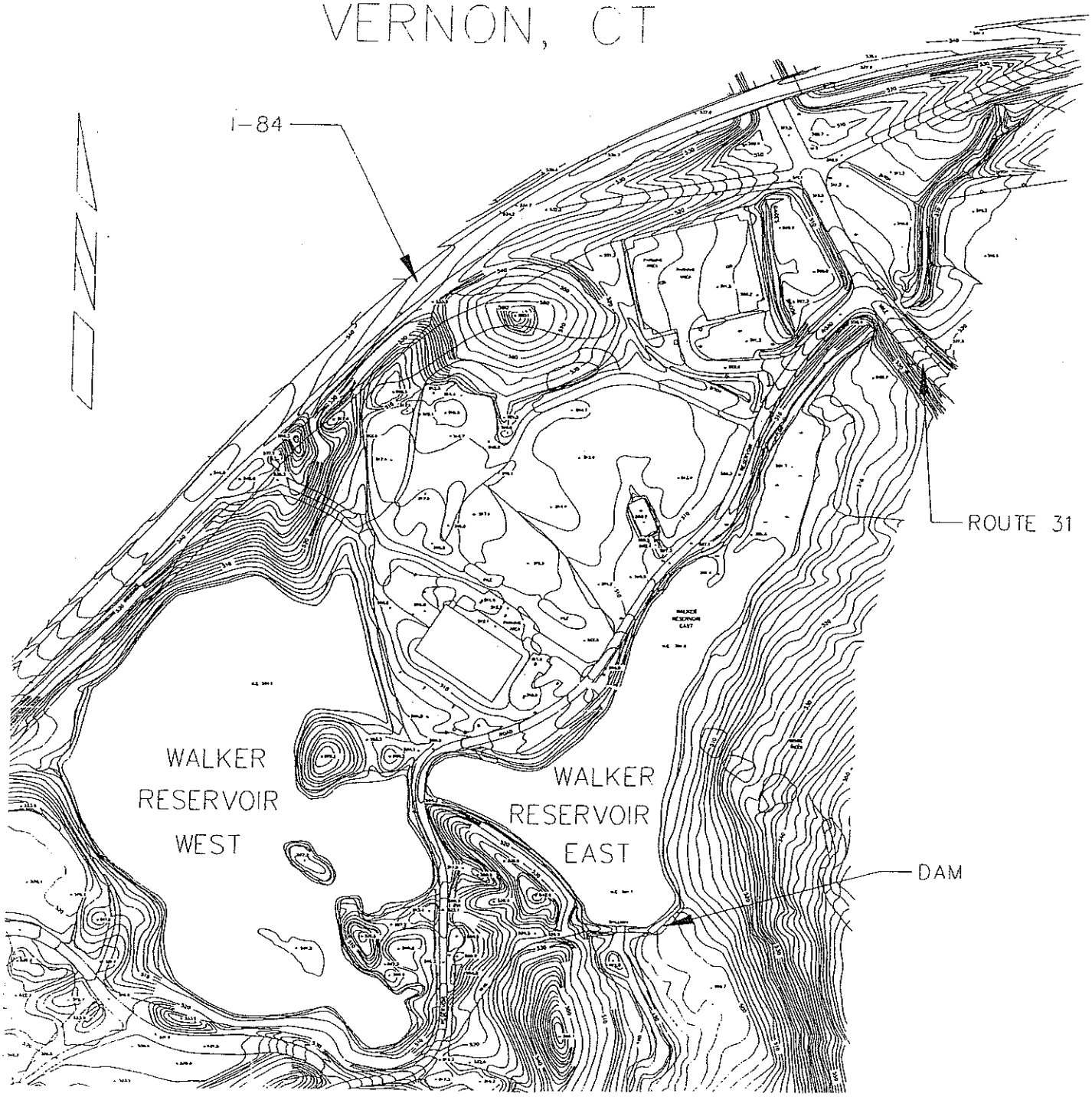
Sincerely yours,

Karl F. Acimovic

Karl F. Acimovic, P.E. & L.S.

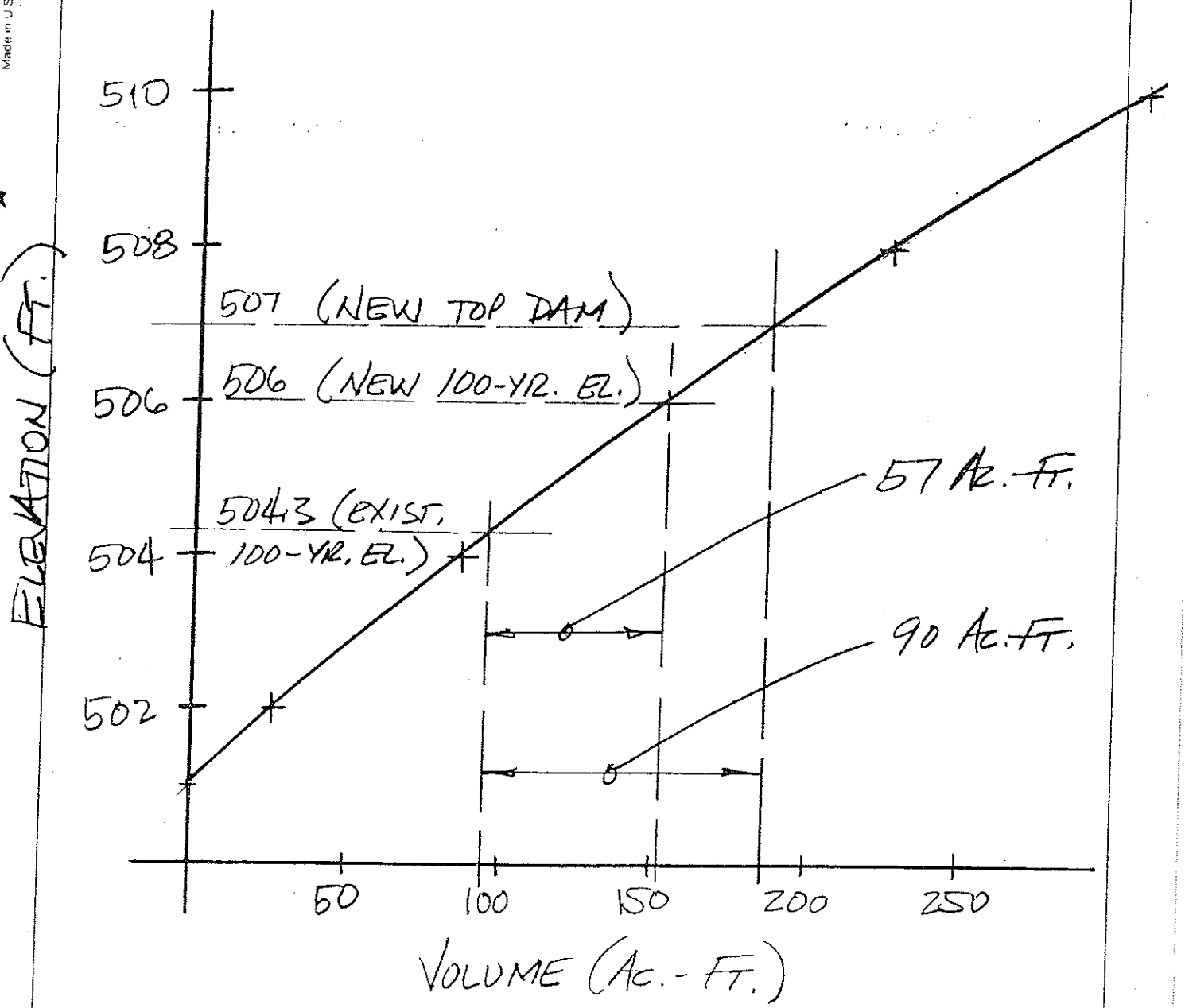
enclosures

WALKER RESERVOIR DAM
VERNON, CT



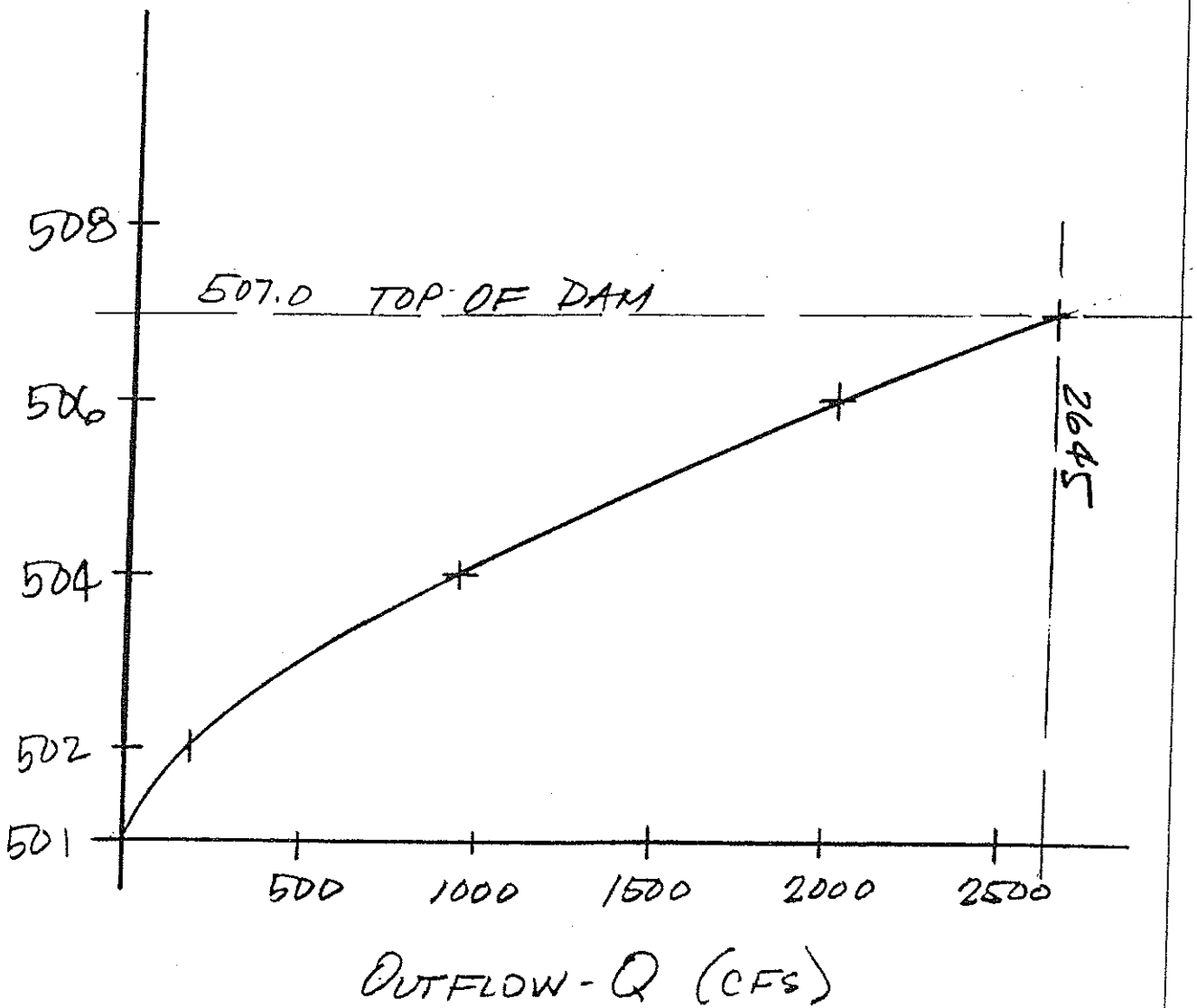
Scale 1" = 40'

ELEVATION Vs. STORAGE



ELEVATION VS. OUTFLOW

(BASED ON $Q = CLH^{1.5}$, WHERE $C = 3.0$ AND $L = 60'$)



INSPECTION REPORT

DEP / INLAND WATER RESOURCES DIVISION

INSPECTION CHECK LIST

DAM NAME & NUMBER:	Walker Reservoir Dam / #14616
INSPECTION DATES:	March 24, 1998 (Including diving inspection)
IMPOUNDMENT AREA:	Walker Reservoir
POOL LEVEL:	1.5 inches above spillway crest Flow ≈ 5-10 cfs on 3-24-98 (incl. flow through stones)
WEATHER CONDITIONS:	Clear, Sunny
INSPECTOR(S):	Karl Acimovic
ACTION TAKEN:	

DAM / EMBANKMENTS The dam consists of a combination earth embankment on the upstream side and stone masonry wall on the downstream side (see photos). The crest area and upstream slopes are covered by unmaintained grass and brush, with stumps from recently cut trees covering the top of the dam. A pedestrian / hiking path crosses the top center line of the dam. The downstream toe is covered with trees, brush and forest litter.

GENERAL CONDITION: Fair - Based upon the condition of the embankment, walls and downstream toe areas which are covered with various vegetative types, walls that have voids and missing stones and a toe area saturated with high ground water and seepage.

VEGETATIVE COVER: The grass and brush growth on top of the dam is generally uncontrolled and not maintained. Trees have been recently cut, but stumps are still prevalent. The path across the crest is down to barren soil in many locations and there are eroded areas devoid of cover on each side of the spillway. Additional trees need to be cut along the abutment areas (particularly the left) and the downstream toe. Specifically, all trees within 25 feet to 30 feet within toe of

slope or end of dam areas where the crest meets the abutment need to be cut and stumps need to be removed.

EROSION / BURROWS: Erosion is evident in several areas, although none appears to have resulted in any significant earth movement or sliding. The most visible and damaging effect appears to be adjacent to and beneath the existing spillway and its training walls, where soil materials and small stones have eroded and been transported to downstream locations. Only large stones remain for the primary spillway flow area and the training wall area on both sides (see photos). Some additional small areas were also apparent on the upstream slopes, most likely due to wave action during storms. No animal burrows were visible during this inspection.

