

THESIS EVALUTATION

Student: Alan Partridge

Date: October, 1984

Alan demonstrated excellent abilities in a number of architectural skills. He documented a clear understanding of the history of brewing while gaining an understanding of the brewing process. With Mr. Bill White acting as the brewing expert, Alan projected the industry into probable futures and ascertained a logic to form the basis for design evolution.

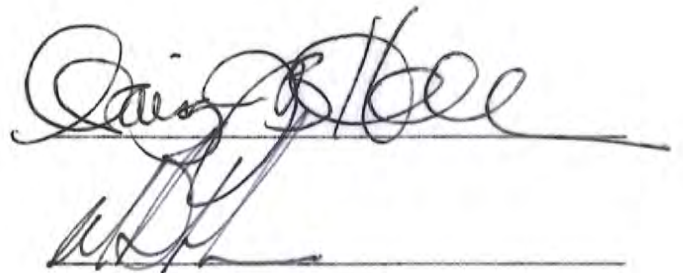
The above background material was then supplemented with how a brewery should relate to the public, an element very important to the success of marketing beer. Alan set a goal to create a design which would lead the public through the process through a simple tour of the facility. After an initial slow start, a design gradually evolved that suited this purpose as well as responding to the practical elements surrounding the brewing process.

Alan's graphic and presentation skills are well developed. His ability to hold back from jumping to design solutions before understanding the problem is excellent. He has an excellent ability to isolate and prioritize the important issues that need to be dealt with. He displayed an ability to work with building codes to help formulate a posture for design. His grasp of building materials and building assemblies is also well developed. All in all, the process of working with Alan on his thesis project has been a delight. We wish to extend our congratulations to Alan on his thesis and to extend our wish that he has a very fulfilling career as an architect.

Standing: First Class

Evaluators:

Mr. Craig Henderson: Architect

A handwritten signature in dark ink, appearing to read 'Craig Henderson', written over a horizontal line.

Mr. Bruce McFadden: Architect

Mr. Bill White: was the Brewmaster for Labatt's Alberta Brewery and is currently the Packaging Superintendent and Assistant Plant Manager:

A handwritten signature in blue ink, appearing to read 'Bill White', written over a horizontal line.

A Thesis Dissertation

For

A BREWERY

Prepared By:

**R. Allan Partridge
R.A.I.C. Syllabus Programme
Edmonton, Alberta**

Thesis, Level 9, Stage 5



Premises of the O'Keefe Brewing Company
of Toronto, circa 1900

TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Thesis Background.
- 1.2 Scope of Thesis Study.
- 1.3 Definitions.
- 1.4 Acknowledgements.

2.0 HISTORICAL RESEARCH, DOCUMENTATION AND ANALYSIS

- 2.1 Beer - The Universal Drink
 - 2.1.1 Beer and the dawning of man.
 - 2.1.2 Beer and Religion.
 - 2.1.3 "The Brewers Guild"- An honourable Association.
- 2.2 Beer in the Americas
 - 2.2.1 U.S.A.
 - 2.2.2 Canada.
- 2.3 The Brewery - A Study of Building Types
 - 2.3.1 Great Britain.
 - 2.3.2 Europe.
 - 2.3.3 U.S.A.
 - 2.3.4 Canada.
 - 2.3.5 The Brewery- Architectural Conclusions.

3.0 THE BREWERY - A STUDY OF PROCESS

- 3.1 Introduction.
 - 3.1.1 The History of the Process.
 - 3.1.2 Effects of Technology.
- 3.2 The Process.
 - 3.2.1 Overview.
 - 3.2.2 Raw Material Preparation.
 - 3.2.3 Brewing.
 - 3.2.4 Fermentation.
 - 3.2.5 Aging.
 - 3.2.6 Bottling.
 - 3.2.7 Warehousing.

TABLE OF CONTENTS

3.3 Additional Processes.

- 3.3.1 Power Plant.
- 3.3.2 Water Storage and Filtering.
- 3.3.3 Bottle Return, Cleaning and Retail Outlet

4.0 PROGRAMME AND CONSTRAINTS

4.1 Introduction.

4.2 User Data.

- 4.2.1 World Beer Consumption.
- 4.2.2 Canadian Per Capita Consumption.
- 4.2.3 Domestic Beer Sales.
- 4.2.4 Data Conclusions.

4.3 Financial Data.

- 4.3.1 Capital Costs.
- 4.3.2 Operational Costs.

4.4 Architectural Programme.

- 4.4.1 Power Plant.
- 4.4.2 Raw Material Storage.
- 4.4.3 Brewhouse.
- 4.4.4 Fermentation and Aging Rooms.
- 4.4.5 Bottlehouse.
- 4.4.6 Warehousing.
- 4.4.7 Central Maintenance and Plant Services.
- 4.4.8 Administration and Public Relations.
- 4.4.9 Retail Beer Outlet.
- 4.4.10 Summary.

4.5 Preliminary Building Code Analysis.

4.6 Site Analysis.

- 4.6.1 Introduction, Site Rationale.
- 4.6.2 Analysis - Site 1.
- 4.6.3 Analysis - Site 2.

TABLE OF CONTENTS.

5.0 PRELIMINARY ANALYSIS.

5.1 Introduction.

5.2 Summary Analysis of Data.

5.3 Conceptual Possibilities.

5.3.1 Massing Possibility

5.3.2 Massing Possibility

5.3.3 Massing Possibility

5.4 Conclusions.

6.0 DESIGN DEVELOPMENT

6.1 Conceptual Brewing Process

6.1.1 Overview

6.1.2 Raw Material Storage & Preparation

6.1.3a Brewhouse - Option a

6.1.3b Brewhouse - Option b

6.1.4 Fermentation & Aging

6.1.5 Package

6.2 Design Solution

6.2.1 Introduction

6.2.2. Objective #1

6.2.3 Objective #2

6.2.4 Objective #3

6.2.5 Objective #4

6.3 Design Drawings (Slide copies of drawings and model)

6.4 Elemental Cost Analysis

7.0 BACKGROUND

7.1 Footnotes

7.2 Bibliography

"ARS LONGA VITA BREVIS, FERMENTVM SEMPER FERMENTVM"

(Art is long, life is short, but beer will always be beer.)

ABSTRACT

This thesis is a culmination of a "Manifesto" theme that began with my entrance into the R.A.I.C. Syllabus programme in February 1981. At that time it was the authors' perception that Part II of the programme should be approached in two basic ways:

1. Central theme close to the students perception of Architecture.
2. A rigorous approach and analysis of substantive areas of study.

With these two areas in mind, the Thesis is by no means seen as a final statement. Rather it serves as a springboard from student life to professional life. Bearing in mind that Architecture and its attendant practice are by no means perfect.

This manifesto theme during Part II was "Places for People". The culmination of study, with the Thesis utilized the sub-theme:

Place of Work and Products

Based on a suggestion from Mr. Craig Henderson of pursuing the study of a process, it seemed that a brewery would fit the theme for its Place of people, Place of Products and on a personal level, have a Place in History.

This Thesis is therefore presented as a statement that embraces History, Research, Technology and Architecture.

