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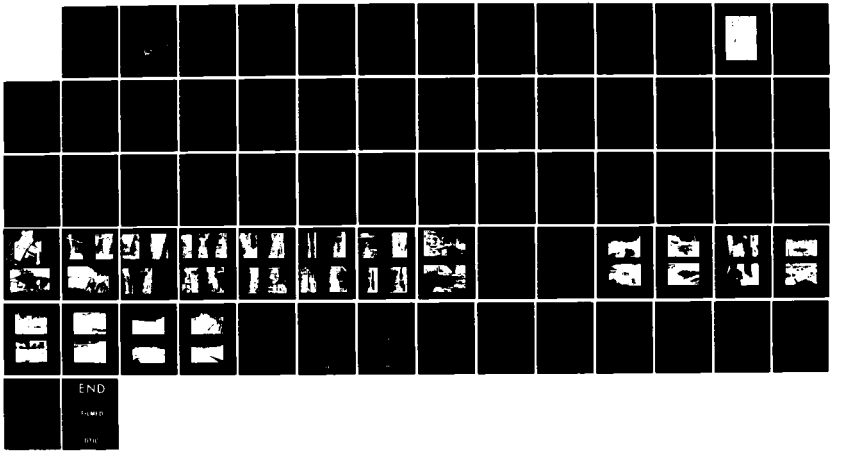
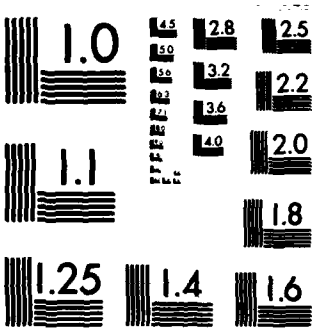
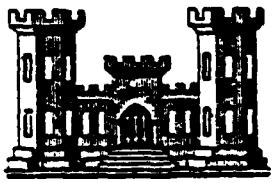




KENNEBEC - ANDROSCOGGIN RIVER BASIN
WILTON, MAINE

WILSON POND DAM
ME 00121

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MARCH 1980

UNCLASSIFIED

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Kennebec-Androscoggin River Basin
Wilton, Maine
Sandy River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The centerline crest length of the dam is about 78 ft. with a height oc about 24 ft. The dam is in fair condition based on a visual examination. It is intermediate in size with a hazard potential of high. Although there were several deficiencies, there was no evidence of settlement, lateral movement ot other signs of structural failure, or other conditions which would warrent urgent remedial action.

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KENNEBEC - ANDROSCOGGIN RIVER BASIN
WILTON, MAINE

WILSON POND DAM
ME 00121

PHASE I INSPECTION REPORT

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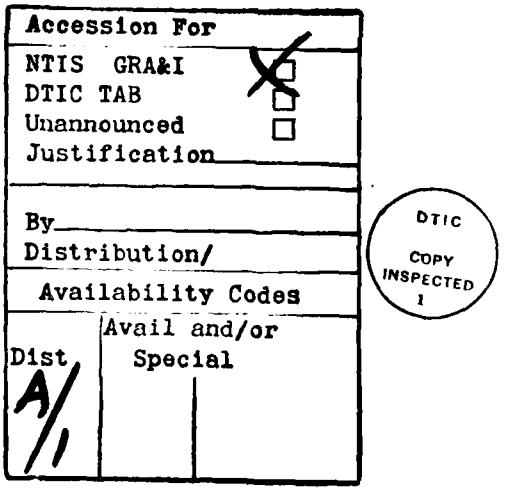


DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MARCH 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT

Identification No.:	ME 00121
Name of Dam:	Wilson Pond
Town:	Wilton
County and State:	Franklin, Maine
Stream:	Wilson Stream tributary to the Sandy River
Date of Site Visit:	8 November 1979

BRIEF ASSESSMENT

Wilson Pond Dam consists of a stone masonry spillway with an adjacent intake structure to divert water into a power canal. The power canal is separated from the downstream channel by an approximately 120-ft. long earth and rock dike. The centerline crest length of the dam is approximately 78 ft. The height of the dam is about 24 ft. The dam was constructed to provide water power for mills built at the outlet of Wilson Pond in the early 1800's. Presently, the dam forms a large recreational pond.

Due to the extent of the downstream development that would be affected in the event the dam were to fail, Wilson Pond Dam has been determined to have a "high" hazard potential classification in accordance with the Corps of Engineers guidelines.

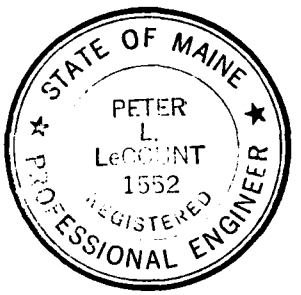
The dam is in fair condition, based on a visual examination of the structure. Although several deficiencies were noted, there was no evidence of settlement, lateral movement or other signs of structural failure, or other conditions which would warrant urgent remedial action.

Based on the "intermediate" size and "high" hazard potential classifications in accordance with Corps of Engineers guidelines, the test flood for this dam is the Probable Maximum Flood (PMF). Hydraulic analyses indicate that the routed test flood outflow of 34,500 cfs (inflow 40,500 cfs or 1,500 csm) would overtop the dam by about 9 ft. With the water level at the top of dam, and no flashboards in place, the spillway capacity is approximately 2,100 cfs which is approximately 6 percent of the test flood.

G.H. Bass & Co., owner of the dam, should engage a registered professional engineer qualified in design and construction of dams to assess the effect of the apparent depression downstream of the spillway on the stability of the structure, to investigate the flow in the area of the intake structure and to determine the need for and means of increasing the spillway capacity, as outlined in Section 7.2. Any necessary modifications resulting from the investigations, and remedial measures,

including rehabilitating stone and concrete masonry at the site and removing brush and trees overhanging the approach channel, power canal, overflow weir and on the dike, as outlined in Section 7.3, should be implemented by the Owner within one year after receipt of this report. The Owner should also prepare a formal operations and maintenance manual for the dam and establish an emergency preparedness plan and downstream warning system.

HALEY & ALDRICH, INC.
by:



Peter L. LeCount
Vice President

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm run-off), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential. Consideration of downstream flooding other than in the event of a dam failure is beyond the scope of this investigation.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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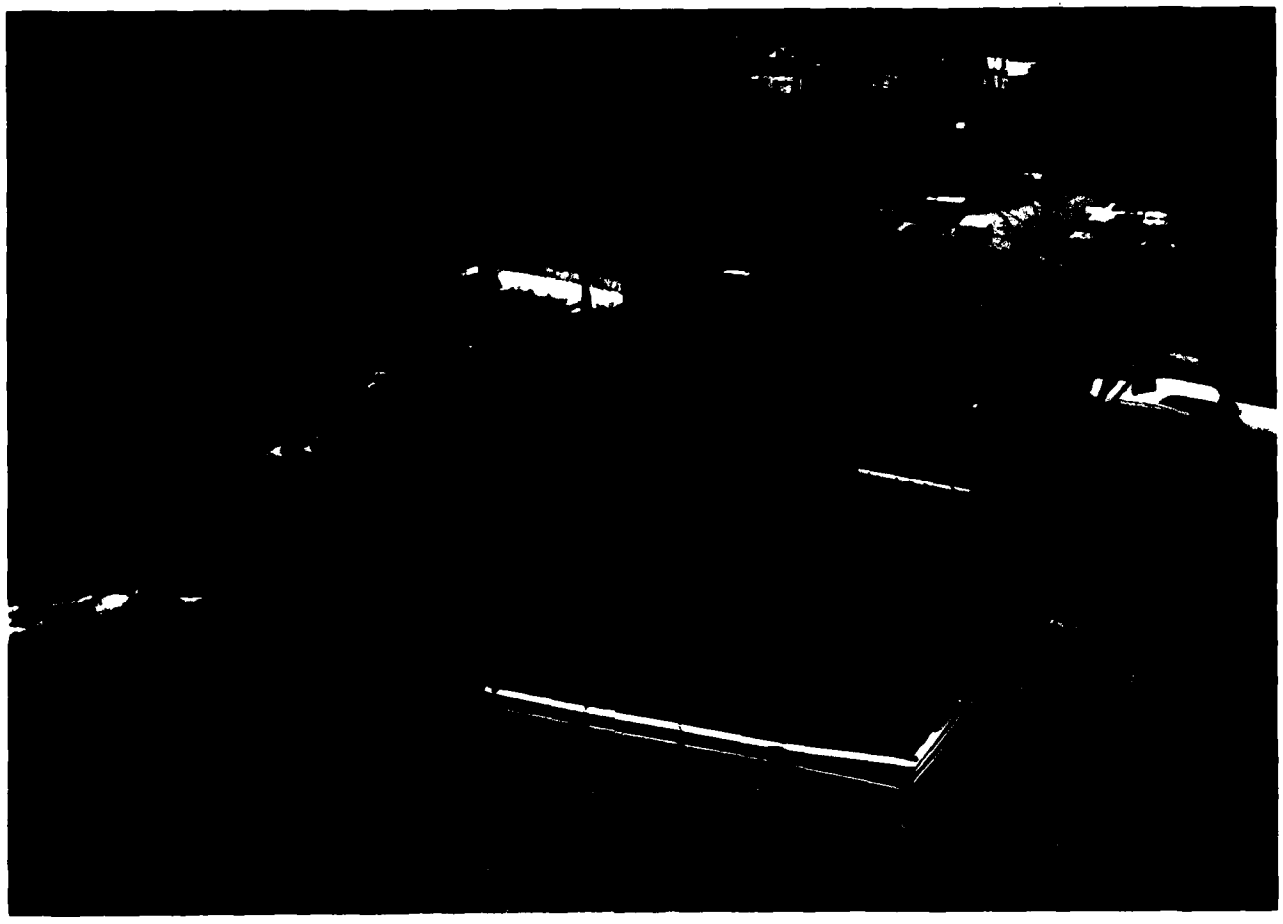
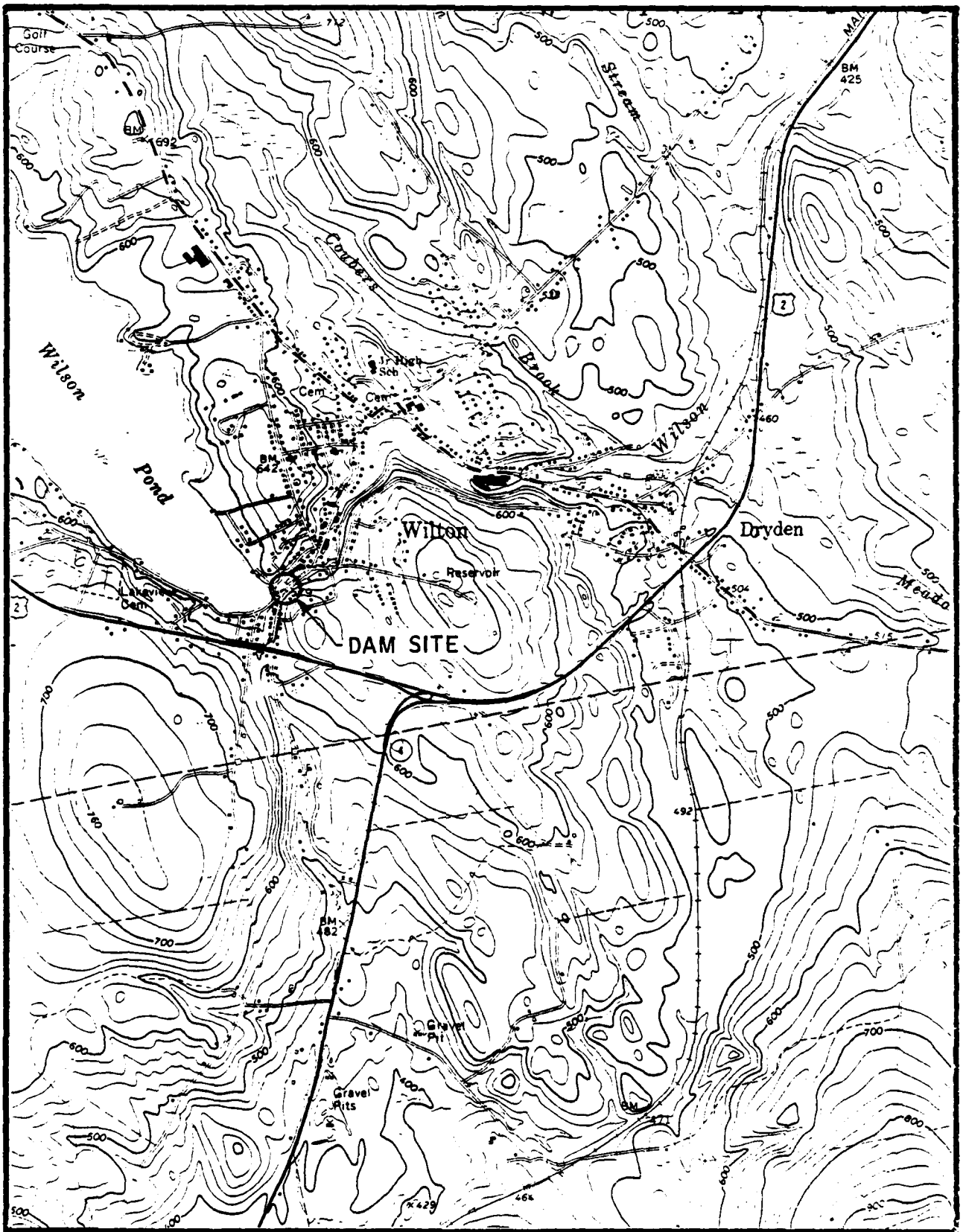