SETTLEMENT / ALIGNMENT / MOVEMENT:

There are no apparent signs of movement or alignment problems. The downstream stone masonry wall shows no signs of alignment deviation or movement, other than capstones which have dropped to the base of the dam. Rotting stumps may, however, present a problem in the future; as they deteriorate, depressions will be left and some settlement may occur.

SEEPAGE / FOUNDATION DRAINAGE:

Having observed the dam at varying water levels, it is evident that seepage and high ground water conditions are prevalent directly along the base of the dam (see attached photos). There are extensive areas along both sides of the spillway discharge channel, particularly along the left side where the toe area is wet for almost the entire length of the wall base. The source of the water may be from two sources, ground water from the adjacent abutment areas and most likely seepage beneath and through the dam. Seepage through the dam is most dominant near the spillway because of the soil materials eroded out between the stones. It is, however, also conspicuous within the low level outlet pipe where flow is entering one of the joints from within the embankment. Other than the spillway and low level outlet area, most of the flow is of a low velocity.

RIPRAP: No riprap was used on the embankment.

STONE MASONRY: Stone masonry (dry) was used for the vertical downstream wall of the embankment. The walls appear in generally fair condition, but

have many open voids behind exposed stones and capstones are missing and having fallen to the base of the wall in many locations.

CONCRETE CONDITION:

There is no concrete on the main embankment of the dam.

CRACKS: Not applicable.

OTHER:

SPILLWAY / TRAINING WALLS / APRON

Primary Spillway - The spillway and apron consist of large open stone masonry, collapsed and settled to some extent by erosion and loss of soil or smaller stone that may have originally bound them together. There is no evidence that these stones were mortared. Training walls consist of the same stone, lying along a shallow rising slope on each side. Other than under storm conditions, low flow passes completely through and underneath the stones, discharging through the wall below the downstream crest. The spillway is not well defined, has no standard width and allows flows to pass onto the earth embankment of the dam during significant storm events.

Secondary Spillway - None

GENERAL CONDITION: Poor to fair, based upon the condition of the stone apron and training walls, and the fact that the larger stones have not collapsed. A better rating could not be achieved due to erosion around the training wall areas and the fact that it is poorly defined.

SETTLEMENT / ALIGNMENT / MOVEMENT:

As noted above, settlement of stone masonry is apparent along the entire spillway. There is, however, no major alignment or movement of the entire structure in this area.

STONE MASONRY: Although already discussed above, the stone masonry spillway is in poor condition. The stone itself is durable, but has settled out due to erosion of materials in the joints. At this point I do not

foresee any major movement of the larger stone other than during significant storm events. However, the slow erosive process will eventually continue to wash out material within the embankment beneath and around the spillway - leading to a lower crest elevation and loss of wetlands and water surface area (i.e., the water level will drop).

CONCRETE CONDITION:

Not applicable; there is no concrete used here.

CRACKS: Not applicable.

SCOURING / UNDERMINING:

As noted above, there is significant scouring and undermining of apron and capstones - see also the attached photos.

OTHER:

DOWNSTREAM CHANNEL

The channel downstream of the spillway consists of a natural stream with small rocks and gravelly soil materials. It meanders through a fairly level wetland area with no deeply defined channel boundaries. During periods of high flow, it is evident that flow spreads over a wide area.

SCOURING: There is no sign of washout, scouring or undermining in the downstream spillway channel. There is deep area at the base of the spillway, but it does not represent a stability problem at this time.

DEBRIS: The channel has a moderate amount of debris, but it does not represent an impediment to flow at this time. The channel should be inspected and significant debris removed on a regular basis during routine maintenance.

RIPRAP: There is no riprap for this channel.

EMERGENCY SPILLWAY

There is no emergency spillway at this site.

CONCRETE CONDITION:	N/A
STONE MASONRY:	N/A
VEGETATIVE COVER:	N/A
RIPRAP:	N/A
OTHER:	N/A

INTAKE STRUCTURE(S)

The intake structure for the low level outlet consists of an 18-inch corrugated metal pipe situated about 21.5 feet upstream of the manhole cover for the sluice gate (which is itself located near the water's edge of the upstream embankment). It was located during the diving inspection and found to be almost completely filled with hard packed gravel materials; only 8 inches was open below the top inside of the pipe. The top of the pipe was approximately 72.5 inches below the water level on the day of the inspection. A large 24-inch wide stone was also found to be obstructing the upstream entrance. Very little of the pipe's condition could be ascertained from the small amount showing.

A gate chamber was found on the upstream end of the embankment with a Town of Vernon Sewer manhole cover. The chamber was completely filled with water and, due to turbidity, very little was visible beyond an open frame approximately 29 inches from the top of the manhole. The frame was apparently installed to avoid vandalism with the gate mechanism; however, because of its inaccessibility, the gate is now inoperable. No attempt was made during this inspection to operate the gate or further open the chamber for fear of not being able to close it. As seen from the downstream end, the gate is apparently circular to match the pipe. From water level to the base of the gate structure is about 62 inches.

GENERAL CONDITION: Poor - The pipe is relatively inaccessible and has not been maintained, probably due to its submerged location.

CONCRETE CONDITION:

Not applicable.

SETTLEMENT / ALIGNMENT / MOVEMENT:

None observable due to inaccessibility. At the end of the pipe, although the inside was filled with soil materials, the diver found no apparent sign of collapse, settlement, or other movement of either the pipe or the surrounding slope.

STONE MASONRY: Not applicable.

CRACKS: Not applicable.

OTHER:

OUTLET STRUCTURE The outlet structure consists of a low level outlet pipe through which flow is controlled by the gate noted above. The pipe actually consists of three different material sections, as noted and seen in the following photos. These are (from the gate looking downstream) corrugated metal, riveted steel and cast iron at the discharge end. Water was observed to enter the outlet pipe through the joint between the corrugated metal and riveted steel pipe connection area. Sizes were difficult to estimate: the cast iron was measured at an ID of 19.5 inches and an OD of 20 inches; other sections were estimated at about 18 inches and appeared to be jammed into each other, rather than properly joined.

GENERAL CONDITION: Fair to poor, based upon visual observation from downstream. While the corrugated pipe section appears intact, the riveted steel and especially the cast iron section at the end are deteriorating.

CONCRETE CONDITION:

Not applicable.

SETTLEMENT / ALIGNMENT / MOVEMENT:

None apparent.

SCOURING / UNDERMINING:

It appears (see photos) that the deteriorated end sections of the outlet pipe have caused some erosion of soil materials around the outside of the pipe adjacent to the stone wall. While its extent is unknown, it is a continuing problem for the future.

STONE MASONRY: Not applicable.

OTHER: Again, the valve is in an apparently inoperable condition. A decision was made not to operate the valve during this inspection, due to the possibility that it would not close after opening and thus drain the pond.

MISCELLANEOUS FEATURES

ACCESS - ROADS, BRIDGES, ETC.:

There are no vehicular access roads for routine maintenance activities, probably a major factor in the deteriorated condition of the site. If recommendations are carried out, access will have to be established for the entire dam. There is no bridge across the spillway, as can be seen from the photos and, at present, fishermen and the general public access the easterly side of the dam by walking across the large stones forming the spillway. The dam itself is now approached by a hiking path starting at Reservoir Road, coming down along the westerly side of the pond and accessing the dam at the westerly end of the crest. A well worn pedestrian path then continues across the dam to the east side.

SAFETY - FENCING, RAILING, ETC.:

No fencing or railing presently exists along any portion of the dam. Because of unrestricted public access to the site, the lack of safety features is a definite liability problem. There are no signs to limit access or to warn of the drops from the top of the stone

walls and the hazard in crossing over the spillway and through the discharge flow.

DOWNSTREAM HAZARD REASSESSMENT:

No change is recommended in the downstream hazard assessment at this time. The recommended design storm is a 100-year return frequency.

OTHER:

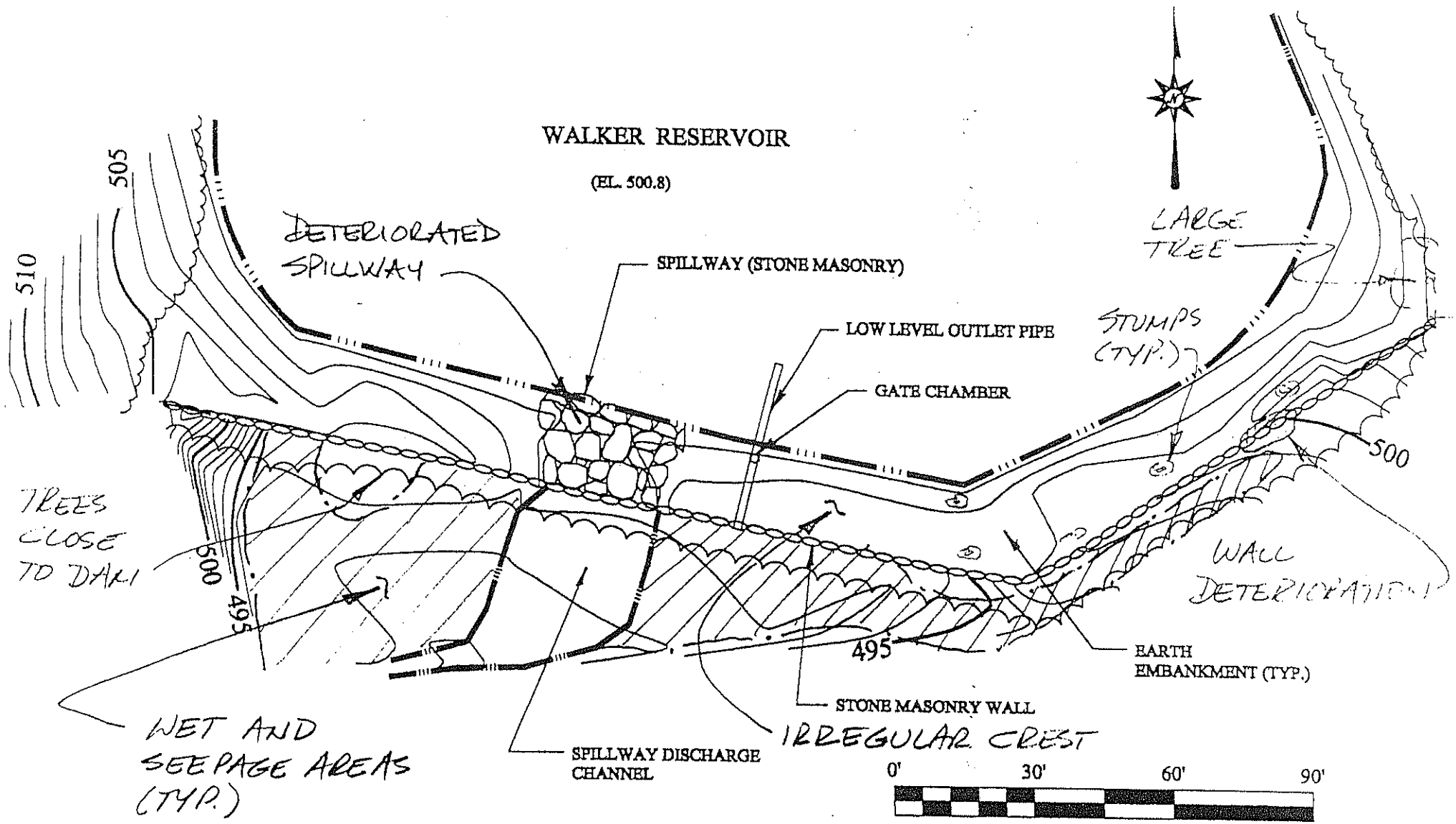
As usual in ponds of this type, the diving inspection done in March was somewhat difficult because of poor visibility. It did, however, yield some of the information noted above and the condition along the upstream side of the dam. The diver noted that there were no signs of obvious sinkholes, depressions or direct piping through the submerged portion of the upstream slope. He did note that the right upstream embankment has a hard surface soil slope of about 2H:1V to a depth of approximately five to six feet, followed by muck at the bottom. The slope along the submerged portion of the left upstream embankment was found to be much shallower with a depth of 4.5 to 5 feet at 30 to 40 feet out (averaging about 7H:1V) from the water's edge. The surface here appeared to be a gravelly, open soil, again with muck at the bottom.