1.0 INTRODUCTION.

1.1 THESIS BACKGROUND

In July 1982 the writer began an analysis to determine a subject of study for a Thesis under the requirements of the RAIC Syllabus Programme. As a personal bias the writer wanted to work on an area of study which would encompass the following:

- 1 The successful integration of a specific process into a building form.
- 2 Creation of a "Place of work" that is a satisfying environment within a "Place of products".
- 3 To understand the evolution of a building type as it relates to its specific process.
- 4 To pursue energy efficiency in an industrialized building type.

With the above statement of Thesis manifesto the writer decided to choose the subject of "Breweries and Brewing" as a Thesis subject.

1.2 SCOPE OF THESIS.

The Thesis is divided into 12 stages as outlined in the "RAIC Syllabus Thesis Guidelines 1981". For the purposes of this stage the following documents are relevant to a presentation of Stages 5 and 6.

1.3 DEFINITIONS

The space requirements in this document are based on (1) the expressed needs of the user group (Labatts), (2) requirements in similar facilities elsewhere and (3) previous experience.

The SUBTOTAL AREA describes the requirement for the performance of any one activity or process. It includes circulation specific to the space type only.

1.4 ACKNOWLEDGEMENTS

The writer would like to thank the following for their assistance in the preparation of Stages 5 and 6.

Messrs. B. McFadden, C. Henderson and J. Donahue for critical appraisal, Messrs. B. Johns and M. Opyr for their guidance and assistance, Mr. W. White for his time and assistance in preparing and refining the Architectural Programme, Mr. R. Partridge for help in finding specific technological data and Mr. E. Bushey for the trip around the "Molsons" Brewery, Edmonton, Alberta.

2.0 HISTORICAL RESEARCH, DOCUMENTATION AND ANALYSIS.



2.1 Beer - The Universal Drink

2.1.1 Beer and the Dawning of Man.

The production and consumption of beer is frequently recorded throughout history and is, infact the oldest beverage next to water to be consumed by man. It is a common area of contention by many Archeologists as to whether or ancestors discovered bread or beer first¹. There is several references in history books to a "Bread Beer."

It has been argued that Dionysus, the Wine god of Greek mythology, was actually a late superimposition on Dionysus the Beer-god². In Egyptian History beer is referenced in the famous Egyptian "Book of The Dead" around 3000 b.c. Each year Rameses III sacrificed to the gods 30,000 gallons of beer brewed in his own Royal Brewery. At the other end of the spectrum the poorer classes drank a similar but poor quality beer. The Egyptians promoted the tonic qualities of beer; of 700 prescriptions listed in the Ebers papyrus, compiled by Egyptian Pharmacists 3500 years ago, 100 contained beer.

An Assyrian tablet of 2000 b.c. lists beer among the foods Noah used in his provisioning of the Ark³. A 4000 year old clay tablet from Mesopotamia indicated, for the first time the high regard and respect given to the art of Brewing. Strangely, it was women that were the Brewmasters of their day. In ancient Babylon these women brewers were also the temple priestesses. The goddess Siris was a patron god of beer and certain types of beer were strictly set aside for specific temple ceremonies. There were several types of beer available to the Babylonian connoisseur. An ancient tablet in New York's Metropolitan Museum lists dark beer, pale beer, red beer, three-fold beer, beer with a head and so on. To the discerning palate and class these beers were sipped through a straw; in the case of Royalty a golden one, just long enough to reach from the throne to a large container kept handily alongside.

The popularity of beer continued into the Greek and Roman eras. Sophocles, the playwright recommended a basic diet of **"Bread, Meat, Vegetables and Beer"** all of course in **"Moderation"**. Julius Ceasar, like most soldiers, enjoyed his beer and it was he who was solely responsible for introducing ales to Britain during the Roman Occupation.

2.1.2 Beer and Religion.

It was in the Christian era that beer really came into its own due in part to Constantine (the first Christian Emperor and Pope) of Rome in an attempt to unite the Christians and the Romans. Constantine wanted to bring peace and in an attempt to unite the two, he no longer condoned the use of beer in religious ceremonies. ⁴

2.1.2 Beer and Religion (continued)

Through the influence of the Monasteries and Abbies throughout Britain and Europe, the quality and acceptability of beer became more apparent. It is often agreed by historians that these early Brewers were the forerunners of the hotels and motels we see today. Roman Catholic history shows a strong involvement in the brewing and sale of Beer not only do they list 3 patron saints of brewing but they have a special prayer:

"Bless O Lord, this creature beer, which by thy power has produced from the kernels of grain that it may be a healthful beverage to Mankind. Grant that through the invocation of thy Holy Name all who drink may derive health of body and protection of soul. Through Christ our Lord, Amen."

(A prayer of The Catholic Church⁵)

Not only did the Churches control the production of beer but also justified the monopolizing of sale by announcing that as drunkenness was a sin they were charged by God with ensuring punishment. By control of all areas they insured a steady income because of **"one of mans sins."**⁶

As in the ancient times, the brewers in the Medieval period were women. This strikes a strange note today as women Brewmasters (or Brewmistresses) are few and far between. Yet beer has always been regarded as a food beverage and not a drink and in that period women were charged with the task of food production and preparation. Once the Churches and Monasteries established the art and techniques of brewing, the "ale wives" took over the business.

2.1.3 "Ale Wives" - Women and Brewing.

Women had to contend with the many Medieval laws governing quality, quantity, and price. This clearly indicated the importance of beer in everyday life. As well as being involved in production they also aided in its distribution. The great events in the lives of Medieval England carried the name "ale". It was the tradition of the bride to sell ale on her wedding day, to help defray the costs of the wedding; hence the words "bride ale" became "bridal". As the Art of Brewing became popular and demand for different ales more complex, the production of beer became a viable and interesting profession. From here on in the Brewing of Beer became a mans domain.

2.1.4 "The Brewers Guild" - An Honourable Association

In the history of the Worshipful Company of Brewers an entry into the City of London, England, City Letter Book, 1292 has a particular significance. It is the earliest written evidence for the existence of a body of brewers who had joined together to protect themselves and their trade.

Their guild was typical of craft guilds that grew from the natural and spontaneous association of men involved in the same craft. These men by their association desired to improve and protect their own trade. When the guild first obtained its charter it was called "Gild of St. Mary and St. Thomas the Martyr, ie. Thomas a Becket. The use of martyred names for guilds is common (for guilds) as they were associated with the Church. In the case of the Brewers the use of Thomas a Becket is somewhat unknown, but it may be due to the fact that on his trip to France he took along some barrels of beer. In addition, it was well recorded that Thomas was a heavy drinker in his youth⁷. Pilgrims on their way to his shrine at Canterbury frequently stopped and drank many gallons of beer - thus gaining the gratitude of the Brewers.

This duality between the Church and the Crown gave the Guilds and opportunity to exercise some political muscle. The thirteenth century saw repeated attempts to have a Mayor elected who would represent the interests of citizens against the power of the self perpetuating Aldermen. It was largely due to the united efforts of the new Guilds that in 1271 Walter Hervey was elected as Mayor of London. Walter's term was short lived as the Aldermen saw to it that he was accused of underhanded activities on behalf of his supporters. Among the things he was accused of was allowing the Brewers to sell ale below the price fixed by the Crown.