1. Overview of Wilson Pond Dam showing downstream face of spillway and power canal



FILE NO. 4454 A19

DAM: Wilson Pond

IDENTIFICATION NO. ME 00121

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LOCATION MAP

U.S.G.S. QUADRANGLE

WILTON, ME

APPROX. SCALE: 1"= 2000'

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WILSON POND DAM
ME 00121

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Haley & Aldrich, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of New Hampshire and Maine. Authorization and notice to proceed were issued to Haley & Aldrich, Inc. under a letter dated 31 October 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW33-80-C-0009 has been assigned by the Corps of Engineers for this work. Camp, Dresser & McKee, Inc. was retained as consultant to Haley & Aldrich, Inc. on the structural, mechanical/electrical and hydraulic/hydrologic aspects of the Investigation.

b. Purpose of Inspection. The primary purposes of the National Dam Inspection Program are to:

1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

2. Encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.

3. Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dam is located at the southeastern end of Wilson Pond within the downtown area of Wilton, Maine, as shown on the Location Map, page vii. The latitute and

longitude of the dam site are N44°35.2' and W70°14.0', respectively. Flow is conveyed from the dam by Wilson Stream to the Sandy River. The watershed is tributary to the Kennebec River.

b. Description of Dam and Appurtenances. Wilson Pond Dam consists of a spillway and an adjacent intake structure with two wooden control gates to divert water into a power canal. The centerline crest length of the dam measured from the right abutment of the spillway to the left abutment of the intake structure, is approximately 78 ft. The height of the dam, measured at the left abutment of the spillway, including a 10 ft. local depression in the streambed, is about 24 ft.

An approximately 120-ft. long earth and rock dike separates the power canal from the downstream channel, thus acting as a secondary dam. A gated low level outlet, or drain, for the power canal is located at the upstream end of the dike, just downstream of the spillway. Used in conjunction with the intake gates, this low level outlet can also function as a reservoir drain. At the downstream end of the dike, there is an uncontrolled overflow weir in a side channel configuration, which allows discharge from the power canal to the downstream channel.

The spillway is constructed of stone masonry with a wood plank surface. The crest of the spillway is about 55 ft. long and has provisions for 1 ft. of flashboards. On the right the spillway abuts a concrete wall that retains Main Street, Wilton, and acts as a training wall for the spillway. The left spillway abutment is a stone masonry wall. The top of the wall (identified as top of dam) is approximately 5.2 ft. higher than the spillway crest.

The intake structure is concrete and forms a headwall from the upstream end of the stone masonry wall at the left spillway abutment, over the upstream end of the dike, to the left end of the dam. The structure has two 4-ft. wide by 8-ft. high wooden gates that control flow into the power canal. The inverts of the gates, and of the reservoir drain, are about 14.2 ft. below the top of the dam.

The power canal widens from about 15 ft. at the intake structure to about 30 ft., at the downstream end. At the downstream end flow is directed from the power canal, under a wooden access bridge, to the forebay of the G.H. Bass & Co. shoe factory power tunnel. A debris rack is located over the intake to the shoe factory power tunnel and the tailrace outlets directly into Wilson Stream, approximately 390 ft. downstream of the dam.

The crest of the power canal overflow weir is approximately 32 ft. long and at about the same elevation as the

spillway. Above the overflow weir is a wood plank access bridge that is supported at the ends and by five intermediate concrete piers. The piers are spaced along the weir crest and are typically 8 in. wide, giving an effective crest length of about 28.7 ft.

c. Size Classification. The storage to the top of Wilson Pond Dam is reported to be 13,610 acre-ft., and the corresponding hydraulic height of the dam is approximately 24 ft. Storage of from 1,000 to 50,000 acre-ft. and/or a height of from 40 ft. to 100 ft. classifies a dam in the "intermediate" size category according to the guidelines established by the Corps of Engineers. Although the height of this dam is much less than 40 ft., it is classified as an "intermediate" size dam by virtue of its storage capacity.

d. Hazard Classification. Dam failure analysis computations in Appendix D, which are based on Corps of Engineers "Guidance for Estimating Downstream Dam Failure Hydrographs", demonstrate why this dam has been determined to have a "high" hazard potential classification. A failure of Wilson Pond Dam would result in substantial flooding of downtown Wilton. Approximately 10 structures would be jeopardized by the flood wave and several others would be affected by the resulting flood.

e. Ownership. The name, address and phone number of the current owner of Wilson Pond Dam are:

G.H. Bass & Co.
Weld Street
Wilton, Maine 04294
Phone: (207) 645-2556

G.H. Bass & Co. is believed to have been the owner of the dam and appurtenant structures since about 1877. The water rights to Wilson Pond are presently retained by the Foster Manufacturing Company, Inc. of Wilton, Maine.

f. Operator. Mr. Dana Eames, in charge of maintenance at the G.H. Bass & Co. shoe factory, has been associated with the operation, maintenance and safety of the dam since about 1945. He can be reached at the address and phone number given above.

g. Purpose of the Dam. The dam was originally constructed to provide water power for mills built at the outlet of Wilson Pond. G.H. Bass & Co. has previously used the dam for water power and processing in their shoe

factory. Hydroelectric capabilities were added at some unknown time.

Presently, the dam forms a large recreational pond. During periods of low runoff, the dam maintains sufficient storage of low flow augmentation to satisfy the industrial requirements of a mill located approximately 4,400 ft. downstream from the dam. The power general capabilities of the shoe factory are reportedly still functional, but employed by the Owner for emergency usage only.

h. Design and Construction History. There are no design or construction records available to document when, how and by whom the original dam was built.

i. Normal Operational Procedures. The 1 ft. of flashboards are installed in the spring and removed in the fall. During periods of low flow, when the pond level is below the spillway crest, the intake gates and power canal drain are operated to provide water downstream.

1.3 Pertinent Data

All elevations reported herein are approximate and based on the assumption that the crest of the main spillway is at El. 570.0 National Geodetic Vertical Datum (NGVD) (the level of Wilson Pond shown on the USGS Wilton Quadrangle Map, 1968).

a. Drainage Area. The drainage area tributary to the dam site is 27 sq. mi. The watershed consists of sparsely developed, heavily forested rolling to mountainous terrain which is drained by six brooks all tributary to Wilson Stream. Wilson Pond has a normal water surface area of 570 acres or 3 percent of the total drainage area.

b. Discharge at Dam Site

1. Outlet works capacity at spillway crest elevation.....	1,030 cfs at El. 570.0
2. Outlet works capacity at top of dam.....	1,260 cfs at El. 575.2
3. Outlet works capacity at test flood pool elevation....	2,000 cfs at El. 584
4. Maximum known flood at dam site.....	Pond level reached top of dam (El. 575.2) on 27 March 1953
5. Ungated spillway capacity at top of dam (without flashboards).....	2,100 cfs at El. 575.2

6. Ungated spillway capacity at test flood pool elevation (without flashboards)..... 9,300 cfs at El. 584
7. Total spillway capacity at test flood pool elevation, including power canal discharge capacity..... 11,300 cfs at El. 584
8. Total project discharge at test flood pool elevation.... 34,500 cfs at El. 584

c. Elevation (ft. above NGVD)

1. Streambed at centerline of dam..... 551.0
2. Maximum tailwater..... Unknown
3. Upstream portal invert diversion tunnel..... Not applicable
4. Recreation pool..... 571.0
5. Full flood control pool..... Not applicable
6. Spillway crest
   (without flashboards)..... 570.0
   (with flashboards)..... 571.0
7. Design surcharge - original design..... Unknown
8. Top of dam..... 575.2
9. Test flood surcharge..... 584

d. Length of Reservoir (mi. estimated)

1. Recreation pool..... 2.0
2. Flood control pool..... Not applicable
3. Spillway crest..... 2.0
4. Top of dam..... 2.3
5. Test flood pool..... 3.0

e. Storage (acre-ft.)