RECOMMENDATIONS

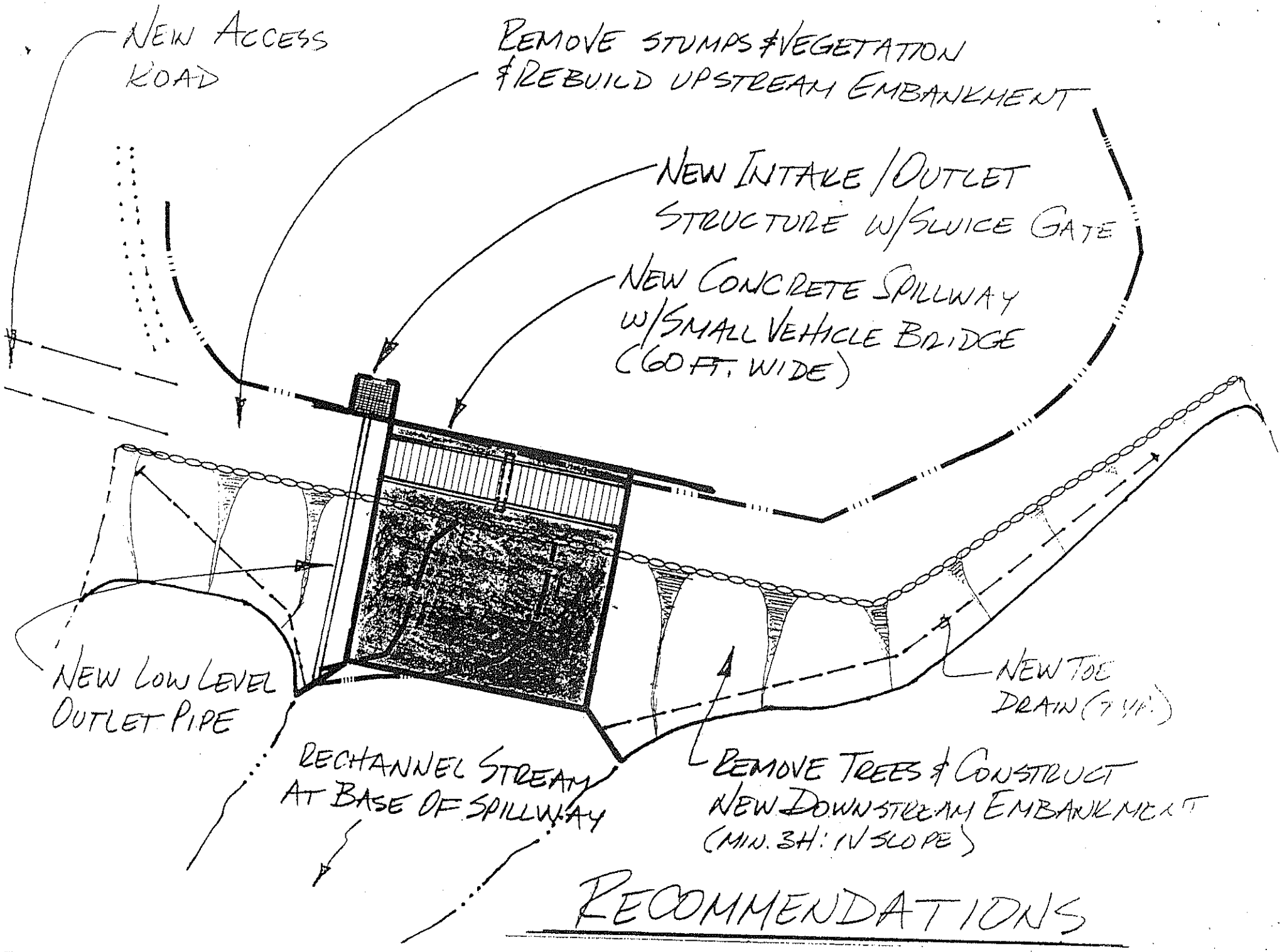
[See attached letter.]

SITE PLAN

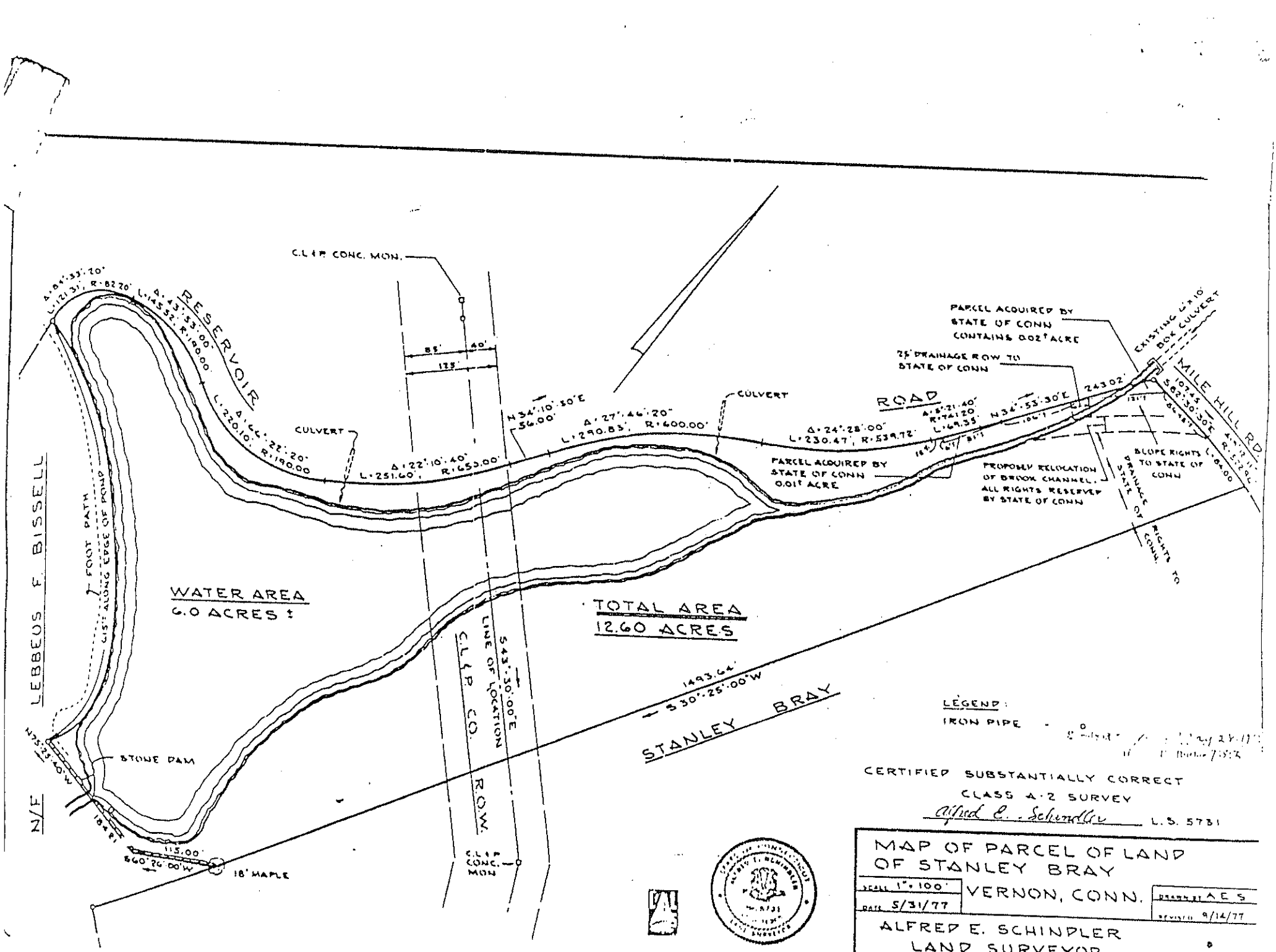
(Existing & Recommendations)



EXISTING SITE PLAN



RECOMMENDATIONS



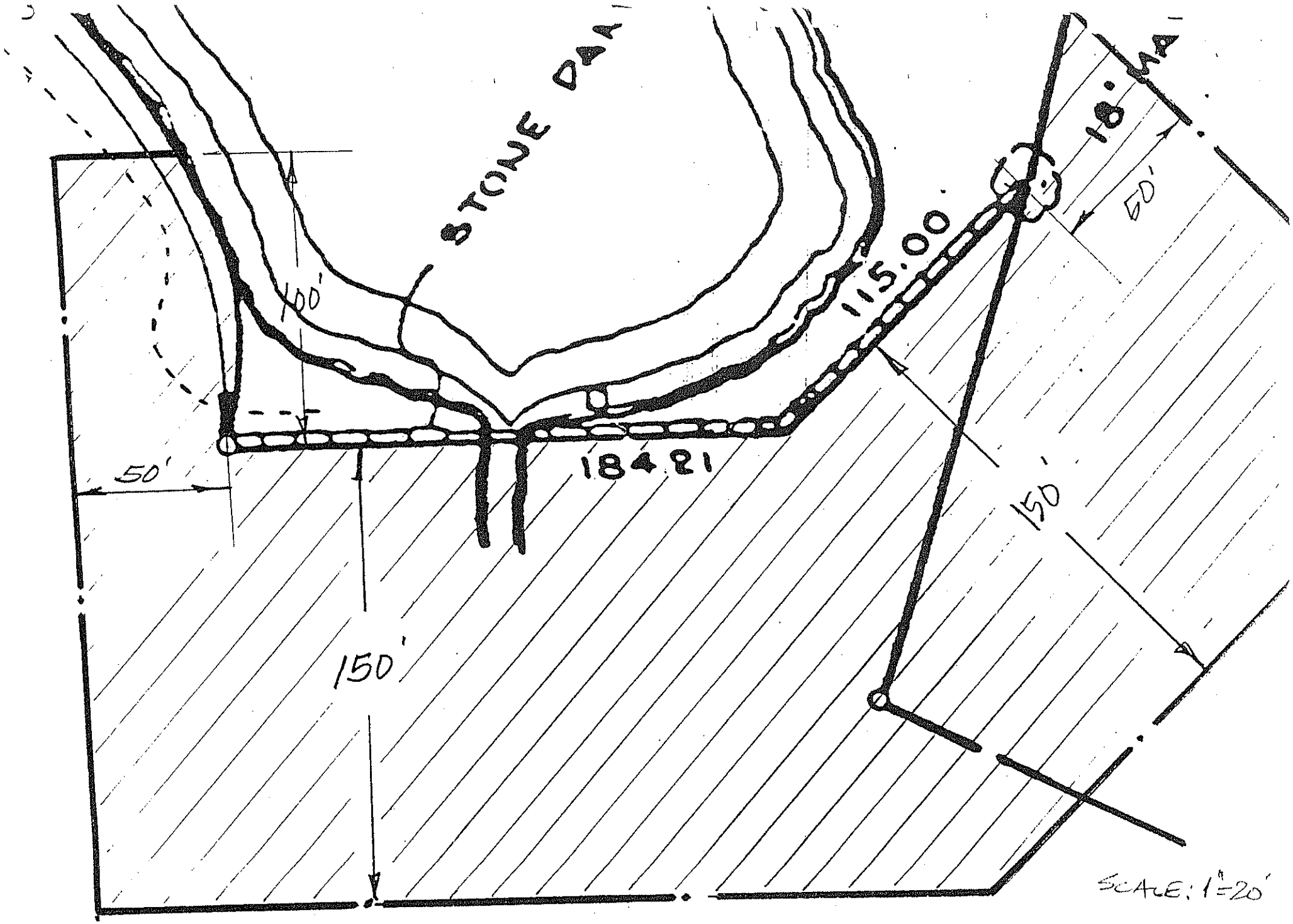
CERTIFIED SUBSTANTIALLY CORRECT
CLASS A-2 SURVEY
Alfred E. Schindler L.S. 5731

MAP OF PARCEL OF LAND OF STANLEY BRAY

SCALE 1" = 100' | VERNON, CONN. | DRAWN BY A.E.S
DATE 5/31/77 | REVISED 9/14/77

ALFRED E. SCHINDLER
LAND SURVEYOR
ELLINGTON, CONN.

DRAWING NUMBER 8



RECOMMENDED PROPERTY ACQUISITION

PHOTOGRAPHS

(Taken 3-24-1998)

PHOTOGRAPHS

WALKER RESERVOIR DAM

Vernon, Connecticut

[Unless otherwise noted, "left" and "right" will refer to the side of the dam as one looks in a downstream direction. Photos were taken March 24,1998, with a later follow-up to show the extensive vegetative growth following the heavy precipitation during the spring of 1998.]

[0598A-1] The right downstream toe area of the dam as taken from the right top crest. Note the wet area in the center of the photo and the tree growth.

[0598A-2] The upstream portion of the stone spillway. Note that the crest line is not well defined and that there are numerous open and washed out areas between stones.

[0598A-3] The right upstream side of the spillway training wall area, washed out from erosion during high flow events and probable overtopping of low areas adjacent to the spillway. Local resident providing voluntary inspection services is visible at center of photo.

[0598A-4] Diver preparing for inspection of intake and low level outlet. Again, note the eroded area directly adjacent to the right spillway training wall.

[0598A-5] The right downstream toe showing another wet area to the left of the one pointed out in 0598A-1, above. This is still to the right of the spillway and downstream channel, directly at the base of the downstream stone masonry wall of the dam.

[0598A-6] A view of the downstream toe area just to the left of the spillway discharge channel. The low level outlet pipe is discharging a small amount of flow visible at the base of the wall in the center of the photo.

[0598A-7] An overview of the right downstream toe area showing the extent of the wetland and toe seepage at the base of the dam. The spillway is in the bottom right corner of the photo.

[0598A-8] A view of Walker Reservoir East looking north from the upstream side of the dam. The diver visible in the center of the photo is searching for the pipe intake, as well as checking the upstream slope of the dam for any signs of depressions, piping through the embankment and any problems of a general nature.

[0598A-9] Another view of the diver at right upstream spillway area. Note again the wash area behind the wall and the northerly end of the pond. Reservoir Road is located at the center rear of the photo.

[0598A-10] A view of the right downstream wall and toe area of the dam. Once again, note the seepage and wetland areas and trees growing in close proximity to the dam. The spillway discharge and downstream channel are visible at the right center of the photo.

[0598A-11] The low level outlet pipe located at the base of the downstream wall just left of the spillway. Note that the discharge is located directly at the base of the wall and that it is ponded and flowing against the stone masonry.

[0598A-12] A closeup view of the low level outlet pipe, a cast iron flanged pipe end extending a short distance into the dam - a point from which the pipe changes to a different material makeup (see following photos). Note the open stone voids adjacent to the pipe, the hole in the side of the pipe and the washout beneath the large stone on the left side of the pipe.

[0598A-13] Another closeup view of the pipe end, showing a hole in its right side wall as well as the left.