After the demise of Hervey's Mayoralty the Aldermen had the formation of trade associations banned. This ban further explains the close link between the trade builds and the Church, and why many guilds started as religious fraternities. By the fourteenth century the guilds were beginning to function openly as declared trade associations and finally, with prominent guildsmen sitting as Aldermen. In 1319 Edward II granted a new charter to the City of London and with it autonomy from the Church and Crown was granted to the Guilds. This charter and its clause relating to the Guilds gave them considerable powers both in their own trades and within the government of the City.

What followed was the rise to power of the Brewers Guild. They eventually were given authority in 1437 to rule, govern and push their own kind⁸. Also, in 1437, it was required to have a charter reviewed and confirmed by Parliament and it was no secret

2.1.4 The Brewers Guild - An Honourable Association (continued)

that some members of Parliament would like to see the demise of certain Guilds one of which, was the Brewers Guild. A sum of money to the amount of \$300 was recorded in the Guild Ledger to: **"get to us friendship for to have our Charter confirmed by Parliament"**⁹. During this the Brewers fared the best, the Guild of Taylors lost their Charter which was not reinstated for some time.

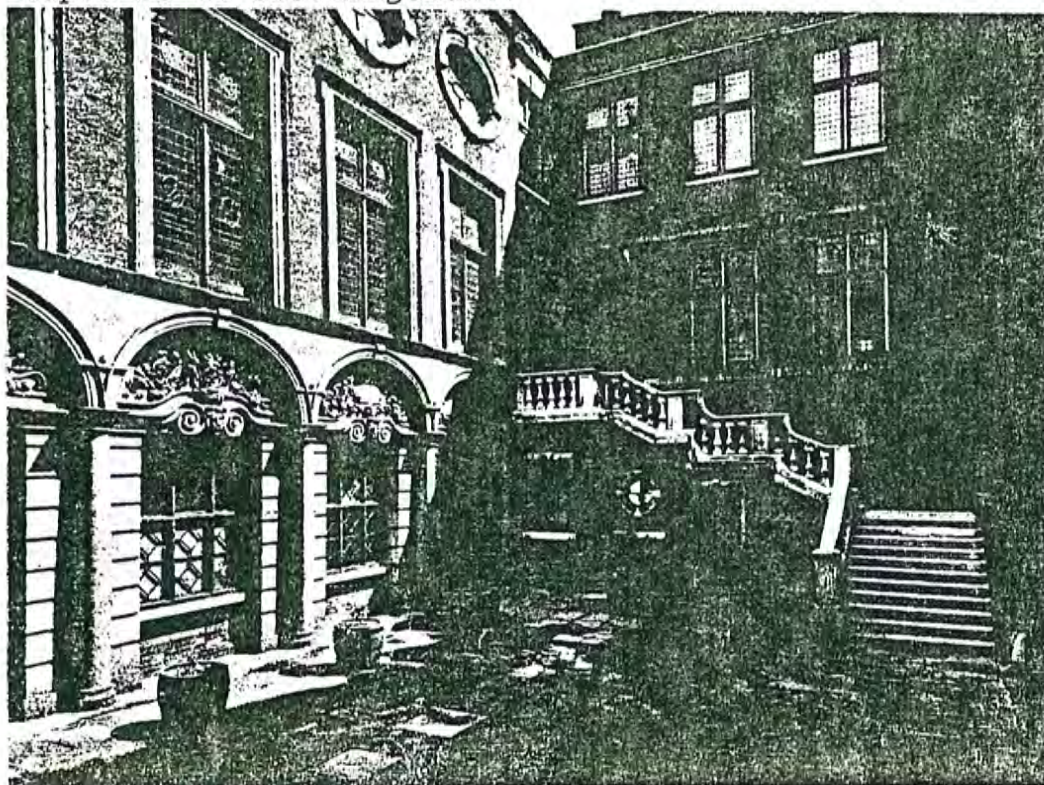
During the Tudor and Elizabethian periods the Guild flourished and participated in the building of schools for the rich and orphanages for the poor. All of these had ulterior motives of securing support for their trade but it is assumed that their deeds had the people at heart. Their golden years are considered to be during the seventeenth century when their Guild hall was burned during the Great Fire of 1666 they embarked upon a spending spree. In 1670 the Guild started construction on a new hall. Two tenders were recieved on a design by Messrs. Whiteing and Aldridge, one from a Mr. Ball for \$7000.00 and a Captain Caine for \$7200. Then the bargaining began by asking if both builders would allow \$6000 for the old materials: both refused. Then both were asked to cut their prices and after much wrangling Captain Caine was given the contract for \$6600. When it was completed in 1673 it had cost the Guild \$12000 the extras coming in the form of ornate decoration.

The decline of the Guild came in the eighteenth century as the power transferred into the hands of the big businessmen. Also in 1753 came the rejection of the Guild's charter to exercise its autonomy. It was at this point that the larger breweries began their climb as they, caught up in the expanding world bought out smaller breweries. Typical was Samuel Whitbread whose breweries survive to this day. For one hundred years the Guild was to be nothing more than a simple association with little to do. The Brewers Hall still existed as a place to meet and have a meal. In 1795 the "Committee of Porter Brewers." formed by the owners of the large breweries transferred power from the Guild.

The steady growth in the nineteenth century of the big breweries was encouraged by increased mechanization and large capital investment beyond the realm of the small brewer. In addition there was a marked decline in the domestic brewing industry as people discovered tea and other beverages but the demand for beer increased. As breweries were lost so the membership changed, the major brewers were very wealthy and with the exodus to the Cities of people looking for work concern was expressed about the poor. In order to alliviate the social problems the new Guild changed its name to the " Brewers Company " and took it upon itself to assist organizations in building schools, homes for the poor, etc.

It is astonishing that a Guild like the Brewers Guild can survive into the Twentieth century and still take an active role in society. Guilds are still chartered today as they were 500 years ago, most recently was the Guild of Scientific Instrument Makers in 1955. The renewed interest in the Brewers Guild came just after the implementation in 1901 of the Liquor Licensing Laws which by restricting the sale of alcoholic beverages was seen as a direct threat to the Breweries. Under the name of the "Brewer's Society" meeting at the Brewers Hall, the Brewers Society formulated policies on a national basis, some of these policies led to the standardization of bottles and caps as well as stringent quality standards. The Brewer's Society continued to support charities and hospitals through their various bursaries and grants. The Second World War was to have a far reaching effect on the Brewer's Society, for on the night of 29 December 1940, the Brewer's Hall was destroyed during an air raid. Fortunate for the Society its records were being kept at the Guildhall. After several years of meeting at other premises (including the second floor of the Royal Bank of Canada Building) the Society completed its new hall in 1960 at a cost of \$266000. in 1972 the Society's control over the industry diminished as the different unions decided to negotiate not with the national body but with the individual breweries. This brought representation of the workers into the Society as the "Trade Committee" which not only regulates as before the quality of the industry but also its conduct.

The Brewer's Guild typifies the way in which the industry has changed and stayed flexible into the Twentieth century. More changes will undoubtedly come in the future not only to the Brewer's Guild but to the industry as a whole. For those whose task it will be to carry on these traditions, its history will, it is hoped be an encouragement.