1. Recreation pool..... 11,010
2. Flood control pool..... Not applicable
3. Spillway crest..... 10,730
4. Top of dam..... 13,610
5. Test flood pool..... 14,730

f. Reservoir Surfaces (acres)

1. Recreation pool..... 594
2. Flood control pool..... Not applicable

3.	Spillway crest	570
4.	Top of dam	690
5.	Test flood pool	900

g. Dam

1.	Type	Gravity; wooden planks over stone masonry spillway with concrete intake structure at left side
2.	Crest length	78 ft.
3.	Height	24 ft.
4.	Top width	Not applicable
5.	Side slopes	Not applicable
6.	Zoning	Unknown
7.	Impervious core	Unknown
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	Approximately 120-ft. long earth and rock dike separates power canal from D/S channel

h. Diversion and Regulating Tunnel — Not applicable

i. Spillway

1.	Type	Timber planked stone masonry broad crested weir
2.	Length of weir	55 ft.
3.	Crest elevation	570.0 ft.
4.	Gates	None (flashboards are a maximum of 1 ft. in height)
5.	U/S channel	60-ft. wide x 220-ft. long channel from Wilson Pond having an 8 ft. normal water depth
6.	D/S channel	60 ft. wide Wilson Stream through downtown Wilton
7.	General	Power canal running parallel to D/S channel on left bank has a 32-ft. long overflow weir at crest El. 570.0

j. Regulating Outlets. The reservoir drain consists of a gated 2-ft. diameter low level outlet (estimated invert El. 561) through the power canal dike which discharges into Wilson Stream immediately downstream of the spillway. Although the drain was apparently intended for dewatering the power canal, it can also serve as a reservoir drain if the two 4 x 8-ft. wooden canal sluice gates (estimated invert El. 561) are also opened. Significantly greater outlet works capacity is available when the power generating facilities are opened and water is allowed to flow from the power canal through the shoe factory.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No design data for the original dam were located and none are believed to exist.

2.2 Construction Data

The Operator of Wilson Pond Dam believes the dam to have been constructed between 1840 and 1850. However, no data concerning the construction of the dam were disclosed.

2.3 Operation Data

Neither the Owner nor the State maintain records regarding the operation of the dam. No data on the operation of the dam were available.

2.4 Evaluation of Data

a. Availability. A list of the data available for use in preparing this report is included on page B-1. A selected document from the listing is also included in Appendix B.

b. Adequacy. There was a lack of engineering data available to aid in the evaluation of Wilson Pond Dam. This Phase I assessment was therefore based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement.

c. Validity. In general, the available data located were not applicable to an engineering evaluation of the dam.

SECTION 3 - VISUAL EXAMINATION

3.1 Findings

a. General. The Phase I visual examination of Wilson Pond Dam was conducted on 8 November 1979. The upstream water surface elevation was about 0.5 ft. above the spillway crest that day. The 1 ft. of flashboards, maintained on the spillway crest during the summer, had been removed for the winter months.

In general, the project was found to be in fair condition. Several deficiencies which require correction were noted.

A visual inspection check list is included in Appendix A and selected photographs of the project are given in Appendix C. A "Site Plan Sketch", page C-1, shows the direction of view for each photograph.

b. Dam. Wilson Pond Dam, the spillway and adjacent intake structure, appears to be in good to fair condition. The spillway was obscured from view by flowing water during the site visit, Photo No. 4. However, based upon those portions of the spillway that could be viewed, the abutments, and observations made during an initial site reconnaissance in September 1979, Photo No. 5, when no water was flowing over the weir, the structure appears to be in good condition. The only significant conditions noted near the spillway were an apparent depression of the stream bed downstream from the weir, erosion of the concrete/ledge interface downstream of the right abutment, Photo No. 6, and the loss of stone at the masonry retaining wall about 50 ft. downstream of the right abutment, Photo No. 7.

The intake structure, Photo No. 3, is in fair condition. Although the operation of the intake gates and canal drain was not demonstrated during the site visit, nothing was observed that would indicate that they were not operational. Water from the approach channel was observed to be passing through or around the intake structure and into the power canal. The exact nature of the leakage is unknown, but there is a 1-ft. deep depression in the ground behind the left spillway abutment wall close to the intake structure. Flow was also evident from the power canal to the downstream channel in the vicinity of the canal drain, Photo No. 9. In both cases, the water was clear.

c. Appurtenant Structures. The power canal, Photo No. 10, is in fair condition with several local failures of the stone walls along the canal. Minor brush is present along

the banks of the upstream end of the canal and growing out of the masonry joints at various locations throughout the site. In particular, a 6-in. diameter birch tree is growing out of the wall at the downstream end of the power canal between the forebay and overflow weir, Photo No. 12.

The wooden access bridge and area adjacent to the forebay are in good condition, Photo No. 11. The debris rack over the intake of the shoe factory power tunnel, though rusted, is considered to be in good condition and was free of debris.

The dike that separates the power canal from the downstream channel is in need of maintenance. The crest of the dike is about 15 ft. wide and is vegetated with grass and weeds. Several areas have been worn bare, Photo No. 1, from foot traffic. On the downstream side, the slope of the dike is quite irregular and part is approximately 1 horizontal to 1 vertical. Brush and about two dozen trees up to 24 in. in diameter, cover the slope. There is local erosion and sloughing of the slope, and several voids extend about 3 ft. into the dike under rocks along the downstream side.

The canal overflow weir at the downstream end of the dike is in poor condition, Photo No. 12. The concrete surfaces have eroded and there are a number of cracks in the weir, two of which are large enough to allow considerable seepage flow, Photo No. 13. Water was also noted to be seeping through the stone masonry wall which serves as the left abutment of the weir. Small trees are growing in the masonry at the left abutment and at the apron of the overflow weir.

The apron downstream of the canal overflow weir is comprised of boulders, mortared riprap and concrete. Seepage through the weir was entering cracks on the downstream side of the apron and flowing beneath it. The water was clear, but it is not known if any water was passing directly under the overflow weir or if it was all originating from the cracks in the weir.

d. Reservoir Area. Wilson Pond is bordered by sparsely developed, heavily forested rolling to mountainous terrain, Photo No. 14. The shoreline is generally developed, as well as one small island located in the upper end of the pond. There is no significant probability of landslides into the reservoir affecting the safety of the dam. No conditions were noted which could result in a sudden increase in sediment load into the reservoir. The banks of

Wilson Pond, at the southern end in the vicinity of the dam, are formed with stone masonry, Photo No. 15. This masonry is continuous from the reservoir, under the Canal Street bridge and along the approach channel. The alignment and condition of the masonry is good along the approach channel, Photos No. 2 and 8, but considered only fair along Wilson Pond with local failed areas. However, this condition does not affect the safety of the dam. Immediately downstream of the Canal Street bridge are the supports for an abandoned fish screen.

e. Downstream Channel. Wilson Stream conveys discharges from the pond a distance of approximately 14 mi. to Farmington Falls, Maine, where the stream joins the Sandy River. The Main Street bridge crosses Wilson Stream approximately 500 ft. downstream of the dam and marks the beginning of the downtown section of the Town of Wilton through which the stream flows, Photos Nos. 16 and 17. The channel has some debris and minor vegetation in it immediately downstream of the dam. Approximately 4,400 ft. downstream of Wilson Pond Dam is the remains of the breached Wilton Woolen Company Dam.

3.2 Evaluation

Based on the visual examination conducted on 8 November 1979, Wilson Pond Dam is considered to be in fair condition. The remedial measures outlined in Section 7.3 should be implemented to correct the noted deficiencies in the intake structure, canal (reservoir) drain, dike and canal overflow weir.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. In general, there are no formal procedures for the operation of Wilson Pond Dam. The one foot flashboards are removed in the fall and replaced in the spring. The intake gates are operated in conjunction with the canal drain to provide downstream flow during periods of low run-off. Although the operation of the intake gates and canal drain was not demonstrated during the site visit, nothing was observed that would indicate that they were not operational. According to the Owner, the power generating facilities are not normally used, but are available for emergency operation.

b. Description of Any Warning System in Effect. There is no warning system or emergency preparedness plan in effect for this structure.

4.2 Maintenance Procedures

a. General. There are no established procedures or manuals for inspection and maintenance of the dam. Remedial measures are reportedly performed by the Owner.

b. Operating Facilities. There is no formal plan to maintain the flashboards, intake structure, canal drain or power generating facilities. Reportedly, the spillway timber planks were last replaced about 20 years ago and repairs were performed on the intake gates in 1978. Rehabilitation of the channel wall masonry downstream of the canal drain outlet which was performed in 1970 is evident (see Appendix page A-4).

4.3 Evaluation

Maintenance of the facility is being performed on the basis of need as determined by the Owner. There are currently no formal operation and maintenance procedures in effect for Wilson Pond Dam. Formal written operational procedures, maintenance programs, warning system and emergency preparedness plans should be established.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Wilson Pond Dam forms a large (570 acre) recreational pond. The earth and stone dam has a 55-ft. long spillway with a wood planked surface and provisions for 1 ft. of flashboards. The spillway freeboard is approximately 5 ft. relative to its left abutment, which incorporates two 4-ft. wide by 8-ft. high intake gates. The intake gates regulate flow to a power canal which has a gated 24-in. drain that allows flow directly back to the downstream channel. The power canal runs parallel to the downstream channel for approximately 150 ft. before entering a shoe factory. A 32-ft. long canal overflow weir, having the same crest elevation as the spillway, discharges to Wilson Stream approximately 110 ft. downstream of the dam. The drainage area tributary to Wilson Pond Dam is 27-sq. mi. of heavily-forested rolling to mountainous terrain. The normal surface area of Wilson Pond represents about 3 percent of the total drainage area. The reported surcharge storage available between spillway crest and top of dam is 2,800 acre-ft.

5.2 Design Data

There are no hydraulic/hydrologic design data available for the dam.

5.3 Experience Data

The most significant flood at the dam site, for which pictorial records are available, occurred on 27 March 1953. Based on photographs contained in the pictorial account of the flood, titled "Wilton Flood", as well as the recollection of the dam operator, it is estimated that the Wilson Pond peak flood crest was equal to top of dam elevation. Analysis contained in Appendix D indicates that this flow was not greater than 10 percent of the routed PMF outflow.

5.4 Test Flood Analysis

Based on the Corps of Engineers Guidelines, the recommended test flood for the size "intermediate" and hazard

potential "high" is the Probable Maximum Flood (PMF). The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The 27-sq. mi. drainage area consists of sparsely developed, heavily-forested, rolling to mountainous terrain. A peak inflow rate of 1,500 csm was selected for the PMF inflow which results in a test flood inflow of 40,500 cfs.