[0598A-14] The interior of the low level discharge as seen from the downstream end. Note the flow of water emanating not from the gate in the background, but from the pipe joint visible at the end of the riveted pipe section. It appears that the riveted pipe may have been a part of the original low level outlet. Later, the sluice gate and the corrugated metal pipe at the rear were probably added. At some point, the cast iron flanged end section visible at the outside in the previous photos was probably pushed into the end of the wall to replace a deteriorating riveted section.

[0598A-15] Another view of the pipe interior; the three different pipe types are now clearly visible - deteriorating cast iron in the foreground, followed by riveted steel pipe and corrugated metal pipe at the upstream end.

[0598A-16] Looking straight up the center of the low level outlet with a clear view of the sluice gate at the end of the pipe. The gate was not operated during this inspection since little of its history is known and because once opened, the gate might not close and thus slowly drain the reservoir.

[0598A-17] The left downstream toe area of the dam, with the stone wall clearly visible. Note that some of the capstones are missing at the top of the wall and, as in other sections of the dam, some of those stones are at the base of the wall.

[0598A-18] A view of the spillway area as seen from the left side of the downstream discharge channel. Note the vegetative growth, the capstone dropped from the top of the wall in the center of the photo and the flow beneath the spillway capstones.

[0598A-19] A closeup of the spillway looking up from the left downstream channel embankment area. Again note the flow beneath the capstones and through the lower wall.

[0598A-20] Another view - looking toward the right side - of the downstream spillway wall showing more of the flow through the wall.

[0598A-21] The right downstream embankment wall as seen from the left side of the downstream spillway discharge channel.

[0598A-22] The spillway as seen from the right downstream channel embankment.

[0598A-23] The right downstream stone wall showing many of the voids between the stones. Note also the probable repair area of smaller stones at the left side of the wall where larger stones had fallen down to the base.

[0598A-24 Looking along the right downstream wall toward the spillway. The large stones at the center of the photo are located at the base of the wall area shown in the previous photo.

[0598A-25] An overview of the top crest of the dam as taken from the right abutment. Note the stumps along the left crest and the large trees remaining at the left abutment.

[0598B-1] The diver searching for the pipe culvert passing beneath Reservoir Road between Walker Reservoir East and Walker Reservoir West. Because of heavy debris, no defined culvert opening could be found at the downstream end beneath the shallow stone headwall section visible in the center of the photo. A pipe opening was found on the upstream side, but because it was also filled with debris, its exact size and material type could not be determined. It appears that it is a small pipe and from the curve at its top, it appears to be smaller than 12 inches in size. Because of the blockage and small flow openings, the head differential (i.e., the elevation difference) on the day of inspection between reservoir sections was approximately 0.5 feet. It should be noted that in the storm water management plan prepared by SEA Consultants, Inc. in 1989 and 1990, this pipe was described as a 12-inch RCP. If so, the information may be on file at either Engineering or Public Works. It could not be verified by this inspection.

[0798C-9] An overview of the upstream side of the dam with new vegetative growth clearly visible along the entire upstream crest. The spillway is located at the center of the photo.

[0798C-10] The crest of the dam looking east from the right abutment. The spillway is again at the center of the photo. Note the extensive vegetative growth.

[0798C-12] The wet area at the right downstream toe of the dam (see 0598A-5 above). Note how some of these areas are less prominent and visible with the dense vegetative growth.

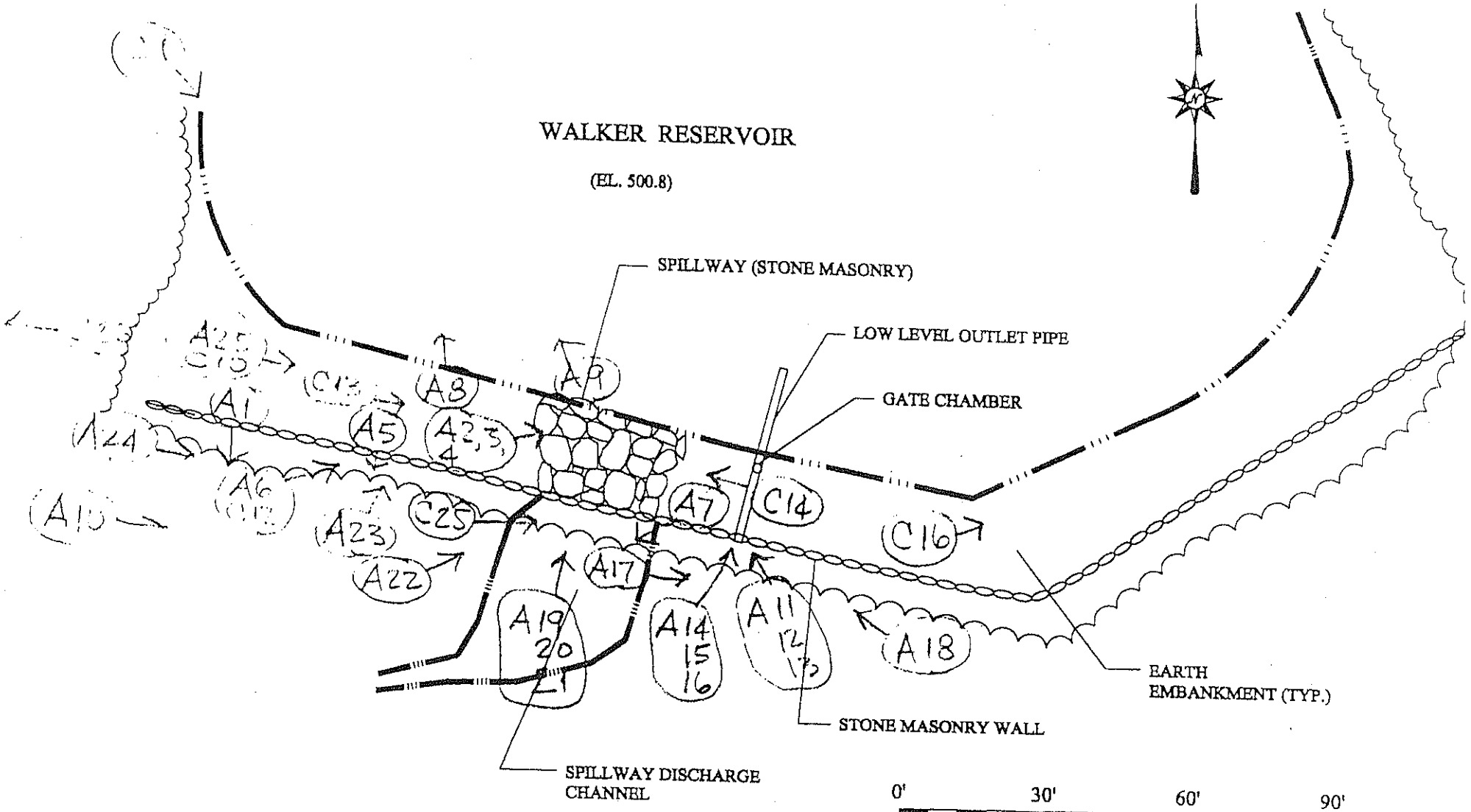
[0798C-13] The spillway and scoured upstream crest at the right training wall area. Note the path created by extensive pedestrian traffic along the center of the embankment, mostly from fishermen.

[0798C-14] Another view of the stone masonry spillway showing the extensive voids between large stones. All smaller stone and soil material between and beneath the stones has been washed out.

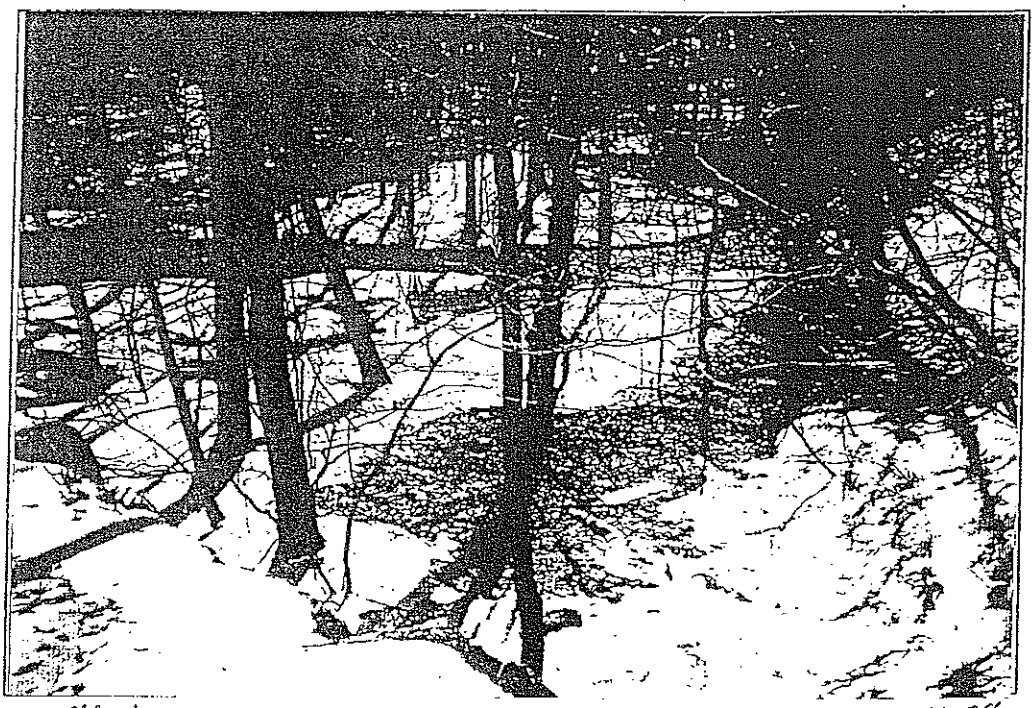
[0798C-16] The left center of the crest near the angle point in the dam. This photo illustrates the many stumps left in the embankment and the worn path from pedestrian traffic.

[0798C-25] Although less extensive than in previous photos, the spillway discharge continues to flow beneath and through the downstream wall.

[0798C-26] The right abutment area as seen from the right crest of the dam. Note the dense vegetation and a small path leading westerly from the dam. This would represent the most likely access point for future maintenance work on the dam.