The courtyard of Brewers' Hall, Addle Street, completed in 1673

2.2 Beer in the Americas.

2.2.1 U.S.A.

At the time when America began to be seriously colonized, the Dutch, on a world wide basis, were the most powerful mercantile competitors of the English. The Dutch had formed a West India Company to exploit fur trade in the Hudsons Bay area and the Mohawk Valley. It was not until 1626 that Peter Minuit made his canny purchase of Manhattan Island that a colony, as such, began.

The tenuous colony did not develop rapidly; in 1629 there were only 350 people but nevertheless the West India Company saw fit to build a brewery. Much of the farming in New Amsterdam concentrated on the growing of raw materials for beer, for the Dutch as well as the English were equally fond of their beer. As the colonies grew so did the need for breweries.

On the English side the Pilgrims had arrived after their historic crossing of the Atlantic. As most of the funding for their voyage had come from merchants in England they were hesitant to establish any major industry such as a brewery. In fact the frequent references to malt houses and malt mills imply, that in addition to such supplies of English malt and beer, some must have been coming from within the Colonies. Malt at that time was of major monetary value. It might even be mentioned in a will, as Richard Borden did when he left his wife **"twenty bushels of barley malt"**¹.

As such, the brewing industry of the seventeenth century was, like England purely a home brew affair but many sought and enjoyed the atmosphere of an "Alehouse" and in 1629 the General Assembly became concerned with the high prices these alehouses were charging. Concern led to price controls and taxation.

It appears that the private brewing industries did not come under the new taxation laws as long as the beer brewed in the home was not sold. The prevalence of beer with the colonists led to the erection of a brewhouse at Harvard College. As water had many impurities in it the process of brewing negated these, so the students at Harvard were rationed to "two bevers a day" (a bever being a ration of bread and beer.) a riot ensued when the wife of one president sold the beer and left the students without food for days.

At the beginning of the 1700's, there were some 250 000 colonists in all. By the time of the Revolution there were 1 000 000. Many nations made up the "melting pot" of the colonies. At this time there were traits of change in the drinking habits of the colonials, cider was popular as a substitute as was rum. Drinking habits at meal times shifted from beer to wine, especially Madeira.

2.2.1 U.S.A. (continued)

For the French Colonists it was a claret from Bordeaux. To the poorer classes beer was still the main beverage.

As the nineteenth century came the brewing in New England declined and the Breweries of Philadelphia and New York gained noteriety. Part of this sucess came in the form of the Consuls to the British Foreign Office writing in praise of the local ale as imported beer tended to go bad or taste peculiar. This support is corroborated by other agencies of the time. Larger breweries became a standard part of the City structure with the average size being 6000 barrels (approx. 240 000 gals.) per year. The average cost of a brewery was approx. \$40.000.²

The introduction of Lager beers in the 1840's had the same effect that porter had earlier in Britain. In most basic terms Lager beers reflected a German process and a German taste. Lager varies from the "British ales" in two ways: Lager was beer that, properly speaking, stored through the winter in a cool place and was ready for drinking come the Spring, and second, that it was made with a yeast that fermented on the bottom of the vat rather than the top.

In the 1860's the number of Breweries increased dramatically. New York and Pennsylvania still dominated the field holding a 85% of the market share. For the German brewers the 1860's meant stepped up production and expansion. Several of the firms that were later to forge ahead as industry leaders were founded in that period. One of the most famous is the Brewing dynasty founded by August Krug and on his death was taken over by his Bookkeeper named Joseph Schlitz.

As the Industrial revolution took hold major centres developed for brewing and with it some common names; St. Louis- "E. Anheuser Company Brewing Association." Millwaukee- "Fred Miller Brewing Company." Many more were to follow: Pabst, Olympia and others. All these Brewers enjoyed an unparalleled growth in their industry. At the turn of the Twentieth century they thought nothing could go wrong.

How was it possible for Prohibition to happen? Why was the opposing propaganda so ineffective?. Historian Charles Merz sugessts that the major breweries were pro German and as the Distillers had been outlawed at the beginning of the war people turned to the breweries as a source of anguish at the growing drunkenness. There is also another less demonstrable theory that prohibition was inevitable, that it was inherent in the dramatic growth of the industry.

2.2.1 U.S.A. (continued)

The Brewers had accumulated a great deal of clinical data to support that 2.75% alcohol by weight did not lead to drunkenness and therefore could not be called intoxicating. The courts decided that 1/2% to 1% constituted a non intoxicating beverage, at this point brewing on a national scale came to a halt. Only a few of the big national were allowed a license to manufacture "near beers" or "cereal beverages" for, what was termed, "medicinal purposes". This production of near beer led to such breweries as Anheuser-Busch building a plant described as "collosal" to produce its brand called "Bevo". This production of near beers was brought to a halt by a bill passed in December 1921.

For fourteen years Prohibition raged until one by one under State referenda the Act was repealed. Congress sought to define the taxation and as such the barter to the industry was increased alcoholic content justified by "increased palatibility and aroma". Many Breweries had gone bankrupt others had undertaken alternate uses from fur storage to the making of macaroni. The sentiment of American Brewers was expressed in the journal AMERICAN BREWER: "Victory at last, and a beer bill which will make it possible to produce a good, wholesome, palatable beer! We are grateful that the will of the people finally prevailed⁴".

By June 1933, 31 Brewers were back in operation; a year later this number would swell to 756. This first year was disastrous and disappointing; many States although ratified still had problems that ranged from policing the new tax laws to bootlegging that still persisted. In addition the Brewing industry was feeling the pressures of the now popular soft drink industry which it now had to treat as a child that had suddenly grown up. For the next 6 years as America lifted itself out of the era of Depression the Breweries had a close look at its consumer and responded to change, change which would have to wait till after the Second World War.

After post war restrictions were lifted in 1948 the Brewing industry took on its new ventures. Due to the increasing use of the media by the public the Breweries concentrated their efforts on promotion, advertising, organization and distribution. The Breweries took time to understand its consumers. Through marketing they realized that more people are showing a preference for drinking beer in the home⁵ as opposed to in a bar. From this packaged beer became a popular item added to the weekly shopping list. As distribution costs rose the chain brewery became a reality. Many of the larger Breweries absorbed smaller ones and the breweries moved out west.

2.2.1 U.S.A. (continued)

The popularity of the West Coast was one of the major reasons for the breweries expansion programme. The summertime crowds that, now due to increased mobility were flocking to the Coast in droves placed a heavy demand on the breweries. They had no choice but to buy Breweries and maintain production at its demand point. The number of breweries was not the only solution to the problem; Breweries now had to invest large sums of money into advertizing. The average drinker of 50 years ago drank draught beer oblivious to the appearance of the container it came in. Today the consumer is aware of the advertizing gimmicks and packaging the Breweries use. Curiously, one of the means by which beer sales have been pushed to record levels in recent years has been the sucessful campaign to bring back beer to its original social position: a universal beverage. It is no longer the workingman's drink or the German's drink, it is even no longer exclusive to men.....most of these temporary rules have been removed by one form or another, and the acceptance of beer is closer than ever to its original position. The kettle in the kitchen has given way to the tremendous factory covering city blocks, but the drink in the glass fills the same purpose it always has.

