CANADA - BRITISH COLUMBIA

FRASER RIVER FLOOD CONTROL 1968 AGREEMENT

Inventory and Engineering Branch
Ministry of Environment
Victoria, British Columbia

Water Planning and Management Branch
Inland Waters Directorate
Pacific and Yukon Region
Department of the Environment
Vancouver, British Columbia

DISTRICT OF SURREY

Operations and Maintenance Instructions
Flood Control Works

Serpentine and Nicomekl Dams

Associated Engineering Services Ltd.
1661 West 8th Avenue
Vancouver, B.C.
V6J 1V1

DISTRICT OF SURREY

Operations and Maintenance Instructions
Flood Control Works

Serpentine and Nicomekl Dams

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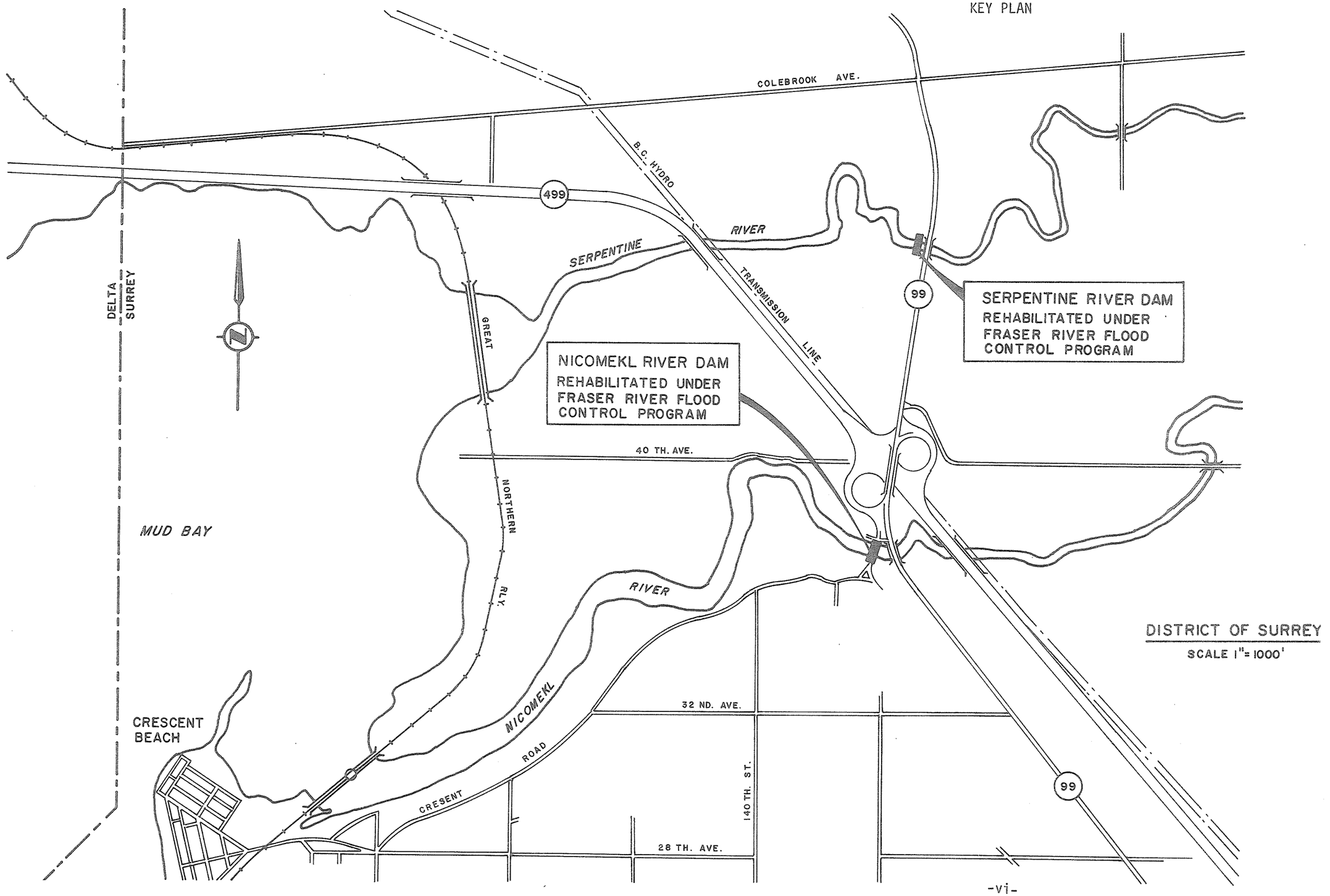
DISTRICT OF SURREY FLOOD CONTROL PROJECT

KEY PLAN



DISTRICT OF SURREY

SCALE 1"= 1000'

INTRODUCTION

1. THE PROGRAM

1.1 THE FRASER RIVER FLOOD CONTROL 1968 AGREEMENT

Canada and the Province of British Columbia signed an agreement on May 24, 1968, providing for construction of flood control works in the lower Fraser Valley. The Agreement carried out jointly by the two senior governments, provides for a comprehensive flood control program for the area and includes rehabilitation of existing dykes, increased river bank protection, and improvement of internal drainage facilities.

2. THE PROJECT

2.1 THE DISTRICT OF SURREY PROJECT

At the District of Surrey, work under the Fraser River Flood Control Program included repairs to the Serpentine and Nicomekl dams including the provision of stoplog guides. The construction costs amounted to $1,175,955.66 and the supervision costs amounted to $79,539.20 for a total contract cost of $1,255,494.86.

2.2 PROJECT CONSTRUCTION PERIOD

At the District of Surrey, construction commenced in December 1973 and was substantially completed in November 1974.

3. RESPONSIBILITY FOR MAINTENANCE

3.1 RESPONSIBILITY FOR PROJECT MAINTENANCE

Under the Fraser River Flood Control 1968 Agreement, the District of Surrey undertook to operate and maintain the completed structures. This manual has been prepared with this maintenance in mind.

Under the Dyke Maintenance Act (Appendix 6), it is the responsibility of the Inspector of Dykes to ensure that the integrity of the dyking system is maintained. It is the intention that the Inspector of Dykes will conduct regular inspections.

3.2 CONTRACT MAINTENANCE TERM

Under the contract maintenance guarantee, the Contractor is responsible to maintain the new works for a period of twelve months following completion of the contract, against any defects arising from improper installation, inferior material, or faulty workmanship.

4. THE OPERATION AND MAINTENANCE MANUAL

4.1 MANUAL CONTENT

Operation and maintenance instructions provided in these instructions are for facilities which were improved under the Program. Special instructions are not provided for existing facilities which were not improved under the Program, except where their maintenance or operation is critical to the integrity of the structures.

These instructions provide general and detailed information on the operation and maintenance of the Serpentine and Nicomekl dams. Included are the as-constructed drawings. Additional information can be found in the Contract Specifications issued to the Municipality during construction.

4.2 FLEXIBILITY OF THE MANUAL AND THE ADDITION OF INFORMATION

This manual should be the working document wherein additonal information gained by the experience of the operators and changing conditions in the Municipality should be appended for the benefit of future operators. The Province may issue addenda or amendments to this document from time to time.

5. PROBLEMS

5.1 QUESTIONS AND TECHINCAL ADVICE

Dyking personnel should familarize themselves with all the flood control works especially the critical areas so that they have a working knowledge of the works. Questions regarding the system should be directed to the Inspector of Dykes.

OPERATING AND MAINTENANCE INSTRUCTIONS

1. GENERAL

1.1 SCOPE OF SECTION B

1.1.1 This section contains instructions, methods, techniques and data pertinent to the operation and maintenance of the District of Surrey flood control works, which are the basis of the design of works constructed under the Fraser River Flood Control 1968 Agreement.

1.2 MAINTENANCE REQUIREMENT

1.2.1 Regular inspection and maintenance of flood protection works is necessary to maintain the integrity of this flood protection system.

1.2.2 Instructions are provided for the guidance and training of operating staff and for reference information on general procedures and precautions concerning the maintenance of the flood protection system.

1.2.3 Maintenance will generally comprise the following:

1) inspection of all works each fall, spring, and during the freshet

2) repair of filter blanket

3) excavation and backfill of all animal holes

4) replacement of anodes

5) repainting of flood gates and metal surfaces

6) reseeding of slopes as required

7) removal of debris and garbage from all flood control works

8) inspection of structures constructed in and about the dam to verify that the standard of flood protection has not been reduced.

1.2.4 Maintenance will include the control of development and construction on, through or in the vicinity of flood control works, to ensure that the standard of protection provided by the reconstruction under the Federal Provincial Fraser River Flood Control 1968 Agreement Program is maintained.

1.3 MUNICIPAL CONTROLS

The Municipality should ensure that construction on through or in the vicinity of the flood control works does not reduce the standard of flood protection provided by the reconstruction under the Federal Provincial Fraser River Flood Control 1968 Agreement Program.

1.3.1 Excavations Adjacent to Flood Control Works

Excavation adjacent and very close to the flood protection structures should be discouraged, but where excavation is necessary, expert advice should be obtained to ensure that the excavation is compatible with stability of the flood protection works.

1.3.2 Access for Maintenance

Access to the dam crest, slopes and adjacent banks shall be maintained to permit inspection and repair of the dams and adjacent flood protection works.

1.3.3 Review of Proposals for Works in the Vicinity of Flood Control Works

Any work or works proposed on or in the immediate vicinity of flood control works should be reviewed by the Municipality, the Inspector of Dykes, and other affected regulatory agencies before work is approved to proceed.

1.3.4 Municipal Regualtions

A Municipal by-law and regulations may be required to regulate work on, through or in the vicinity of the flood protection works.

1.3.5 Engineering Evaluation for New Works

Where work or a new structure is proposed on or adjacent to flood control works and the stability of the works under the new conditions is suspect, an engineering evaluation should be made before work is approved to proceed.

2. EMERGENCY REPAIR WORK

2.1 MEN AND EQUIPMENT

2.1.1 The Municipality should store sufficient materials and maintain equipment adequate to cope with normal emergency operations. As the river rises to critical levels, crews should be advised that they may be called upon, at short notice, to cope with emergencies related to their flood protection works.

2.1.2 Should the Provincial Government mobilize the Lower Fraser Valley Flood Organization and declare an emergency then the municipal forces would be integrated into this organization.

2.2 FRESHET EMERGENCY PROCEDURES

2.2.1 Emergency Work

Municipal work crews should be equipped and on short notice call to cope with emergencies.

2.2.2 Engineering and Soils Consultant Advice

Engineering and soils consultant advice should be obtained to recommend permanent corrective action following emergency situations. The Engineer and soils consultant should be advised promptly of such emergencies so that the area may be inspected under critical conditions.

2.3 DANGER OF DAMS OVERTOPPING

The overtopping of dams should be an infrequent danger since the dams have been rehabilitated. In the event that such a danger does occur, it is probable that the Province will assist the Municipality in any emergency action.

2.4 RECORDS

Cases of severe damage should be recorded, where possible, for the benefit of future maintenance. Photgraphs with locations and dates should be obtained before repairs are affected, but this should not in any way interfere or prejudice emergency work.

3. DAMS

3.1 BASIS OF DAM REPAIRS

3.1.1 The dams were upgraded to increase the useful life expectancy of the structures to a minimum of 25 years and to increase the factor of safety relative to sliding.

3.1.2 The roadway on the existing structures was raised to provide a minimum 2-foot freeboard above design water level.

3.2 INSPECTIONS

3.2.1 Routine Annual Inspections

As a matter of routine the entire dam should be inspected annually.

3.2.2 Debris and Garbage

The dams and channels should be cleared of all debris and garbage.

3.2.3 Patrol Observations and Reports

Municipal patrols should observe and report to their local control headquaters any occurences that could signal a weakening of the works. Points to look for include:

1) damage to the concrete and gunite surfaces;

2) cracking or spalling of concrete and opening of contraction joints;

3) damage to the gates - in particular the neoprene seals, urethane bushings and anodes;

4) damage or loss of filter material upstream of the dams;

5) unusual or inadequate operation behavior.

3.2.4 Field Inspection Log

A log as illustrated in Appendix 4 should be kept of all inspections, and should include the following data:

1) date and time of inspection;

2) condition of gunite surfaces;

3) areas of piping downstream of the dams;

4) problems experienced with the gates;

5) condition of painted surfaces;

6) extent of anode deterioration.

3.3 MAINTENANCE OF DAM STRUCTURES

Since all structures and facilities are subject to deterioration in varying degree, constant vigilance is necessary to be alert to and correct potential unsafe or unsatisfactory conditions as they develop.

Concrete repairs are required where unforeseen conditions may have developed to cause damage. Where the erosion and other damage is extensive and where much of the remaining concrete is suitable for continued service, shotcrete may be used in the maintenance and repair of the eroded concrete.

Metal surfaces require painting from time to time for protection against corrosion. Submerged metalwork is subject to electrolytic deterioration. To reduce the corrosion or oxidation on the submerged metal gates, zinc plates were placed on the face of the gates. The resulting electrolytic action on the zinc necessitates replacement of these anodes every 4 or 5 years. The maintenance of these facilities is principally one of inspecting. The anodes are dissipated on a generally straight-line basis and records are needed to predict when replacement will be required.

3.4 MAINTENANCE OF CHANNELS

To control seepage and eliminate piping below the dams, the inlet channels in the vicinity of the structures were lined with a 4-foot thick gravel filter layer. Maintenance should consist of inspecting the filter layer and replacing any deficiency of filter material.

Scour protection blankets, consisting of a 2-foot thick gravel filter layer overlain by a 2-foot thick layer of 6 to 9 inches of cobbles, were placed on the river bottom on the downstream side of the dams. The scour protection blanket should require little or no maintenance.

APPENDICES

DISTRICT OF SURREY FLOOD CONTROL PROJECT

LIST OF GOVERNMENT AGENCIES, CONSULTING ENGINEERS CONTRACTORS, MANUFACTURERS AND SUPPLIERS FOR THE PROJECT

AGENCY	RESPONSIBILITIES
Office of the Director Inventory and Engineering Branch Ministry of Environment Parliament Buildings Victoria, British Columbia	Coordination and execution of the Project, designers for river bank protection, direction of the construction, and 50% funding of the project.
Water Planning and Management Branch Inland Waters Directorate Pacific and Yukon Region Fisheries and Environment Canada Room 502 - 1001 W. Pender Street Vancouver, B. C., V6E 2M9	Establishment of dyke design grades, and 50% funding of the project.

CONSULTING ENGINEERS	RESPONSIBILITIES
Associated Engineering Services Ltd. 1661 West 8th Avenue Vancouver, B. C. V6J 1V1	Consultants for the dams.
Golder Associates Consulting Geotechnical Engineers 224 West 8th Avenue Vancouver, B. C. V5Y 1N5	Soils consultants to Associated Engineering Services Limited.

CONTRACTOR	RESPONSIBILITIES
Pine Tree Construction Co. Ltd. 18557 - 96th Avenue Surrey, B. C.	General contractor for the repair of the dams.
Brittain Steel Ltd. 400 Ewen Avenue New Westminster, B. C.	Contractor for supply and installation of flood gates.
Caproco Corrosion Prevention Ltd. 12188 - 86A Avenue Surrey, B. C.	Contractor for supply and installation of cathodic protection on flood gates.

DISTRICT OF SURREY FLOOD CONTROL PROJECT

LIST OF AGENCIES THAT MIGHT BE
CONCERNED ABOUT THE STRUCTURES

AGENCY	INTEREST
District of Surrey Surrey, B. C.	Safety of the dams.
Inspector of Dykes	Safety of the dams.
Office of the Director Inventory and Engineering Branch Ministry of Environment Parliament Buildings Victoria, B. C. V8V 1X4	Safety of the dams.
Water Planning and Management Branch Inland Waters Directorate Pacific and Yukon Region Fisheries and Environment Canada Room 502 - 1001 W. Pender Street Vancouver, B. C. V6E 2M9	Safety of the dams.
Regional Manager Aids and Waterways Transport Canada Canadian Coast Guard Box 10060, Pacific Centre 700 West Georgia Street Vancouver, B. C. V7Y 1E1	Navigable Waters - Responsible for administration of the Federal Navigable Waters Protection Act with respect to navigable waters of the Province of British Columbia.
Public Works Canada Manager, Design and Construction 1110 West Georgia Street Vancouver, B. C. V6E 3W5	For consideration of work proposed within the wetted perimeter of a navigable water.
Ministry of Agriculture and Food Parliament Buildings Victoria, B. C.	Flood protection of agricultural lands.

AGENCY	INTEREST
Habitat Protection Division Fisheries and Oceans Canada 1090 West Pender Street Vancouver, B. C. V6E 2P1	Environmental. Recreation and commercial fisheries protection and propogation.
Canadian Wildlife Service Vivarium University of British Columbia Vancouver, B. C. V6T 1W5	Environmental. Recreational wildlife protection and propogation.
Parks and Outdoor Recreation Division Ministry of Lands, Parks and Housing Victoria, B. C.	Environmental. Recreation and land use.
Greater Vancouver Water District 2294 West 10th Avenue Vancouver, B. C.	Watermain crossing the dams.
B.C. Hydro and Power Authority 970 Burrard Street Vancouver, B. C. V6Z 1Y3	Hydro and gas works and structures in or on the dams.
B.C. Telephone Company 768 Seymour Street Vancouver, B. C. V6B 3K9	Telephone communication works and structures in or on the dams.
B.C. Land Commission 4333 Ledger Avenue Burnaby, B. C. V5G 3T3	Establishment of statutory Agricultural Reserves.

DRAWINGS

APPENDIX 3

DISTRICT OF SURREY FLOOD CONTROL PROJECT

AS-CONSTRUCTED DRAWINGS

DRAWING NUMBER	DRAWING TITLE	PROVINCIAL 105 mm NEGATIVE NUMBER
CONTRACT NO. 1	REPAIRS TO THE SERPENTINE AND NICOMEKL DAMS	105325
4884-1-1	Nicomekl and Serpentine Dams, Key Plan	105326
4884-1-2	Nicomekl Dam, Site Plan	105327
4884-1-3	Serpentine Dam, Site Plan	105328
4884-1-4	Nicomekl Dam, River Road Cross Sections	105329
4884-1-5	Serpentine Dam, River Road Cross Sections	105330
4884-1-6	Nicomekl and Serpentine Dams, Filter and Scour Protection Profiles, Road Cross Section	105331
4884-1-7	Nicomekl Dam, General Arrangement, Plan and Sections	105332
4884-1-8	Nicomekl and Serpentine Dams, Roadway Cross Sections, Concrete	105333
4884-1-9	Nicomekl and Serpentine Dams, Roadway Cross Sections, Reinforcement	105334
4884-1-10	Nicomekl Dam, Gate Collar, Elevation and Sections, Concrete	105335
4884-1-11	Nicomekl and Serpentine Dams, Gate Collar, Sections and Details, Concrete	105336
4884-1-12	Nicomekl Dam, Gate Collar, Elevation and Section Reinforcement	105337
4884-1-13	Nicomekl and Serpentine Dams, Gate Collar, Sections and Details, Reinforcement	105338

DRAWING NUMBER	DRAWING TITLE	PROVINCIAL 105 mm NEGATIVE NUMBER
4884-1-14	Serpentine Dam, General Arrangement, Plan and Sections	105339
4884-1-15	Serpentine Dam, Gate Collar, Elevation and Section, Concrete	105340
4884-1-16	Serpentine Dam, Gate Collar, Elevation and Section, Reinforcement	105341
4884-1-17	Nicomekl and Serpentine Dams, Gate and Hinge, Elevation and Section, Structural Steel-Sheet No.1	105342
4884-1-18	Nicomekl and Serpentine Dams, Gate Hinge Details, Structural Steel-Sheet No. 2	105343
4884-1-19	Nicomekl Dam, Stoplog Guides, Elevation and Section, Concrete	105344
4884-1-20	Nicomekl and Serpentine Dams, Stoplog Guides, Sections and Details, Concrete	105345
4884-1-21	Nicomekl Dam, Stoplog Guides, Elevation and Section, Reinforcement	105346
4884-1-22	Nicomekl and Serpentine Dams, Stoplog Guides, Sections and Details, Reinforcement	105347
4884-1-23	Sepentine Dams, Stoplog Guides, Elevation and Sections, Concrete	105348
4884-1-24	Serpentine Dam, Stoplog Guides, Elevation and Section, Reinforcement	105349