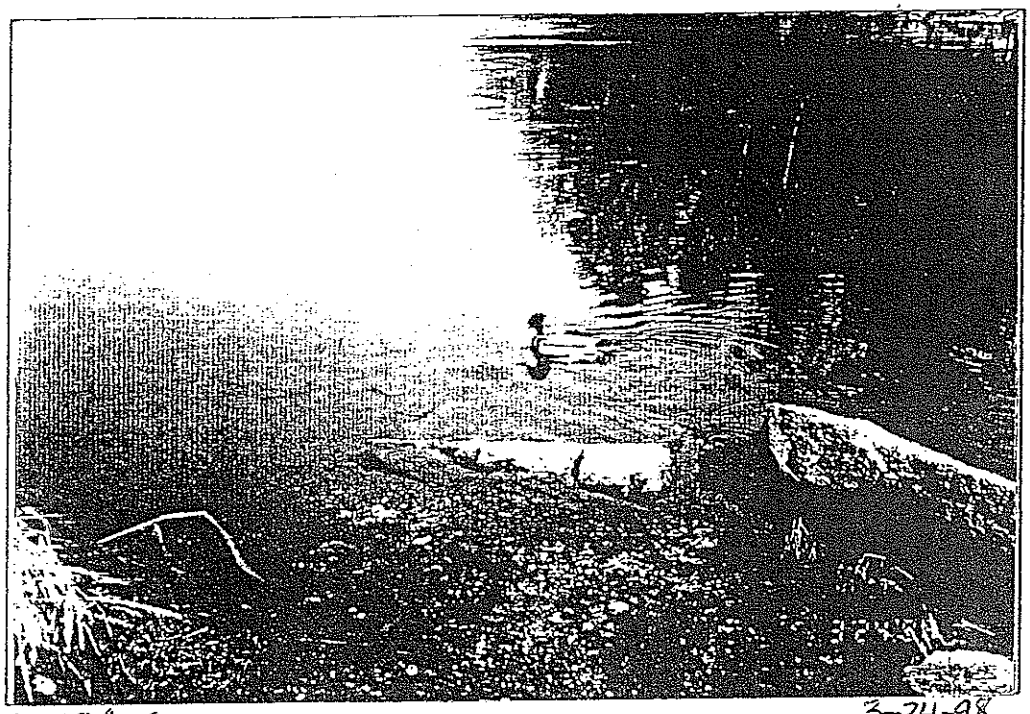


Photographs

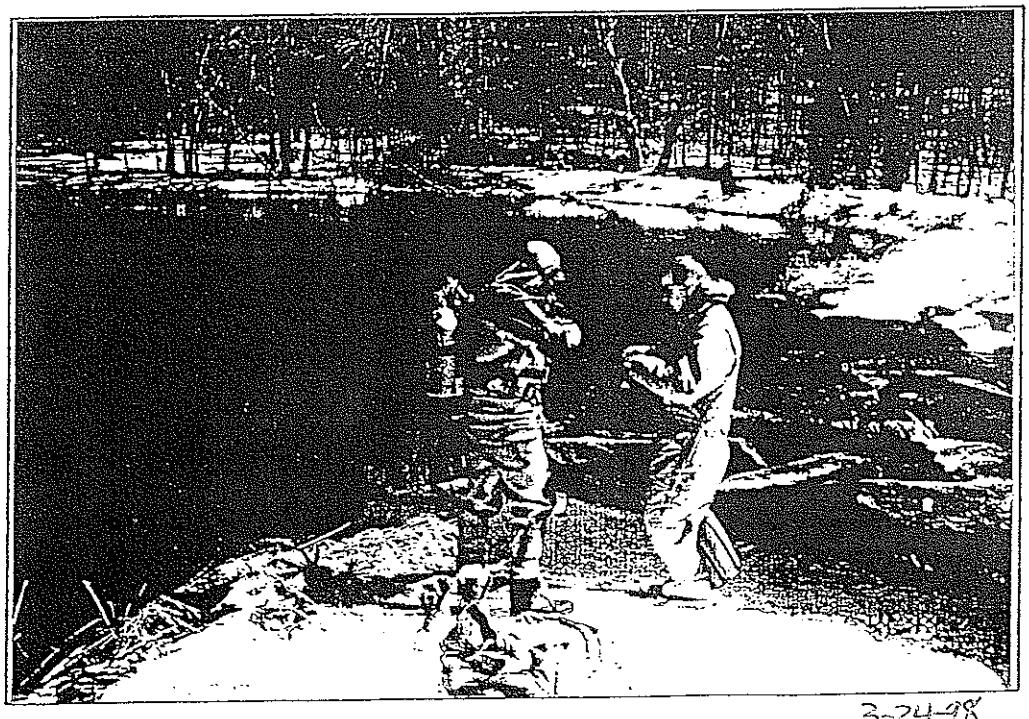


0598A-1 3-24-98

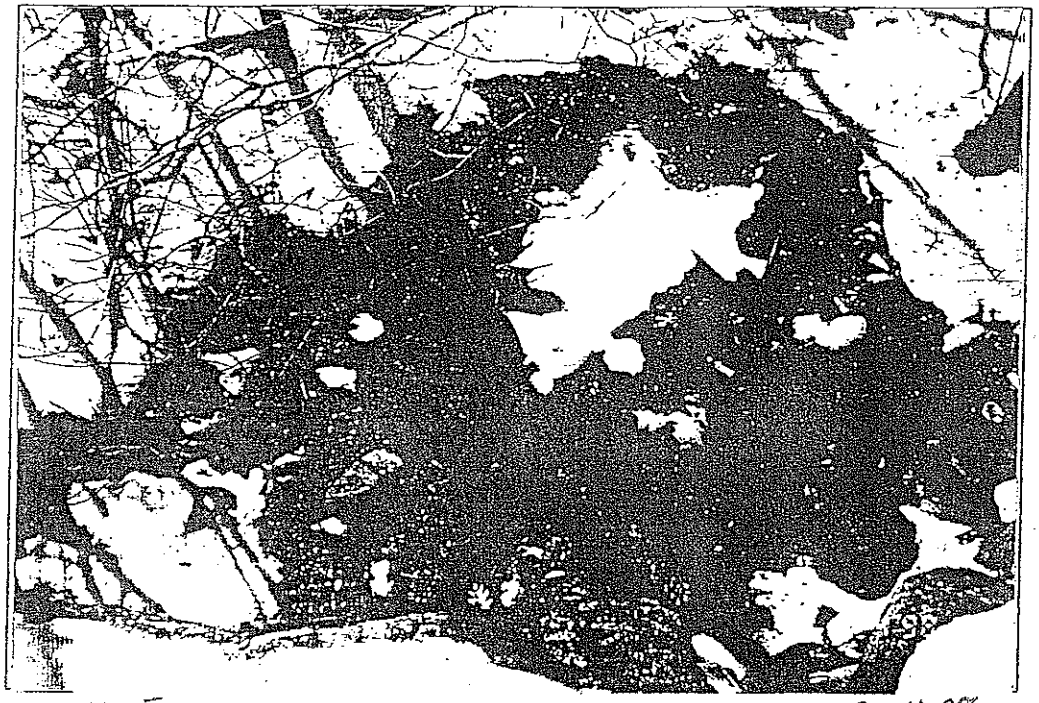
0598A-2 3-24-98



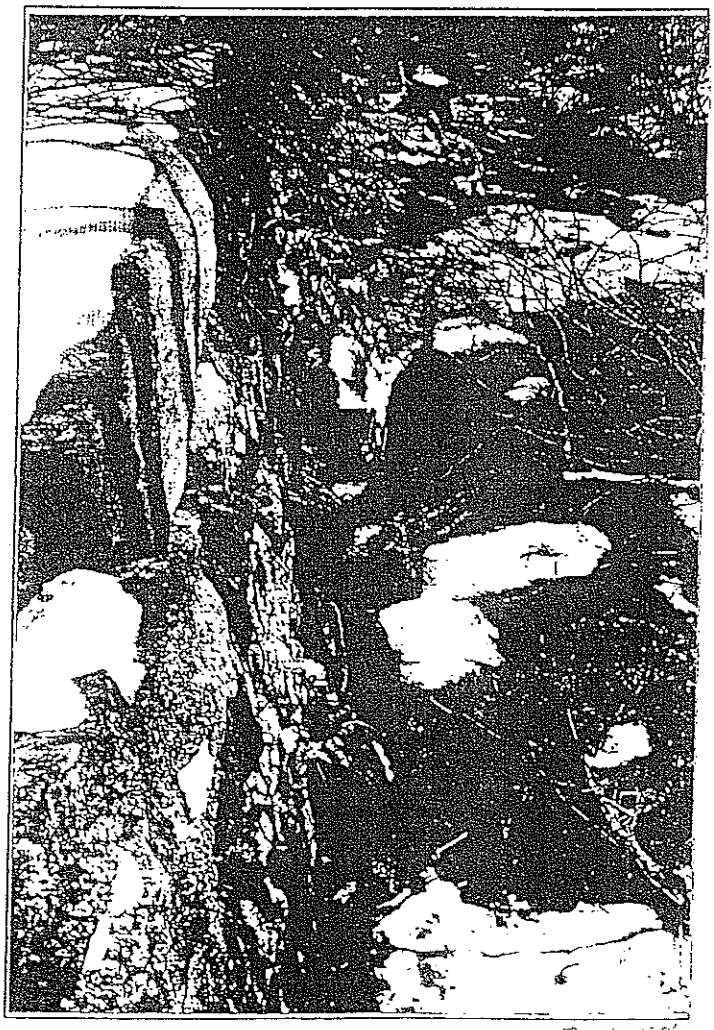
0598A-3 3-24-98



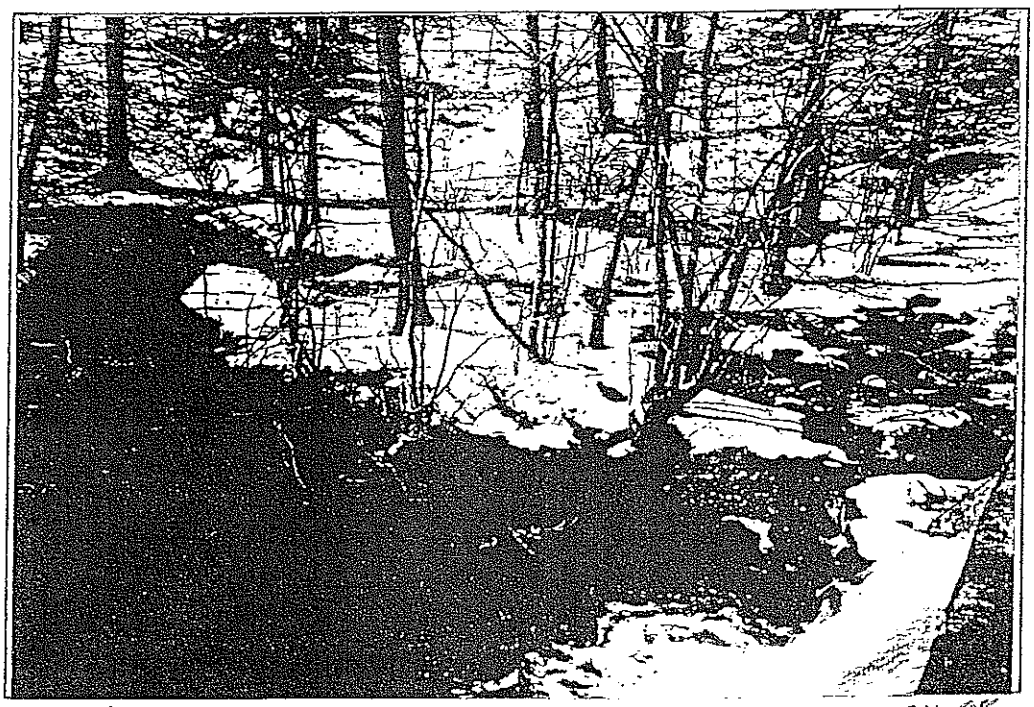
0598A-4 3-24-98



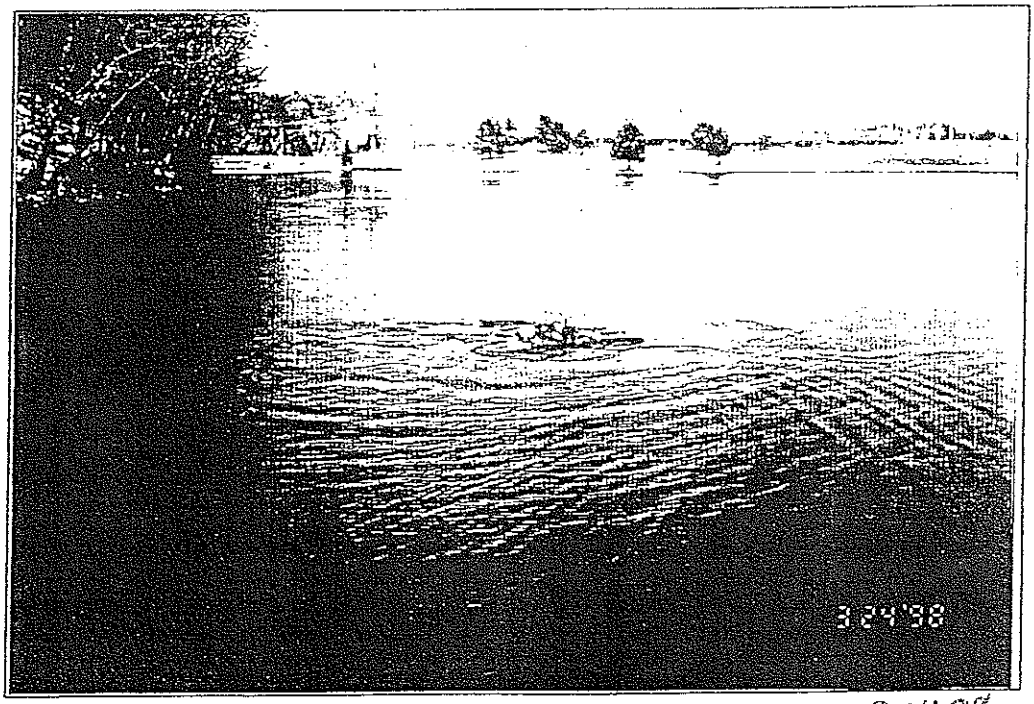
0596A-5 3-24-98



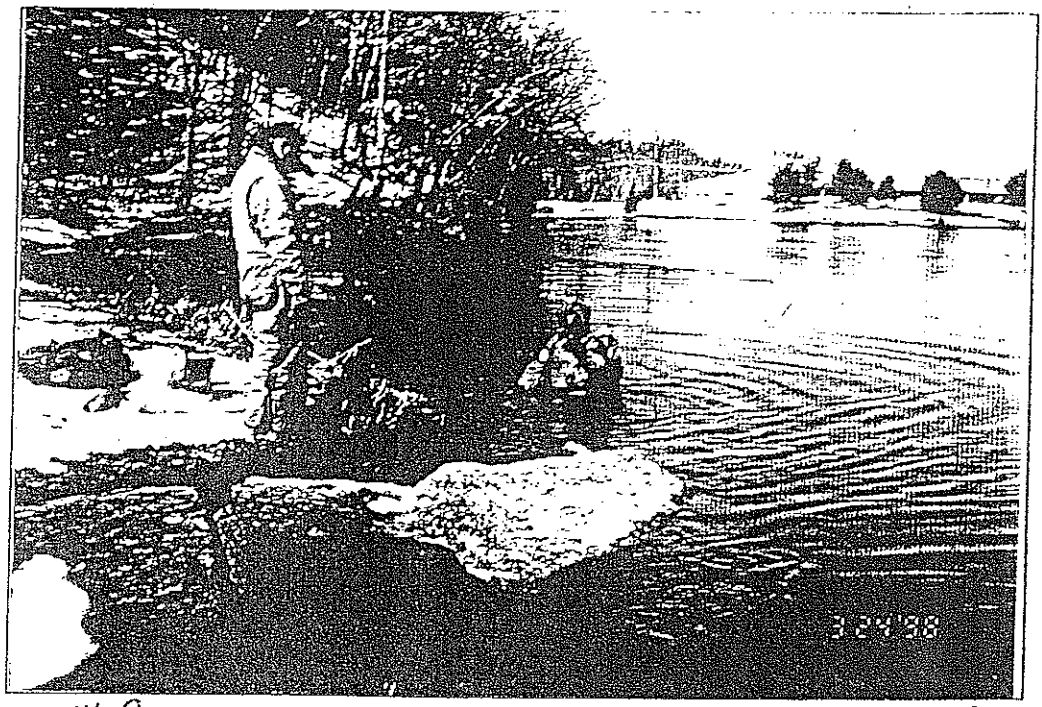