Surcharge storage routing of the test flood inflow, assuming no flashboards on the spillway and the power canal intake gates opened when the upstream water surface is 2 ft. below top of dam, resulted in a routed test flood outflow of 34,500 cfs at a stage approximately 9 ft. above the top of dam. This stage was assumed to be the maximum attainable level based on available topographical information. Higher discharges are assumed to spread out and flow overland with no appreciable increase in pond level. The spillway capacity at test flood stage is 9,300 cfs or about 27 percent of the routed test flood outflow. The spillway capacity at top of dam with no flashboards in place (2,100 cfs) is approximately 6 percent of the routed test flood outflow. Consequently, the spillway is considered hydraulically inadequate under test flood conditions.

5.5 Dam Failure Analysis

Based on Corps of Engineers guidelines for estimating dam failure hydrographs, and assuming that the water surface is at top of dam and that a failure would involve 50 percent of the length of the spillway, the peak failure outflow is estimated to be about 1,940 cfs in addition to the 3,360 cfs project discharge occurring prior to failure. Flooding conditions downstream of the dam prior to failure are such that Wilson Stream would be at the top of its banks, just below the sill elevations of several homes and businesses located in the center of Wilton. The flood surge resulting from a dam failure would cause Wilson Stream to overtop its banks by a depth of about 4 ft., most likely destroying structures located along its banks as well as producing shallow depth sheet flooding down Main Street as it runs through the downstream section of Wilton. Approximately 10 homes and businesses would be seriously damaged or destroyed and several others along Main Street would be impacted by sheet flow flooding.

The potential loss of life resulting from a dam failure would be more than a few and the dam is accordingly classified in the "high" hazard category.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

There was no observed visual evidence of major settlement or lateral movement of Wilson Pond Dam. The spillway was obscured by flowing water during the site examination, making a detailed examination of it impossible. However, a probe of the channel bottom immediately downstream of the spillway indicated that a depression exists in the streambed, either by design or by scour. If scour has occurred in this area, it could affect the stability of the dam.

The flow of water detected at the intake structure and canal drain makes the long-term stability of this area uncertain. Since no records or prior inspection reports exist, the duration and extent of the conditions are unknown and, in turn, warrant particular attention.

The numerous trees on the earth and rock dike pose a threat to its stability. The dike is a secondary feature of the facility, but a local failure of the dike could eventually compromise the integrity of the dam.

A structural failure, or total loss, of the canal overflow weir is similarly not expected to immediately jeopardize the stability of the spillway or intake structure. However, the masonry of this structure is in need of rehabilitation.

6.2 Design and Construction Data

No design or construction data were located for Wilson Pond Dam.

6.3 Post-Construction Changes

The absence of design and construction data precludes an evaluation of the facility for post-construction changes. However, the right training wall of the spillway, the intake structure for the power canal, the headwall for the canal drain and the canal overflow weir are constructed of concrete while the spillway is constructed of stone masonry

and timber. This tends to indicate that these appurtenant concrete structures were probably constructed or rebuilt at a later date than the original spillway.

6.4 Seismic Stability

Wilson Pond Dam is located in Seismic Zone 2 and in accordance with Recommended Phase I Guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination of Wilson Pond Dam revealed that the structure was in fair condition. Although there were no signs of impending structural failure or other conditions which would warrant urgent remedial action, several deficiencies were noted.

Based on the results of computations included in Appendix D and described in Section 5, the spillway is not capable of passing the test flood, which for this structure is the PMF. The PMF outflow of 34,500 cfs (inflow 40,500 cfs or 1,500 csm) would overtop the dam by about 9 ft. With the water level at the top of the dam and no flashboards in place, the spillway capacity is about 2,100 cfs, which is 6 percent of the test flood outflow.

b. Adequacy of Information. This evaluation of the dam is based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement. Generally the information obtained was adequate for the purposes of a Phase I assessment. However, it is recommended that additional information regarding the depression in the streambed downstream of the spillway, the flow to and from the power canal in the area of the intake structure, and the need for and means of increasing the spillway capacity as outlined in Section 7.2, be obtained.

c. Urgency. The recommendations for additional investigations and remedial measures outlined in Sections 7.2 and 7.3, respectively, should be undertaken by the Owner and completed within one year after receipt of this report.

7.2 Recommendations

It is recommended that the Owner engage a registered professional engineer qualified in design and construction of dams to undertake the following investigations:

1. Assess the effect of the depression in the streambed immediately adjacent to the downstream face of the spillway, on the stability of the structure.

2. Investigate the apparent seepage flow at the intake structure into the power canal, from the power canal to the downstream channel and the 1 ft. depression in the vicinity of the canal drain to assess their effect on the stability of the dam.

3. Perform a hydraulic/hydrologic investigation to determine the need for and means of increasing the discharge capacity of the facility.

The Owner should then implement corrective measures on the basis of these engineering evaluations.

7.3 Remedial Measures

Although the dam is generally in fair condition, it is considered important that the following items be accomplished.

a. Operation and Maintenance Procedures. The following should be undertaken by the Owner:

1. Repair the voids in both the concrete and stone masonry walls downstream of the right spillway abutment. If these properties are owned by others, the condition should be called to their attention for remedial action.

2. Replace missing stones along the banks of the power canal.

3. Repair cracks and eliminate seepage at the concrete canal overflow weir.

4. Remove brush and trees that overhang the spillway approach channel, power canal and canal overflow weir.

5. Cut the smaller trees (less than 3 in. in diameter) on the earth and rock dike. Stumps should be removed and voids filled.

   Also, the Owner should consider cutting the larger trees on the dike, removing their stumps and major root systems, and backfilling the voids. In conjunction with this work, the areas of the dike where local erosion and sloughing are occurring should be filled and provided with a well developed surfacial layer of vegetation.

6. Prepare an operations and maintenance manual for the dam. The manual should include provisions for

annual technical inspection of the dam and for round-the-clock surveillance of the dam during periods of heavy precipitation and high project discharges. The procedures should delineate the routine operational procedures and maintenance work to be done on the dam including the intake gates and canal drain to ensure safe, satisfactory operation and to minimize deterioration of the facility.

7. Develop a written emergency preparedness plan and warning system to be used in the event of impending failure of the dam or other emergency conditions. The plan should be developed in cooperation with local officials and downstream inhabitants.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A - INSPECTION CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

Dam: Wilson Pond

Date: 8 November 1979

Time: 0730-1130

Weather: Overcast, cool (approx. 40°F)

Water Surface Elevation Upstream: 570.5 (NGVD) (0.5 ft. above spillway crest)

Stream Flow: Unknown

Inspection Party:

Peter L. LeCount	-	Soils/Geology
Charles R. Nickerson Haley & Aldrich, Inc.		
Roger H. Wood	-	Structural/Mechanical
Joseph E. Downing Camp, Dresser & McKee, Inc.	-	Hydraulic/Hydrologic

Present During Inspection:

Dana Eames (during most of the site examination)

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Wilson Pond Dam DATE: 8 Nov 79

AREA EVALUATED	CONDITION
POWER CANAL DIKE EMBANKMENT	
Crest Elevation	570.0 (Spillway and canal weir)
Current Pool Elevation	570.5
Maximum Impoundment to Date	27 March 1953, (See Appendix B)
Surface Cracks	None observed
Pavement Condition	Not applicable
Movement or Settlement of Crest	None observed, crest has irregular shape
Lateral Movement	Not evident due to irregularity
Vertical Alignment	Fair, irregular
Horizontal Alignment	Fair, irregular
Condition at Abutment and at Concrete Structures	Satisfactory except for approximately 1-ft. deep hole behind left training wall of spillway. Possible seepage between spillway and power channel
Indications of Movement of Structural Items on Slopes	No structural items on slopes
Trespassing on Slopes	Unrestricted, but not common or significant
Animal Burrows in Embankment	None observed
Vegetation on Embankment	Top and upstream edge grass, downstream slope has brush and trees (max. 24 in. diameter), and exposed roots
Sloughing or Erosion of Slopes or Abutments	Minor local erosion of downstream face, with several holes exposing rock fill (probed max. 4.5 ft. into voids)
Rock Slope Protection - Riprap Failures	Upstream face has stone masonry wall; upper stones missing at one location
Unusual Movement or Cracking at or near Toes	Downstream slope irregular with numerous rocks
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None observed, canal weir apparently founded on bedrock
Toe Drains	None observed
Instrumentation Systems	None

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Wilson Pond Dam DATE: 8 Nov. 1979

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	See spillway approach channel
b. Intake Structure	
Condition of Concrete	Good. Slight deterioration at cold joints
Stop Logs and Slots	No provision for stop logs observed
Gates	Two manually operated gates to canal; recently maintained; visible portion is in good condition
OUTLET WORKS - SERVICE BRIDGE	
a. Concrete and Structural	
General Condition	Good
Condition of Joints	None observed
Spalling	None observed
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	Seepage through left wall into canal
Cracks	Several old minor cracks - right side
OUTLET WORKS - CANAL	
General Condition	Stone masonry: cut stone open joint masonry near service bridge, fieldstone open joint at left side and primarily open joint cut stone on right side with some fieldstones at top
Canal Bottom	Not visible

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Wilson Pond Dam DATE: 8 Nov. 1979

AREA EVALUATED	CONDITION
Seepage	Some flow appears to be coming through both side walls at upstream end, especially the right side wall
Loose Stone	There has been some displacement of rock into the canal especially the U/S end of the left side and also near the center of the right side.
Overhanging trees	None; some brush present near top of walls on both sides
Gates	Waste gate (possibly 3' wide) at right side. Conveys water back to channel D/S of weir. Appears in good condition but has rusted operating rod. Concrete structure appears to be in good condition. End wall appears to be recently re-mortared or rebuilt (1970 date in mortar)
OUTLET WORKS - CANAL WEIR	
General Condition of Concrete	Poor
Rust or Staining	None observed
Spalling	None observed
Erosion or Cavitation	Surface erosion
Visible Reinforcing	None observed
Any Seepage or Efflorescence	Flow through two cracks (10± cracks present) Seepage flow through left abutment and left side wall. Some of the flow is going below D/S apron. There may be seepage under apron but cannot be certain due to conditions
Condition of Joints (Weir)	Eroded
Drain holes	None observed
Loose Rock or Trees Overhanging Channel	One tree right side
Condition of Discharge Channel	Concrete apron and boulders, one bush present. Flow exiting from under apron. Eroded apron surface

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Wilson Pond Dam DATE: 8 Nov. 1979

