

Tom Schuetz
c/m (initial)
Oct 11/92

888654

BLUBBER BAY QUARRY

PROPERTY DESCRIPTION

TEXADA ISLAND
BRITISH COLUMBIA
CANADA

PREPARED BY: RICHARD M. GRAINGER, P.Eng.
MARCH 27TH, 1991

REVISED 26TH AUGUST 1992
TED THOMSON

I INTRODUCTION

BLUBBER BAY QUARRY IS A CONVENTIONAL OPEN PIT MINING, CRUSHING AND SCREENING OPERATION THAT MINES 3 DIFFERENT GRADES OF LIMESTONE. THE QUARRY HAS BEEN IN OPERATION ON A CONTINUOUS BASIS SINCE 1907 AND CURRENTLY PRODUCES OVER 1 MILLION TONS PER YEAR OF HIGH QUALITY CRUSHED LIMESTONE PRODUCTS.

ASH GROVE CEMENT WEST, INC. OBTAINED BLUBBER BAY QUARRY IN AUGUST 1983 AS PART OF IT'S OREGON PORTLAND CEMENT AQUISITION. THE ORIGINAL OWNER AND FOUNDING COMPANY WAS THE PACIFIC LIME CO. (FOUNDED IN 1907). IT WAS SUBSEQUENTLY PURCHASED BY GYPSUM LIME AND ALABASTINE (1955),
DOMTAR (1962), AND
OREGON PORTLAND CEMENT (APR. 1 1983).

FOR THE FIRST 55 YEARS BLUBBER BAY QUARRY PRODUCED HIGH QUALITY LIME AND MORTAR PRODUCTS. BLUBBER BAY QUARRY CEASED MANUFACTURING LIME IN 1963 AND NOW SHIPS ALL ITS LIMESTONE VIA BARGE TO OTHER LOCATIONS FOR FURTHER PROCESSING. THOSE LOCATIONS INCLUDE ASH GROVE'S RIVERGATE PLANT IN PORTLAND, OREGON, C.B.R.'S CEMENT PLANT IN VANCOUVER, BRITISH COLUMBIA, CONTINENTAL LIME'S PLANT IN TACOMA, WASHINGTON, AND SEVERAL PAPER MILLS ALONG THE COAST OF BRITISH COLUMBIA.

SOMETIME IN 1992, BLUBBER BAY QUARRY WILL BEGIN TO SUPPLY ASH GROVE CEMENT WEST'S NEW 700,000 TONS PER YEAR SEATTLE CEMENT PLANT.

II LOCATION

BLUBBER BAY QUARRY IS LOCATED ON THE NORTHERN TIP OF TEXADA ISLAND WHICH LIES OFF THE WEST COAST OF BRITISH COLUMBIA, CANADA. THE 30 MILE LONG X 3 MILE WIDE ISLAND IS SITUATED ON THE GEORGIA STRAIT BETWEEN VANCOUVER ISLAND AND THE NORTH AMERICAN CONTINENT. (SEE FIG. 1).

THE CLOSEST MAJOR METROPOLITAN CENTER IS VANCOUVER, B.C. (POP. 1,000,000) WHICH LIES 60 MILES TO THE SOUTH. ACCESS TO BLUBBER BAY IS VIA ROAD AND 3 FERRIES, AIR, OR WATER. (SEE FIG. 2).

BLUBBER BAY AND THE TWO COMMUNITIES ON THE ISLAND, GILLIES BAY AND VANANDA ARE SERVICED BY A HALF HOUR FERRY TRIP FROM POWELL RIVER.

THE PROXIMITY OF BLUBBER BAY QUARRY TO PACIFIC TIDE WATER LENDS THE PROPERTY TO MANY ECONOMIC ADVANTAGES. SHIPPING, VIA BARGE, IN AND OUT OF BLUBBER BAY QUARRY TO ALL PARTS OF THE NORTH AMERICAN WEST COAST IS RELATIVELY INEXPENSIVE.