AS CONSTRUCTED

CANADA · BRITISH COLUMBIA

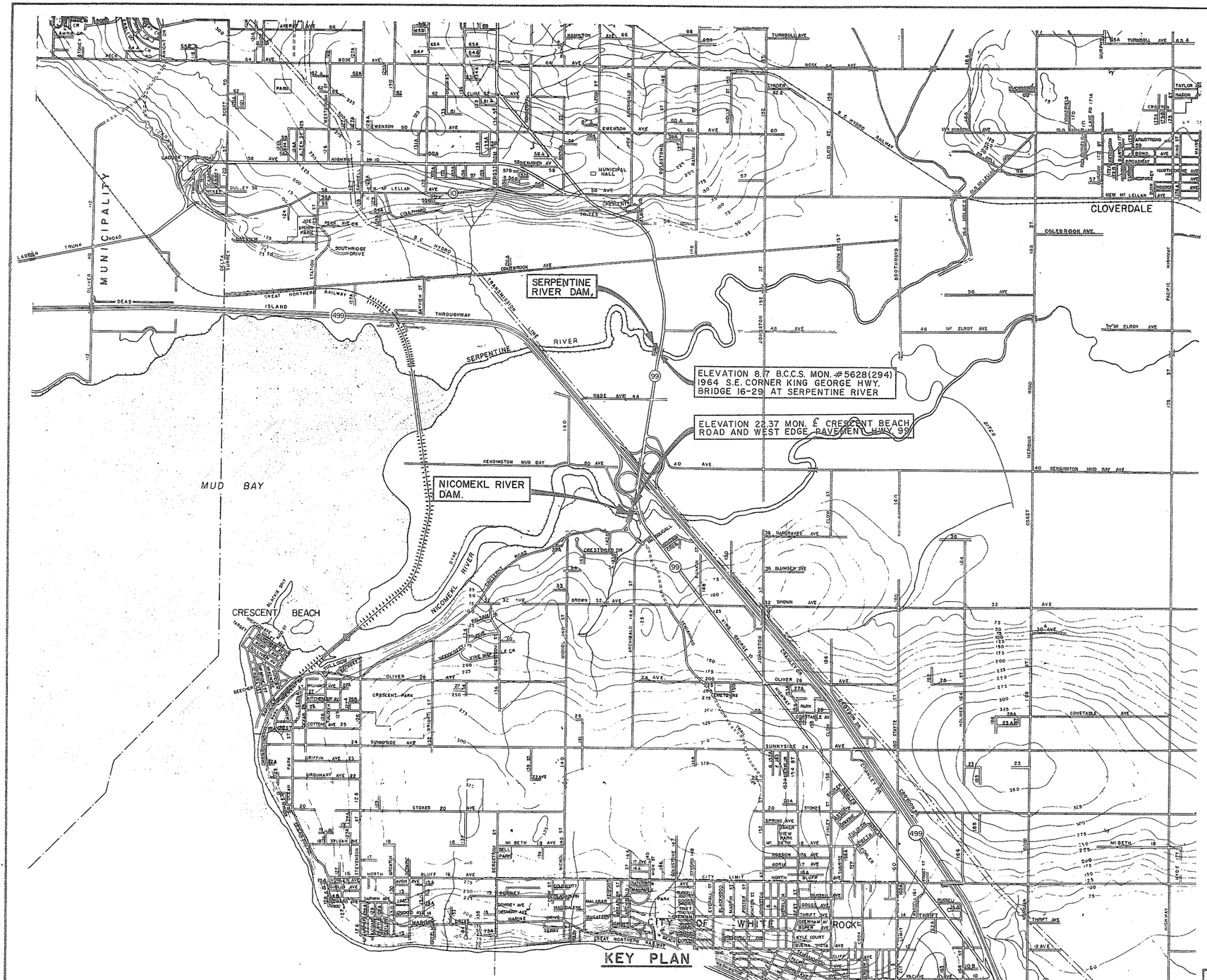
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
PROJECT NO: 10-1 DISTRICT OF SURREY

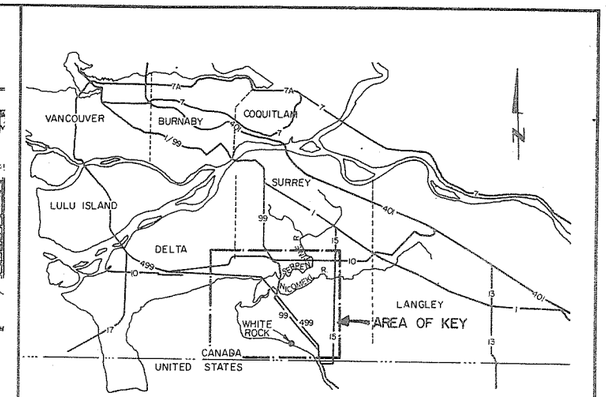
CONTRACT NO: 1 REPAIRS TO THE SERPENTINE AND NICOMEKL DAMS

AESL
Consulting Engineers

ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER B. C.

SET NO ◯





SITE LOCATION PLAN

AS CONSTRUCTED NOTES

1. THE NOTATION 'EXISTING' REFERS TO STRUCTURES, GRADES AND PROFILES PRIOR TO CONSTRUCTION.
2. THE CONTRACT COMPLETION DATE WAS NOVEMBER 22, 1974.

NOTE: ELEVATIONS ARE TO GEODETIC SURVEY OF CANADA.

NO.	DATE	BY	REVISIONS
1	16.6.75	RAV	AS CONSTRUCTED

ENG.

DATE 8 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept 72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-101

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

TITLE: NICOMEKL AND SERPENTINE DAMS
KEY PLAN

DESIGN		SCALE	1" = 1000'
DRAWN	RAV	DATE	AUGUST, 1972
CHECKED		APPROVED	
DRAWING NO.	4884-1-1	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

TEST HOLE NO. 101 LOG

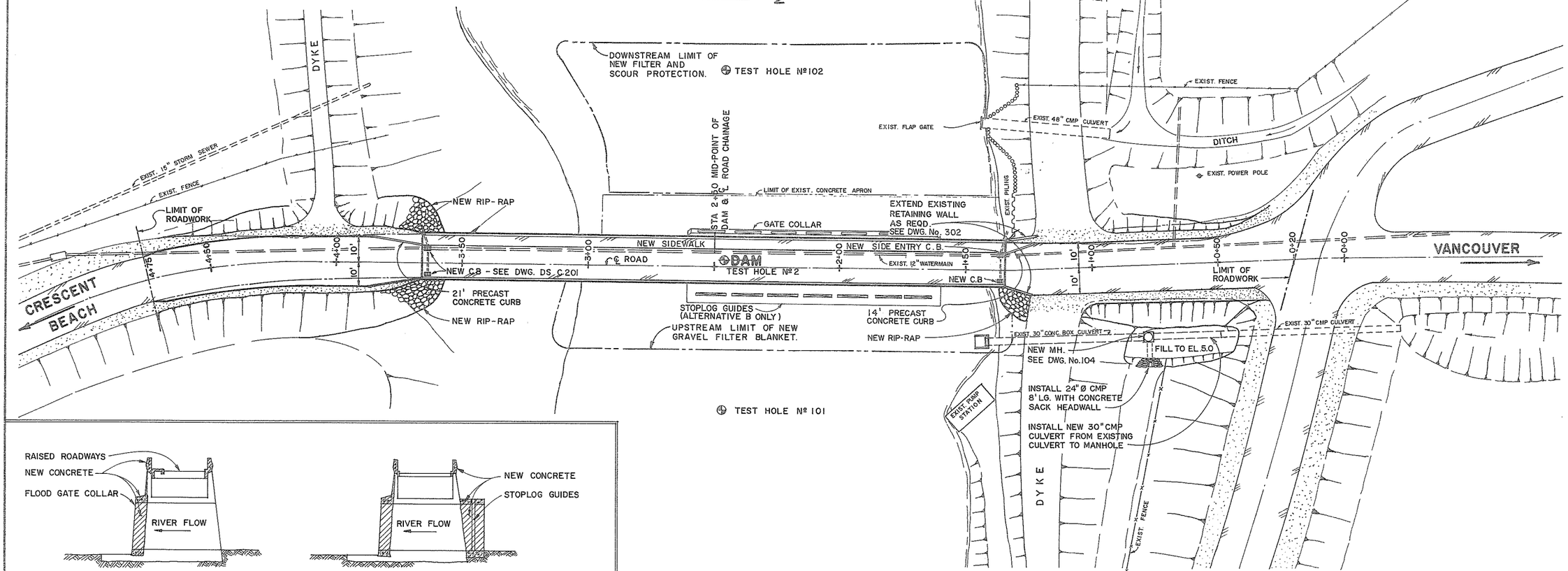
ELEV.	SYMBOL	
-9.0		GREY VERY FINE SANDY SILT.
-9.5		LOOSE BLACK ORGANIC SILT AND SHELLS.
-11.0		LOOSE GREY CLAYEY SILT WITH TRACE MED. SAND AND SHELLS.
-13.5		COMPACT GREY VARVED SILTY CLAY.
-16.5		DENSE GREY SILTY FINE SAND TRACE GRAVEL.
-18.5		VERY DENSE GREY FINE SILTY SAND TILL.
-30.5		

TEST HOLE NO. 2 LOG

ELEV.	SYMBOL	
10.0		
5.0		FILL- SAND AND GRAVEL WITH CLAY ZONES.
		CONCRETE - 2/3 GOOD CONDITION 1/3 BROKEN CONCRETE LACKING IN CEMENT BINDER 90% RECOVERY, LOSS OF WATER BELOW 16' DEPTH.
-14.8		
-17.2		VOID.
-18.0		CLAYEY SAND AND GRAVEL.
-19.0		BENTONITE.
		HARD TO VERY HARD LAYERS OF SANDY SILT, SILTY SAND AND CLAYEY SILT WITH OCCASSIONAL PEBBLES AND COBBLES.
-33.5		

TEST HOLE NO. 102 LOG

ELEV.	SYMBOL	
-14.0		3" ORGANIC SILT COMPACT GREY CLAYEY SILT WITH SOME VERY FINE SAND AND SAND PARTINGS.
-20.0		VERY DENSE GREY FINE SILTY SAND TILL SOME GRAVEL.
-29.5		



ALTERNATIVE A
DRAWINGS APPLICABLE 4884-1-1 THROUGH 18

ALTERNATIVE B
DRAWINGS APPLICABLE 4884-1-1 THROUGH 24

SERPENTINE AND NICOMEKL TYPICAL DAM SECTIONS

NOTE:
1. FOR RIVER AND ROAD CROSS SECTIONS AND PROFILES SEE DRAWINGS Nº 104 AND Nº 106.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	T.W.	AS CONSTRUCTED	

APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE
11 Sept 72

APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA
12 SEPT 72

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-102

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE
NICOMEKL DAM
SITE PLAN

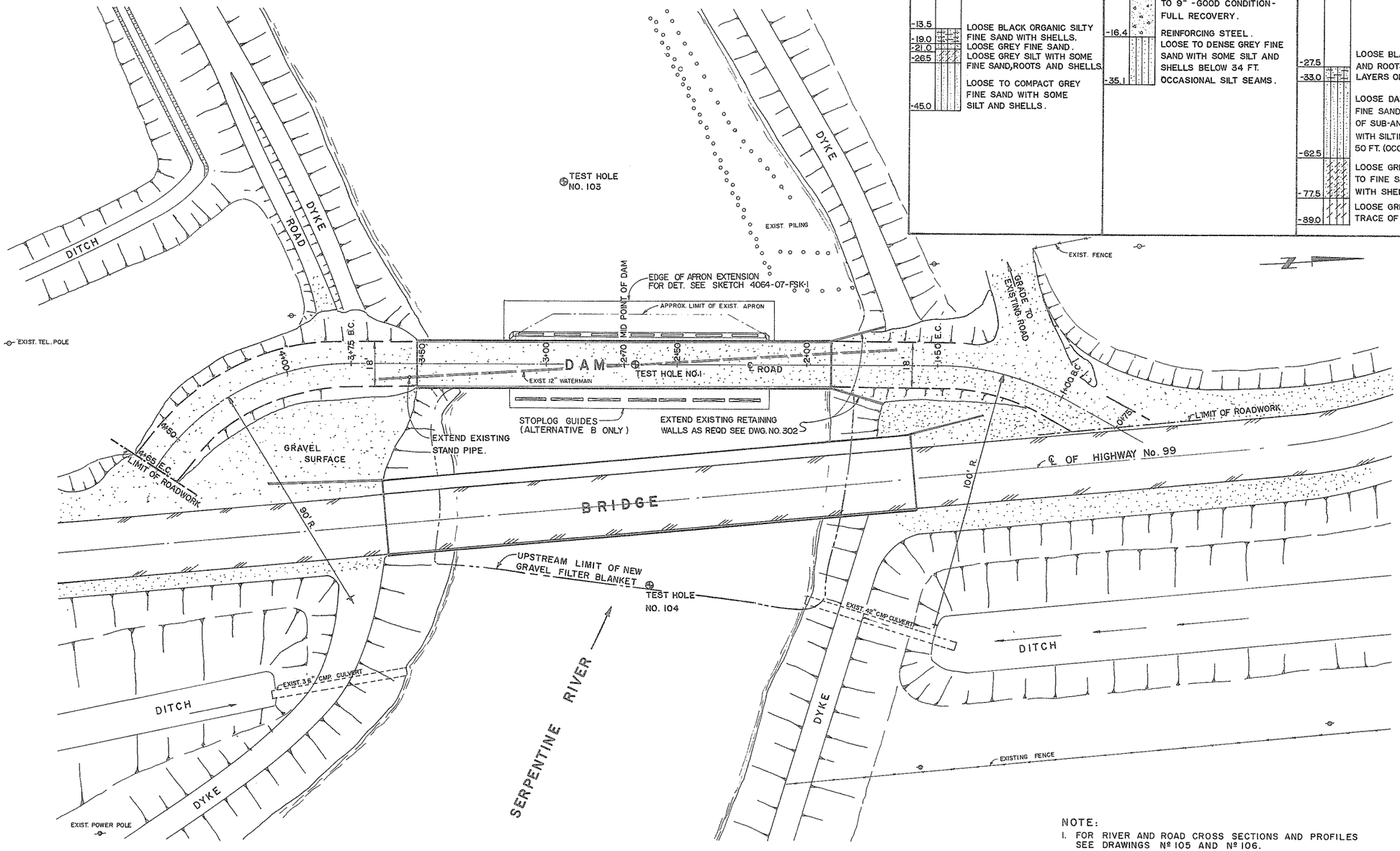
105327

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN		SCALE	1" = 20'
DRAWN	T.W.	DATE	AUGUST, 1972
CHECKED		APPROVED	
DRAWING NO.	4884-1-2	REV.	1

"5 SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 4"

SOIL - 3994 - A.E.S.L.



TEST HOLE NO. 104 LOG

ELEV.	SYMBOL	
-13.5		LOOSE BLACK ORGANIC SILTY FINE SAND WITH SHELLS.
-19.0		LOOSE GREY FINE SAND.
-21.0		LOOSE GREY SILT WITH SOME FINE SAND, ROOTS AND SHELLS.
-26.5		LOOSE TO COMPACT GREY FINE SAND WITH SOME SILT AND SHELLS.
-45.0		

TEST HOLE NO. 1 LOG

ELEV.	SYMBOL	
10.0		FILL - CLAY, SAND AND GRAVEL, OCCASIONAL COBBLES.
4.4		CONCRETE WITH AGGREGATE TO 9" - GOOD CONDITION - FULL RECOVERY.
-16.4		REINFORCING STEEL.
-35.1		LOOSE TO DENSE GREY FINE SAND WITH SOME SILT AND SHELLS BELOW 34 FT. OCCASIONAL SILT SEAMS.

TEST HOLE NO. 103 LOG

ELEV.	SYMBOL	
-27.5		LOOSE BLACK ORGANIC SILT AND ROOTS, CHIPS WITH LAYERS OF GREY FINE SAND.
-33.0		LOOSE DARK GREY SILTY FINE SAND WITH A TRACE OF SUB-ANGULAR GRAVEL WITH SILTIER STRATUM AT 50 FT. (OCCASIONAL SHELLS).
-62.5		LOOSE GREY VERY FINE TO FINE SANDY SILT WITH SHELLS.
-77.5		LOOSE GREY SILT WITH A TRACE OF CLAY.
-89.0		

NOTE:
1. FOR RIVER AND ROAD CROSS SECTIONS AND PROFILES SEE DRAWINGS Nº 105 AND Nº 106.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.72		AS CONSTRUCTED	

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA WILLIAM C. KELLY

11 Sept 72
APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

12 Sept 72
APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 101 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-103

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

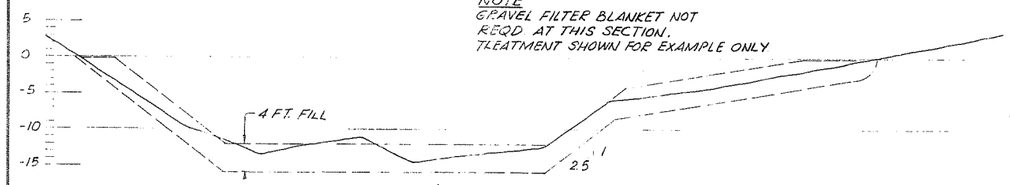
TITLE
SERPENTINE DAM
SITE PLAN

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

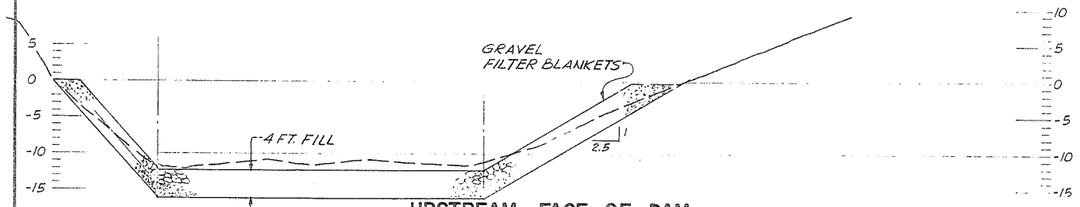
10538

DESIGN	SCALE 1" = 20'
DRAWN	DATE AUGUST, 1972
CHECKED	APPROVED
DRAWING NO. 4884-1-3	REV. 1

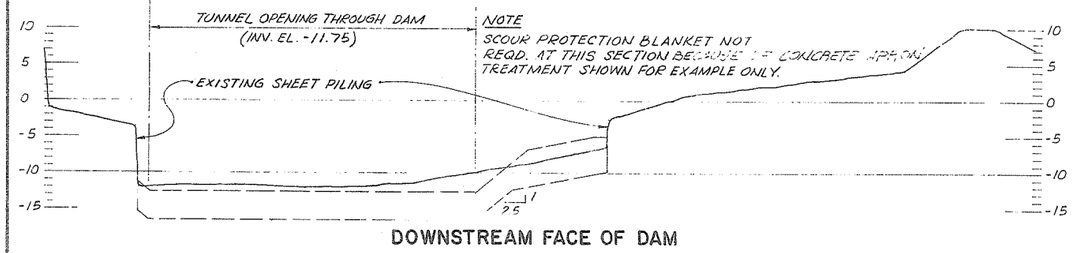
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN A



50' UPSTREAM OF DAM

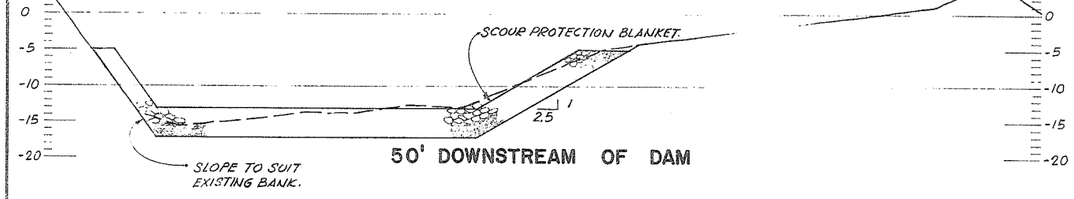


UPSTREAM FACE OF DAM



DOWNSTREAM FACE OF DAM

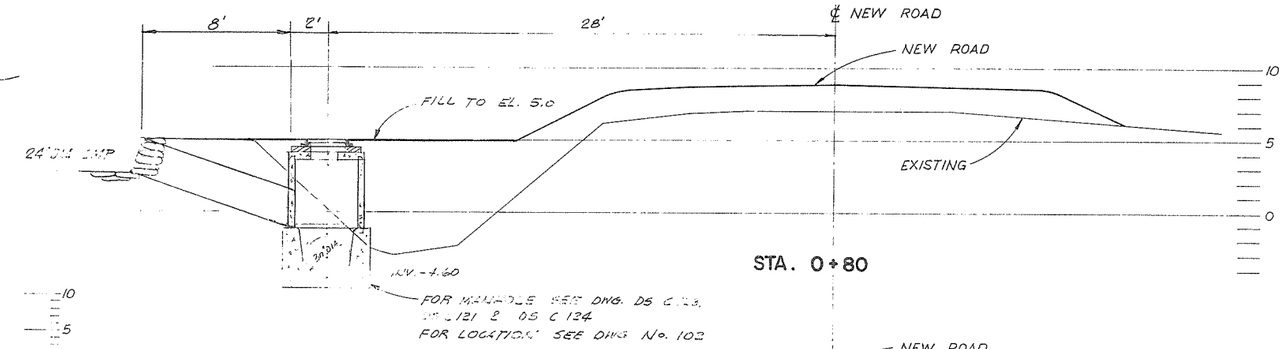
DREDGE TO ALLOW 4 FT. SCOUR PROTECTION BELOW TUNNEL INVERTS (TYP.)