2.2.2. Canada.

The earliest confirmed existance of brewing in Canada dates to around 1633 when a young Jesuit Priest wrote for the publication called "Relations⁶". In detailing the diet of a farm labourer in the little colony of New France, the Jesuit wrote that in addition to their allowance of flour, lard, oil and vinegar, codfish, peas, etc., **"they are given a chopine of cider a day, or a quart of beer"**.

There are numerous references in "Relations" to the building of the home Breweries which were considered a nessesary adjunct of any large household or religious institution. In 1634 Father LeJeune, the first superior of the Jesuits in Canada, reported to France: **"As for drinks, we hall have to make some beer; but we shallw ait until we have built and we have a brewery, these articles are assued with time."**⁷

The position of a brewer is evident in a report of a religious celebration in Quebec in 1646, which lists the local crafts represented in the procession: **"carpenters, masons, sailors, toolmakers, brewers and bakers"**.

When the Intendant Jean Talon decided to build a brewery in Quebec in 1668, his reasons were exactly the same as those which would be given to indicate a vigorous and healthy brewing industry in Canada today:

2.2.2 Canada. (continued)

To quote from a letter by Father Francis LeMercier:

"A brewery which M. Talon is having built will also contribute not only to the public welfare by forcing a decrease in the use of intoxicating drinks, which occasions a great lawlessness here; that can be obviated by this other drink, which is very wholesome and not injurious. Moreover it will keep in the Country the money which is now being sent out of it in purchase of so much liquor from France. It will also promote the consumption of the super abundance of grain which has sometime been so great that the labourers cannot find a market for it."

There are but a few names which stand out in the history of brewing in Canada most notably that of John Molson. In commenting about life in Montreal in the eighteenth and nineteenth centuries Stephen Leacock has this to say:

"In the history of the country the name of Molson recalls the breath of steamboats, the ringing of gold pieces in the cashiers desk in the bank, the subdued whispering in the college library, the shrill whistle of the first locomotive and the great joyous cries from the stadium....."

John Molson came to Quebec at the age of 19 from Lincolnshire, England in 1782. Just less than 4 years later Molson had opened his first brewery with a capacity of 4,000 gallons sold at 5¢ a bottle. Over the next 50 years John Molson had a hand in everything including steamboats, hotels, schools, railways and the famous Molson bank. Many suggest that this is one mans way of more out of what he already had, still others as Steven Leacock states are enjoying the little bit of true romanticism this man Molson brought.

The history behind John K. Labatt is not as romantic but none the less still interesting. John Labatt arrived in Canada from Ireland in 1833. His story is one of dedication to his chosen work. He worked hard at building a brewing empire and was the first to utilize the rail to ship his beer to the prairies.

Other names came along; Tom Carling set up a brewery in London, Ontario in 1840, Eugene O'Keefe came from Ireland at the age of 5 with his parents. After a short career in banking he and another Irishman formed the Victoria Brewery in 1862. This was the first brewery in Canada to brew Lager. It is interesting to note that the history of the brewing industry in Canada closely parallels that of the U.S.A. as opposed to that of the U.K., until the arrival of the Prohibition Era.

2.2.2 Canada. (continued)

Prohibition wasn't revoked until 1933 when the depression was in full swing. During the fourteen years it was applied the law forbade the import, export, and sale of alcohol in all but a few specialized instances. American prohibition read well on paper but did not work in practice. Canadian prohibition was almost impossible to figure out. Canadian prohibition was much older as a result of the Canadian Temperance Act of 1878. This gave the authority to localities to decide if they wanted to be wet or dry. During World War I there was prohibition under the war measures act, by the time the U.S.A. had decided on prohibition all the Provinces were dry with the exception of Quebec. Ontario enacted Prohibition in 1916, and though it repealed this legislation in 1927, some counties remained without legal drinking until the late 1940's. During the Prohibition years not only did the production of illegal alcohol flourish in Canada, where many fortunes were made in trade, but Canada was also one of the principle sources for beer, wine and spirits drunk in the U.S.A. The reason, quite simply, was that the world's longest undefended border was also unpatrolable, just as the laws of Prohibition were unenforceable.

The Post Prohibition Era brought modest growth to the industry similar to that of the U.S.A. Larger breweries consolidated smaller ones and the Revision to the liquor laws made illegal the transportation of beer across Provincial borders. Each Province was set up with its own Liquor Licensing Board under the control of the Provincial Governments to control the sale and price to the consumer.

Today the brewing industry in Canada enjoys a healthy growth which is expected to be approx. 3% per year. Like the U.S.A., the industry here tries to diversify into new products such as low alcohol beers and seasonal products, while maintaining a strong interest in sponsorship of sporting events and recently rock concerts.

In addition the Canadian brewing industry have made several major breakthroughs in recent years, the most common is the universal bottle which is reported to save the industry many millions of dollars each year. The universal beer bottle was adopted in the early sixties and is the envy of the world. Also, Labatts have succeeded in obtaining a license to brew Budweiser, a popular American beer.

2.3 The Brewery - A Study of Building Types

2.3.1 Great Britain

The history of brewing in Great Britain is long, controversial and fascinating. The building form equally reflects this social change. The building types were often domestic in scale reflecting the small communities they served. There is some universality to the built form across the world, due largely to the fact that many of the brewers in the U.S.A. and Canada were either British or German.

An early copper engraving (Fig. 1) shows the production of beer in the 1700's. Like breweries of that time, there is a verticality to the process starting with raw products at the top of the brewery and finished goods at the bottom.