THE OCEAN HAS A STRONG MODERATING EFFECT ON THE CLIMATE. YEARLY RAINFALL IS 30 INCHES AND TEMPERATURES RANGE FROM 77°F AVERAGE SUMMER DAY TEMPERATURE TO 50°F AVERAGE WINTER DAY TEMPERATURE. THIS CLIMATE INABLES BLUBBER BAY QUARRY TO OPERATE YEAR ROUND WITH VERY LITTLE DIFFICULTY.

2m tons / (114-cs it)

B. MINERAL RESOURCES

BLUBBER BAY QUARRY'S REAL WEALTH LIES IN ITS MINERAL RESOURCES AND ITS PROXIMITY TO TIDE WATER.

MOST OF THE NORTH END OF TEXADA ISLAND INCLUDING MOST OF ASH GROVE CEMENT WEST'S PROPERTY IS UNDERLAIN BY THE QUATSINO LIMESTONE FORMATION. THIS DEPOSIT IS KNOWN TO BE UP TO 1800 FT. THICK IN SOME AREAS. LARGE AREAS OF THE LIMESTONE "BED" OUTCROP ON THE SURFACE WHILE OTHER AREAS ARE COVERED BY GLACIAL TILL.

ASH GROVE CEMENT WEST, INC. OWNS LIMESTONE MINERAL RIGHTS TO 2665 ACRES ON THE NORTH END OF TEXADA OF WHICH AT LEAST 1500 ACRES HAS LIMESTONE OUTCROPPING ON OR NEAR THE SURFACE.

THE AREAS PRESENTLY BEING MINED, (PIT #6) HAVE DOLOMITIC LIMESTONE ON THE SURFACE WITH HIGHER QUALITY (HIGH CALCIUM) LIMESTONE RESERVES INCREASING WITH DEPTH. THIS REQUIRES A JUGGLING ACT TO PRODUCE SUFFICIENT QUANTITIES OF THE CORRECT GRADE OF LIMESTONE FOR PRESENT MARKET DEMANDS. IN ADDITION, THE DEPOSIT IS INTRUDED BY A NETWORK OF DYKES (IGNEOUS INTRUSIVES) WHICH CONSTITUTE APPROXIMATELY 25% OF THE DEPOSIT AND HAVE TO BE MINED AS WASTE. THE PRESENT WASTE TO ORE RATIO IS .5 TO 1.

BLUBBER BAY QUARRY MINES 3 DIFFERENT GRADES OF LIMESTONE WHICH INCLUDE:

- 1. CHEMICAL GRADE LIMESTONE (+97.5 CaCO₃, .2 - .7 MgO)
- 2. CEMENT GRADE LIMESTONE (+90.0 CaCO₃, .7 - 1.5 MgO)
- 3. AGRICULTURAL GRADE LIMESTONE (+90.0 CaCO₃, 1.5 - 3.5 MgO)

EXTENSIVE EXPLORATORY DRILLING HAS DELINEATED AROUND PIT NO. 6 ALONE:

10 YEARS OF CHEMICAL GRADE LIMESTONE RESERVES,
 25 YEARS OF CEMENT GRADE LIMESTONE RESERVES AND ANOTHER
 25 YEARS OF AGRICULTURAL GRADE LIMESTONE RESERVES.
 (HIGH MgO CONTENT)

Potential for landscaping material

ADDITIONAL STEP-OUT DRILLING HAS INDICATED MUCH GREATER RESERVES THAN THOSE LISTED ABOVE.

ON A LOCAL SCALE, THE GRADE OF LIMESTONE IS ERATIC DUE TO IMPURITIES SUCH AS SILICA, IRON AND MAGNESIUM. DURING PRODUCTION, EVERY BLAST HOLE (ON A 10' X 10' PATTERN) IS SAMPLED AND ANALYZED IN BLUBBER BAY QUARRY'S LAB TO DETERMINE IF IT IS WASTE OR ORE. IF IT IS MARKETABLE LIMESTONE, IT IS THEN DETERMINED WHAT ITS MOST PROFITABLE USE WOULD BE.