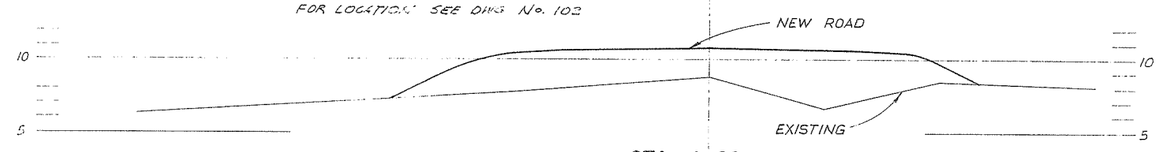
50' DOWNSTREAM OF DAM

RIVER CROSS SECTIONS

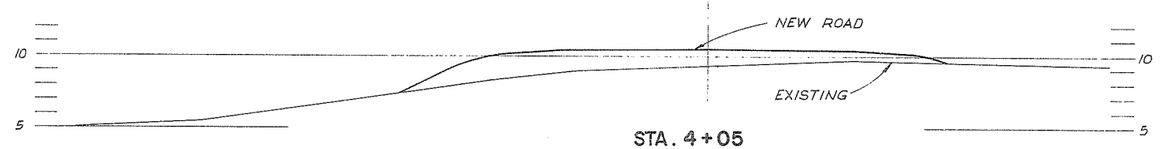
(LOOKING UPSTREAM)
SCALE – HORIZ. 1" = 20'-0"
VERT. 1" = 10'-0"



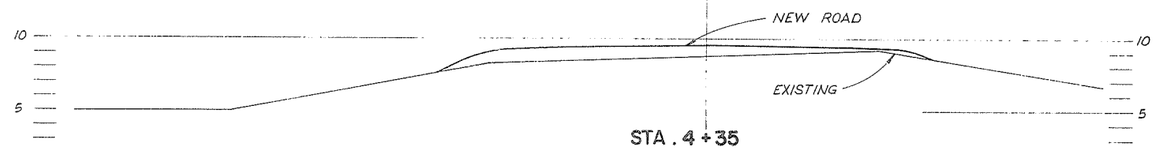
STA. 0+80



STA. 1+22



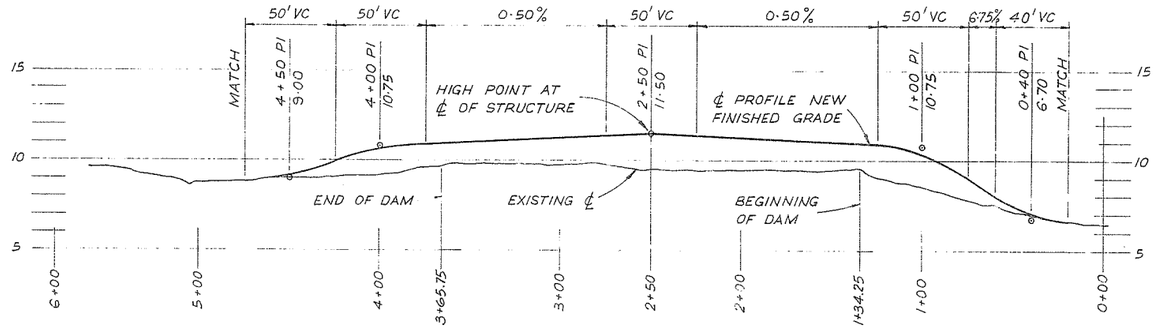
STA. 4+05



STA. 4+35

ROAD CROSS SECTIONS

SCALE 1" = 5'-0"



℄ ROAD PROFILE

SCALE – HORIZ. 1" = 40'-0"
VERT. 1" = 4'-0"

NOTES:
1. ALL RIVER BANK SLOPES TO BE TRIMMED TO 2½ HORIZONTAL TO 1 VERTICAL SLOPES OR FLATTER, AS REQUIRED. UNLESS NOTED.
2. UPSTREAM UNDERSEEPAGE BLANKET TO EXTEND UP RIVER BANKS TO ELEVATION 0.0 FT.
3. DOWNSTREAM SCOUR PROTECTION BLANKET TO CONSIST OF 2 FT. MINIMUM SAND AND GRAVEL FOLLOWED BY 2 FT. MINIMUM THICK LAYER OF 6 IN. TO 9" COBBLES.
4. DOWNSTREAM SCOUR PROTECTION BLANKET TO EXTEND UP RIVER BANKS TO ELEVATION -5 FT.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	D.W.	AS CONSTRUCTED	

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA WILLIAM C. KELLY

DATE 11 Sept 72
APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 13 Sept 72
APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-104

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

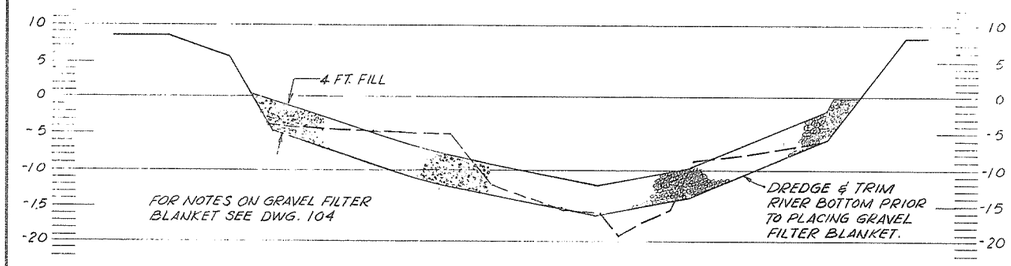
TITLE
NICOMEKL DAM
RIVER AND ROAD CROSS SECTIONS

105329
AESL ASSOCIATED ENGINEERING SERVICES LTD.
Consulting Engineers VANCOUVER, B.C.

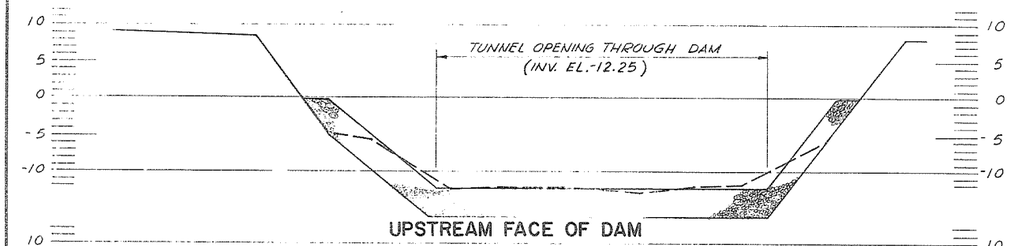
DESIGN	W.C.K.	SCALE	AS NOTED
DRAWN	P.W.	DATE	AUGUST, 1972
CHECKED	W.C.K.	APPROVED	W.C.K.
DRAWING NO.	4884-1-4	REV.	1

SCIL - 3700 D - A.E.S.L.

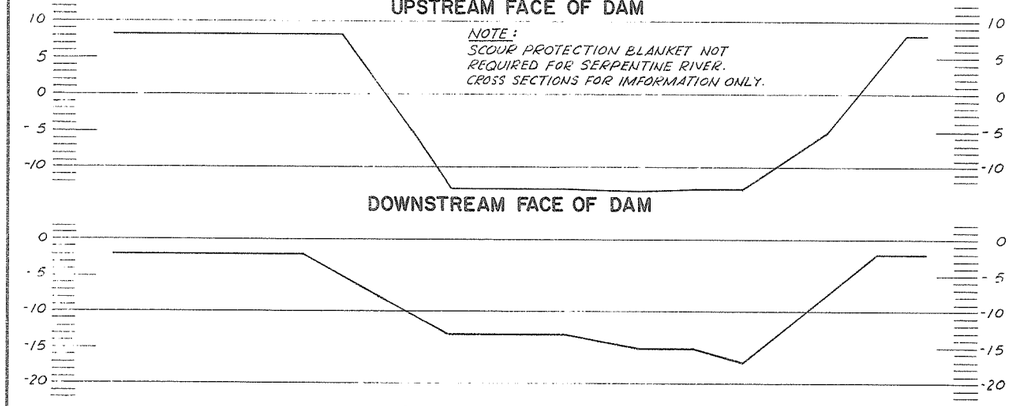
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



UPSTREAM FACE OF HIGHWAY BRIDGE

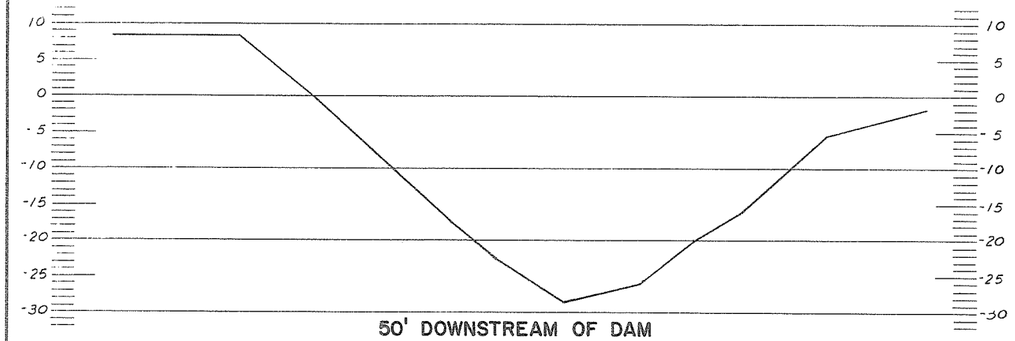


UPSTREAM FACE OF DAM



DOWNSTREAM FACE OF DAM

30' DOWNSTREAM OF DAM

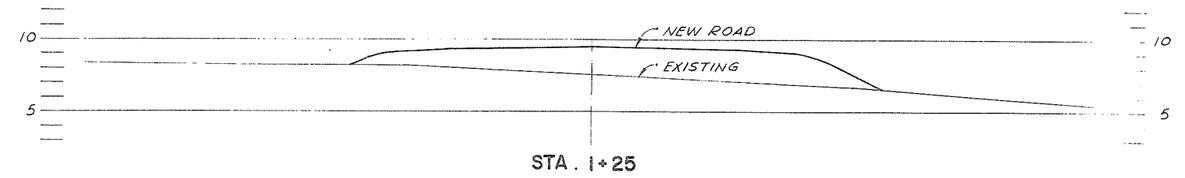


50' DOWNSTREAM OF DAM

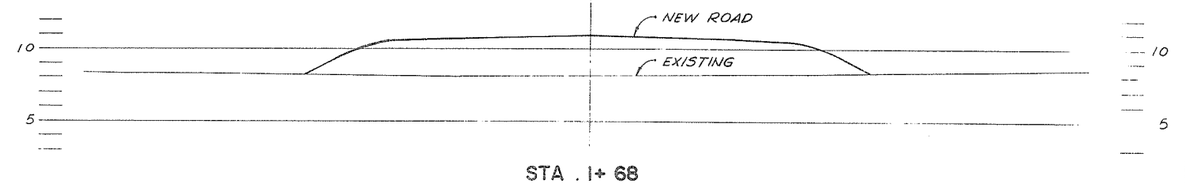
RIVER CROSS SECTIONS

SCALE - HORIZ. 1"= 20'-0"
VERT. 1"= 10'-0"

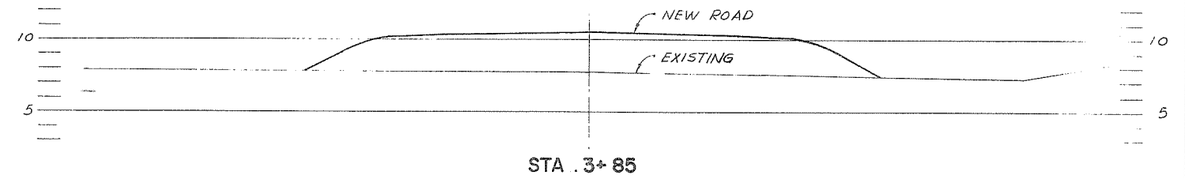
& NEW ROAD



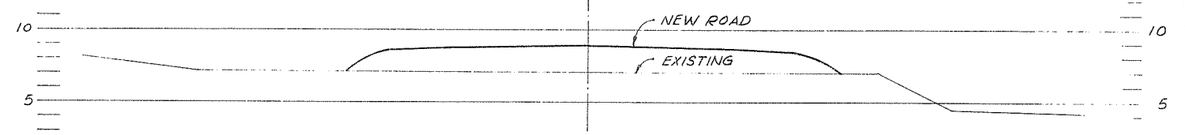
STA. 1+25



STA. 1+68



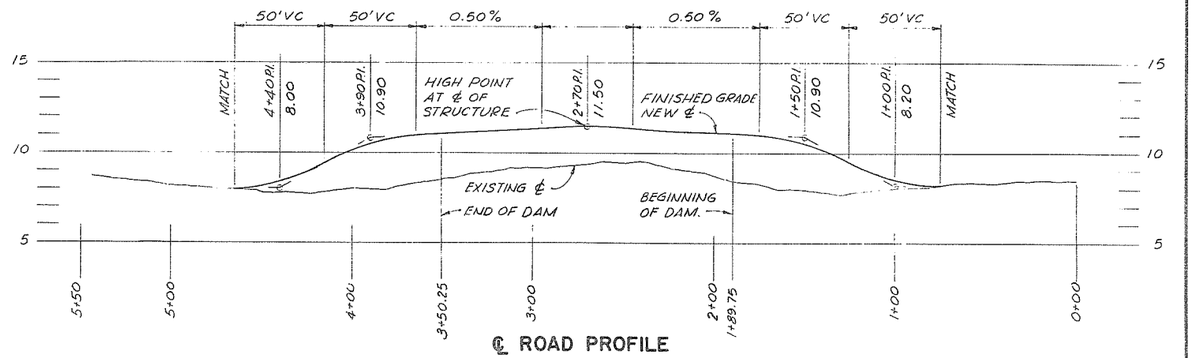
STA. 3+85



STA. 4+30

ROAD CROSS SECTIONS

SCALE 1"=5'-0"



℄ ROAD PROFILE

SCALE - HORIZ. 1"= 40'-0"
VERT. 1"= 4'-0"

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

PROFESSIONAL ENGINEER — WILLIAM E. KELLY — PROVINCE OF BRITISH COLUMBIA

DATE 11 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE D. Sept 1972
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-105

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

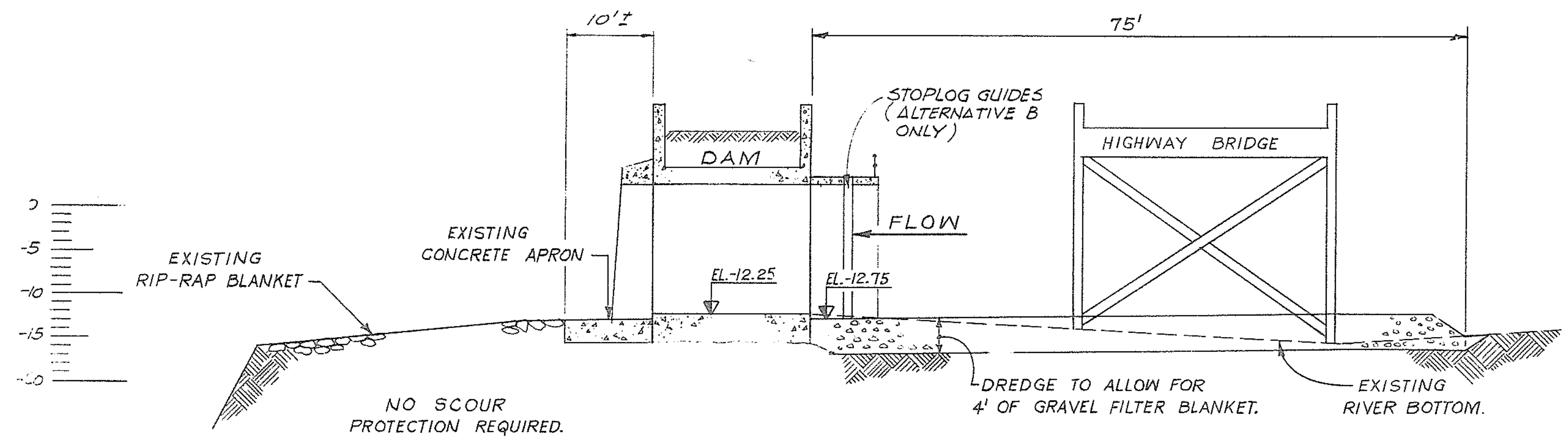
TITLE
SERPENTINE DAM
RIVER AND ROAD CROSS SECTIONS

105330
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	LEF	SCALE	AS NOTED
DRAWN	G.J.Q.V.	DATE	AUGUST 1972
CHECKED	LEF	APPROVED	
DRAWING NO. 4884-1-5		REV.	1

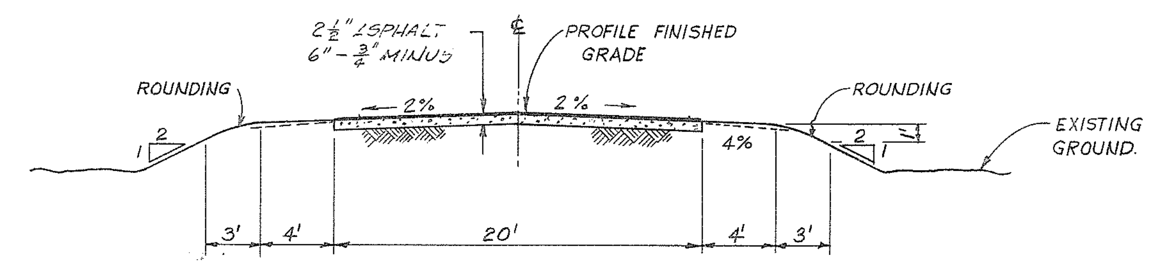
SCIL - 2700 D - A.E.S.