0596A-6 3-24-98



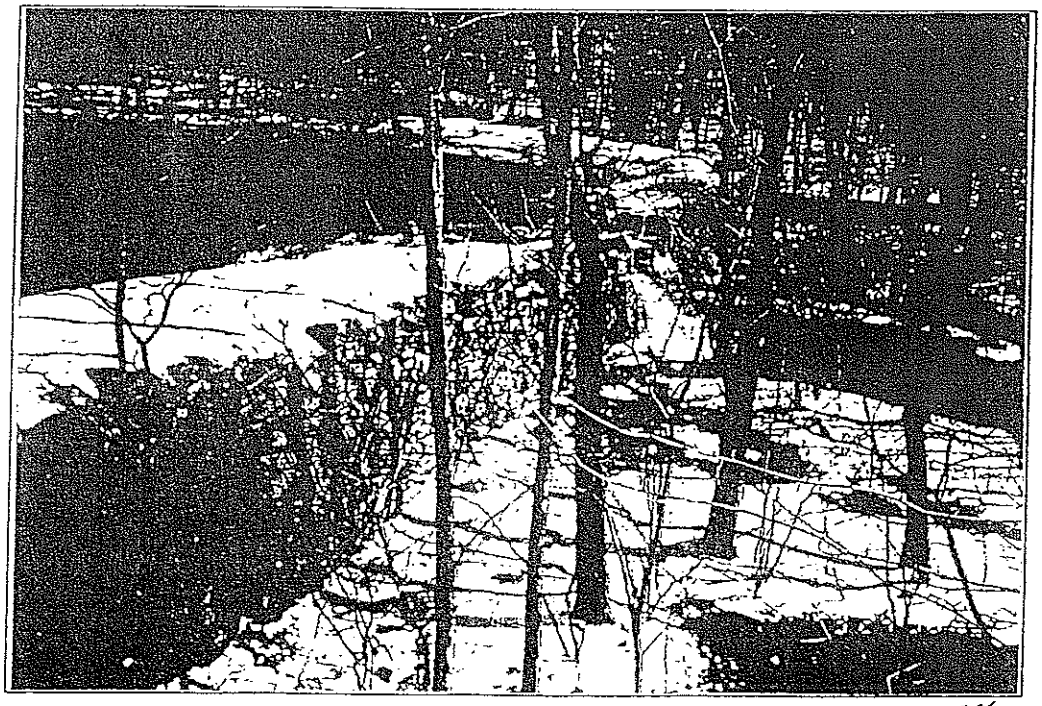
0598A-7 3-24-98



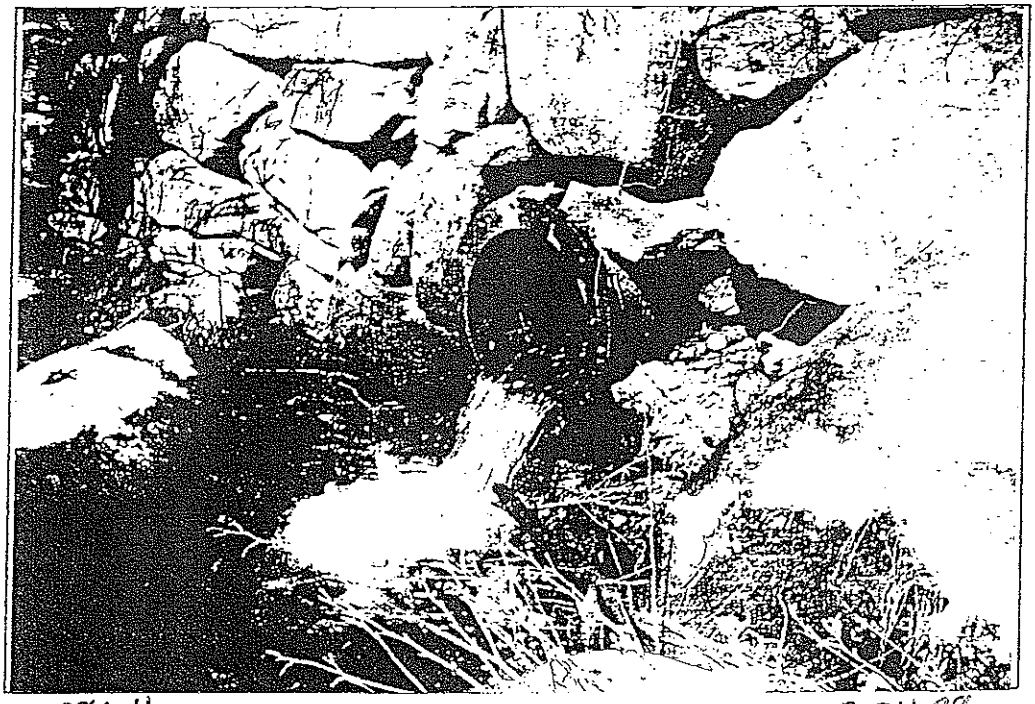
0598A-8 3-24-98



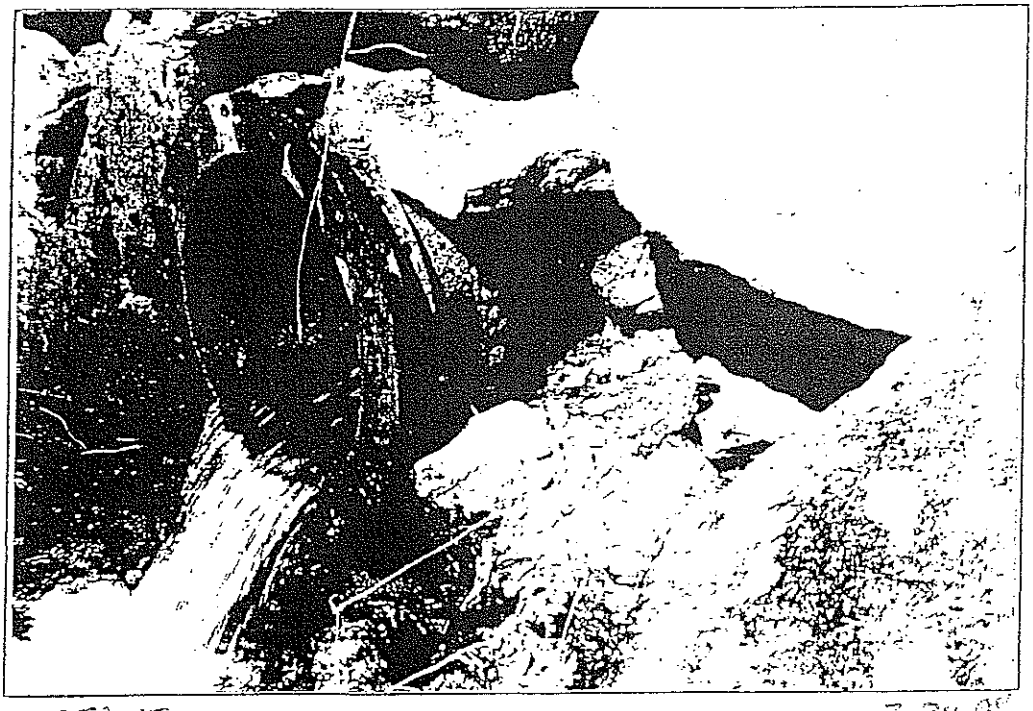
CS98A-9 3-24-98



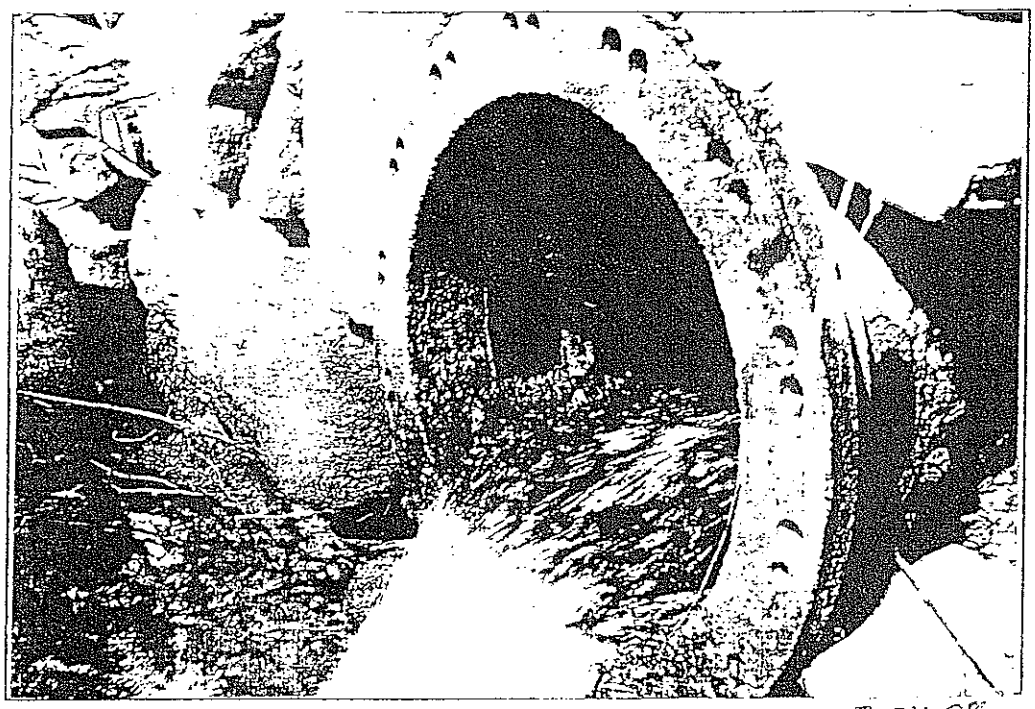
CS98A-10 3-24-98



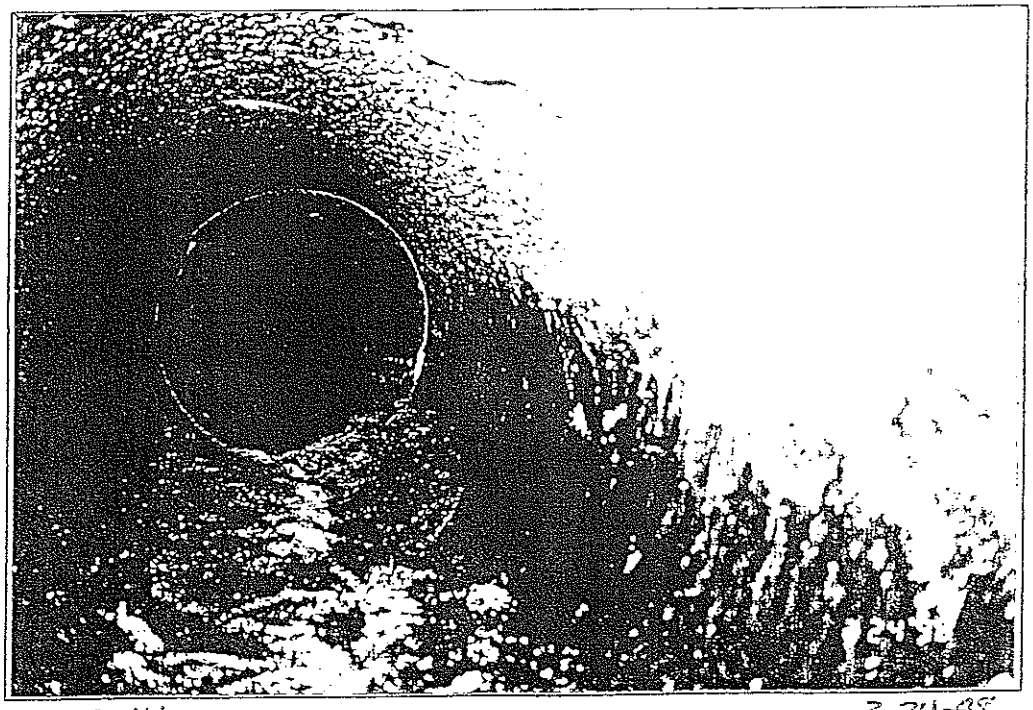
C598A-11 3-24-98



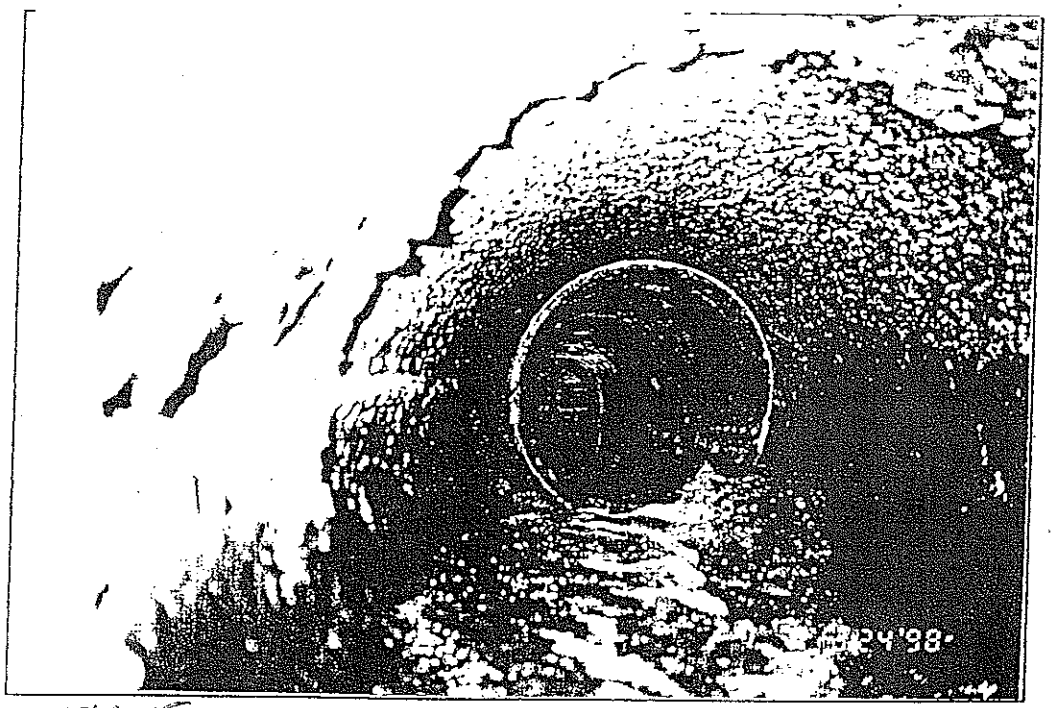
C598A-12 3-24-98