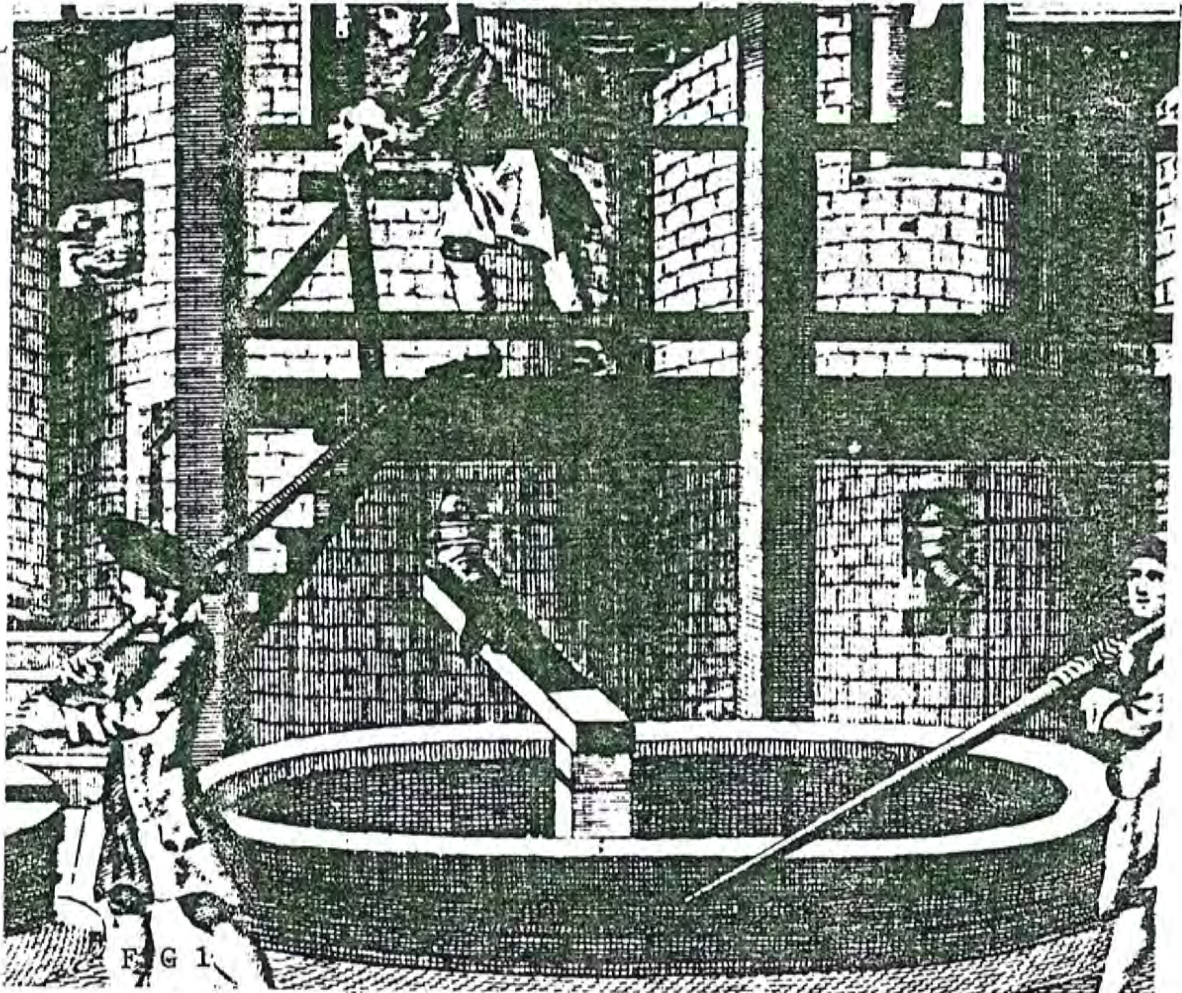


FIG 1.
The use of manpower was large in breweries, due to the product handling and time needed on a specific part of the process.

2.3.1 Great Britain (continued)

The change in English society prior to the Industrial Revolution is also reflected in the style of brewery architecture. As can be seen in Fig.2 the style of breweries catered to the community it served. The lower brewery is typical of the rural form, respecting the intent of the community. While on the other hand the brewery in the upper part of the illustration shows the shift to larger facilities and a current architectural style.

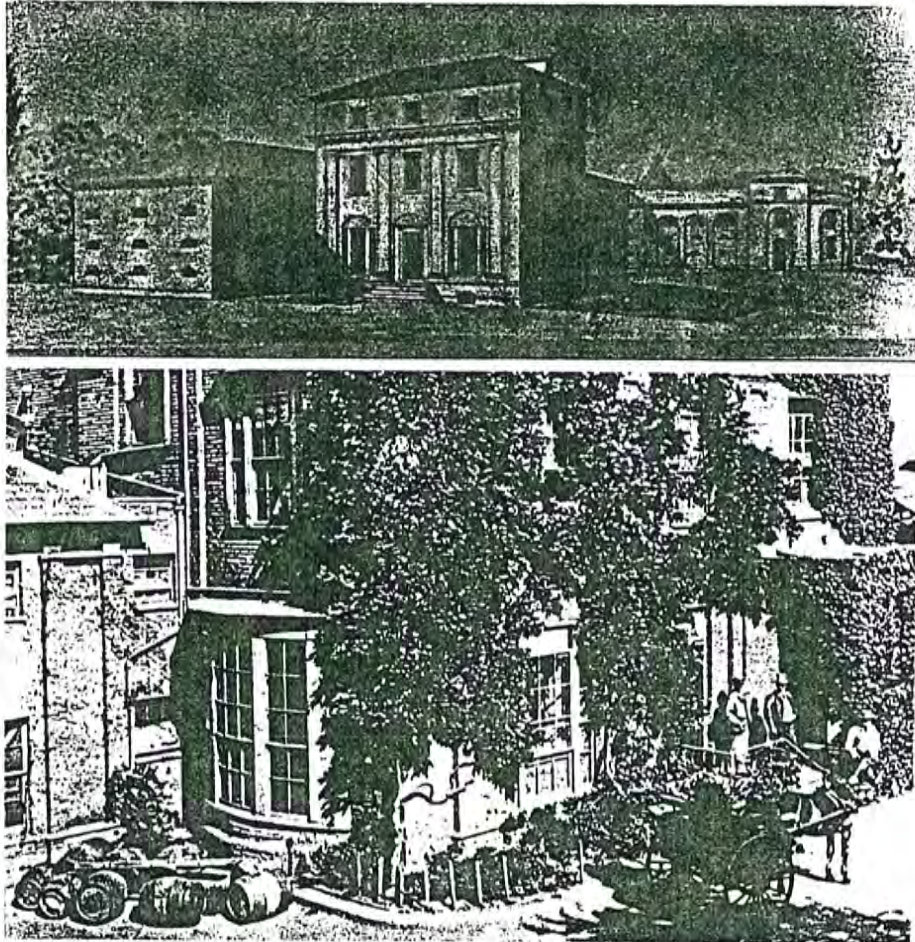
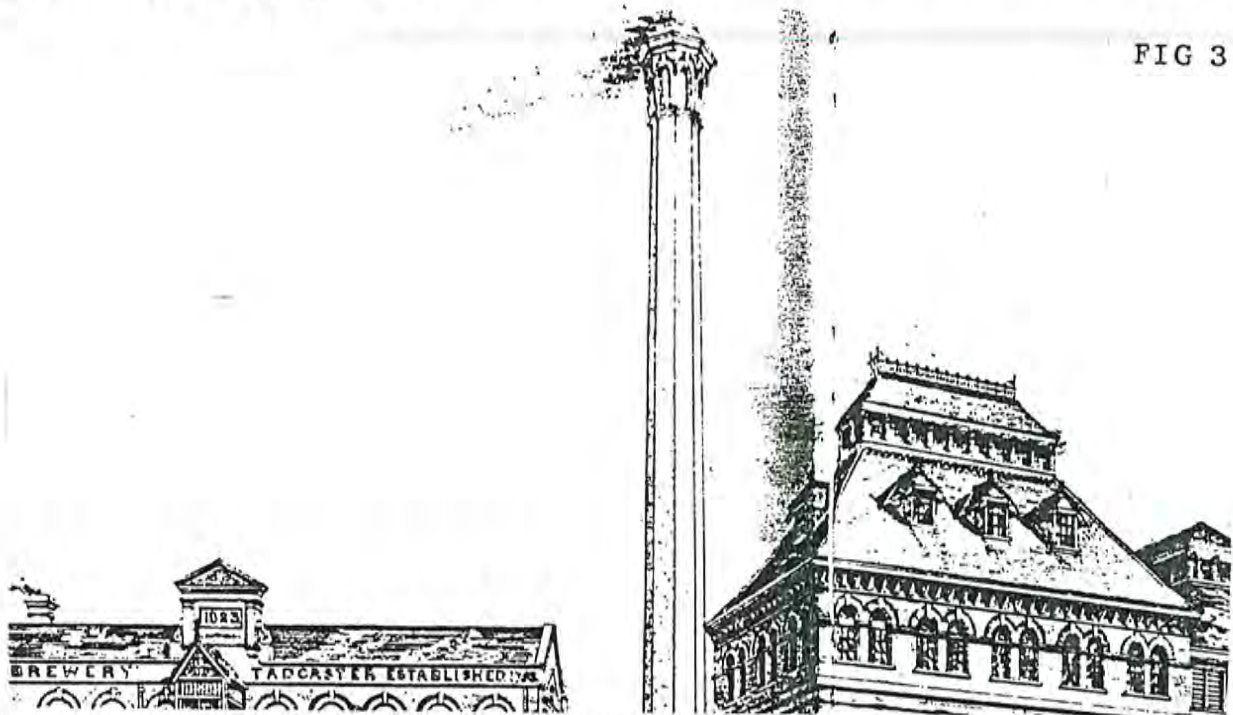