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good. Roadway bridge at entrance to channel. Riprap at bridge displaced on right side probably due to construction of sewer crossing
Loose Rock Overhanging Channel	None observed
Log Boom	None, but provisions for fish screen or bar rack present at bridge abutments and pier at channel entrance
Trees Overhanging Channel	1 on left side, 5 ± on right side
Floor of Approach Channel	Good; only minor trash present
Channel Walls	Open joint stone masonry walls: few missing stones
b. Weir and Training Walls	
General Condition of Walls	Stone masonry walls left side (mortared above water line - open joint below) Concrete wall on right side founded on ledge. Good condition
Weir	Timber planking visible. Battered upstream and downstream faces. Provision for reported 12 in. of flashboards. Minor debris hung up on flashboard pins. Note flow precludes a detailed inspection.
Rust or Staining	None observed
Spalling	At cap only
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	None observed
Drain Holes	None observed
Erosion	Right wall D/S erosion at concrete-ledge interface

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Wilson Pond Dam DATE: 8 Nov. 1979

AREA EVALUATED	CONDITION
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	Masonry wall on right side is loose (part of roadway retaining wall)
Trees Overhanging Channel	10 ± trees on left side
Floor of Channel	Rocky with some loose rock, few logs and minor trash present

APPENDIX B - ENGINEERING DATA

LIST OF AVAILABLE DATA
WILSON POND DAM

Document	Contents	Location
Wilton Flood	Photographic account of the flood on 27 March 1953	Wilton Historical Society Wilton, Maine (See Appendix pages B-2 through B-9)
Wilton's 150 Years 1803-1953	A booklet prepared for sesqui-centennial observance dated July 1953	Wilton Historical Society
Wilton Community Development Committee Report	Study of town planning and development	Town Office Town of Wilton Wilton, Maine

MARCH 27
1953

Wilton FLOOD

FIVE MINUTES after all furnishings except a kitchen range had been removed and firemen and volunteers had been ordered out by Fire Chief Raymond Whitney of the Wilton Fire Department, the Newton Harnden home on Davis Court folded and disappeared into a rampaging Wilson Stream. ''The chimney snapped like a whip, gave three puffs, and disintegrated'',as one spectator described it. The house had recently been redecorated inside and out. Nothing remains even of the land on which the house stood except what holds a small portion of the front and southeasterly foundation walls.

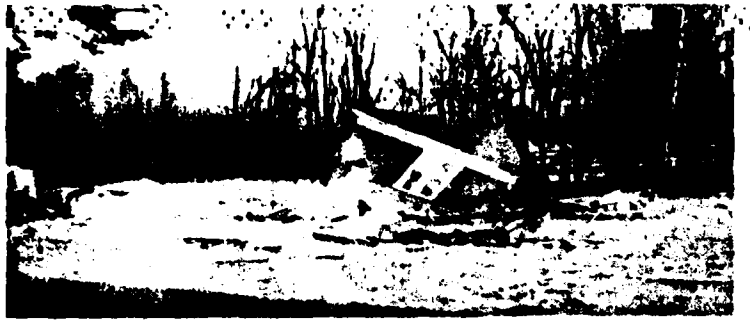
LeRoy Woodman Photo

ALBERT ''RUD'' FIEL, local contractor, placing sand bag to re-enforce Depot Street end of Wilton Woolen Company dam. Despite high water battering company buildings, not even one pane of glass was broken. Only superficial wetting was sustained by the dye house.Valuable dyestuffs and motors had been removed by a group that had started working at 4 a.m.

WILLARD BASS surveys sandbag that he has just reset more securely into place to help hold back sideswiping Wilson Stream as it rages over the popular picnicking grounds near the G. H. Bass & Co. parking area.

THE DAM shows the haste with which Wilson Lake is determined to become a full-fledged river.

MILL DAM taken through spray from Wilton Woolen Company shipping room window at 'crest time'.



HARNDEN HOUSE photographed a few seconds after cover photo (*LeRoy Woodman Photo*). Where were we when this happened? See opposite page.

DAY AFTER: flood water is still over Route 2 leading to East Dixfield. A rare sight is this one - of TWO teams of horses!

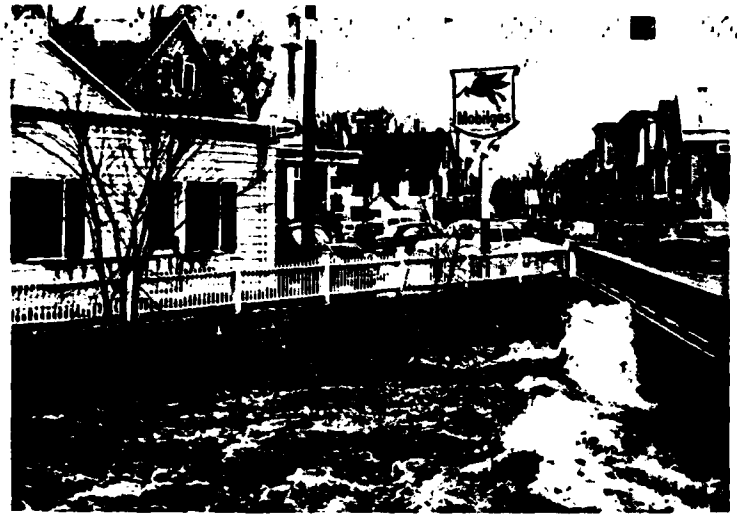
All photos were taken by Harold Karkos except those credited to LeRoy Woodman, proprietor of PIERWOOD STUDIO, Wilton, and of LUCE'S STUDIO in Farmington.

Booklets of photographic prints of flood scenes may be obtained from Mr. Woodman or at either Studio.

Printed by WILTON PRINTING SERVICE

WILSON STREAM looking toward the lake from the bridge near Brookside Filling Station.

EVERETT MASTERMAN, in firemen's garb, points out portion of damage to retaining wall as Willard Bass looks on.



RAGING STREAM pounds bridge near Brookside Filling Station but bridge wins battle without returning a single blow.

FREE PARKING AREA near Davis & Rolfe warehouse. Note landslide in background. Extensive water damage was dealt the goods stored in the basements of Edwards, Larrabee's, First National Stores, Davis & Rolfe, and Scrivens Store. Fire Department pumpers fought the water.

SPENCER TRASK ''soaking his feet'' in the Recreation Room of the Congregational Church basement. Motors and oil burners have been safely removed.

TOWN GRADER pulls out clump of trees in order to allow stream to straighten and thus prevent further undermining of Davis Court road.

LOOKING NORTH down Main Street as repair crew work hard to keep stream from eroding Wilton's main thoroughfare.

"DRYDEN FALLS" over new sidewalk with Marble's Model Cleaners truck fighting the current. Dryden Post and Hall's Variety Store shown at right in distance.

PORTION OF WALL near the bridge leading to Hubert Ryan's law office shown at extreme right and to the Wilton Free Public Library at the height of the battering by Wilson Stream.

FROM NEAR TONY'S MARKET porch one sees water crossing Village View Street in Dryden.

JIM ORDWAY, town manager, directs chopping of hole in bridge as a precautionary measure prior to anchoring with chain to tree on Congregational Church lawn. P.S. Bridge remained.

''BUBBLING SPRING'' appears in Main Street near Wilton Furniture Store.

''NORRWOCK POND'' in North Jay with the Old Trading at the left (formerly Allen's Garage). Norrwock Shoe Company is shown in the distance beyond reach of the waters.

LAURENCE CRANEY house behind Joe's Esso Station is surrounded by stream at flood-tide.

[illegible] WALTER HOLMES residence taken from the New Jay [illegible]. Photo shows water over Route 2 and the Old Jay [illegible].

''BACKUS LAKE'' near but not endangering the Studebaker headquarters of Wayne and Vestena Backus. View from East Wilton road looking toward Wilton.

LOCAL BOY surveys high water behind K & D Diner. At right is storage tower of former woodworking plant.

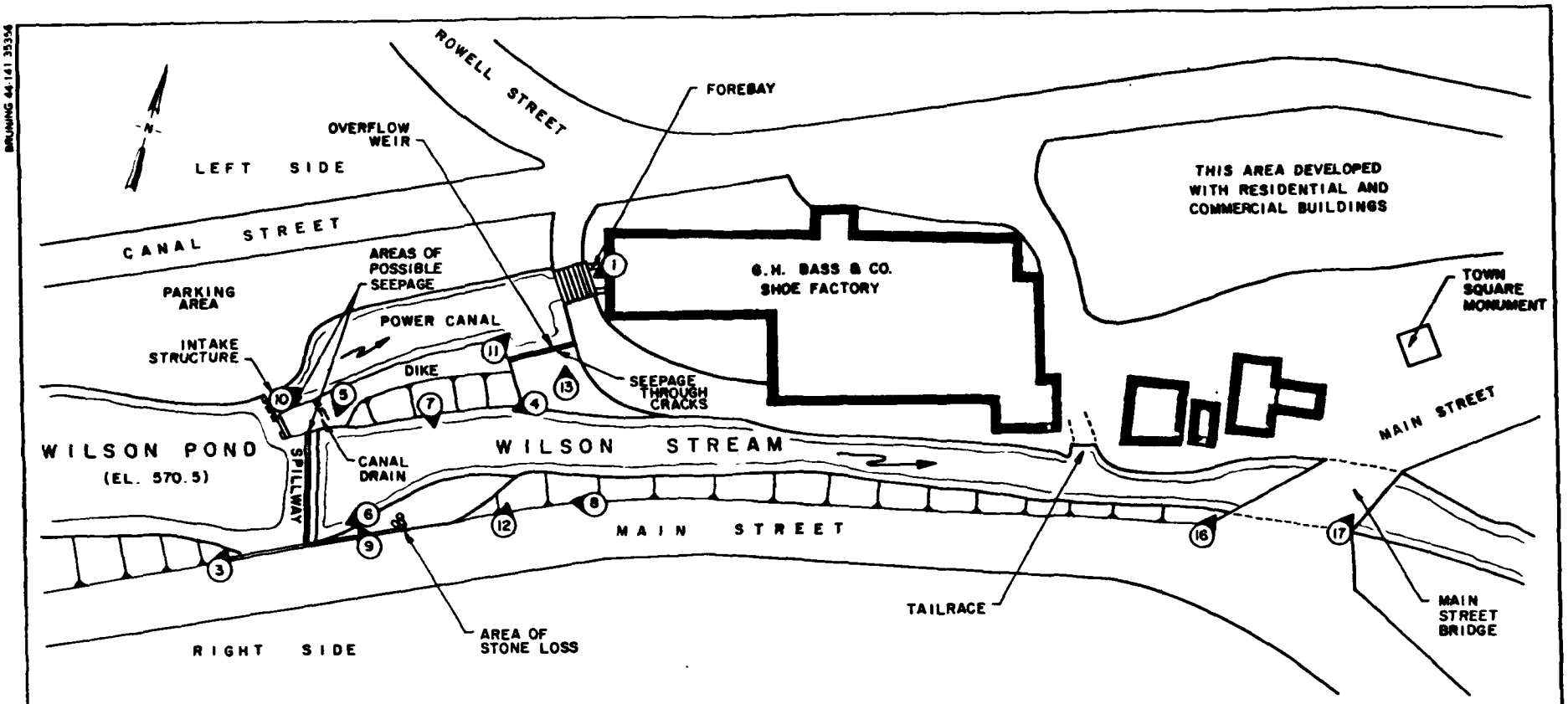
HIGH WATER pours over dam at East Wilton near the Reynolds & Ouellette Store and opposite the Post Office.