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



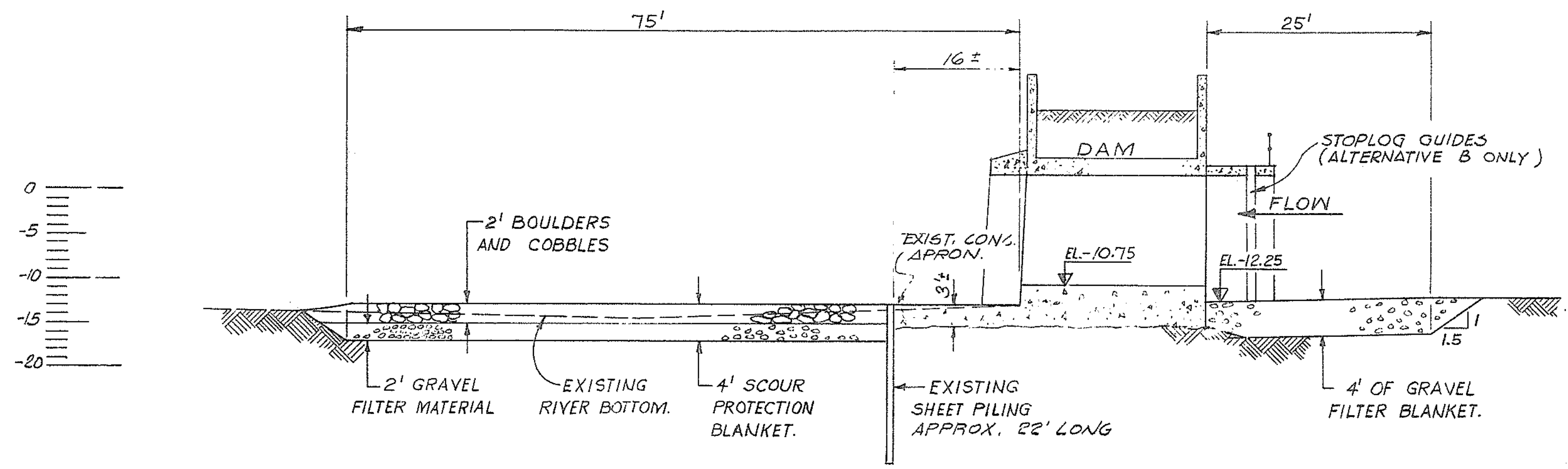
℄ PROFILE SERPENTINE RIVER

SCALE: 1" = 10'



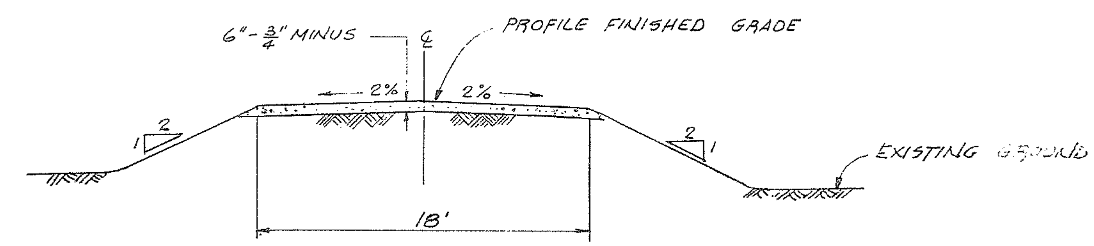
NICOMEKL
CROSS SECTION
TYPICAL APPROACH ROAD

SCALE: 1" = 5'



℄ PROFILE NICOMEKL RIVER

SCALE: 1" = 10'



SERPENTINE
CROSS SECTION
TYPICAL APPROACH ROAD

SCALE: 1" = 5'

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	V.W.	AS CONSTRUCTED	

DATE 11 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 15 Sept. 1972
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10·1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-106

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

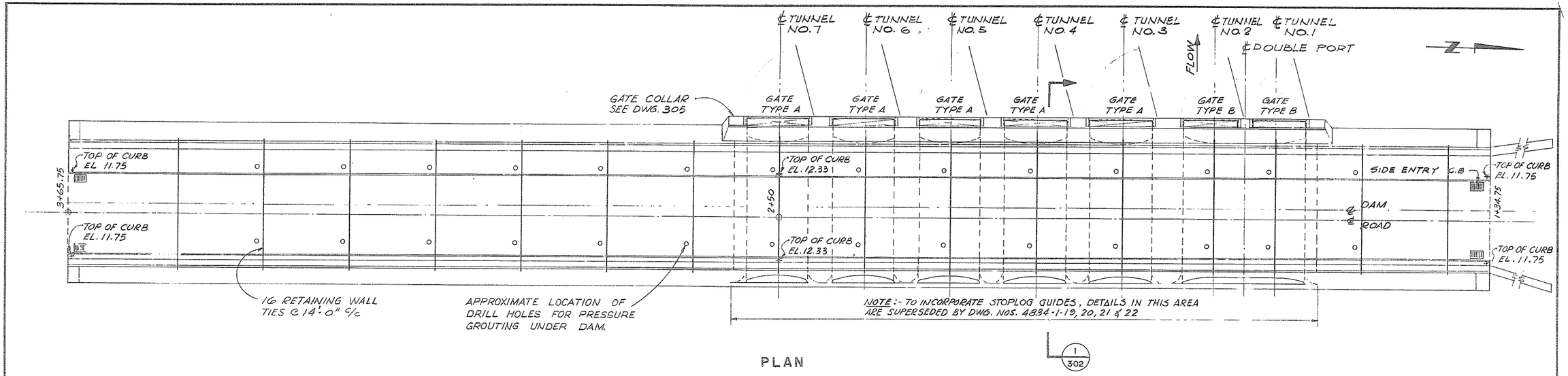
TITLE
NICOMEKL AND SERPENTINE DAMS
FILTER & SCOUR PROTECTION PROFILES
ROAD CROSS SECTION

105331

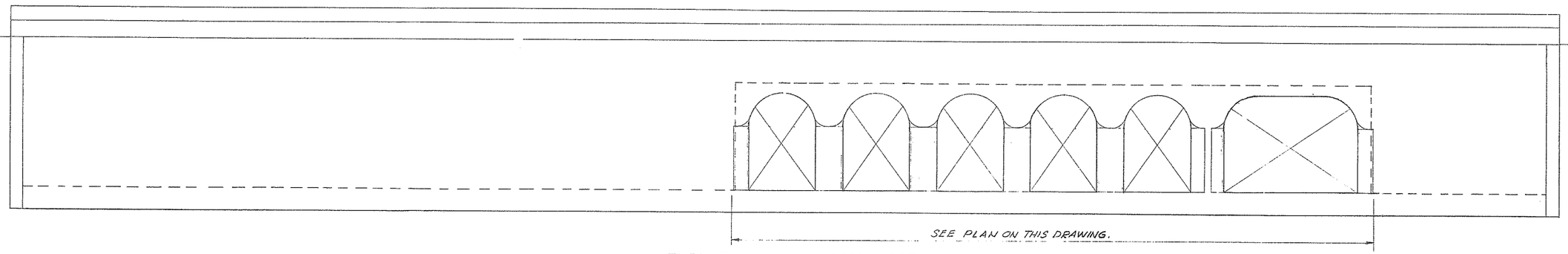
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

DESIGN	LRF	SCALE	AS NOTED
DRAWN	R.R.C.	DATE	AUGUST, 1972
CHECKED	LRF	APPROVED	
DRAWING NO.	4884-1-6	REV.	1

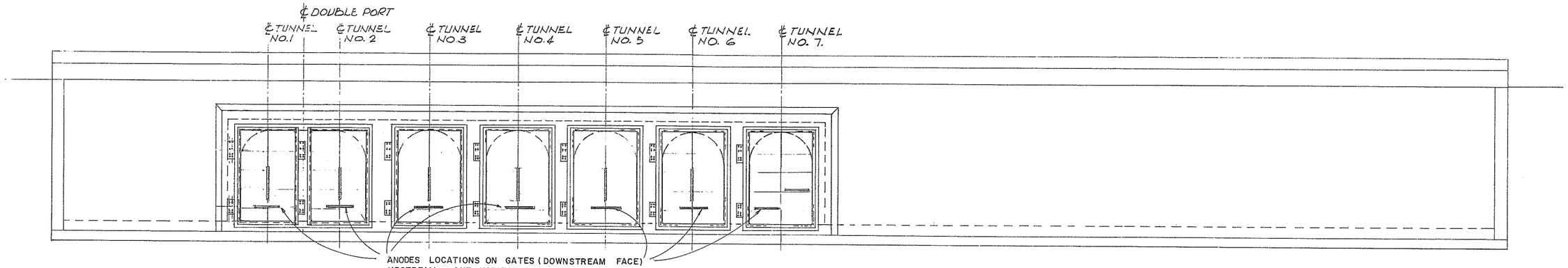
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN



PLAN



ELEVATION OF UPSTREAM FACE



ELEVATION OF DOWNSTREAM FACE

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	W.W.	AS CONSTRUCTED	

DATE 11 Sept 72 APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept 1972 APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-301

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

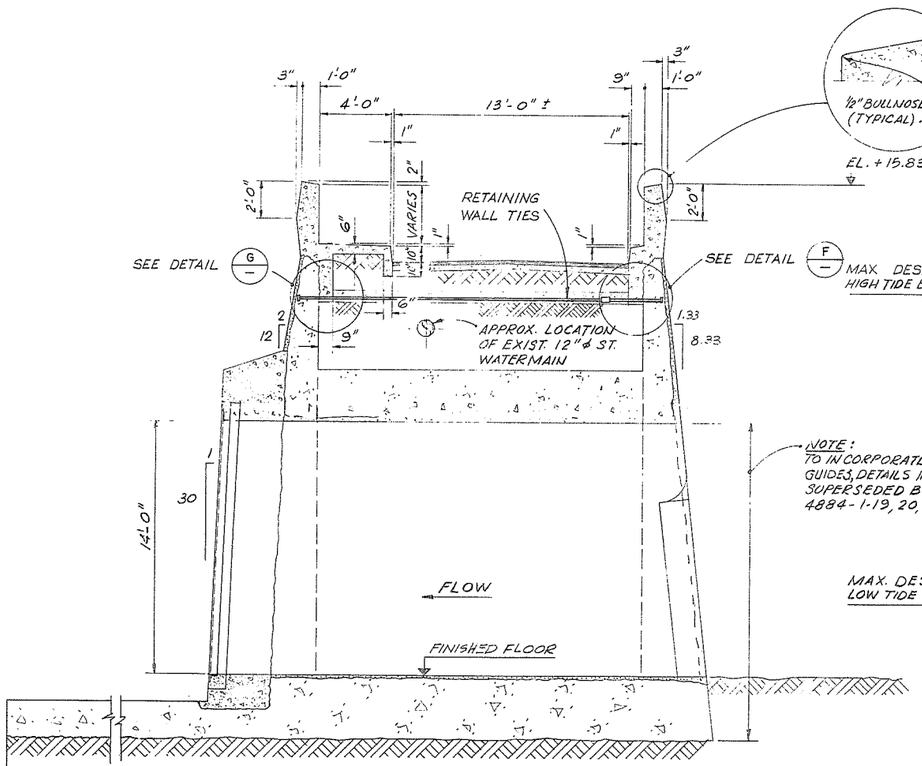
TITLE
NICOMEKL DAM
GENERAL ARRANGEMENT
PLAN AND SECTIONS

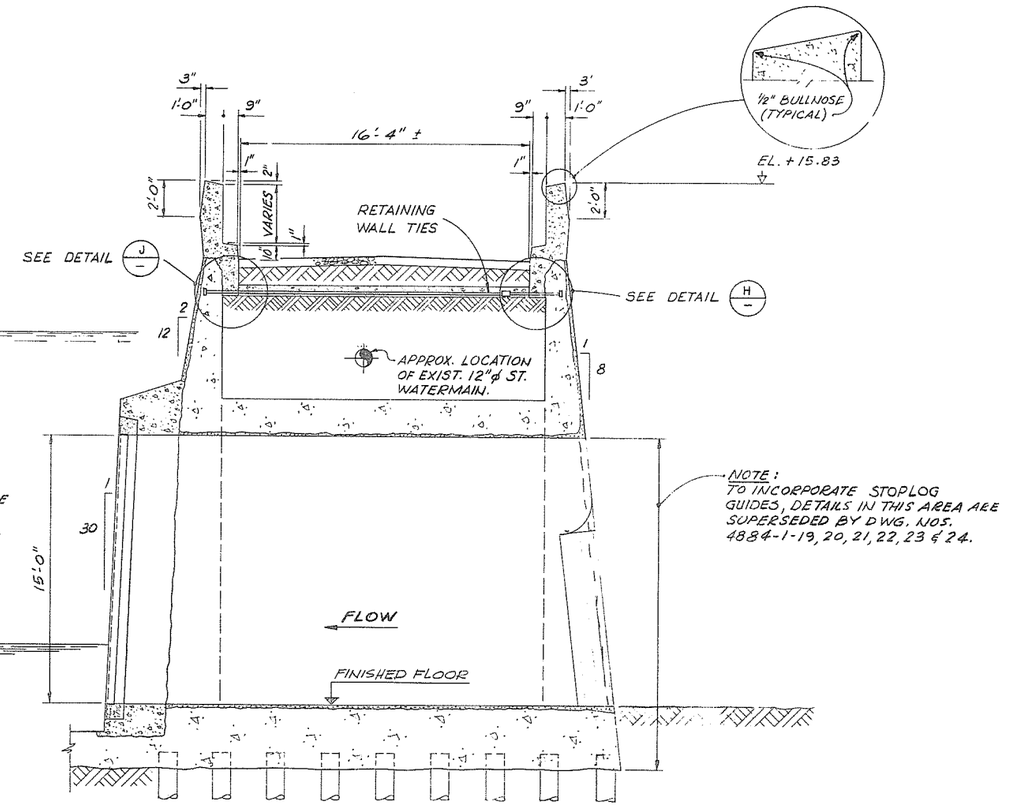
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C. — 105332

DESIGN W.P.Miller	SCALE 1/8" = 1'-0"
DRAWN R.W.W. – G.J.Q.V.	DATE AUGUST, 1972.
CHECKED W.P.M.	APPROVED
DRAWING NO. 4884-1-7	REV. 1

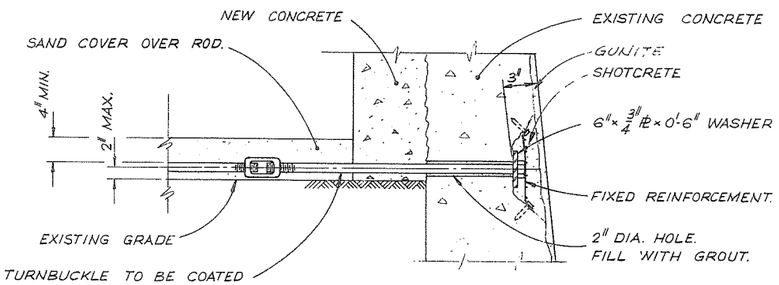
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

SCIL - 3709 D - A.E.S.



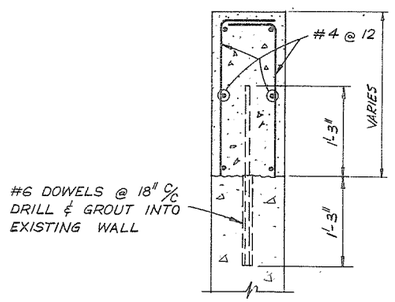


SECTION 1/301
NICOMEKL DAM



DETAIL F/— H/—
DETAIL G/— J/— (OPPOSITE HAND)
1" = 1'-0"

SECTION 2/308
SERPENTINE DAM



RETAINING WALL EXTENSION DETAIL
1" = 1'-0"

LEGEND

- EXISTING CONCRETE
- NEW CONCRETE
- SHOTCRETE OR GUNITE

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	J.W.	AS CONSTRUCTED	

APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE
DATE 11 Sept 72

APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA
DATE 12 Sept 1972

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-302

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

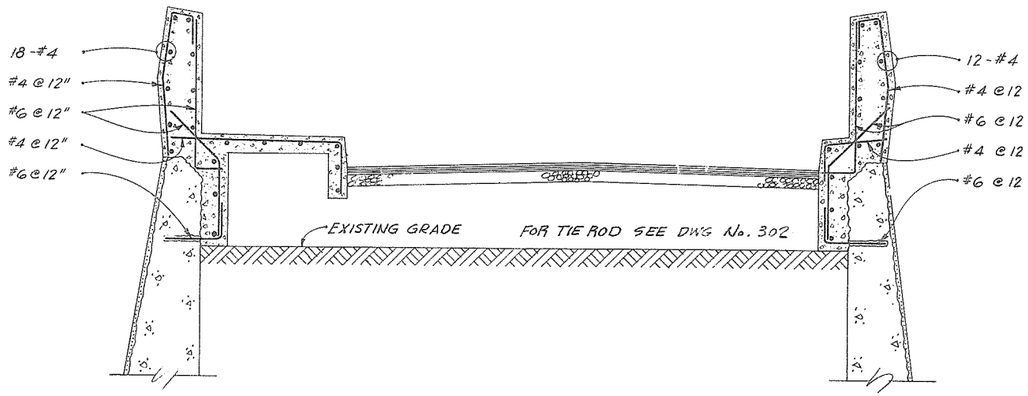
TITLE NICOMEKL AND SERPENTINE DAMS
ROADWAY
CROSS SECTIONS
CONCRETE

105333
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

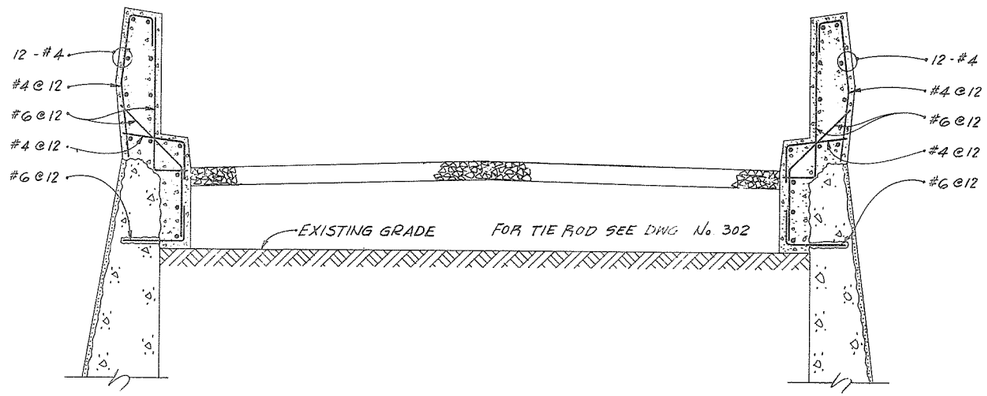
DESIGN W.F.Kelly	SCALE 1/4" = 1'-0"
DRAWN G.J.Q.V.	DATE AUGUST, 1972
CHECKED W.F.K.	APPROVED
DRAWING NO. 4884-1-8	REV. 1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

SCIL - 37069 - A.E.S.



SECTION 1/301
NICOMEKL DAM



SECTION 2/308
SERPENTINE DAM

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

DATE 11 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept 1972
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-303

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

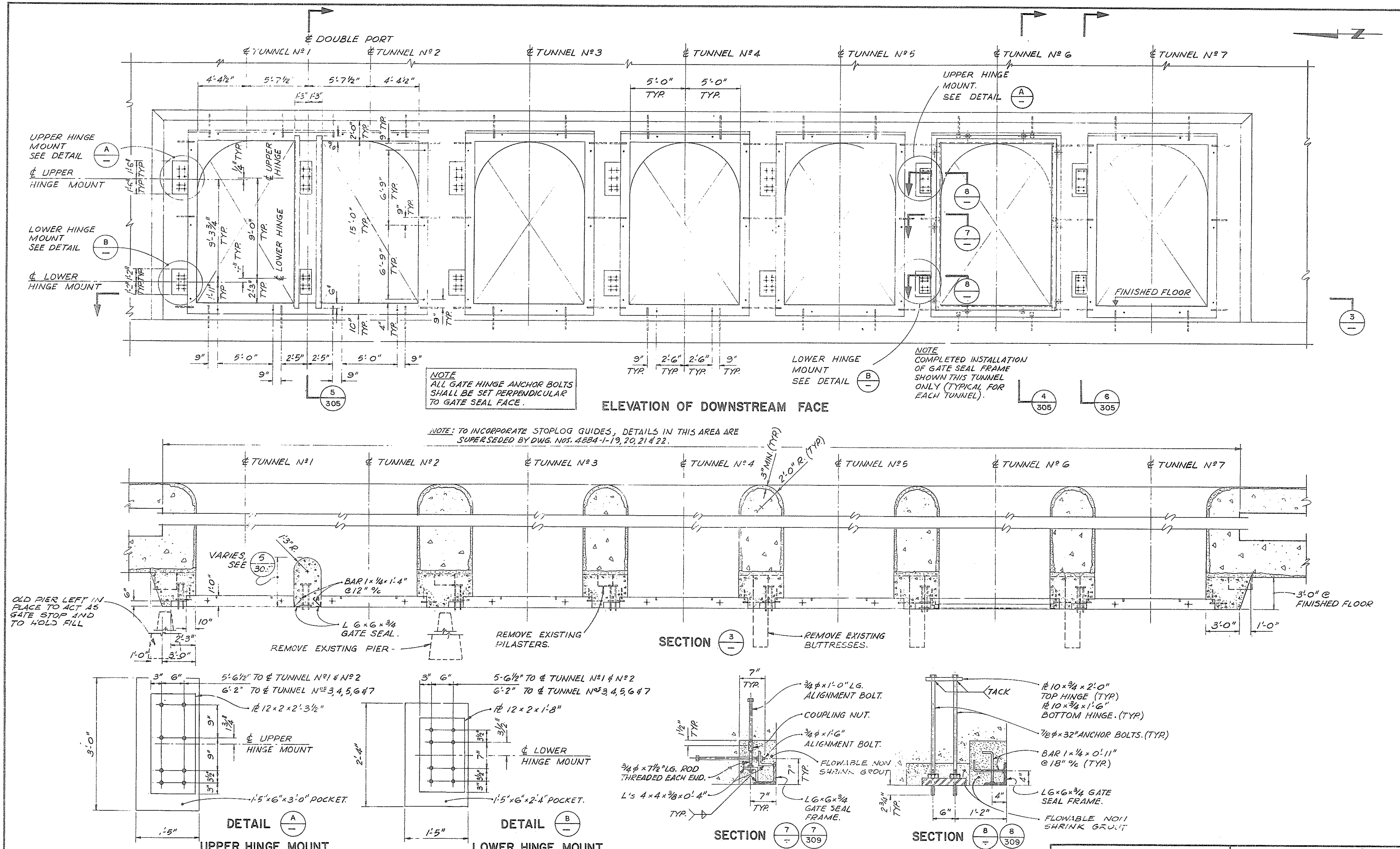
TITLE NICOMEKL AND SERPENTINE DAMS
ROADWAY
CROSS SECTIONS
REINFORCEMENT

105334
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

DESIGN	W.F.Kelly	SCALE	1/2" = 1'-0"
DRAWN	G.J.Q.V.D	DATE	AUGUST, 1972
CHECKED	W.F.	APPROVED	
DRAWING NO.	4884-1-9	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

ECIL - 3709 D - A.E.S.



NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE — DATE 11 Sept 72

APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA — DATE 12 Sept 1972

PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-304

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

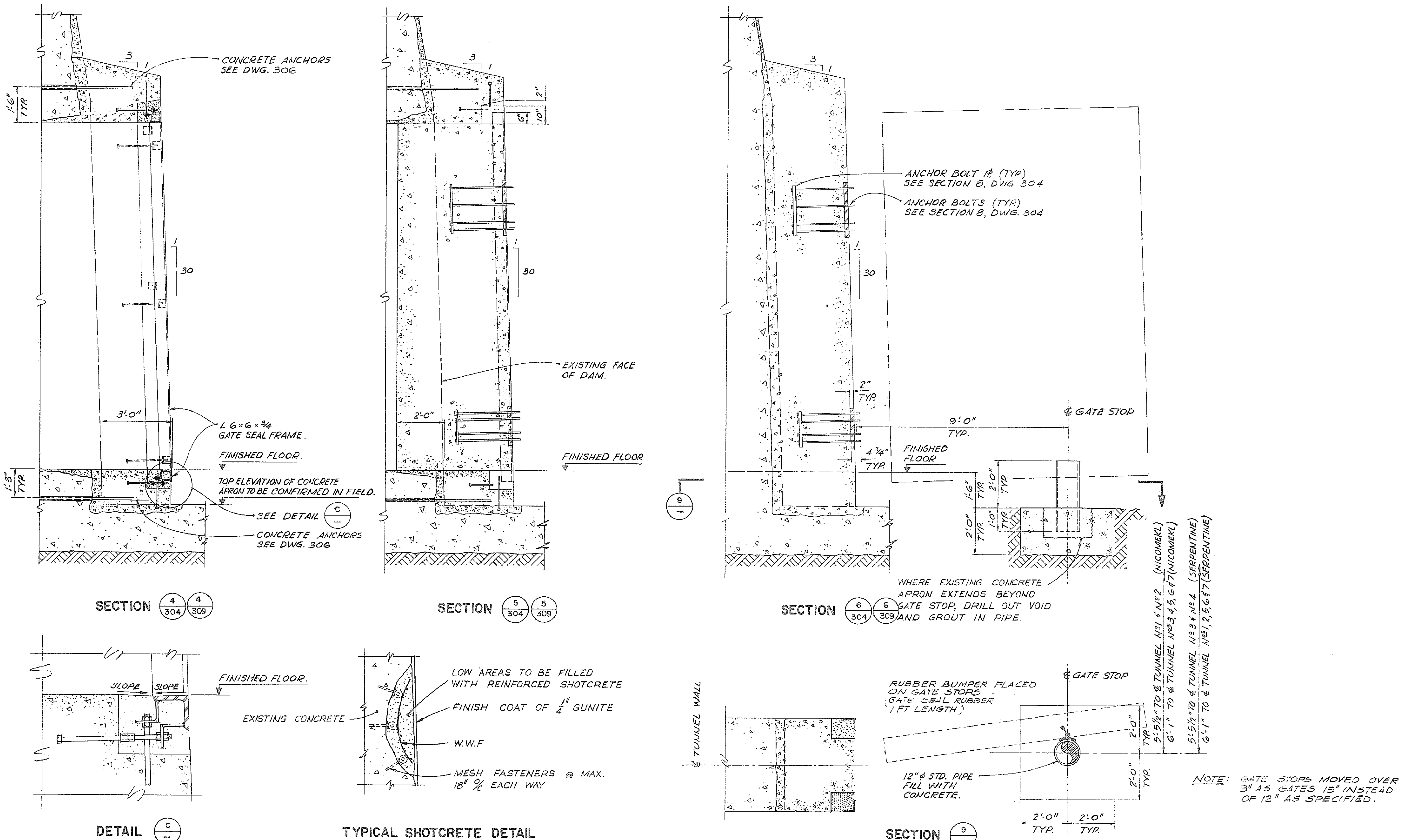
TITLE NICOMEKL DAM
GATE COLLAR
ELEVATION AND SECTIONS
CONCRETE

105335

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	W F Kelly	SCALE	1/4" & 1" = 1'-0"
DRAWN	G.J.Q.V.	DATE	AUGUST, 1972.
CHECKED	W F K	APPROVED	
DRAWING NO.	4884-1-10	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-305

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE NICOMEKL AND SERPENTINE DAMS
GATE COLLAR
SECTIONS AND DETAILS
CONCRETE

105336

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

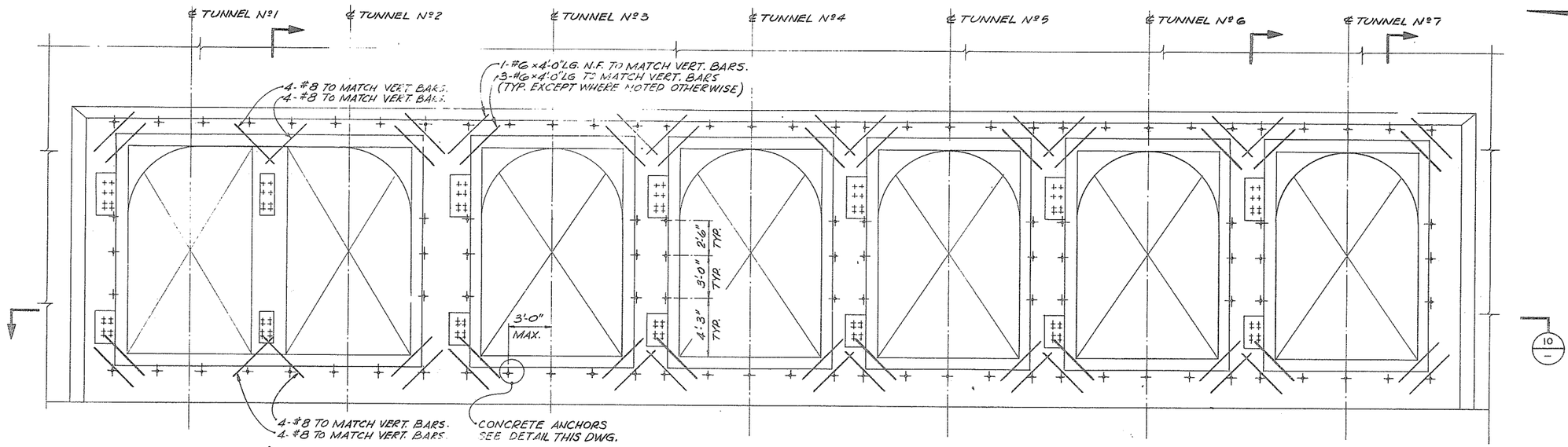
DESIGN	W.F.Kelly	SCALE	1/2" = 1'-0"
DRAWN	G.J.Q.V.	DATE	AUGUST, 1972
CHECKED	W.F.K.	APPROVED	
DRAWING NO.	4884-1-11	REV.	1

DATE 11 Sept 72 — APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept. 1972 — APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

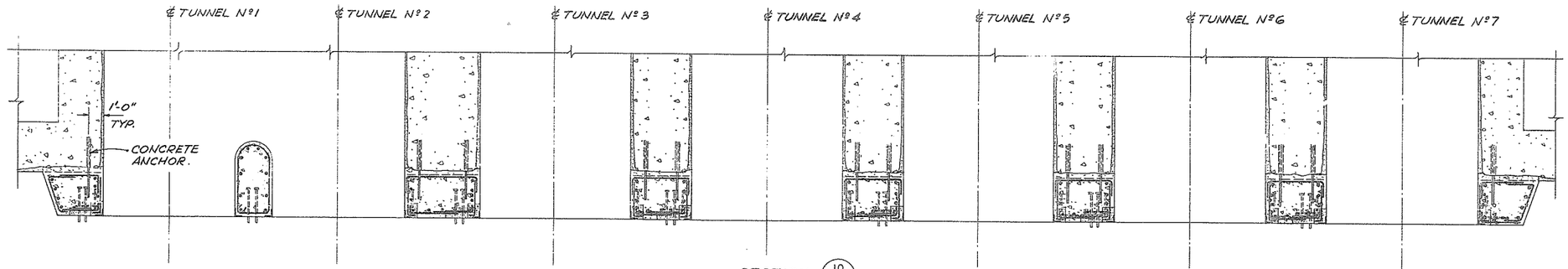
NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



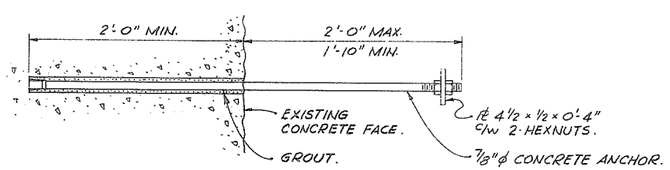
ELEVATION OF DOWNSTREAM FACE

SCALE $\frac{1}{4}$" = 1'-0"



SECTION (10 / —)

SCALE $\frac{1}{4}$" = 1'-0"



CONCRETE ANCHOR DETAIL

SCALE $1\frac{1}{2}$" = 1'-0"

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	VAN	AS CONSTRUCTED	

R.J. Talbot
11 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

D.E.H. 1972
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-306

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

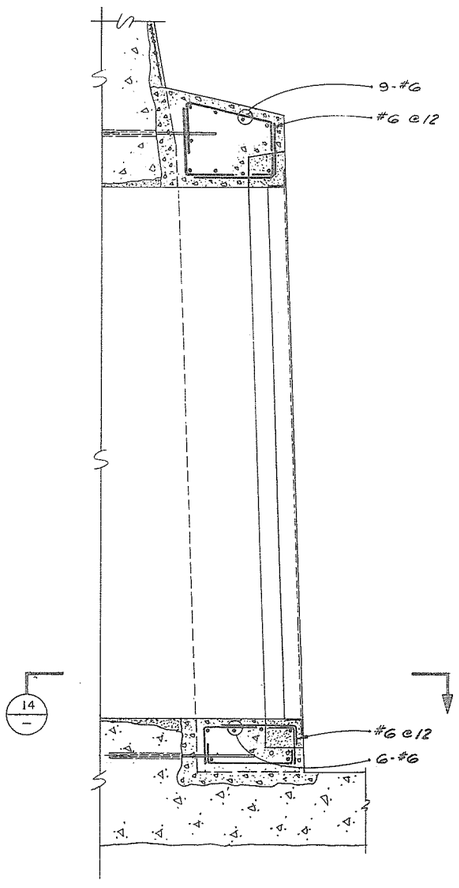
TITLE
NICOMEKL DAM
GATE COLLAR
ELEVATION AND SECTION
REINFORCEMENT

105337

AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

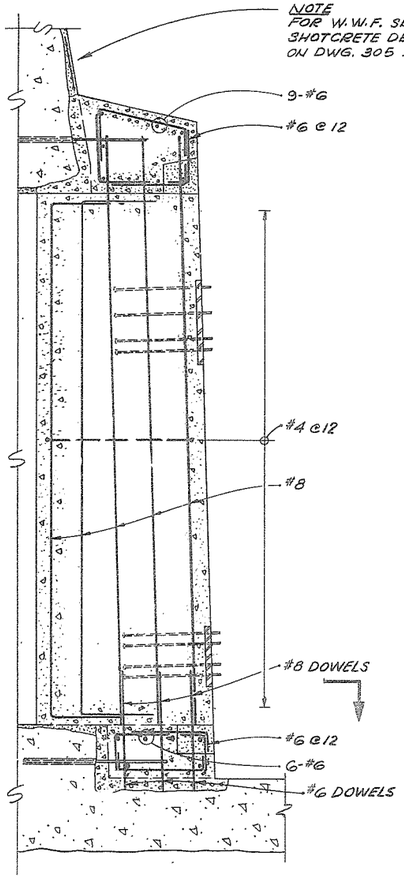
DESIGN	W.F.K.	SCALE	AS NOTED
DRAWN	G.J.O.V.	DATE	AUGUST, 1972.
CHECKED	W.F.K.	APPROVED	
DRAWING NO.	4884-1-12	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



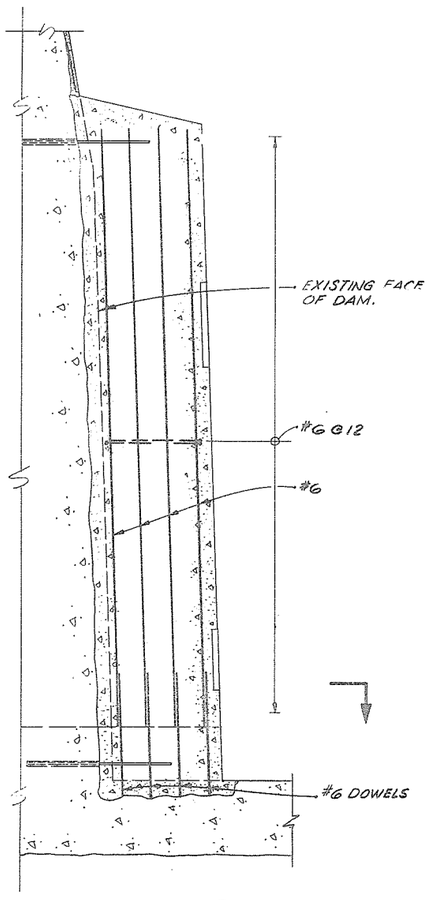
14

SECTION 11/306 11/310



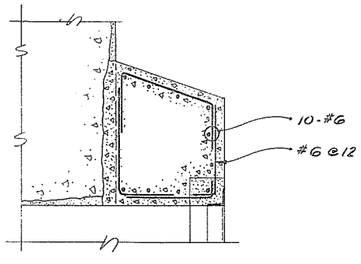
15

SECTION 12/306 12/310

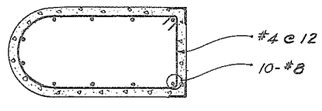


16

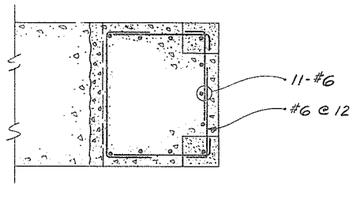
SECTION 13/306 13/310



SECTION 14



SECTION 15



SECTION 16

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	W.W.	AS CONSTRUCTED	

APPROVED
DATE 11 Sept 72
THE FRASER RIVER JOINT PROGRAM COMMITTEE

APPROVED
DATE 12 Sept. 1972
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-307

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

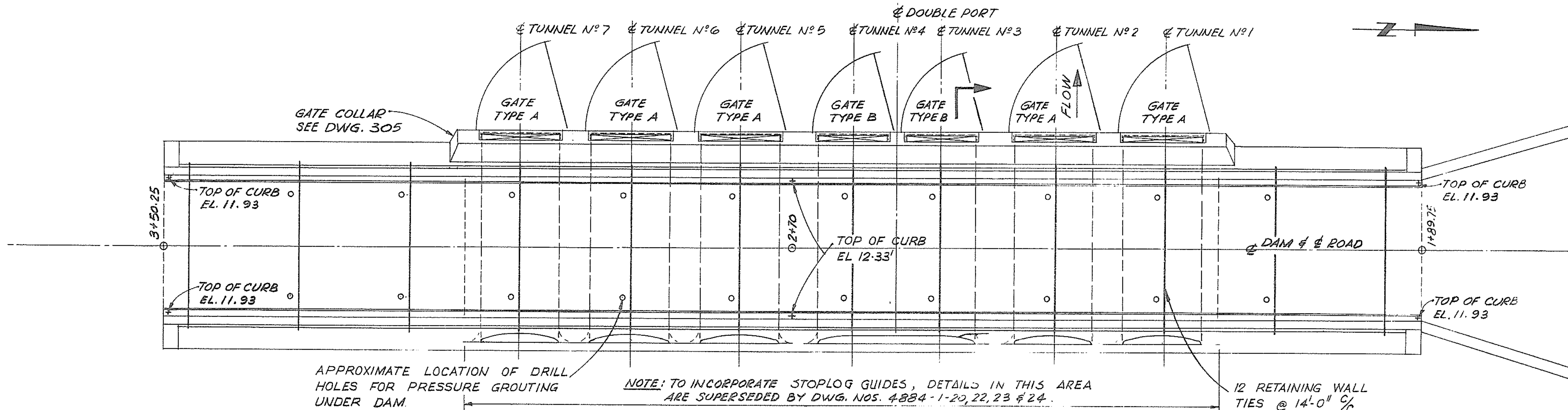
CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE NICOMEKL AND SERPENTINE DAMS
GATE COLLAR
SECTIONS AND DETAILS
REINFORCEMENT

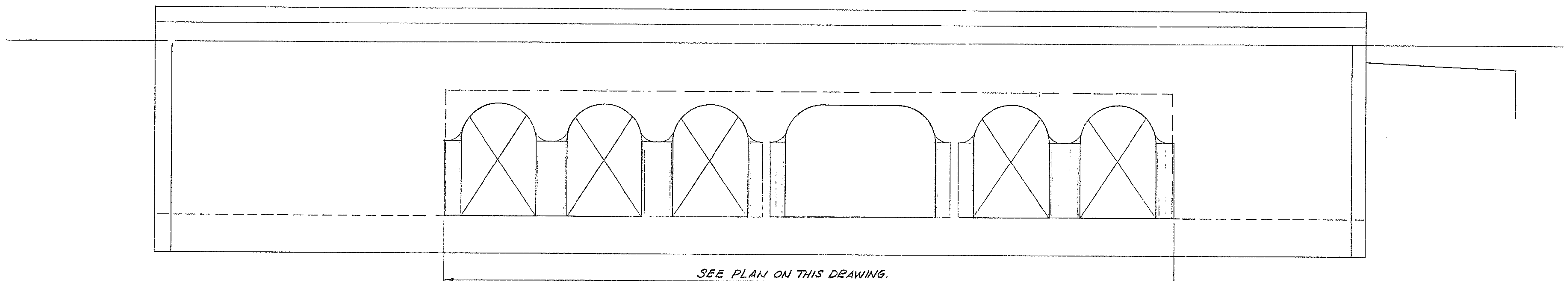
105338
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

DESIGN	W.H.K.	SCALE	1/2" = 1'-0"
DRAWN	G.J.Q.V.	DATE	AUGUST, 1972.
CHECKED	W.H.K.	APPROVED	
DRAWING NO.	4884-1-13	REV.	1

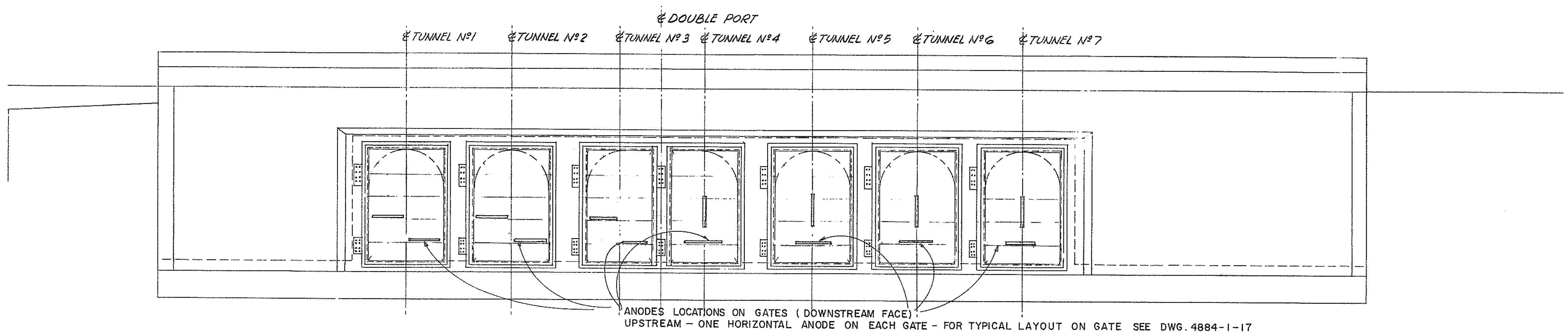
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN



PLAN



ELEVATION OF UPSTREAM FACE



ELEVATION OF DOWNSTREAM FACE

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	V.W.	AS CONSTRUCTED	

DATE 11 Sept 72
APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept. 1972
APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10·1 CONTRACT NO. 1