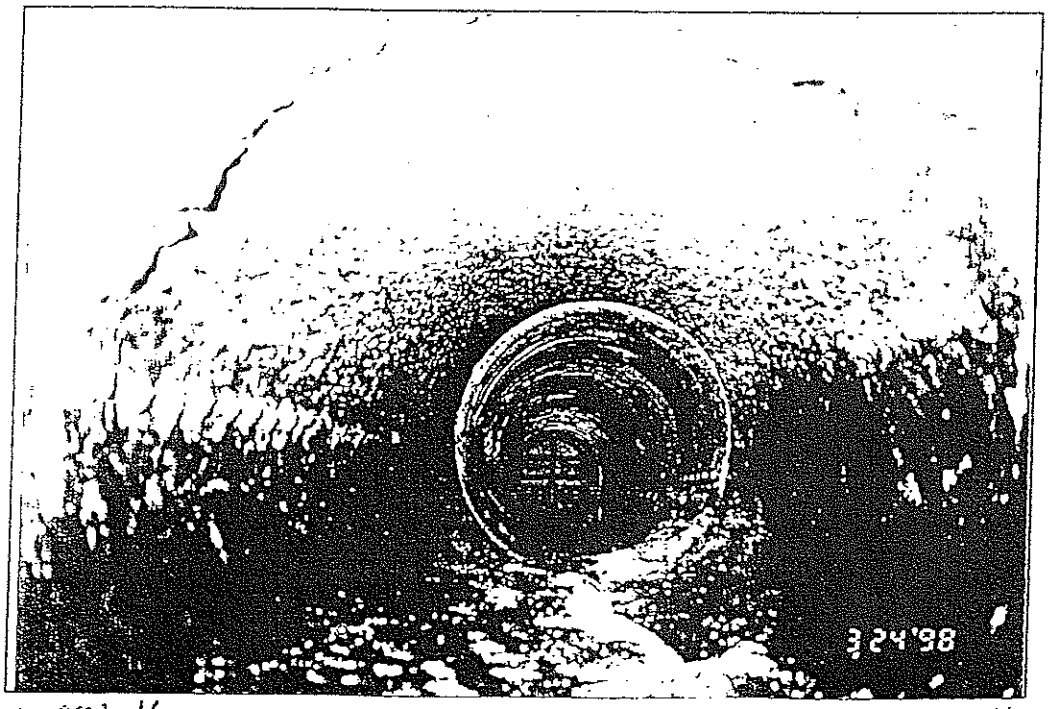
C5984-13 3-24-98



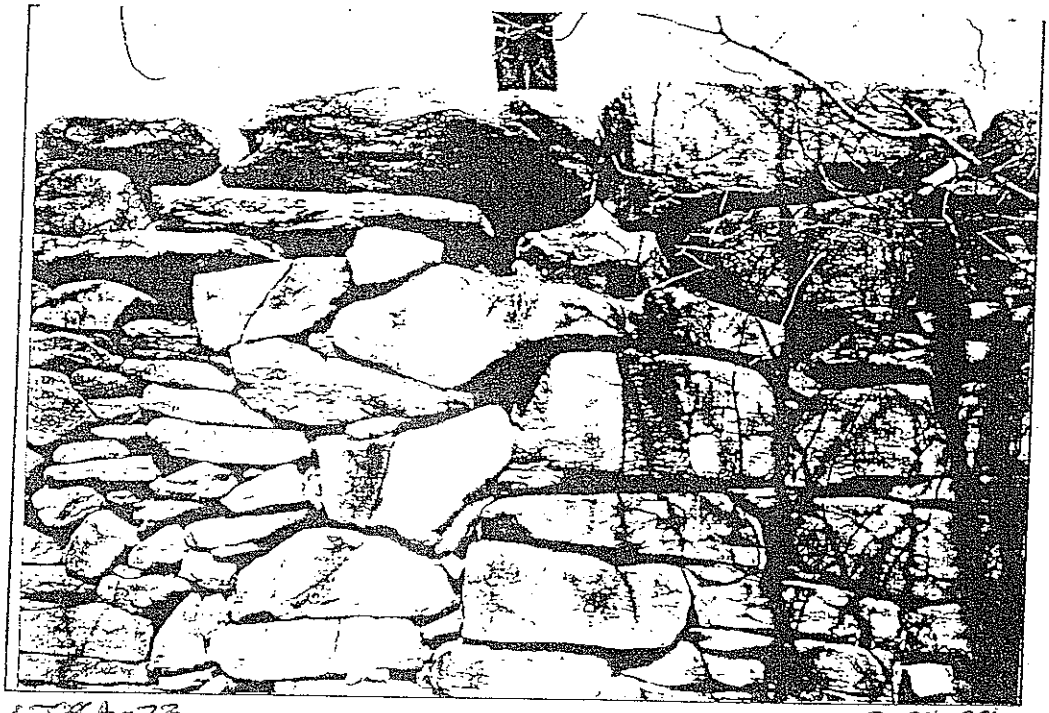
C5984-14 3-24-98



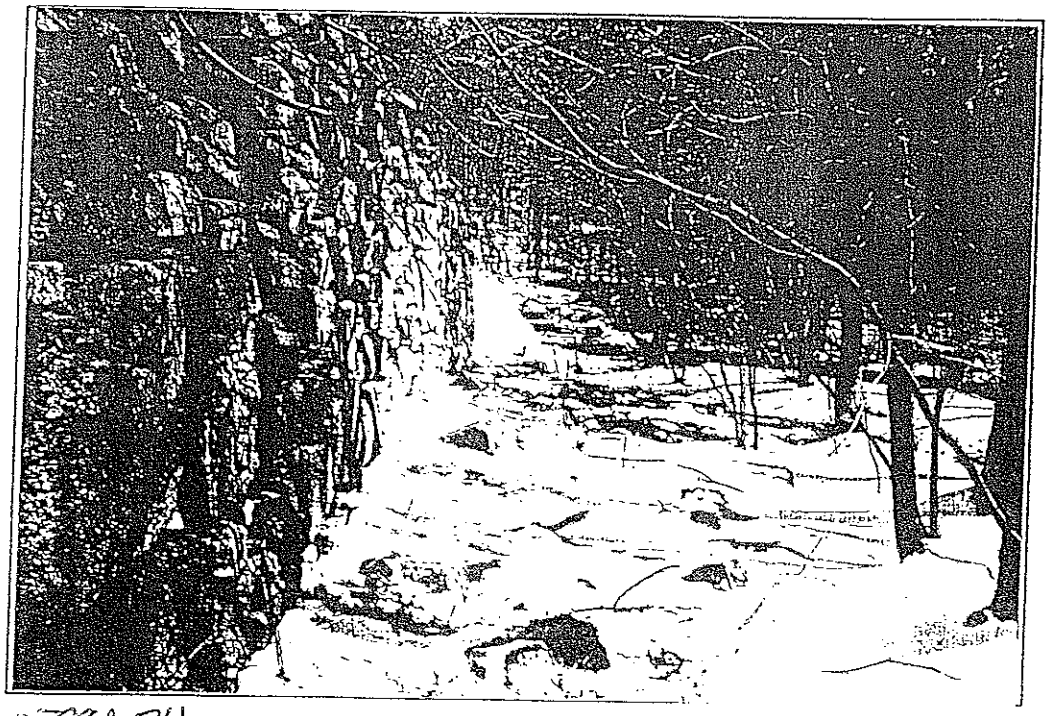
CS98A-15 3-24-98



CS98A-16 3-24-98



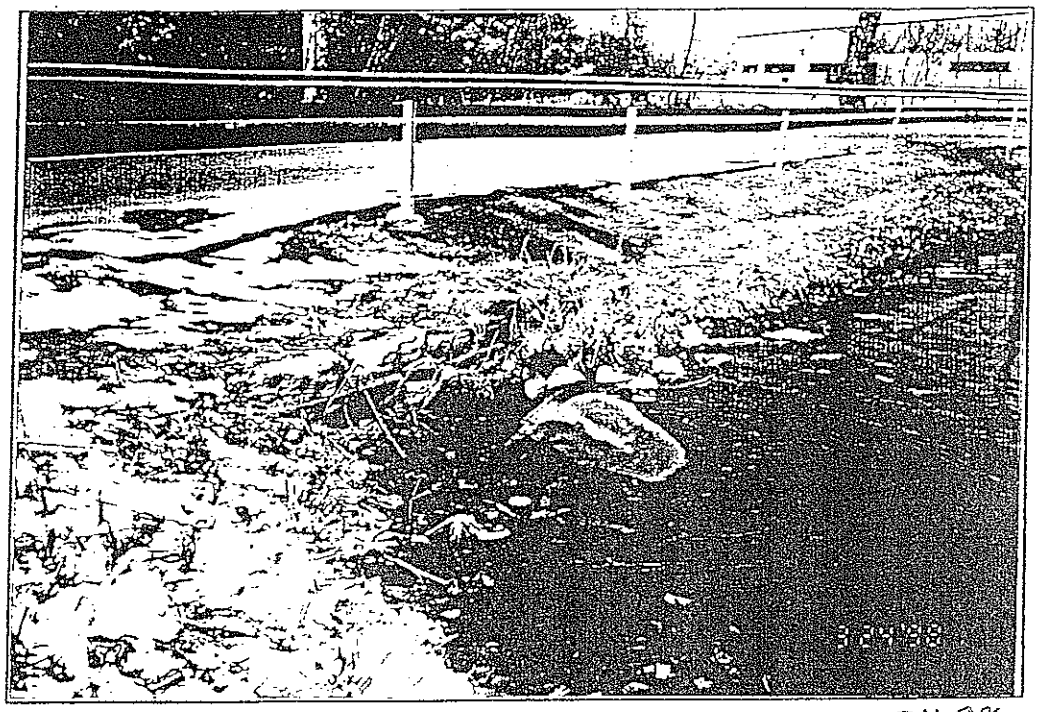
5598A-23 3-24-98



5598A-24 3-24-98

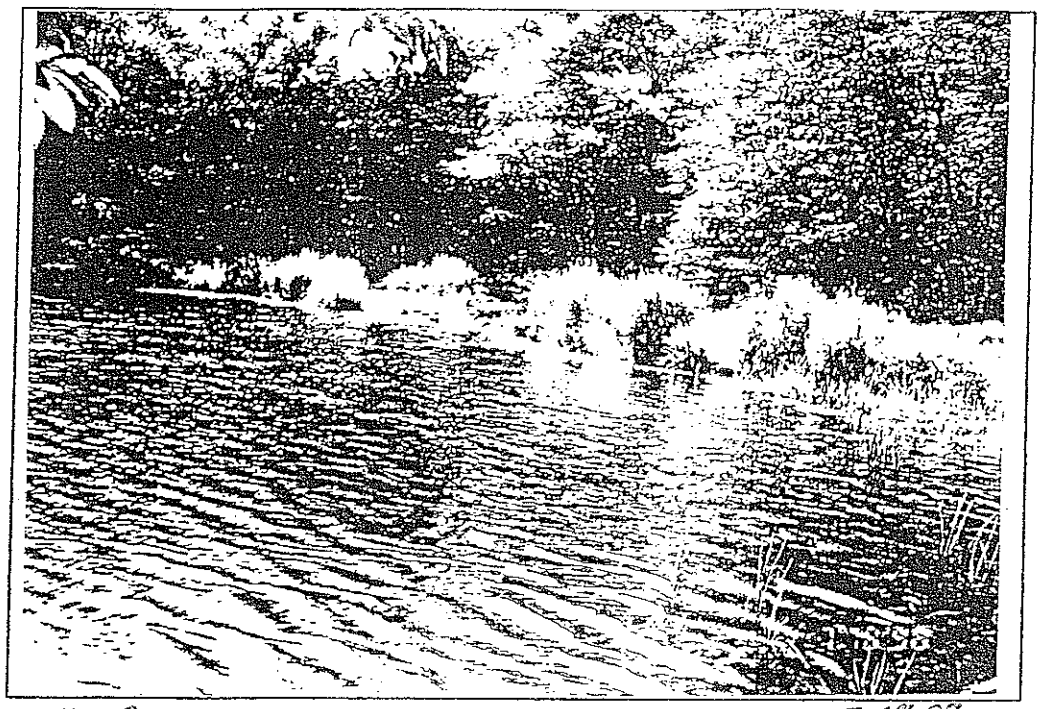
05984-25

3-24-98

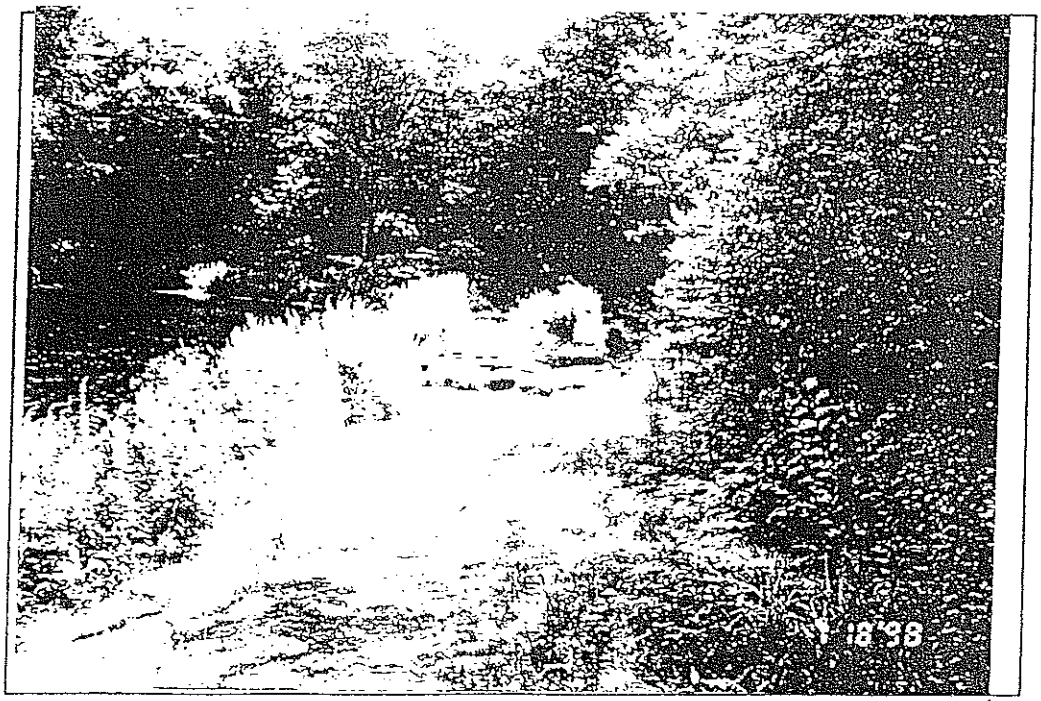