VIEW from Central Garage.

DAVIS COURT - Fifteen minutes after the Newton Harnden House (shown on cover) had disappeared and fifteen minutes before the tall evergreen behind the fence had followed the house downstream.

MAIN STREET - Just as repair work was getting under way. Rear of Edwards Store overhangs Wilson Stream.

APPENDIX C - PHOTOGRAPHS



NOTES

PLAN DEVELOPED FROM "G. H. BASS & CO., WILTON, ME", BY IMPROVED RISK MUTUALS, DATED NOVEMBER 1927 AND FIELD OBSERVATIONS MADE ON 8 NOVEMBER 1979.

PHOTOS NOS. 2, 14, AND 15 WERE TAKEN AT LOCATIONS OUTSIDE THE LIMITS OF PLAN.

LEGEND

(2) PHOTO NUMBER AND DIRECTION OF VIEW

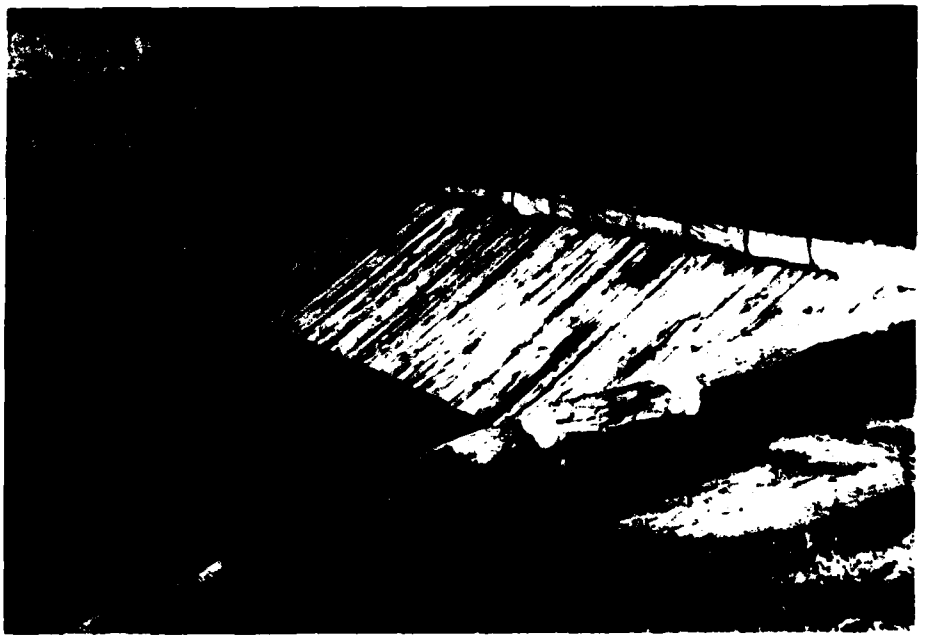
Wilson Pond Dam
Wilton, ME

SITE PLAN SKETCH

2. Overview of Wilson Pond Dam, upstream

3. Intake structure

4. Spillway and right abutment, downstream



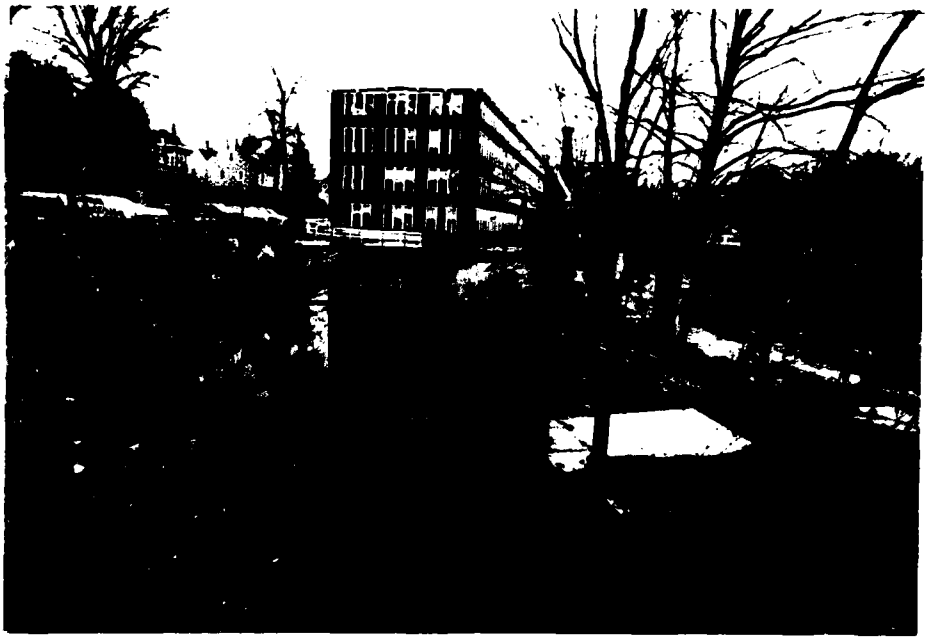
5. Spillway with flashboards and right abutment, during period of low flow (September 1979)