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE
SERPENTINE DAM
GENERAL ARRANGEMENT
PLAN AND SECTIONS

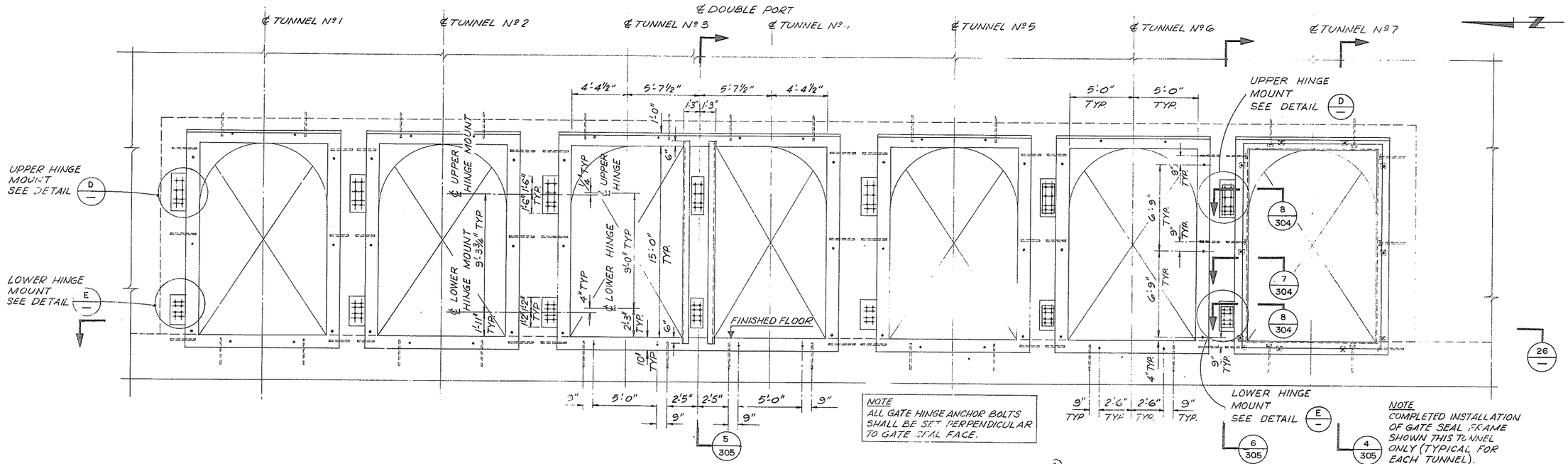
A.E.S.L. DRAWING NO. 4064-07-308

105339

AESL Consulting Engineers ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	W.F. Kelly	SCALE	1/8" = 1'-0"
DRAWN	G.J.Q.V.	DATE	AUGUST, 1972
CHECKED	WFK	APPROVED	
DRAWING NO.	4884-1-14	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

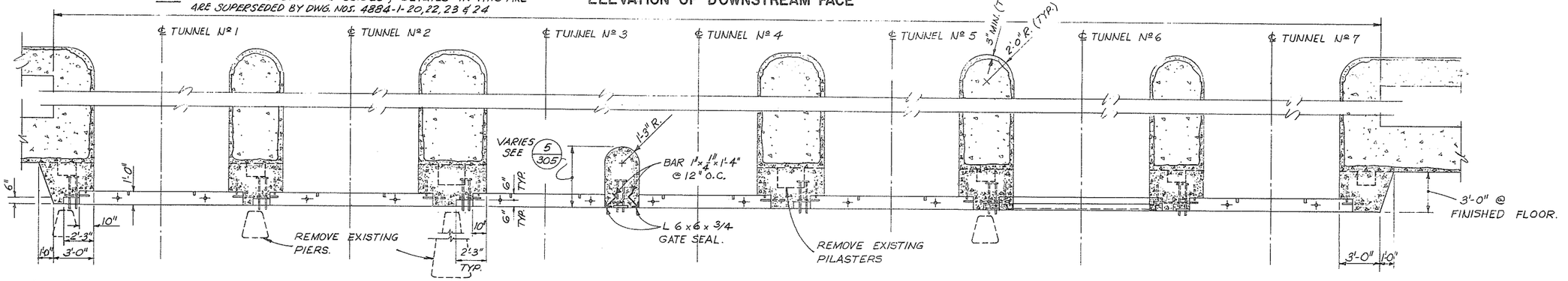


NOTE
ALL GATE HINGE ANCHOR BOLTS SHALL BE SET PERPENDICULAR TO GATE SEAL FACE.

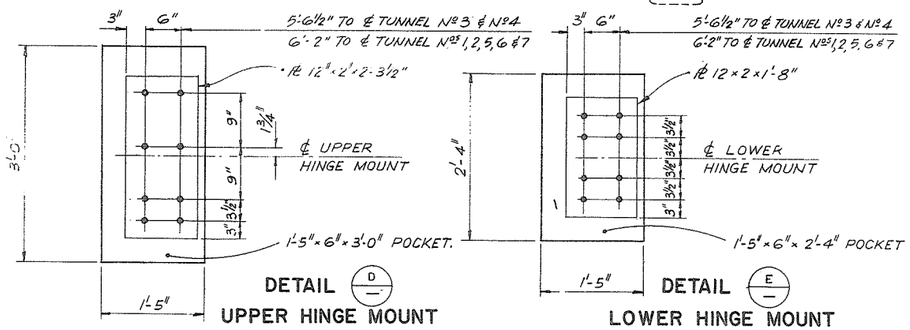
NOTE
COMPLETED INSTALLATION OF GATE SEAL FRAME SHOWN THIS TUNNEL ONLY (TYPICAL FOR EACH TUNNEL).

NOTE: TO INCORPORATE STOPLOG GUIDES, DETAILS IN THIS ARE ARE SUPERSEDED BY DWG. NOS. 4884-1-20, 22, 23 & 24

ELEVATION OF DOWNSTREAM FACE



SECTION 26 —



DETAIL D — UPPER HINGE MOUNT

DETAIL E — LOWER HINGE MOUNT

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	W.W.	AS CONSTRUCTED	

APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE — 11 Sept 72

APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA — 12 Sept. 1972

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-309

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

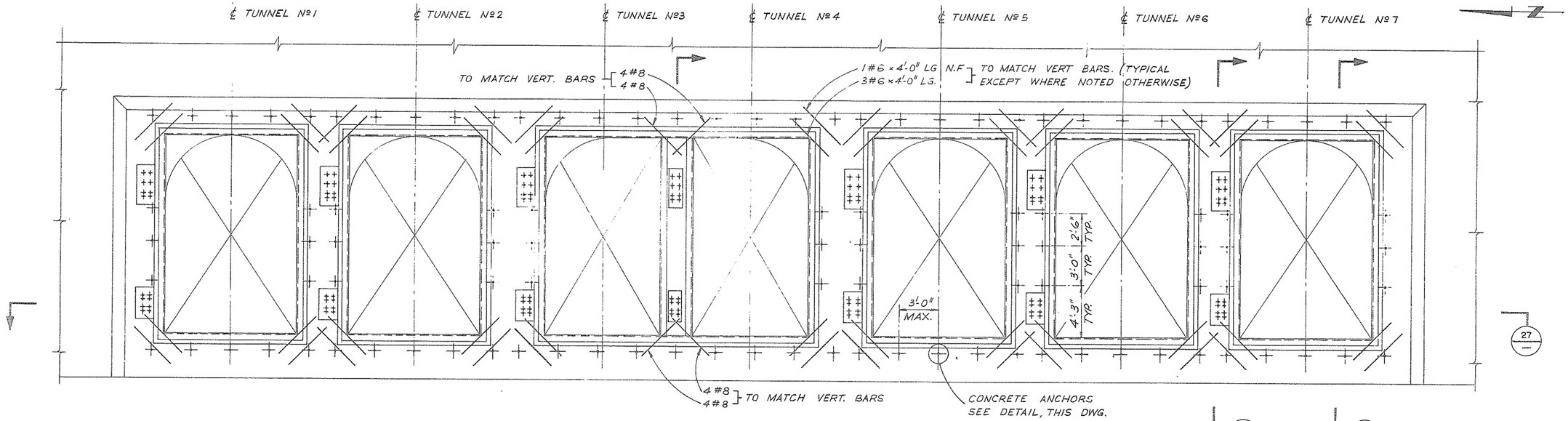
CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE: SERPENTINE DAM
GATE COLLAR
ELEVATION AND SECTIONS
CONCRETE

105340
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	W.F. Kelly	SCALE	1/4" & 1" = 1'-0"
DRAWN	R.R.C. & G.J.G.V.	DATE	AUGUST 1972
CHECKED	W.F.K.	APPROVED	
DRAWING NO.	4884-1-15	REV.	1

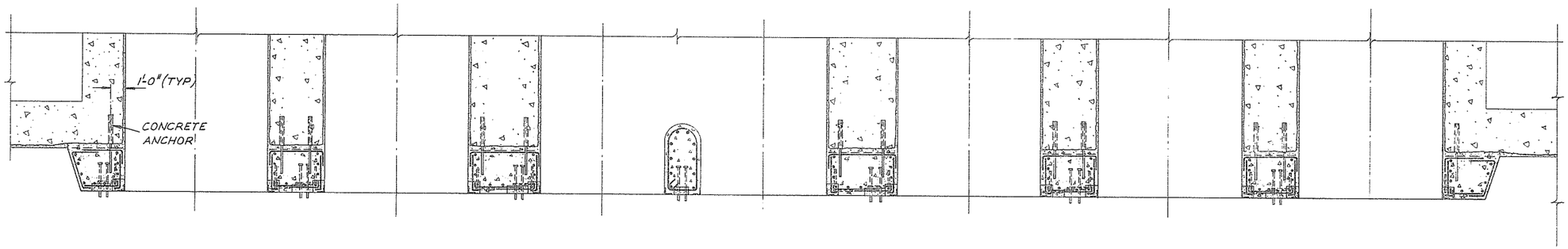
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 26

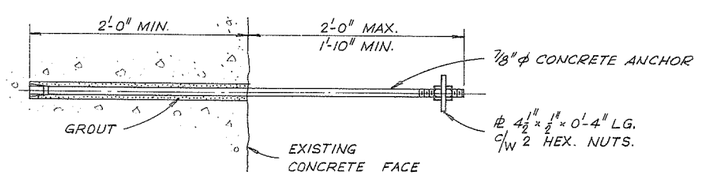


ELEVATION OF DOWNSTREAM FACE

SCALE $\frac{1}{4}$" = 1'-0"

12 307





CONCRETE ANCHOR DETAIL.

SCALE $1\frac{1}{2}$" = 1'-0"

SECTION 27

SCALE $\frac{1}{4}$" = 1'-0"

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	WW	AS CONSTRUCTED	

DATE 11 Sept 72 APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 Sept 1972 APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 101 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-310

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

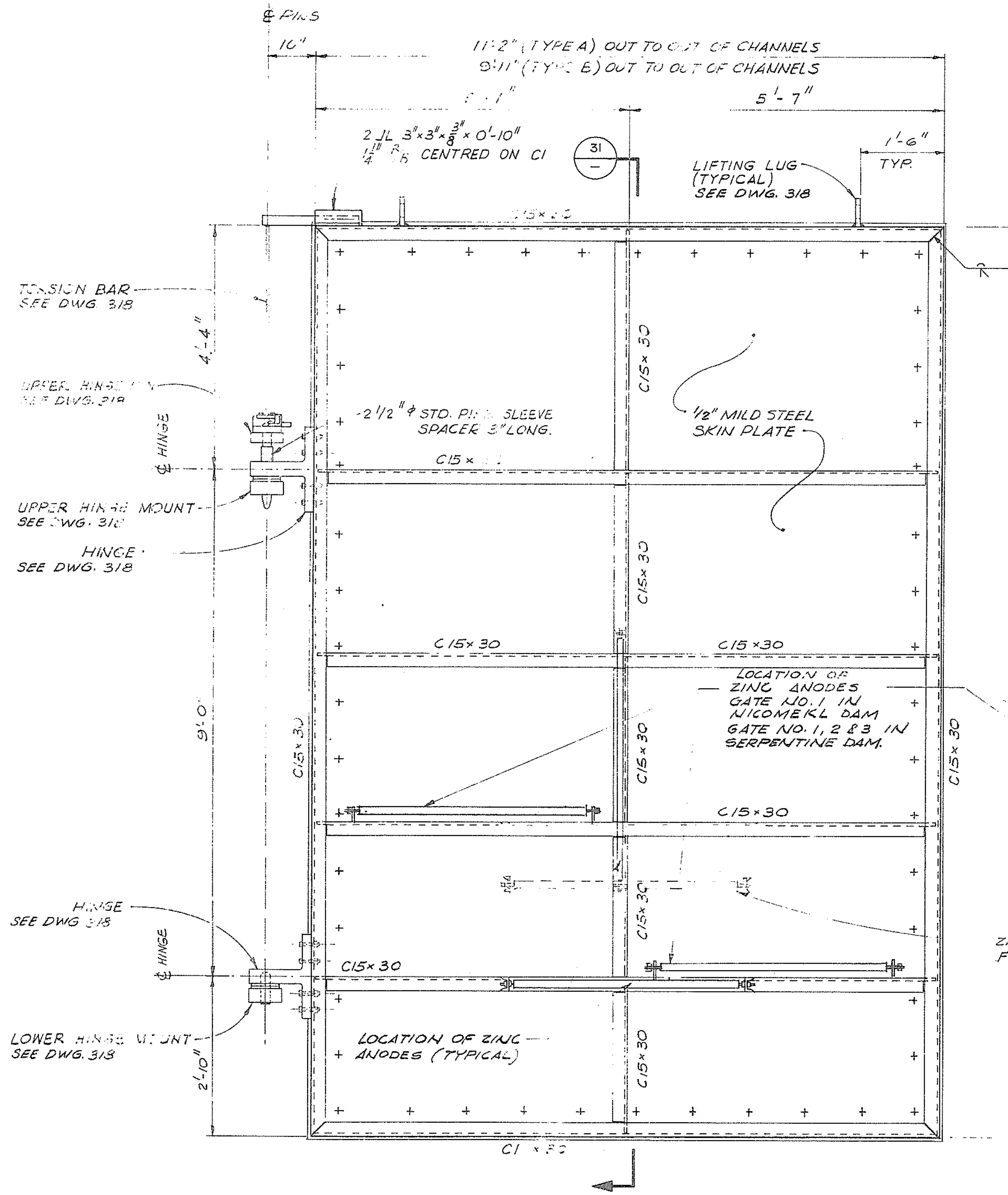
TITLE SERPENTINE DAM
GATE COLLAR
ELEVATION AND SECTION
REINFORCEMENT

105341
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

DESIGN	W Kelly	SCALE	AS NOTED
DRAWN	P.W.	DATE	AUGUST, 1972
CHECKED	WK	APPROVED	
DRAWING NO.	4884-1-16	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

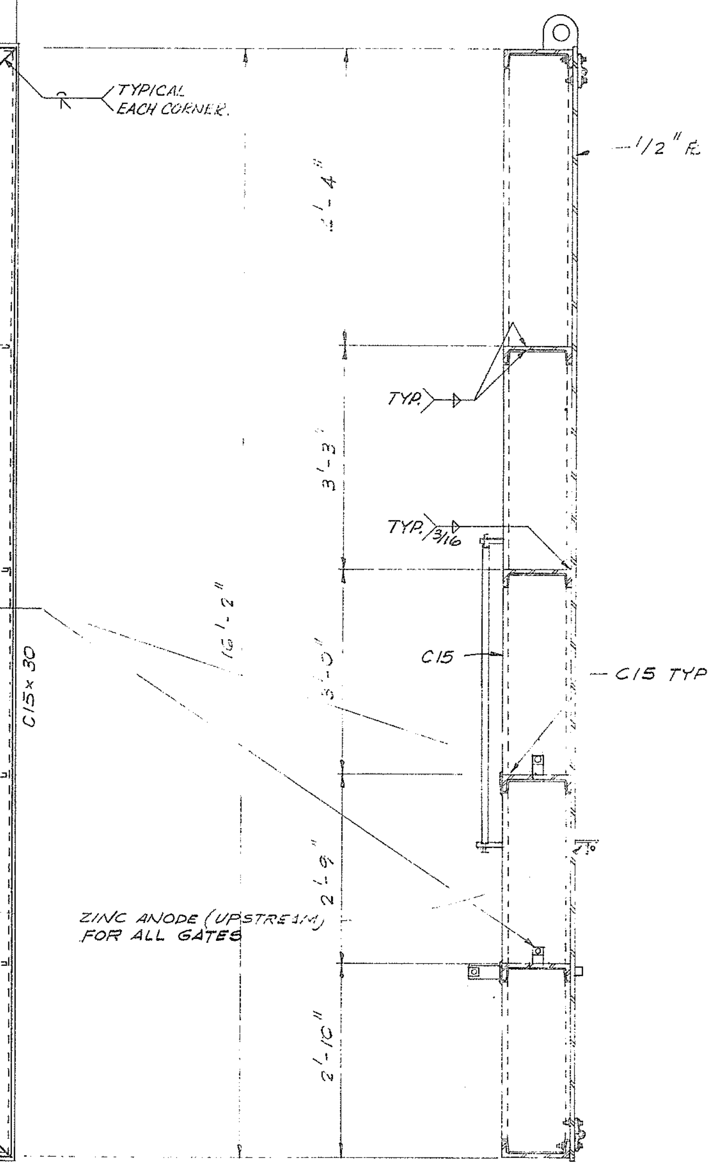
6CIL - 3793 B - A.E.S.



FLOOD GATE- ELEVATION.

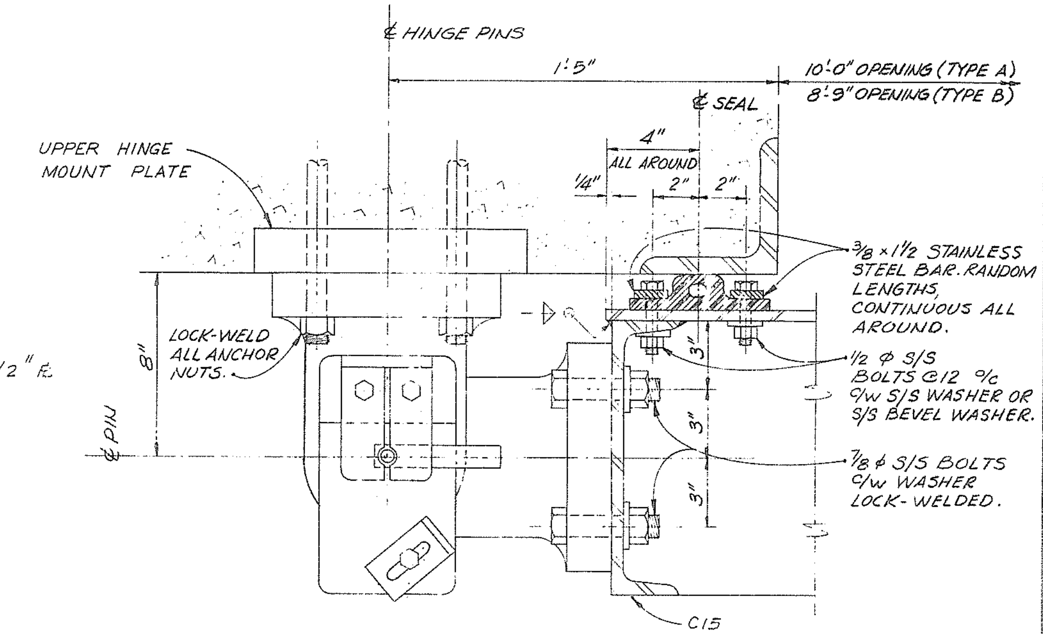
3/4" = 1'-0"

10 TYPE A REQD.
4 TYPE B REQD.



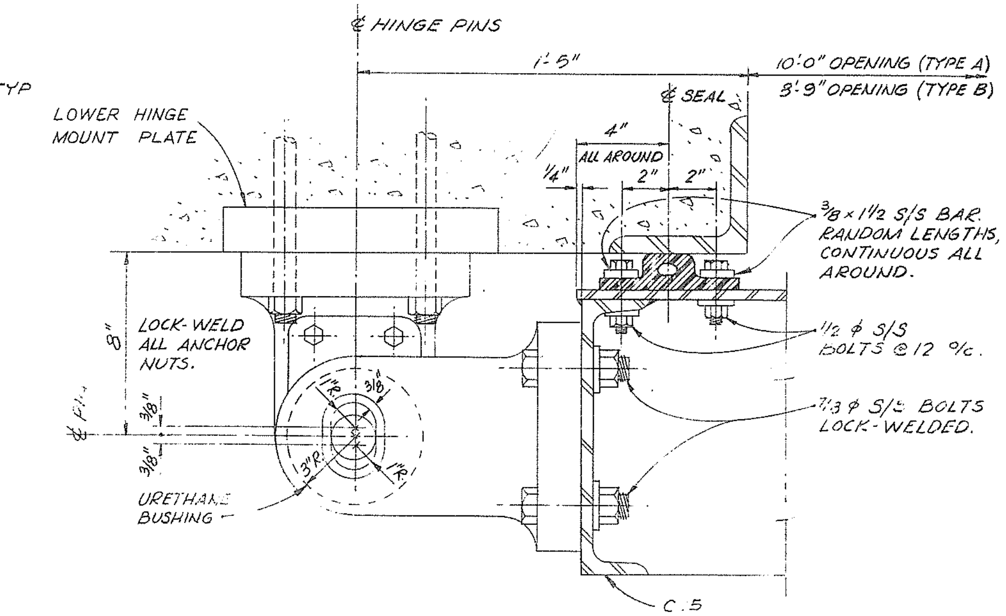
SECTION 31

3/4" = 1'-0"



UPPER HINGE ASSEMBLY

3" = 1'-0"



LOWER HINGE ASSEMBLY

3" = 1'-0"

NOTES :-
- ANODES AND SUPPORTING BRACKETS TO BE SUPPLIED AT SITE BY THE PROVINCE. CONTRACTOR SHALL MOUNT ANODES AFTER GATES ARE INSTALLED AND SHALL TOUCH-UP PAINT AS REQUIRED.
- ALL HINGE CONTACT SURFACES TO BE FINISHED TO 125

NOTE: LOCATIONS OF ANODES FOR NICOMEKL DAM FLOOD GATES SEE DWG. 4884-1-7
LOCATIONS OF ANODES FOR SERPENTINE DAM FLOOD GATES SEE DWG. 4884-1-14

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

DATE 11 Sept 72 APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 13 Sept 1972 APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1 A.E.S.L. DRAWING NO. 4064-07-311

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

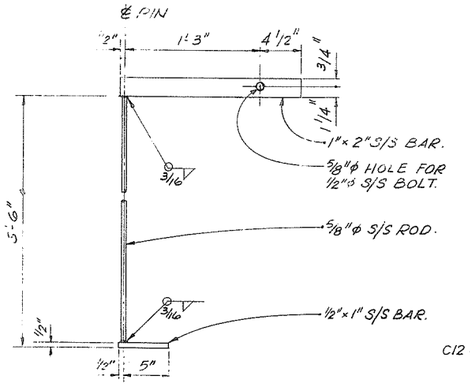
TITLE NICOMEKL AND SERPENTINE DAMS
FLOOD GATE AND HINGE
ELEVATION AND SECTION
STRUCTURAL STEEL - SHEET Nº 1

105342

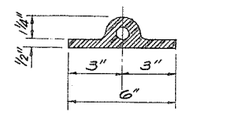
AESL ASSOCIATED ENGINEERING SERVICES LTD. Consulting Engineers VANCOUVER, B.C.