C. BUILDINGS / INFRASTRUCTURE

THE BLUBBER BAY QUARRY INFRASTRUCTURE CONSISTS OF A PLANT SITE, BARGE LOADING DOCK, A SMALL TOWNSITE, AND A FEW OUT BUILDINGS. FIGURE 5 SHOWS ALL THE BUILDINGS ASSOCIATED WITH BLUBBER BAY QUARRY EXCEPT FOR THE QUARRY BUILDINGS WHICH INCLUDE A POWDER MAGAZINE, CAP MAGAZINE, PUMP HOUSE AND A QUARRY LUNCHROOM/OFFICE BUILDING.

THE ACTUAL PLANT SITE CONSISTS OF TWO INDEPENDENT CRUSHING SYSTEMS IN WHICH EACH HAVE TWO INTERNAL CIRCUITS.

K-SYSTEM

CEMENT ROCK CIRCUIT
PRODUCING 5" MINUS CEMENT ROCK

CHEMICAL STONE CIRCUIT
PRODUCING NO. 1 CHEM (3/4" X 1/4")
AND NO. 2 CHEM (1 3/4" X 3/4")
AND CHEM FINES (1/4" MINUS)

(SEE FIGURE 6)

T-SYSTEM

CEMENT ROCK CIRCUIT
PRODUCING 4 1/2" MINUS CEMENT ROCK
AND 2" MINUS CEMENT ROCK

AG-LIME CIRCUIT
PRODUCING 2" MINUS AG-ROCK

(SEE FIGURE 7)

BOTH SYSTEMS DISCHARGE AND STOCKPILE THEIR PRODUCTS OVER THE SAME RECLAIMING TUNNEL/BARGE LOADING SYSTEM. THE RECLAIMING TUNNEL HAS 15 CHUTES TO DRAW FROM, 10 GRAVITY AND 5 VIBRATORY.

THE BARGES ARE LOADED AT A RATE OF 1200 T.P.H. WITH THE LOAD BEING DISTRIBUTED ACROSS THE BARGE FROM AN EXTENDING CONVEYOR (SHUTTLE). THE BARGE IS MOVED UP AND DOWN THE DOCK WITH A WINCH TO LOAD THE BARGE END TO END. PRESENTLY, BARGES ARE BEING LOADED UP TO 13000 TONS.