6. Right abutment training wall, downstream

7. Failed area of stone masonry retaining wall, right side downstream of spillway

8. Spillway and left spillway abutment, downstream

9. Left spillway abutment, intake structure and canal drain



10. Power canal downstream from intake structure

11. Power tunnel forebay with access bridge

12. Canal overflow weir from right downstream bank

13. Cracks and seepage at canal overflow weir

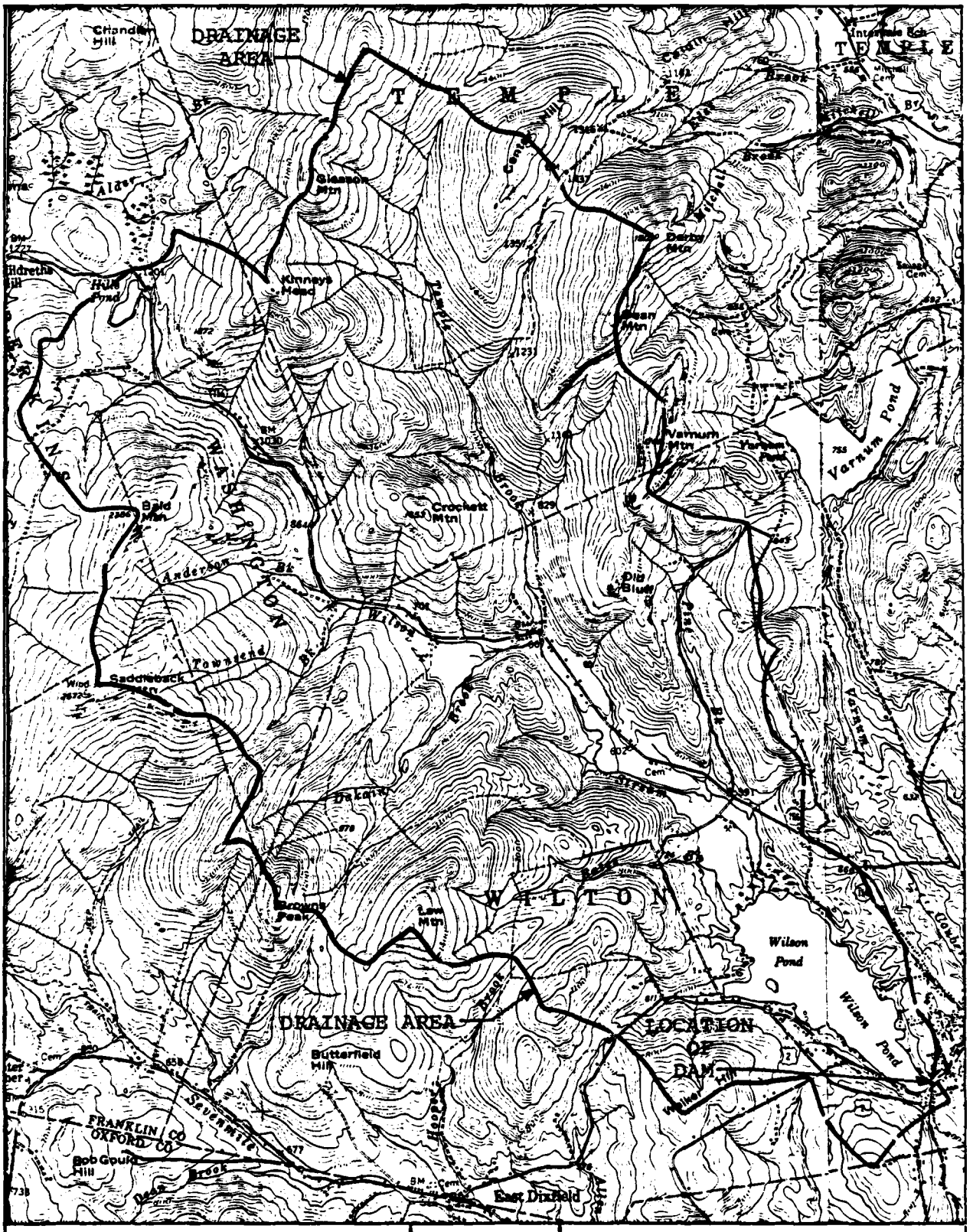
14. Wilson Pond

15. Wilson Pond entrance to approach channel at Canal Street Bridge

16. Downstream channel at Main Street Bridge and power tunnel tailrace outlet

17. Wilson Stream along downtown Wilton, Maine

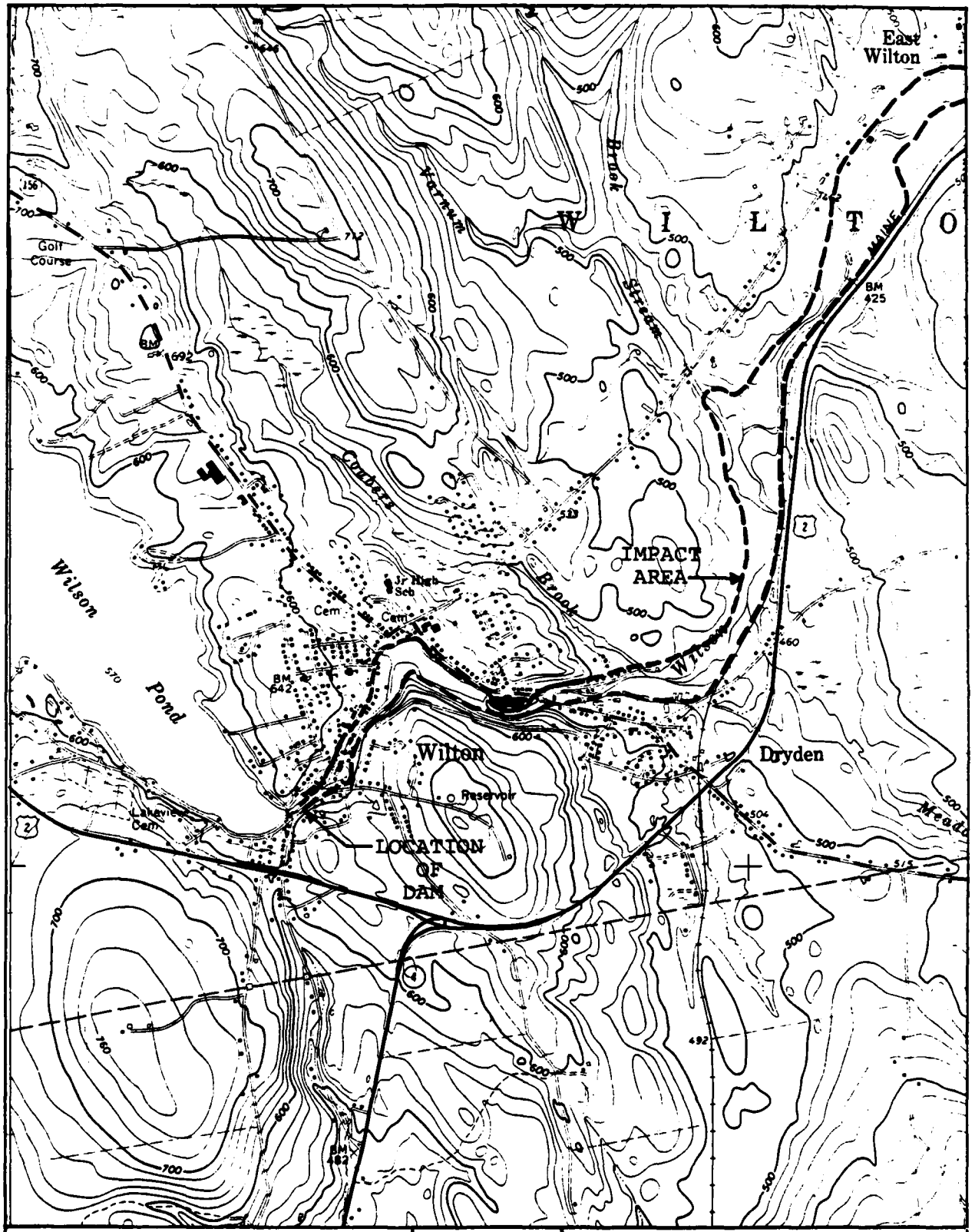
APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS



WILSON POND DAM
ME 00121

DRAINAGE AREA
MAP

APPROX. SCALE: 1' = 5200'



WILSON POND DAM
ME 00121

DAM FAILURE IMPACT AREA MAP

APPROX. SCALE: 1" = 2000'

CAMP DRESSER & McKEE | CLIENT HALEY & ALDRICH | JOB NO. 561-10-RT-14 | COMPUTED BY JED
PROJECT DAM INSP. | DATE CHECKED 1-18-80 | DATE 1/9/80
DETAIL WILSON POND DAM | CHECKED BY Joe A. | PAGE NO. 1

ELEVATIONS

Spillway Crest Elev. 570.0 (assumed from USGS Quad: Wilton, Me, 1968)
Toe of Dam Elev. 551.0
Top of Dam Elev. 575.2
Inv. of Outlet Works Elev. 561.25
Crest Elev of Canal Overflow Weir 570.0

SURFACE AREAS

Drainage Area = 17,280 acres = 27 sq. mi.
From USGS Quads, Wilton, Me. & East Dixfield, Me., 1968:
W.S. Area at Spillway Crest Elev. 570.0 = 570 acres = 0.9 sq. mi.
W.S. Area at Contour 580.0 = 806 acres = 1.3 sq. mi.

Estimate W.S. Area at top of dam (Elev. 575.2)

$(570 + 806)/2 = 688$ acres at Elev. 575.0

Say W.S. Area = 690 acres at Elev. 575.2

STORAGE CAPACITIES

According to COE National Inventory of Dams,
Normal Storage = 10,730 acre-ft. (assume elev. 570.0)
Maximum Storage = 13,610 acre-ft. (assume elev. 575.2)

Then 10,730 ac-ft. / 570 acres = 18.8 ft. avg. normal pond water depth - unable to verify

Surcharge Storage = 13,610 - 10,730 = 2,880 ac-ft. according to COE Nat'l Inv. of Dams

Estimated Surcharge Storage = $(570 + 690)/2 \times 5.2' = 3,276$ ac-ft

However, Est. Surcharge Storage, based on linear interpolation method, does not account for 3 ft. to 5 ft. steep banks along most of the shorline of Wilson Pond.
∴ use 2,880 ac-ft. surcharge.

Storage at Elev. 570.0 = 10,730 acre-ft.
Storage at Elev. 575.2 = 13,610 acre-ft.

Note: Town records report W.S. Area of 480 acres with avg. pond depth of 38 ft. and storage of 18,240 ac-ft. Since area differs by ~20% from Quads, use info. developed above.

SIZE CLASSIFICATION

Height = 575.2 - 551.0 = 24.2 ft.

Storage at top of dam = 13,610 acre-ft.

∴ Size is INTERMEDIATE based on the storage capacity.

HAZARD CLASSIFICATION

Based on the results of the dam failure analysis, pages 6 & 7, a failure would result in the potential loss of more than a few lives.

∴ Hazard Classification is HIGH

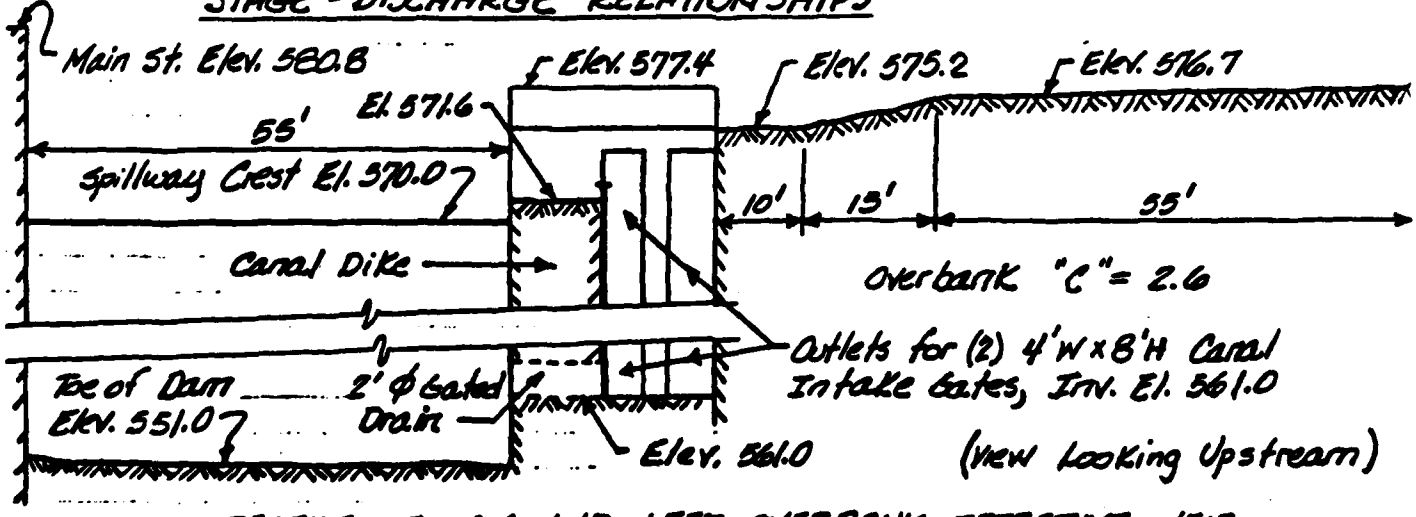
TEST FLOOD DETERMINATION

For an Intermediate size and high hazard, COE Guidelines give the Probable Maximum Flood (PMF) as the test flood.

The watershed consists of sparsely developed, heavily forested rolling to mountainous terrain. Use 1500 csm for PMF inflow for the 27 sq. mi. D.A.

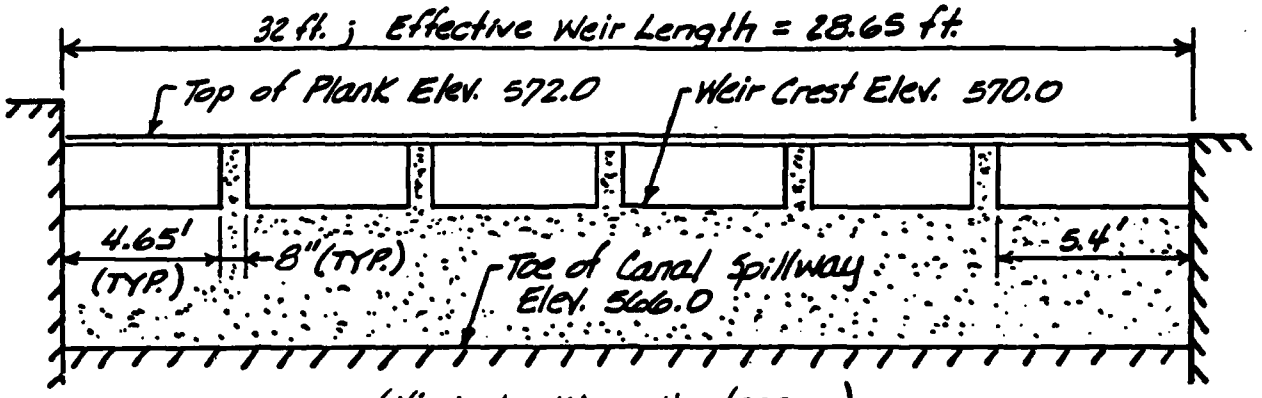
∴ Test Flood Inflow = 27 sq. mi. x 1500 cfs/sq. mi. = 40,500 cfs

STAGE - DISCHARGE RELATIONSHIPS



PROFILE OF DAM AND LEFT OVERBANK EFFECTIVE WEIR

Approx. 125 ft. d/s of the spillway is a Canal Side-Overflow Weir at crest elev. 570.0



(View Looking Upstream)

PROFILE OF CANAL OVERFLOW WEIR

The stage-discharge relationships are a function of both the operation of the canal gates and whether there are flashboards present.