FIG 2

The Industrial Revolution brought with it technological innovations to the brewing industry. With the coming of steam it was now possible to transport materials and produce without having to have vast amounts of manpower. This meant that breweries no longer had to be vertical, they could be 2 to 3 storeys high. This dramatic change in the social fabric brought bigger and better breweries to cater to the vast amounts of people that now headed for the Cities. With more money the brewery owners sought for an image that reflected the social and economic change they were now carefully woven into. The Tadcaster Brewery, Yorkshire was a prime example of a reflection of this change, even to this day, the smoke stack serves as a symbol of the town.

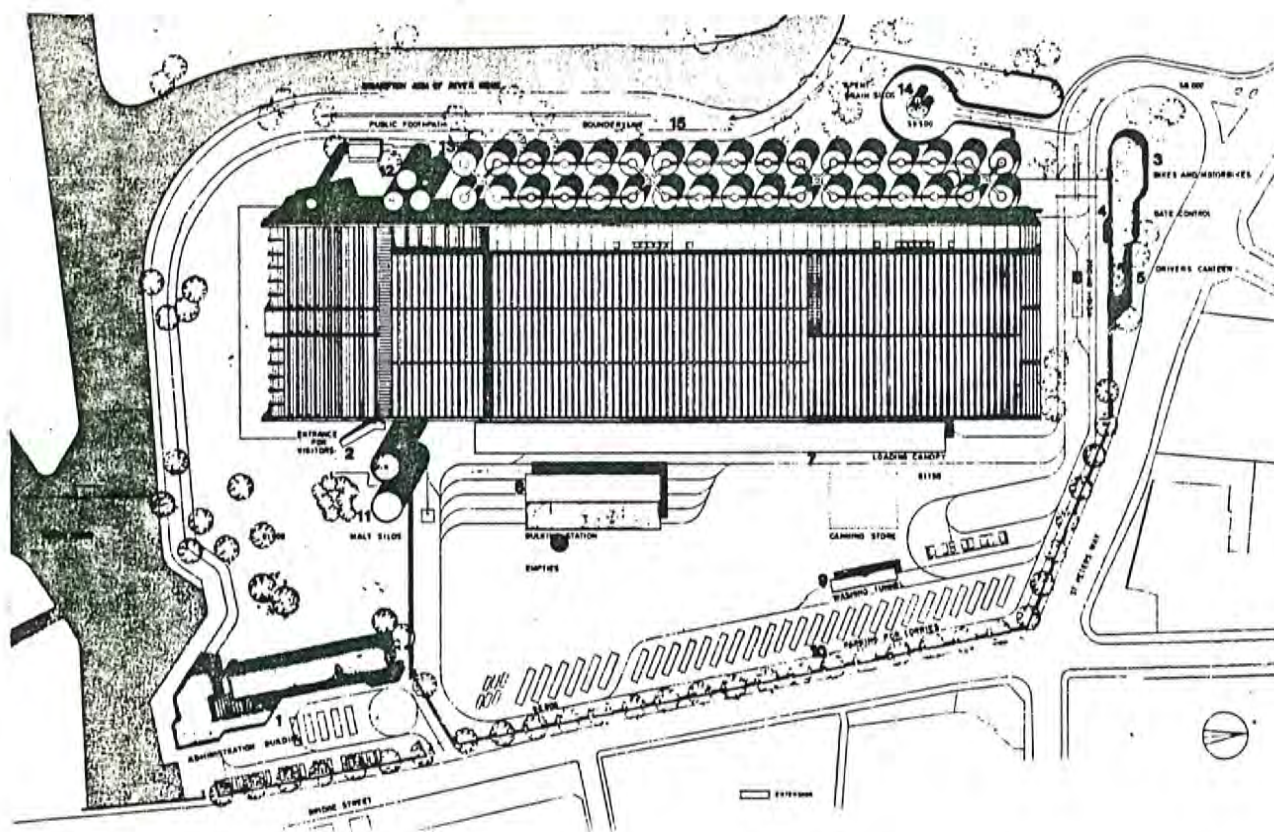
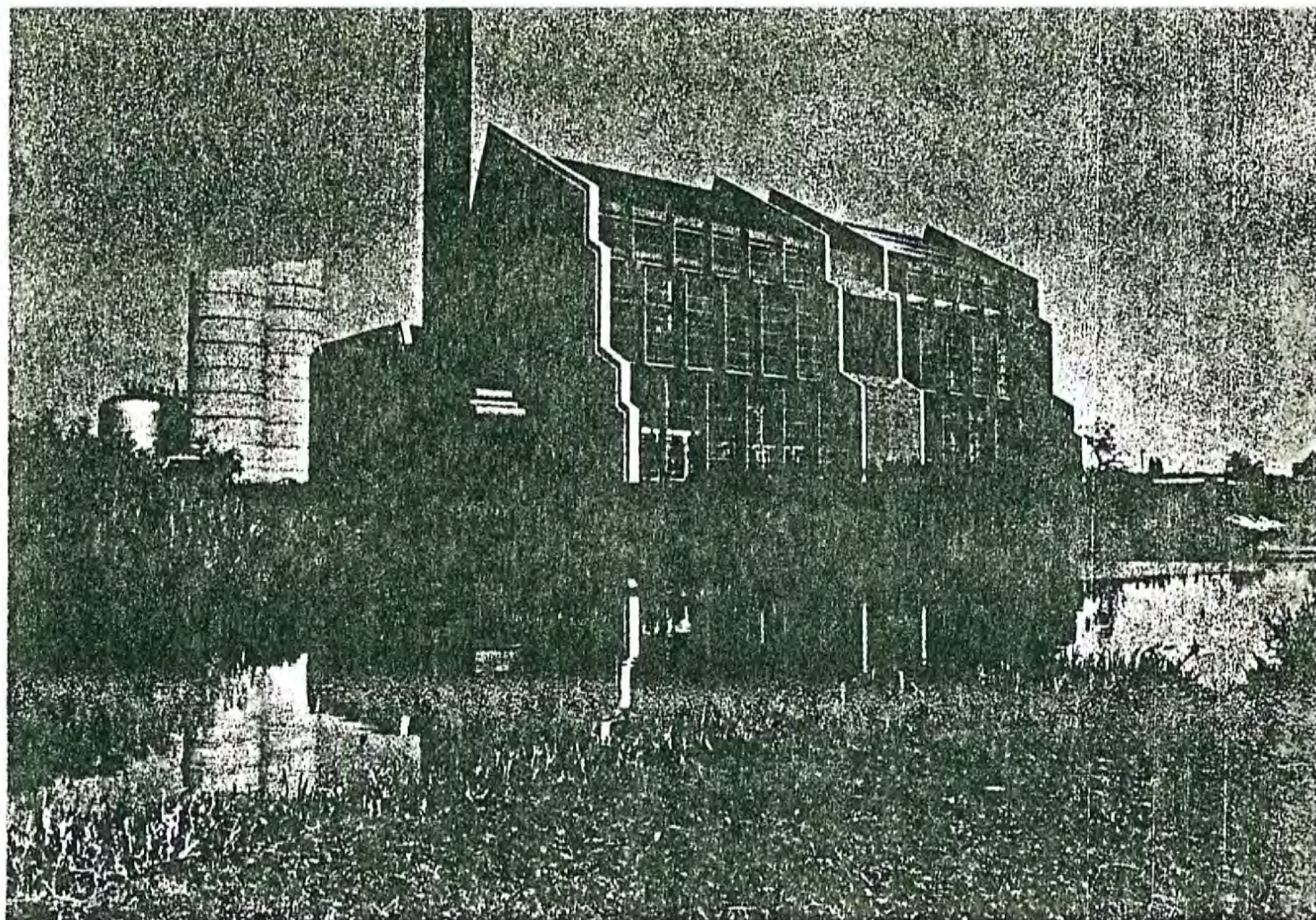
2.3.1 Great Britain (continued)