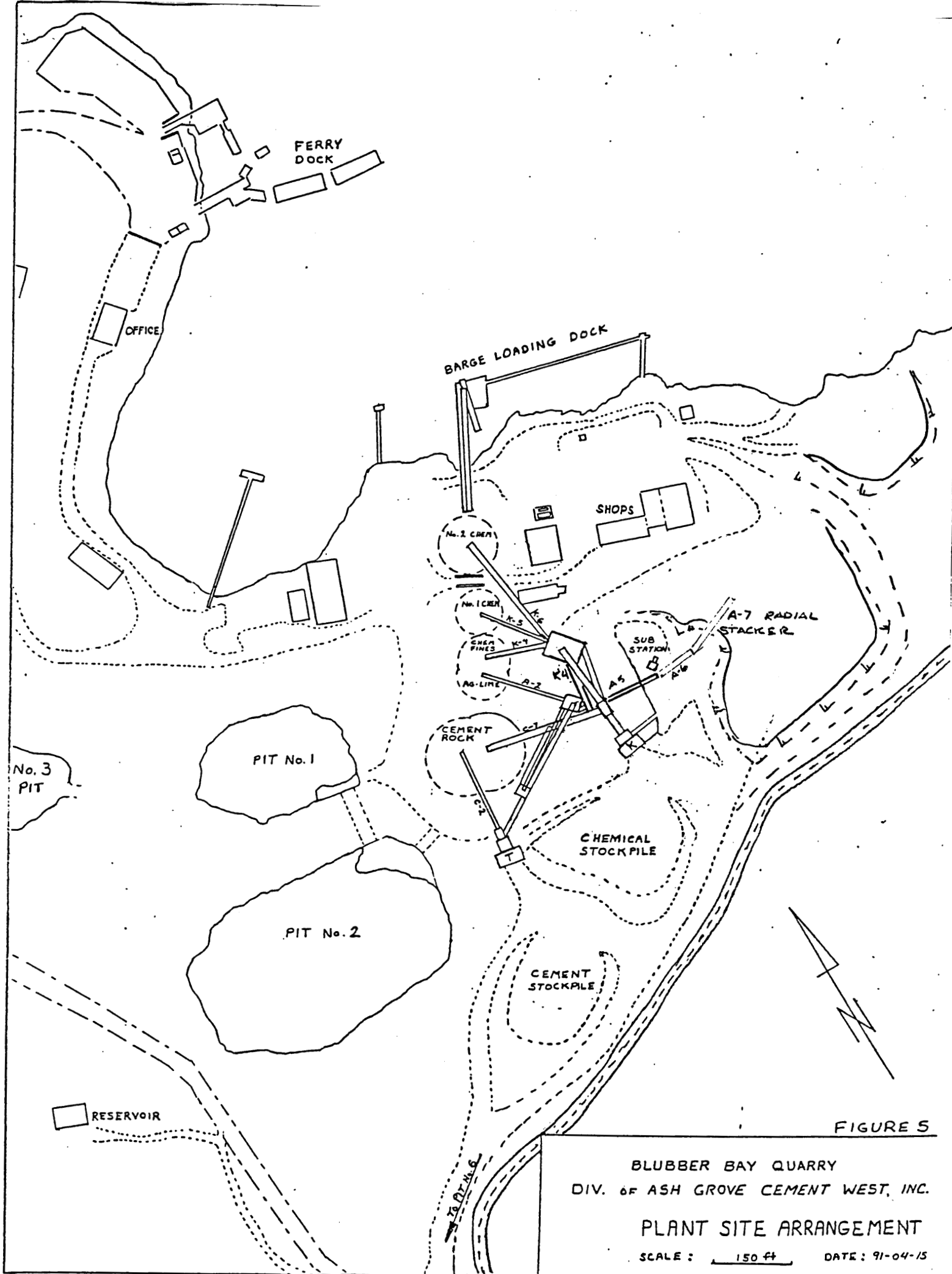


FIGURE 5

BLUBBER BAY QUARRY
 DIV. OF ASH GROVE CEMENT WEST, INC.
 PLANT SITE ARRANGEMENT
 SCALE : 150 FT DATE : 91-04-15

REVIEW OF PRIMARY PROCESS

AT BLUBBER BAY QUARRY

FORESTS ARE HARVESTED AND CLEARED BY LOCAL LOGGERS

↓
MAJOR OVERBURDEN DEPOSITS ARE STRIPPED BY CONTRACTORS

↓
CLEAN-UP AND DRILL SITE PREPARATION BY COMPANY OWNED D-9 DOZER

↓
3½" TO 5½" DIAMETER BLAST HOLES ARE DRILLED BY PNEUMATIC AND HYDRAULIC TOP HAMMER DRILLS ON A 10' X 10' TO 13' X 17' PATTERN

↓
BULK ANFO AND PACKAGED EMULSIONS ARE LOADED IN BLAST HOLES FOR BREAKING THE IN-SITU LIMESTONE

↓
5½ TO 7 CUBIC YARD FRONT END LOADERS LOAD THE BROKEN LIMESTONE INTO 35 TO 50 TON HAUL TRUCKS

↓
HAUL TRUCKS TAKE CHEMICAL GRADE OR CEMENT GRADE LIMESTONE

TO

↓
K-SYSTEM CRUSHING PLANT
(THROUGHPUT = 250 T.P.H)

↓
PRIMARY JAW CRUSHER

↓
SIZING SCREENS

↓
SECONDARY ROLL CRUSHER

↓
SECONDARY SCREENING

↓
PLANT STOCKPILES

↓
HAUL TRUCKS TAKE AGRICULTURAL GRADE OR CEMENT GRADE LIMESTONE

TO

↓
T-SYSTEM CRUSHING PLANT
(THROUGHPUT = 200 T.P.H. AG-LIME
400 T.P.H. CEMENT)