Since normal operating procedures are to remove the flashboards in the fall and not replace them until after the spring run-off has occurred, assume that there are no flashboards under test flood conditions.

Since normal operating procedures are to open the canal gates whenever the dam becomes threatened, assume gates are opened when W.S. reaches Elev. 573.0

Determine when canal gates vs. canal spillway control discharge rate.

Canal Gates $Q_1 = CA\sqrt{2gh} = 0.9 \times (4 \times 8) \times 2\sqrt{64.4(W.S. - 565.0)}$
$= 57.6\left[64.4(W.S. - 565)\right]^{1/2}$

Canal Spillway $Q_2 = CLH^{3/2} = C(28.65)(W.S. - 570)^{3/2}$; C varies with H

From computations (see table, next page), the canal/spillway controls for pond stages below top of dam and the canal gates control for stages above top of dam.

W.S. ELEV.	MAIN SPILLWAY "C"	MAIN SPILLWAY Q (cfs)	OVERBANK FLOW (cfs)	CANAL SPILLWAY "C"	CANAL SPILLWAY Q (cfs)	CANAL GATES (cfs)	TOTAL FLOW (cfs)
570.0	-	0	-	-	*(0)	*(1,030)	0
571.0	3.13	170	-	3.0	(90)	(1,130)	170
572.0	3.22	500	-	3.2	(260)	(1,220)	500
573.0	3.22	920	-	3.4	510	(1,310)	1,430
574.0	3.22	1,420	-	3.6	830	(1,390)	2,250
575.2	3.22	2,100	0	3.7	1,260	(1,480)	3,360
576.0	3.22	2,600	20	3.7	(1,560)	1,530	4,150
576.7	3.22	3,070	70	3.7	(1,840)	1,580	4,720
578.0	3.22	4,010	450	3.7	(2,400)	1,670	6,130
579.0	3.22	4,780	900	3.7	(2,860)	1,730	7,410
580.0	3.22	5,600	1,450	3.7	(3,350)	1,790	8,840
581.0	3.22	6,460	2,080	3.7	(3,870)	1,850	10,390

Elev. > 581.0 water will overtop Main St., assume El. 584.0 to be max. W.S. attainable
* Note: (.....) not included in total Flow due to assumed operating conditions or canal spillway vs. canal gates control.

SURCHARGE-STORAGE ROUTING

Test Flood Inflow (Q_{P_1}) = 40,500 cfs

Surcharge Height to pass Q_{P_1} assumed as Elev. 584.0

$$STOR_1 = \frac{4,000 \text{ ac-ft.} \times 12"/\text{ft.}}{17,280 \text{ acres}} = 2.78"$$

$$Q_{P_2} = Q_{P_1}\left(1 - STOR/19\right)$$

$$= 40,500\left(1 - 2.78/19\right) = 34,580 \text{ cfs}$$

due to the approximations being made, assume

Routed Test Flood Outflow = 34,500 cfs
Test Flood Stage = Elev. 584.0

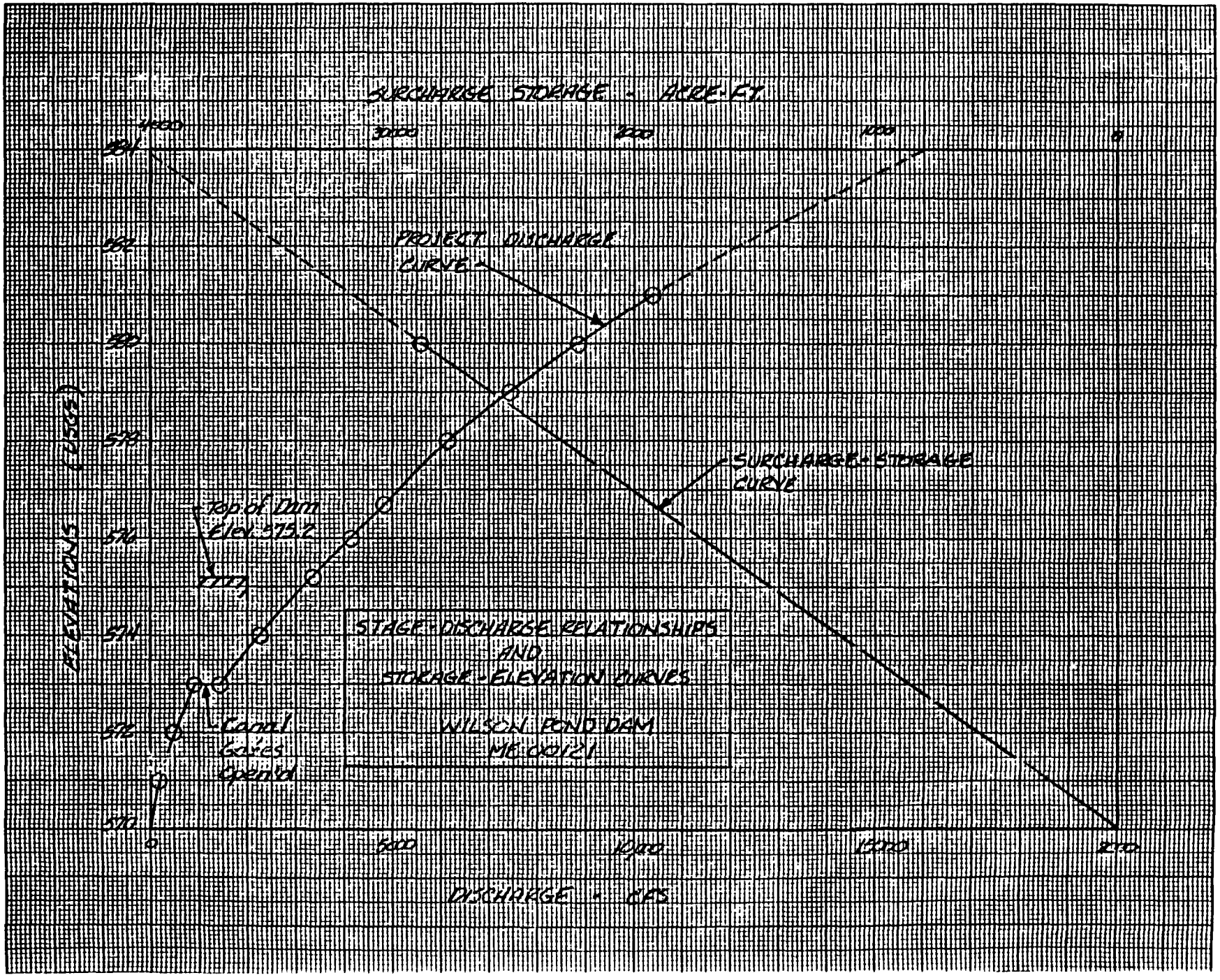
TAILWATER ANALYSIS

Project Discharge with W.S. at top of dam = 3,360 cfs

D/S Channel: 60 ft. wide rect., $S = 0.004$, $n = 0.025$

$$Q = 1.49/n\, A R^{2/3} S^{1/2} = 1.49/0.025\,(60Y)\left(60Y/2Y+60\right)^{2/3}(0.004)^{1/2} = 3,36C$$

By trial, $Y = 6$ ft.; Tailwater at toe of dam = 551.0 + 6 = Elev. 557.0



DAM FAILURE ANALYSIS

Spillway crest Elev. 570.0
Toe of spillway Elev. 551.0
Top of Dam Elev. 575.2

Length of Dam:
Spillway = 55ft.
Canal Dike & Gates Struct. = 23'±

Assume 50% of Spillway fails

Discharge prior to failure with W.S. Elev. at top of Dam = 3,360 cfs (from page 4) = Q_s

Tailwater prior to failure = Elev. 557.0 (from page 4)

Then $Q_f = 8/27\ (32.2)^{1/2}(0.5 \times 55)(575.2 - 557.0)^{3/2} = 3{,}590$ cfs

$\therefore Q_{p_1} = Q_f + Q_s/2 = 3{,}590 + 3{,}360/2 = 5{,}270$ cfs, say 5,300 cfs

Wilson Stream conveys discharges from Wilson Pond through the downtown portion of Wilton (beginning 500' d/s of dam) a distance of approx. 14 miles to Farmington Falls where the stream joins the Sandy River.

Photographs of March 27 1953 Flood contained in a picturetorial account of the flood simply titled "Wilton Flood" indicates that the head on the Wilson Pond Dam was at top of dam. Consequently, these photographs depict probable d/s channel cond.tions immeadiately prior to failure. In general, these photographs indicate that a full spillway discharge will result in downstream flooding conditions which are just below the sill elevations of several homes and businesses. For the most part the stream is at the top of its banks and any significant additional flow would over run its banks.

Main St. Bridge consists of two 13'W x 11.25'H open'gs The 1953 flood w/W.S. at top of dam was at crown of bridge. Bridge is located 300 ft. d/s of dam.

$Q = 1.49/n\ A R^{4/3} S^{1/2} \times 2 = 1.49/0.02 \times (13 \times 11.25)(146.25/48.5)^{2/3} S^{1/2} \times 2$

$\therefore S = (3360/45483)^2 = 0.0055$ which appears reasonable

The Main St. Bridge has a 3.75 freeboard from crown of open'g to top of overflow weir (curb).

Pressure Flow with W.S. at top of curb & tailwater at crown:

$$Q_P = CA\sqrt{2gh} = 0.90 \times (13 \times 11.25 \times 2)\,(64.4 \times 3.75)^{1/2} = 4{,}090 \text{ cfs}$$

Effective weir length for flow over top of bridge is approx. 80 ft., "C" = 3.0

WATER DEPTH ABOVE CROWN OF BRIDGE	BRIDGE FLOW (cfs)	WEIR FLOW (cfs)	TOTAL FLOW (cfs)
0	3,400	-	3,400
3.75	4,100	0	4,100
5.0	4,720	340	5,060
5.5	4,950	550	5,500

A dam failure flow of 5,300 cfs would overtop the bridge by ~1.5 ft. or 2.5 ft. over the road surface which is 1 ft. lower than the curb. A major portion of this flow would run down Main St. which slopes down from the bridge as it leads through the down town area of Wilton.

A grocery store named "Mario's" is located at the bridge left abutment having a sill elev. 1 ft. below road grade or 3.5 ft. below W.S. Elev. following failure.

Similarly, the G.H. Bass & Co. mill would be seriously flooded by the waters which would rise above the window sills following a failure.

Based on field observations, photos of the March 1953 Flood and the above computations, approximately 10 homes and business would be seriously damaged or destroyed as a result of a dam failure and several others along Main St. would experience shallow depth, sheet flow flooding.

∴ Hazard Classification is HIGH

APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

END

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