DESIGN		SCALE	AS NOTED
DRAWN	A.T. & G.J.Q.V.	DATE	AUGUST, 1972
CHECKED		APPROVED	
DRAWING NO.	4884-1-17	REV. 1	

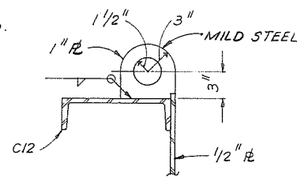
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



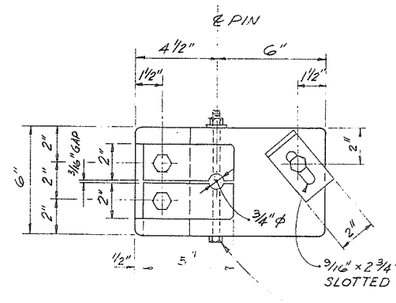
TORSION BAR
1 1/2" = 1'-0"
20 REQD.

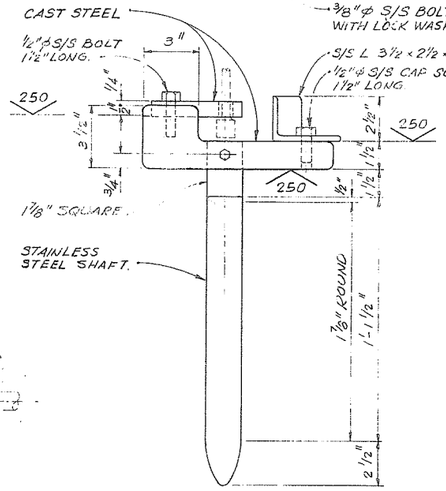


GATE SEAL
3" = 1'-0"

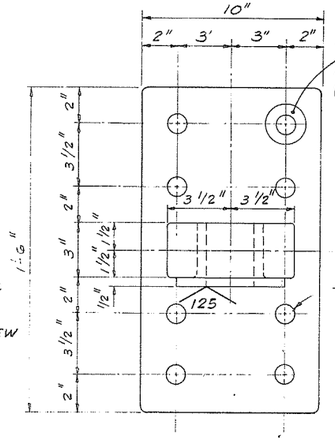


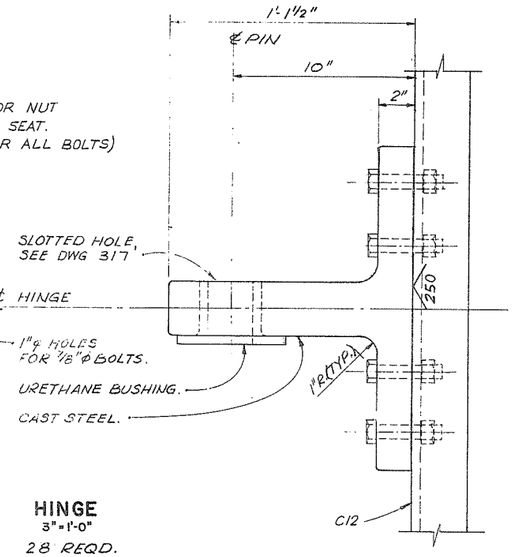
LIFTING LUG
1 1/2" = 1'-0"
28 REQD.



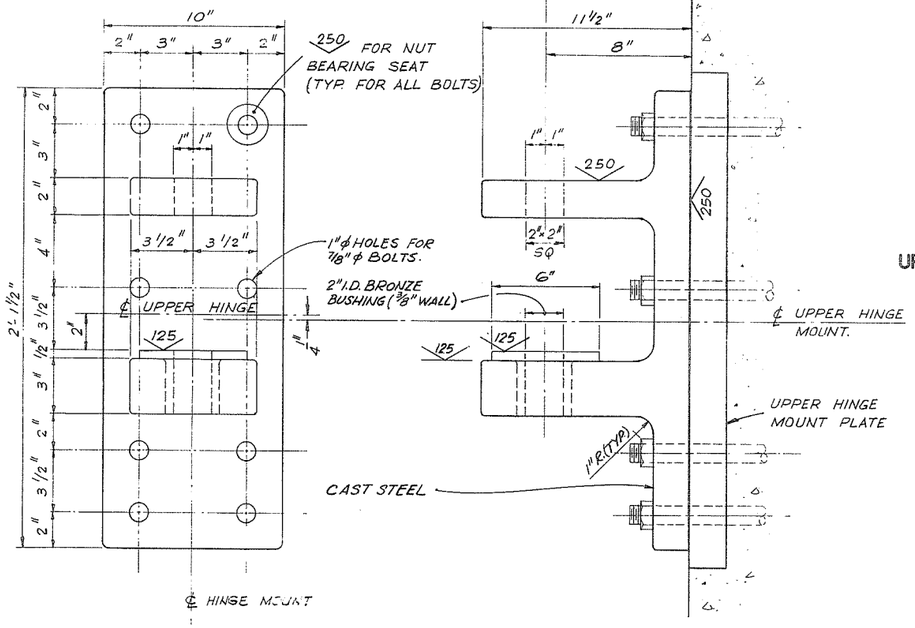


UPPER HINGE PIN
3" = 1'-0"
14 REQD.

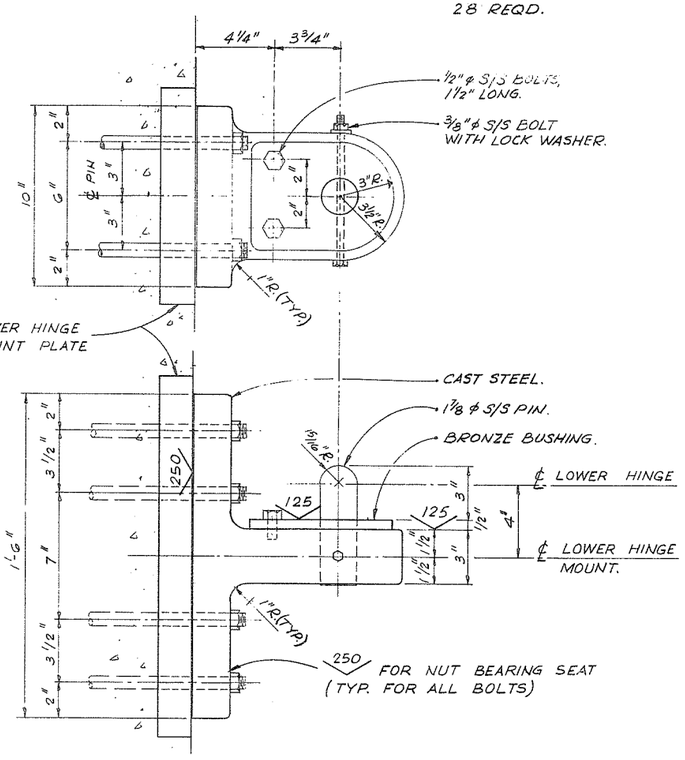




HINGE
3" = 1'-0"
28 REQD.



UPPER HINGE MOUNT
3" = 1'-0"
14 REQD.



LOWER HINGE MOUNT
3" = 1'-0"
14 REQD.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	A.W.	AS CONSTRUCTED	

WILLIAM F. KELLY — BRITISH COLUMBIA — ENGINEER

DATE 11 Sept 72
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE 12 SEPT. 1972
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-312

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

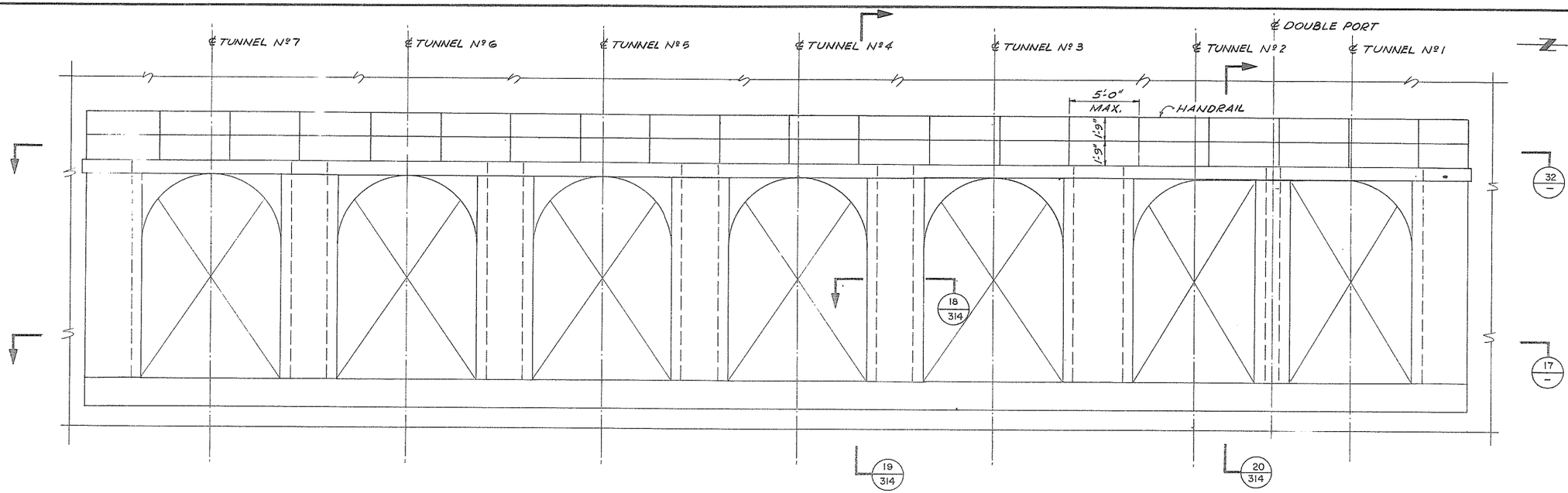
105343

TITLE NICOMEKL AND SERPENTINE DAMS
GATE AND HINGE
DETAILS
STRUCTURAL STEEL - SHEET Nº 2

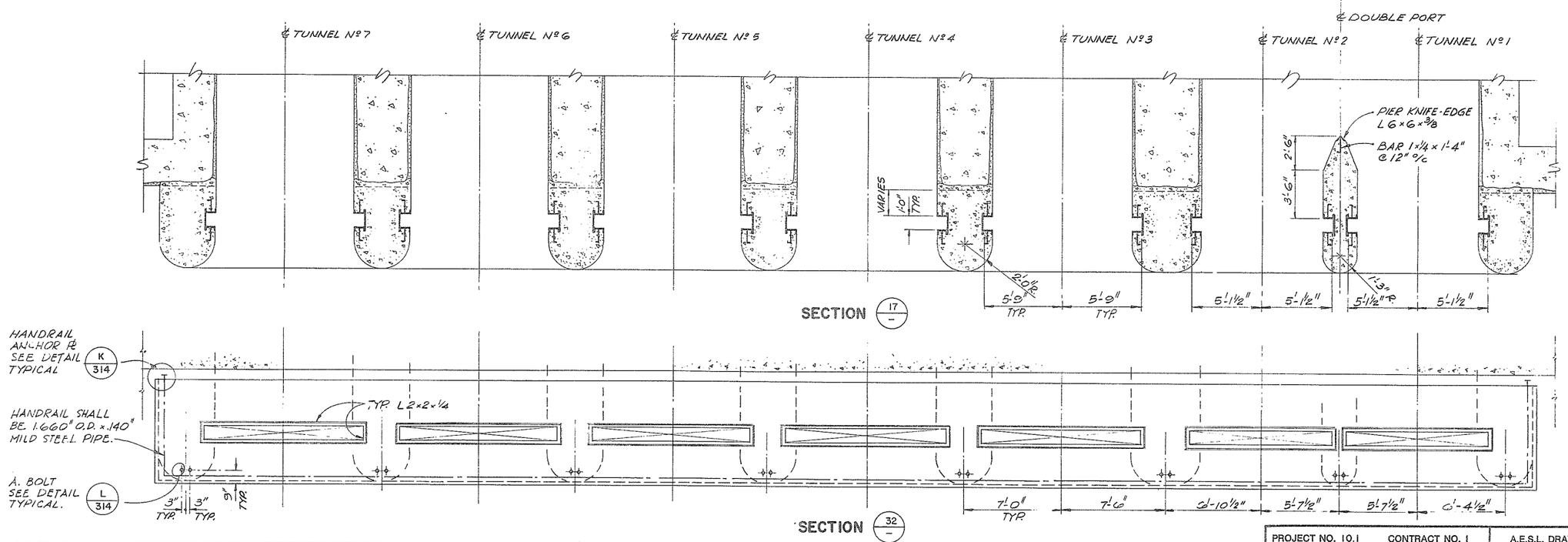
DESIGN	W.F.K.	SCALE	AS NOTED
DRAWN	A.T. & G.J.Q.V.	DATE	AUGUST 1972
CHECKED	W.F.K.	APPROVED	
DRAWING NO.	4884-1-18	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

ECIL - 3709 D - A.E.S.



ELEVATION OF UPSTREAM FACE



NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	G.Q.V.	AS CONSTRUCTED	

DATE 20 Sept 1972
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE OCT 25 72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10.1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-313

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE
NICOMEKL DAM
STOPLOG GUIDES
ELEVATION AND SECTION
CONCRETE

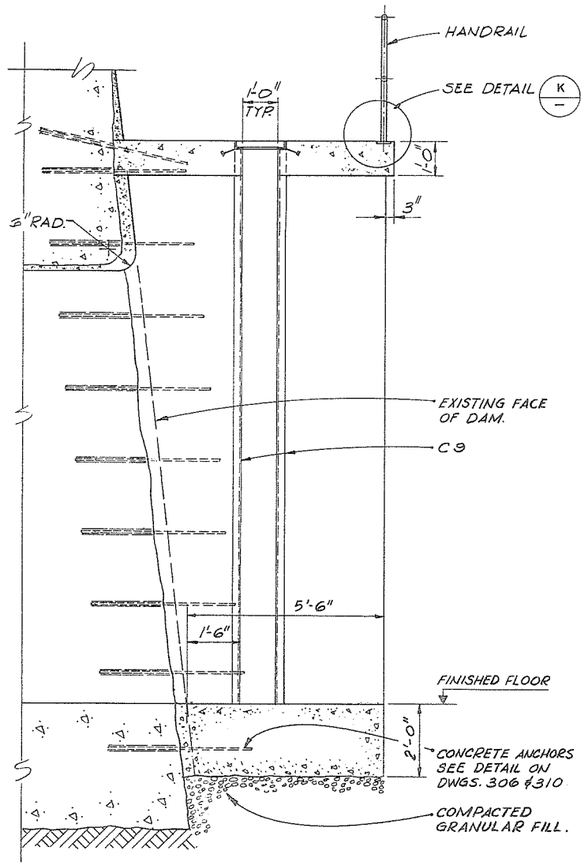
105344
AESL | ASSOCIATED ENGINEERING SERVICES LTD.
Consulting Engineers | VANCOUVER, B.C.

DESIGN	WK	SCALE	1/4" = 1'-0"
DRAWN	G.J.Q.V.	DATE	SEPT. 1972
CHECKED	W.F.Kelly	APPROVED	

DRAWING NO. 4884-1-19 REV. 1

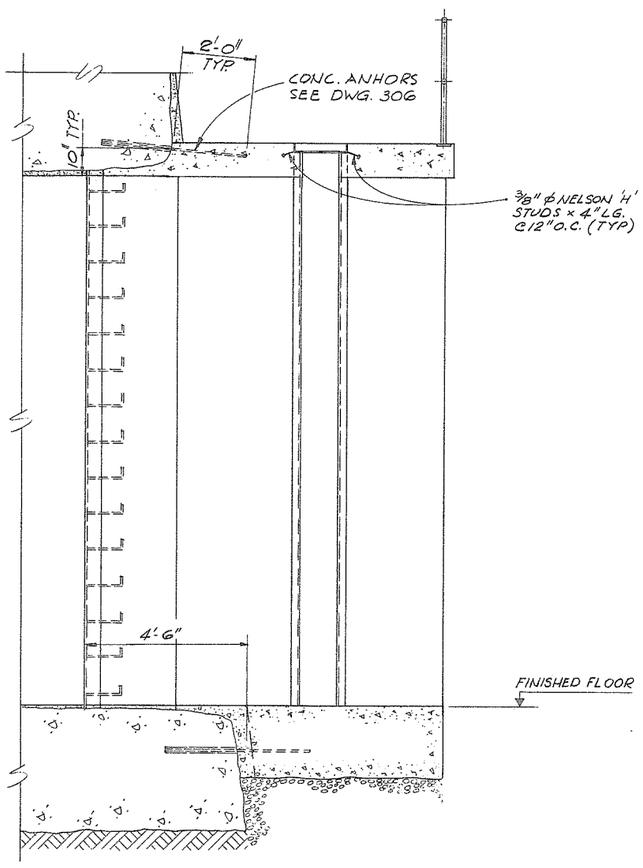
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1

ECIL - 3599 D - A.E.S.L.