↓
PRIMARY JAW CRUSHER

↓
SIZING SCREENS

↓
SECONDARY HAMMERMILL CRUSHER

↓
SECONDARY SCREENING

↓
PLANT STOCKPILES

↓
RECLAIMING TUNNEL

↓
BARGE LOADER

↓
BARGES

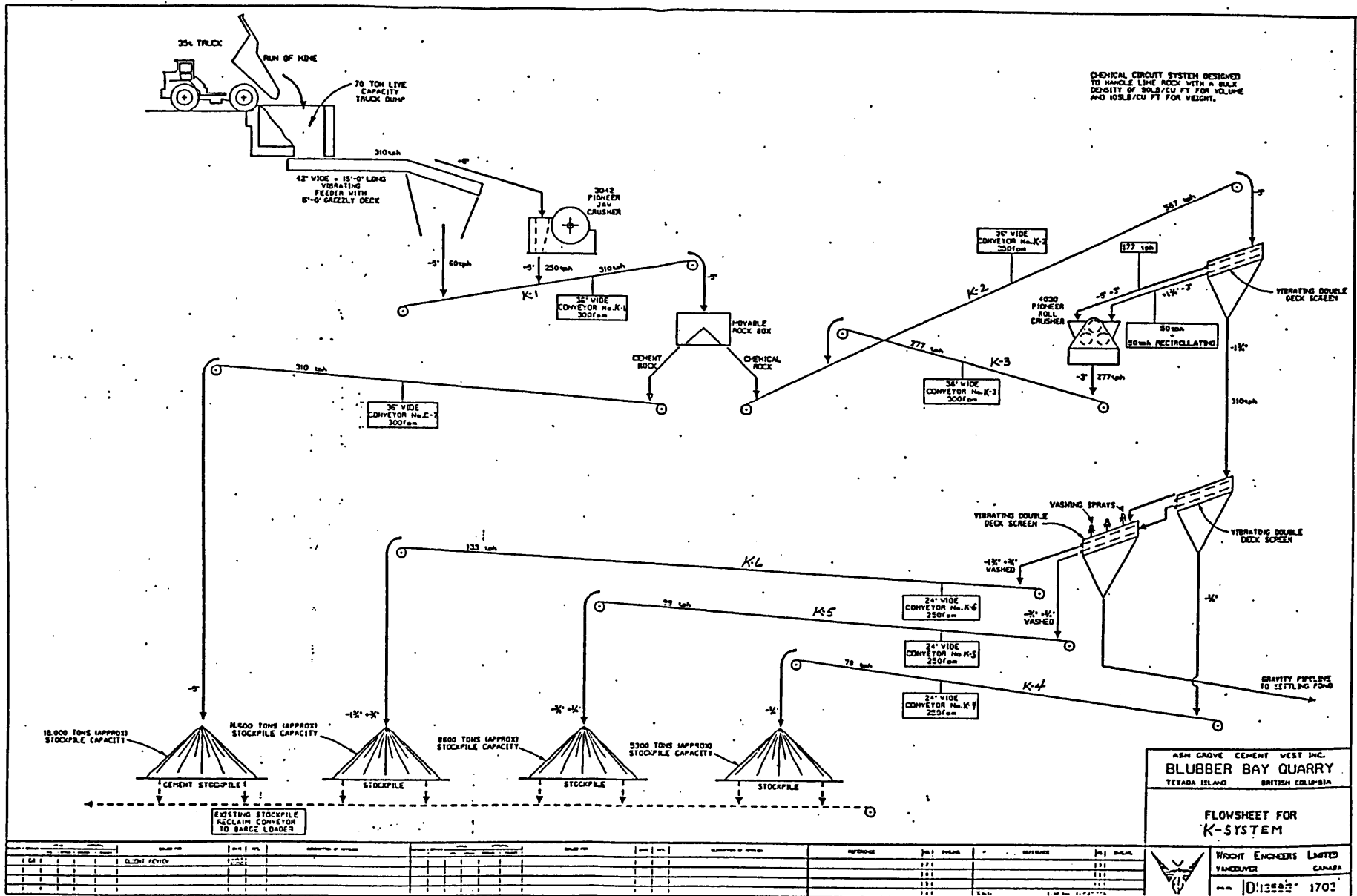
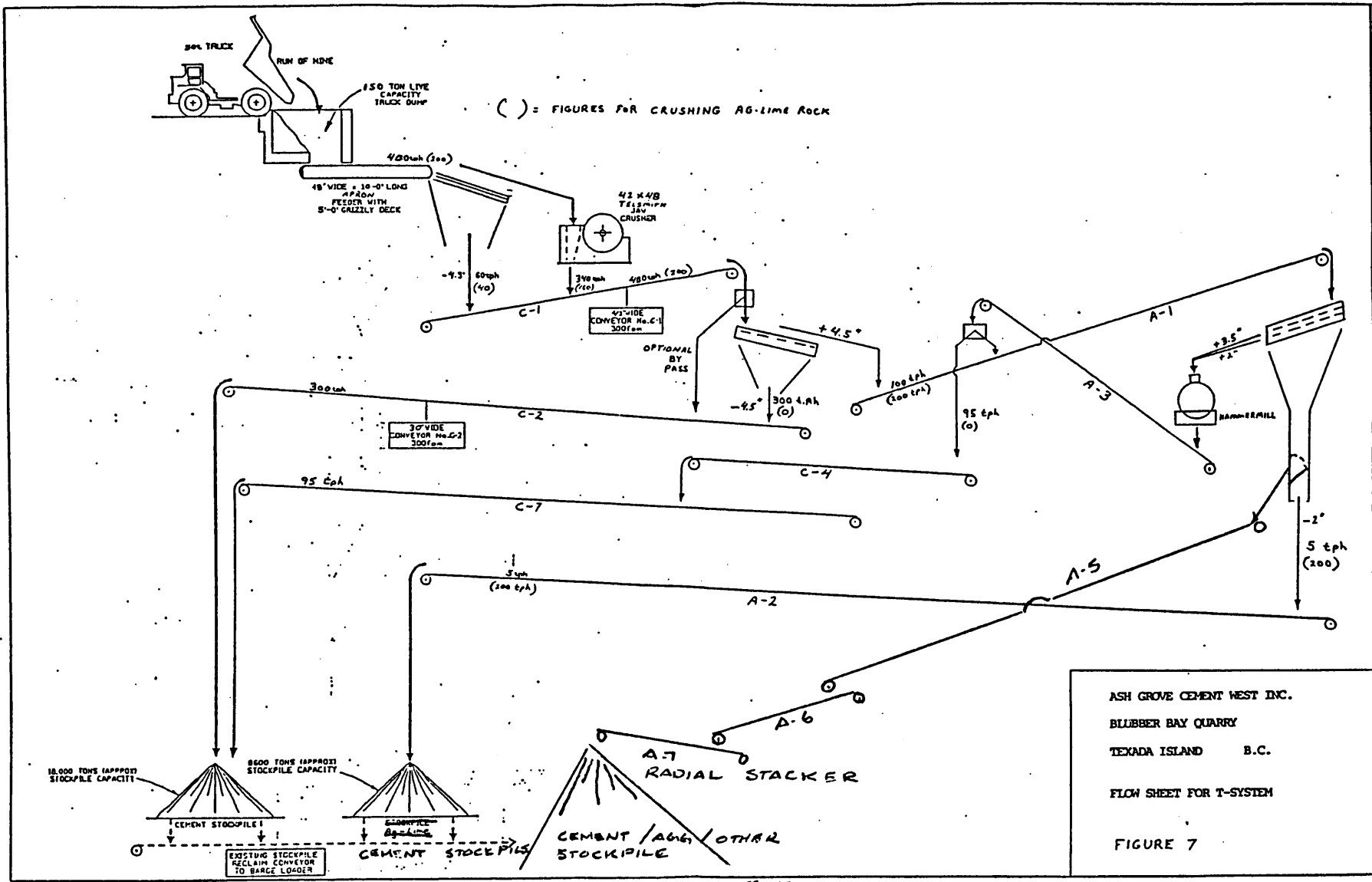


FIGURE 6



TO 200,000 TONS