0598B-1

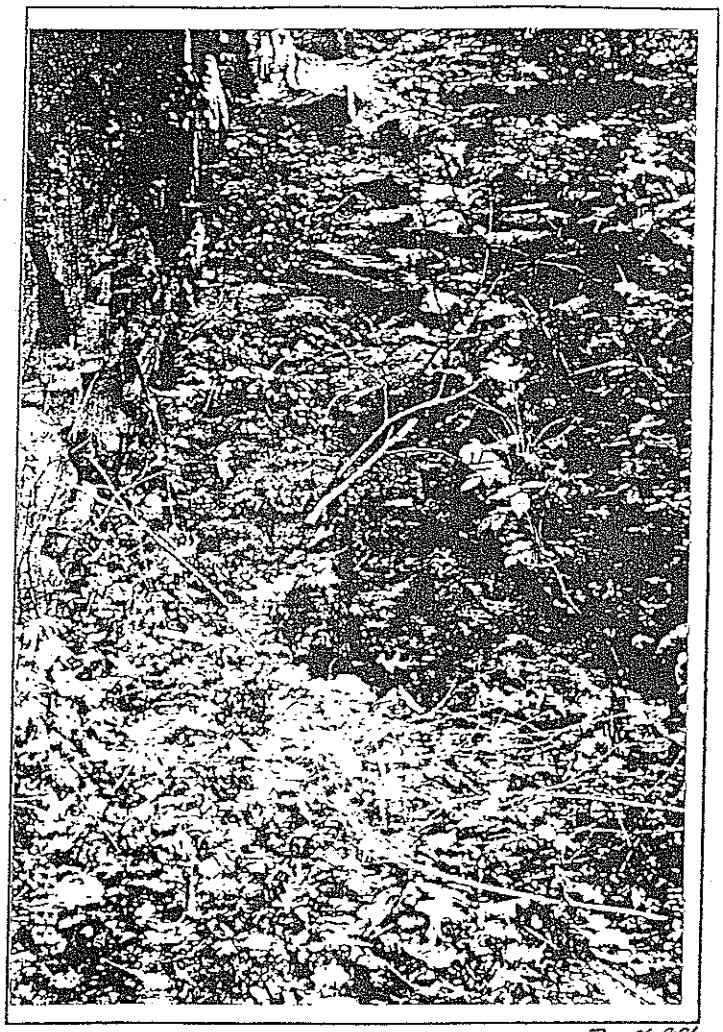
3-24-98



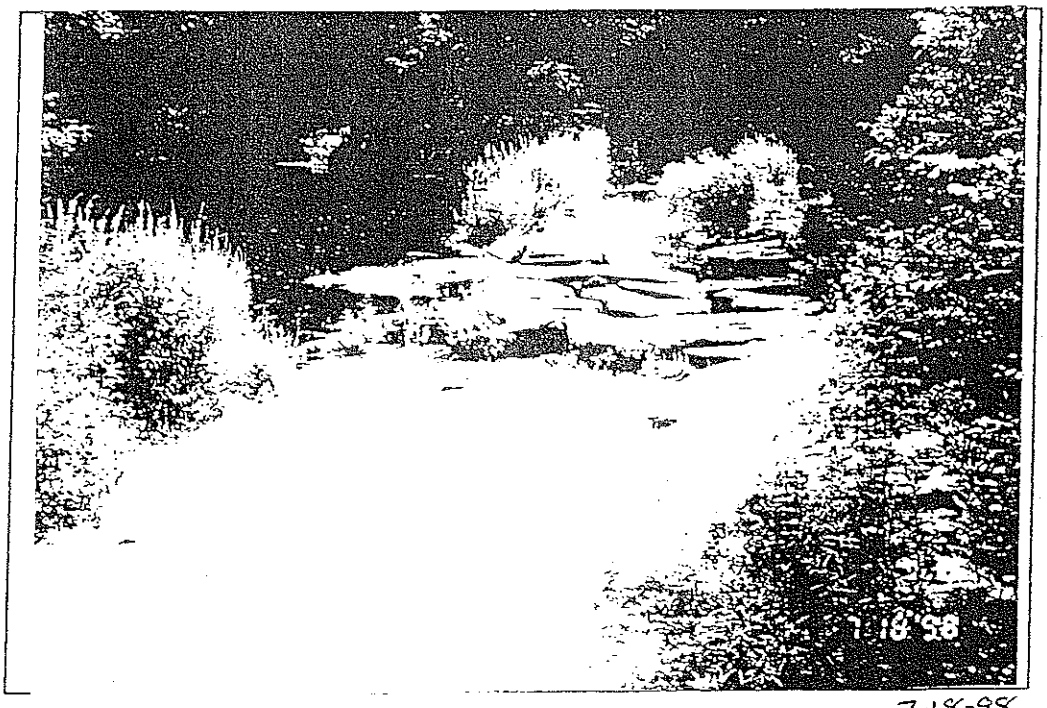
OTASC-9 7-18-98



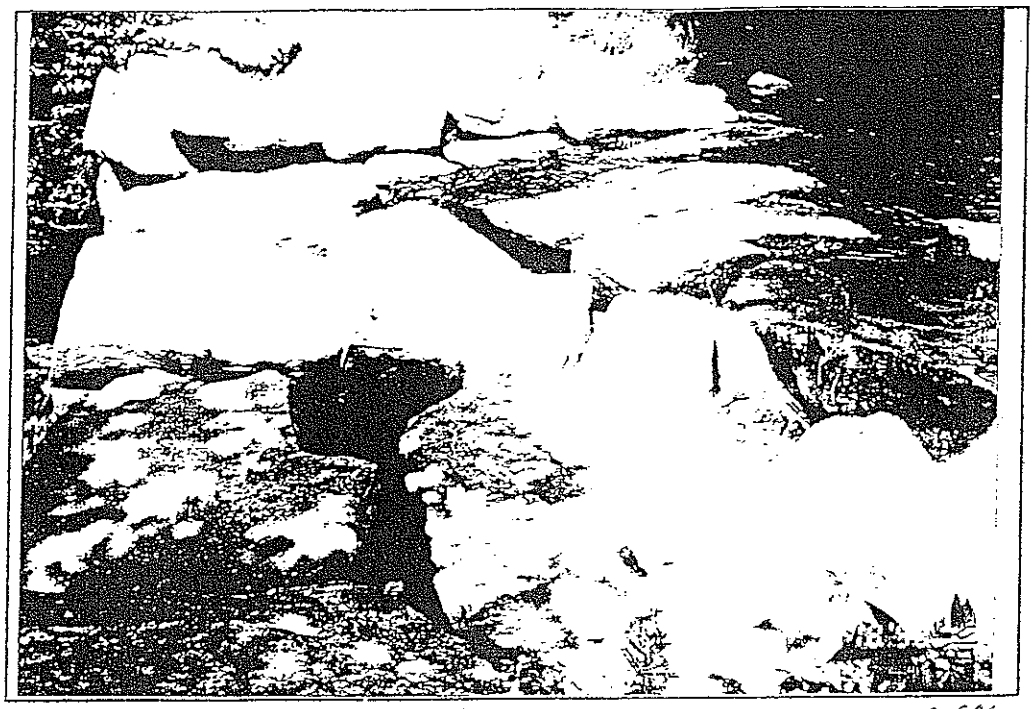
OTASC-10 7-18-98



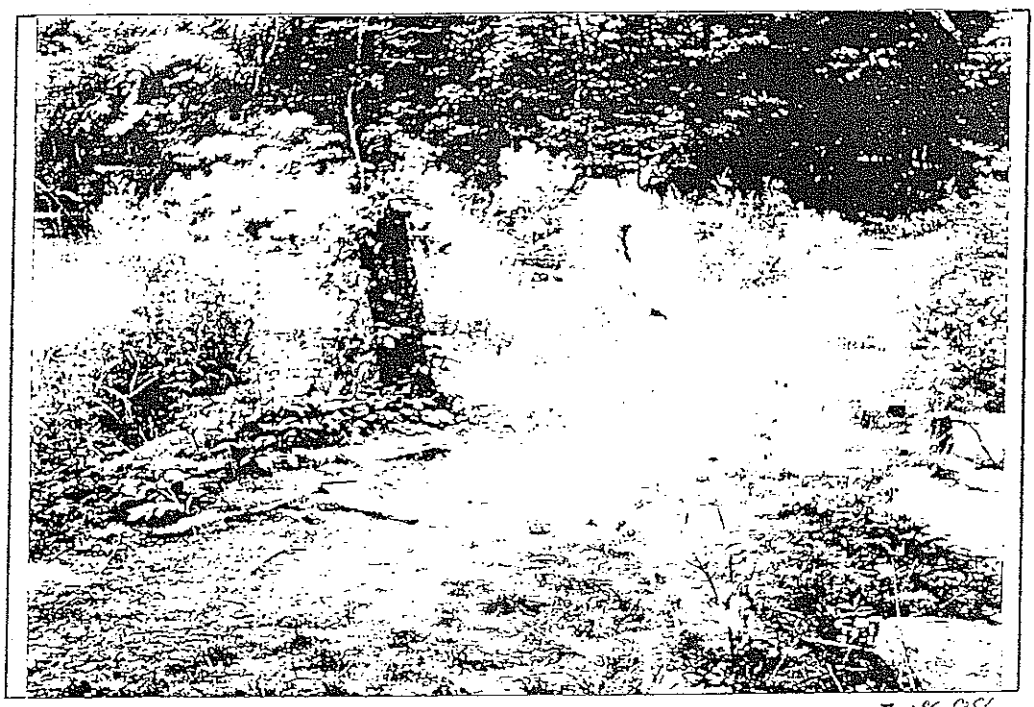
0798C-12 7-18-98



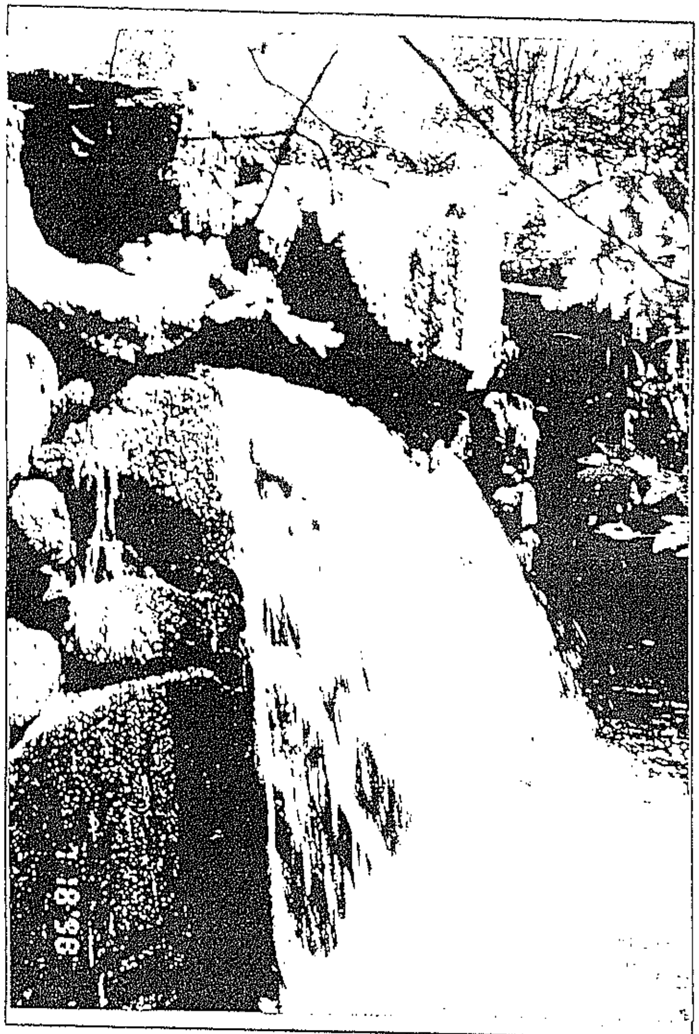
0798C-13 7-18-98



0798C-14 7-18-98



0798C-16 7-18-98



0798C-25 7-18-98

0798C-26 7-18-98