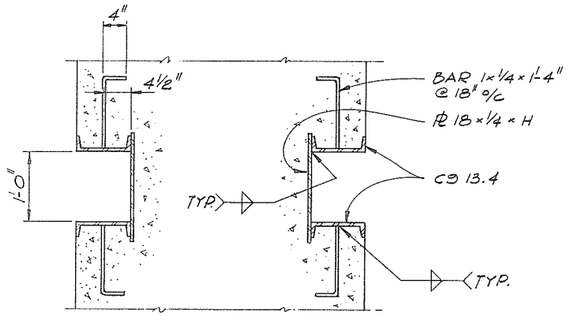
SECTION 19/313 19/317

SCALE 1/2" = 1'-0"



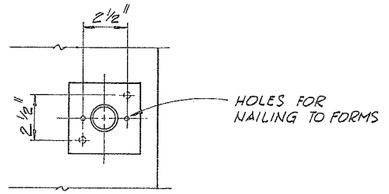
SECTION 20/313 20/317

SCALE 1/2" = 1'-0"

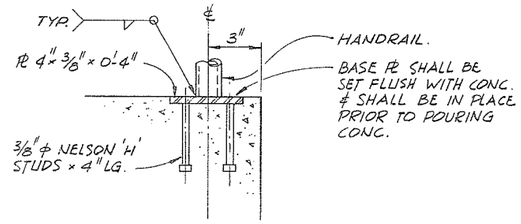


SECTION 18/313 18/317

SCALE 1"=1'-0"

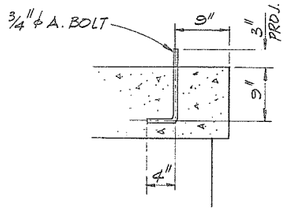


PLAN



DETAIL K/313 K/317

SCALE 3"=1'-0"



DETAIL L/313 L/317

SCALE 1"=1'-0"

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

PROFESSIONAL ENGINEER — WILLIAM KELLY — BRITISH COLUMBIA

DATE 12 Sept 1972
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE Oct 25 72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-314

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

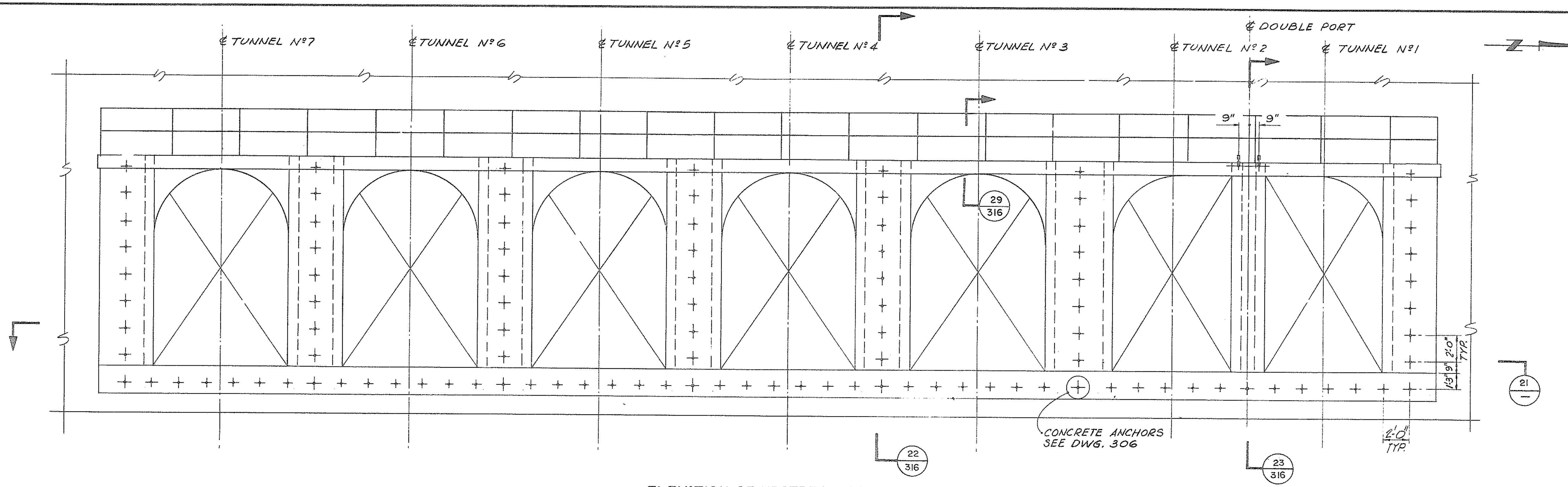
CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE NICOMEKL AND SERPENTINE DAMS
STOPLOG GUIDES
SECTIONS AND DETAILS
CONCRETE

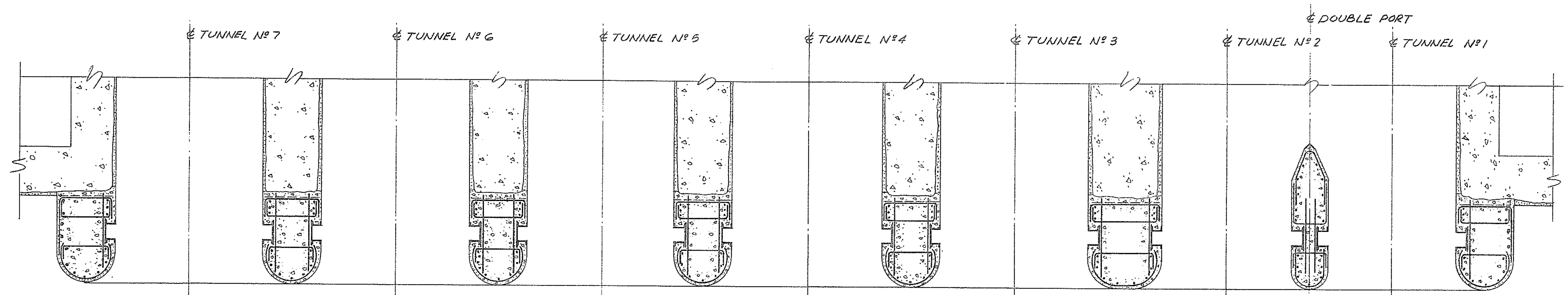
105345
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN WK	SCALE AS SHOWN
DRAWN G.J.O.V.	DATE SEPT, 1972
CHECKED W.F.Kelly	APPROVED
DRAWING NO. 4064-1-20	REV. 1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



ELEVATION OF UPSTREAM FACE



SECTION (21/—)

FOR DETAILS OF REINFORCING
SEE DWG 316.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

DATE 20 Sept 1972
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE Oct 23/72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10.1 CONTRACT NO. 1

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE NICOMEKL DAM
STOPLOG GUIDES
ELEVATION AND SECTION
REINFORCEMENT

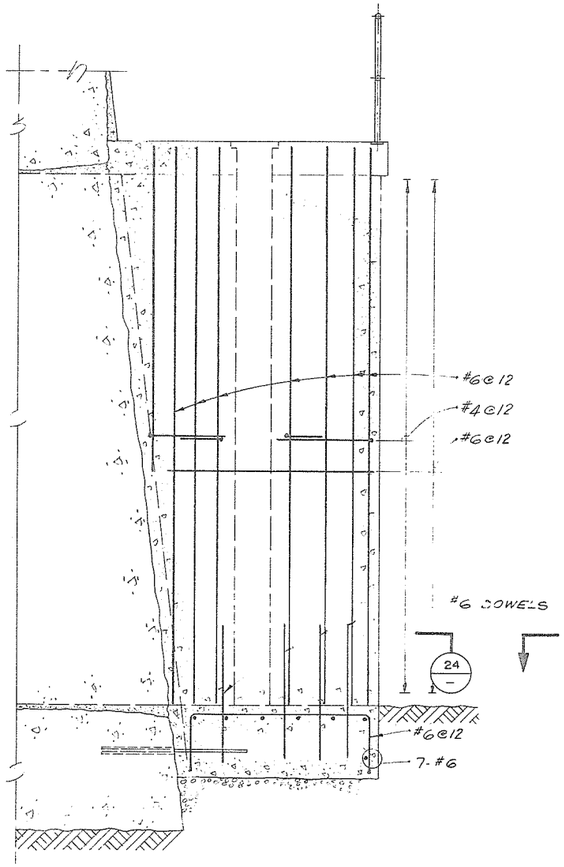
A.E.S.L. DRAWING NO. 4064-07-315

105346

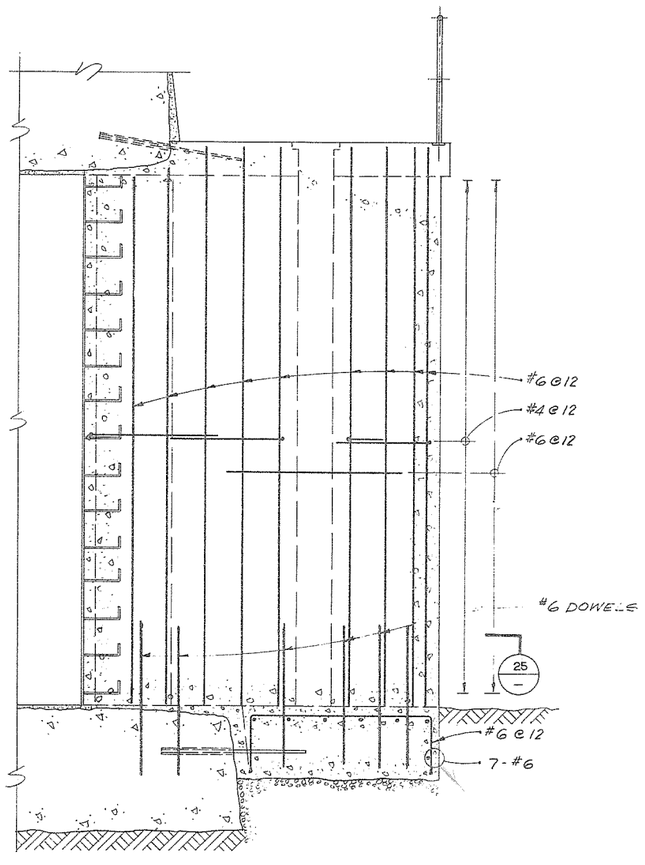
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	W.K.	SCALE	1/4" = 1'-0"
DRAWN	G.J.Q.V.	DATE	SEPT. 1972
CHECKED	W.F. Kelly	APPROVED	
DRAWING NO.	4884-1-21	REV.	1

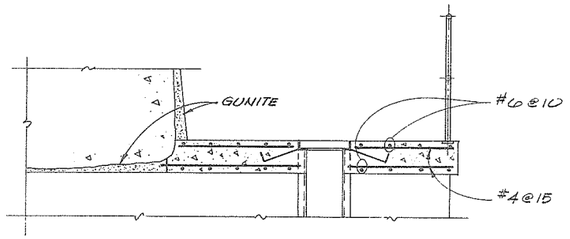
SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN



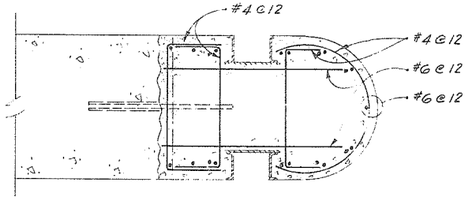
SECTION 22/315 22/318



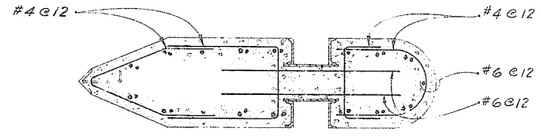
SECTION 23/315 23/318



SECTION 29/315 29/318



SECTION 24/—



SECTION 25/—

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	G.W.	AS CONSTRUCTED	

DATE 26 Sept 1972
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE Oct 3/72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE NICOMEKL AND SERPENTINE DAMS
STOPLOG GUIDES
SECTIONS AND DETAILS
REINFORCEMENT

PROJECT NO. 10-1 CONTRACT NO. 1

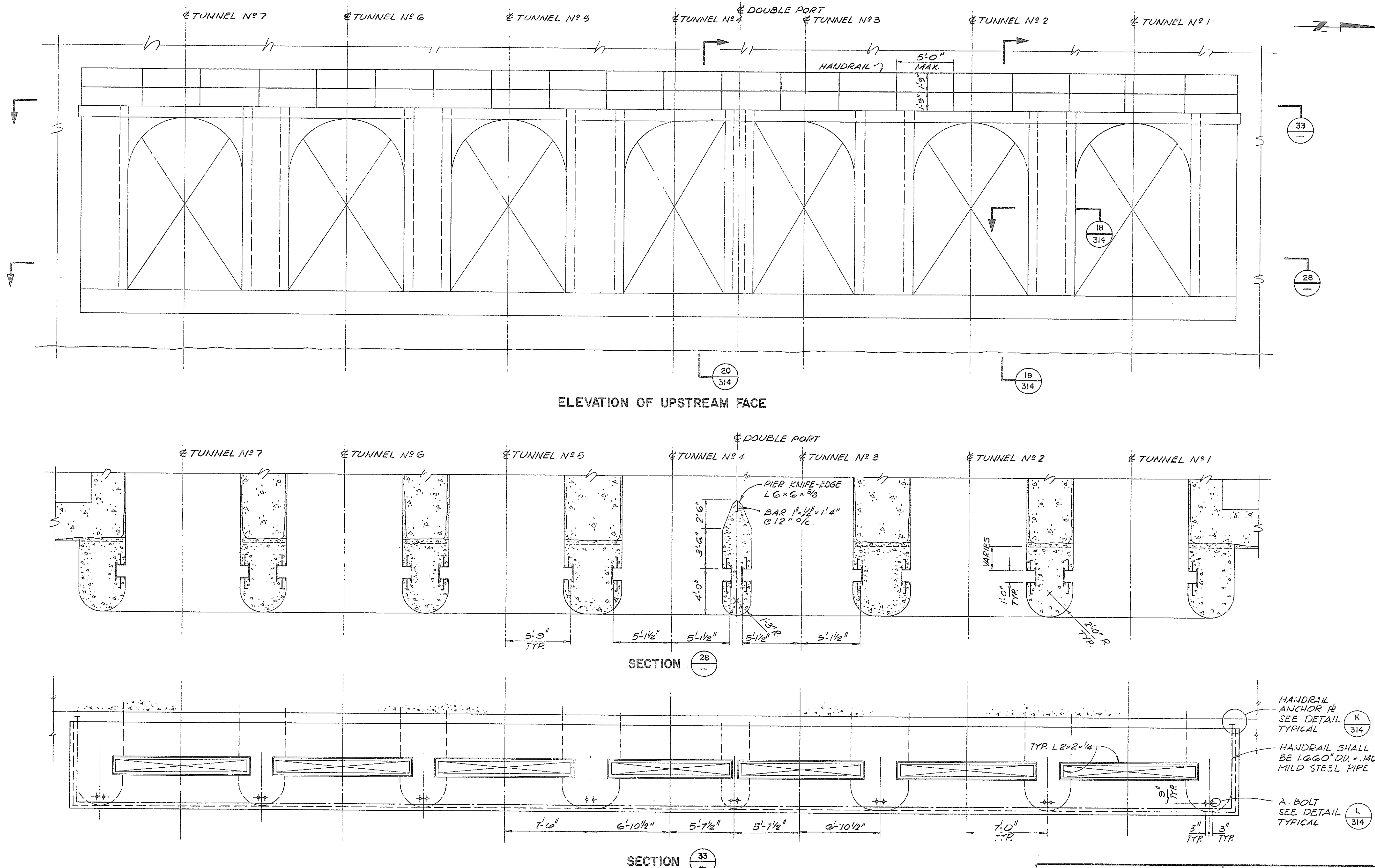
A.E.S.L. DRAWING NO. 4064-07-316

105347

AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN WE	SCALE 1/2" = 1'-0"
DRAWN G.J.O.V.	DATE SEPT., 1972
CHECKED W.F.Kelly	APPROVED
DRAWING NO. 4884-1-22	REV. 1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1



NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75		AS CONSTRUCTED	

APPROVED THE FRASER RIVER JOINT PROGRAM COMMITTEE — DATE 20 Sept 1972

APPROVED FOR THE PROVINCE OF BRITISH COLUMBIA — DATE Oct 25/72

PROJECT NO. 10·1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-317

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

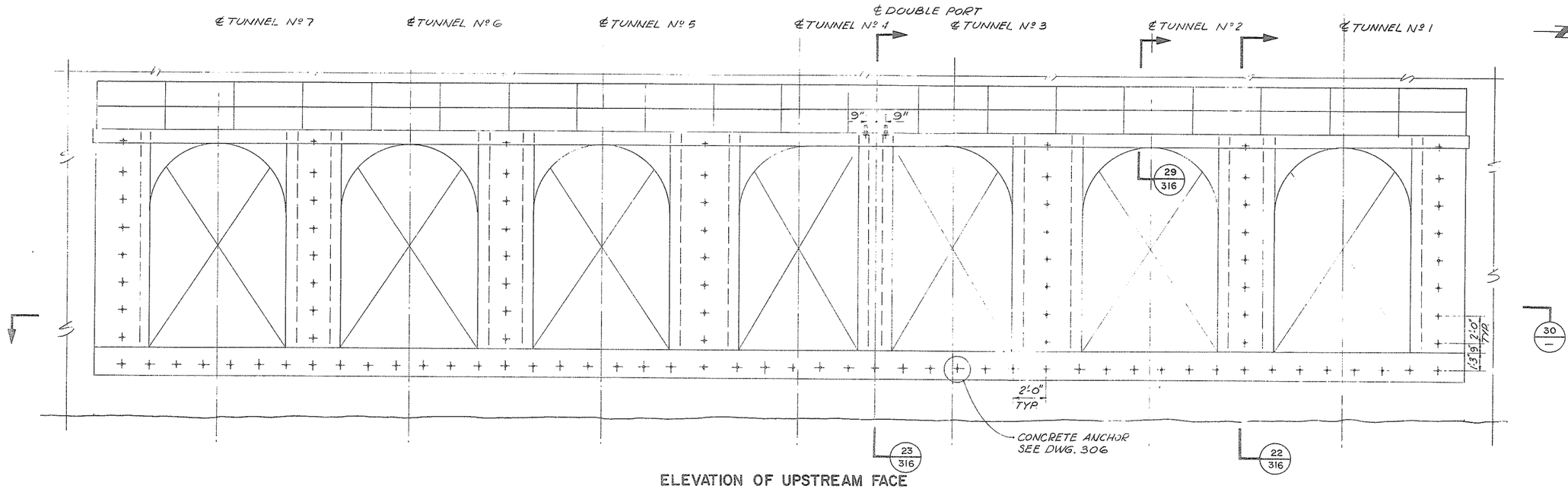
TITLE SERPENTINE DAM
STOPLOG GUIDES
ELEVATION AND SECTIONS
CONCRETE

105348

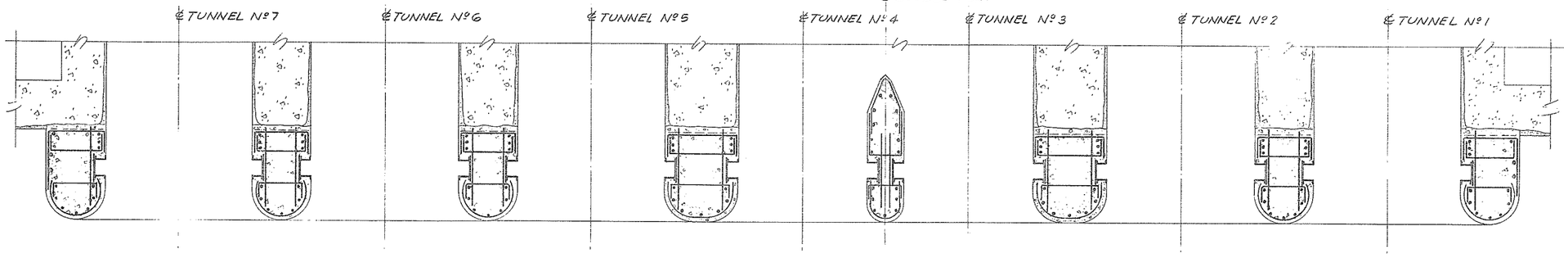
AESL Consulting Engineers — ASSOCIATED ENGINEERING SERVICES LTD. VANCOUVER, B.C.

DESIGN	WK	SCALE	1/4" = 1'-0"
DRAWN	G.J.Q.V.	DATE	SEPT. 1972
CHECKED	W.F. Kelly	APPROVED	
DRAWING NO.	4884-1-23	REV.	1

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN



ELEVATION OF UPSTREAM FACE



SECTION 30/—

FOR DETAILS OF REINFORCING
SEE DWG. 316.

NO.	DATE	BY	REVISIONS	ENG.
1	16.6.75	ww	AS CONSTRUCTED	

DATE 20 Sept 1972
APPROVED
THE FRASER RIVER JOINT PROGRAM COMMITTEE

DATE Oct 4/72
APPROVED
FOR THE PROVINCE OF BRITISH COLUMBIA

PROJECT NO. 10-1 CONTRACT NO. 1

A.E.S.L. DRAWING NO. 4064-07-318

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA
DEPT. OF LANDS, FORESTS AND WATER RESOURCES
WATER RESOURCES SERVICE

CANADA - BRITISH COLUMBIA
FRASER RIVER FLOOD CONTROL 1968 AGREEMENT
DISTRICT OF SURREY

TITLE
SERPENTINE DAM
STOPLOG GUIDES
ELEVATION AND SECTION
REINFORCEMENT

105349
AESL Consulting Engineers
ASSOCIATED ENGINEERING SERVICES LTD.
VANCOUVER, B.C.

DESIGN	MK	SCALE	1/4" = 1'-0"
DRAWN	G.J.O.V.	DATE	SEPT. 1972
CHECKED	W.T. Kelly	APPROVED	
DRAWING NO.	4884-1-24	REV.	1

SCHL - 3999 - A.E.S

SUPERSEDES ALL PREVIOUS PRINTS WITH A NUMBER LOWER THAN 1