Fig. 3 shows the brewery as it was on its opening day, Much of the existing brewery is now lost as replacement work has removed much of the old brewery.



Today the breweries in Great Britain are not as large as their predecessors but still maintain a certain imagery appropriate to the architectural form of breweries. Since the Second World War there have been very few breweries built, a reason may well be that the brewery owners find it easier and cheaper to modify what they have. Another reason could be that many Brewing Companies felt that the industry is going to go through a transition from draught to canned beer. Unlike the U.S.A. and Canada the British have not fallen in love with the idea of contained beer for consumption in the home. There is still the ever popular "pub" and most parties have keg beer on hand, often bought from the local pub or "off licence". Whether there is a change on the horizon is yet to be seen. The demand for keg beer is the primary industry in Great Britain. For the most part the modern brewery in Great Britain is somewhat smaller than its American counterpart as the need for bottling and canning is small.

Typical of this modern brewery is Carlsberg Brewery, Northampton, England (1974). In this brewery is a prime example of architectural style applied to the process of brewing.



- 1 管理棟
- 2 見学者用入口
- 3 自転車・オートバ
- 4 守衛室
- 5 ドライバー用カフ
- 6 計量台
- 7 荷積場
- 8 ビン詰工場
- 9 洗灌トンネル
- 10 トラック駐車場
- 11 麦芽サイロ
- 12 水槽
- 13 貯蔵タンク
- 14 醸造用サイロ
- 15 一般通路

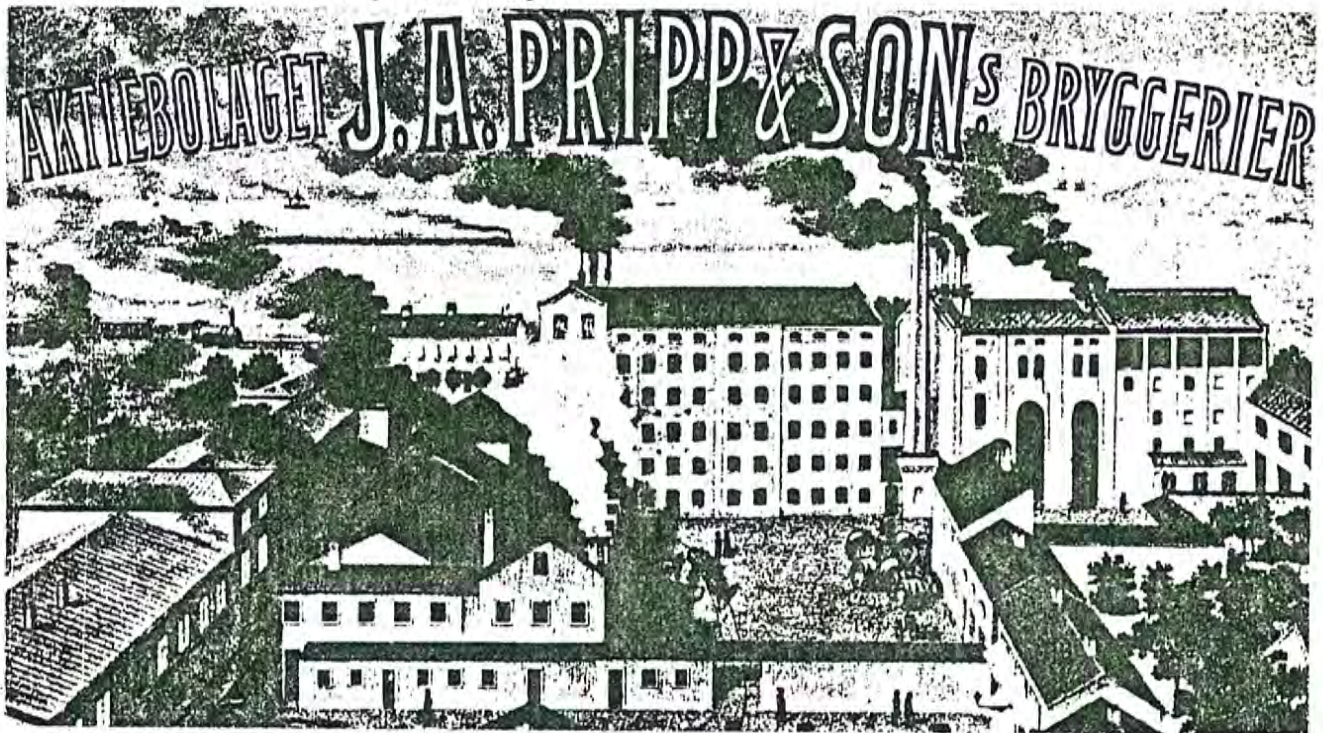
- 1 Administration bu
- 2 Visitors' entrance
- 3 Bicycles and moto
- 4 Gate control
- 5 Drivers' canteen
- 6 Weigh bridge
- 7 Loading area
- 8 Tapping plant &
- draught beer in ta
- 9 Washing tunnel
- 10 Lorry parking
- 11 Malt silos
- 12 Water tanks
- 13 Storage tanks

2.3.2 Europe.

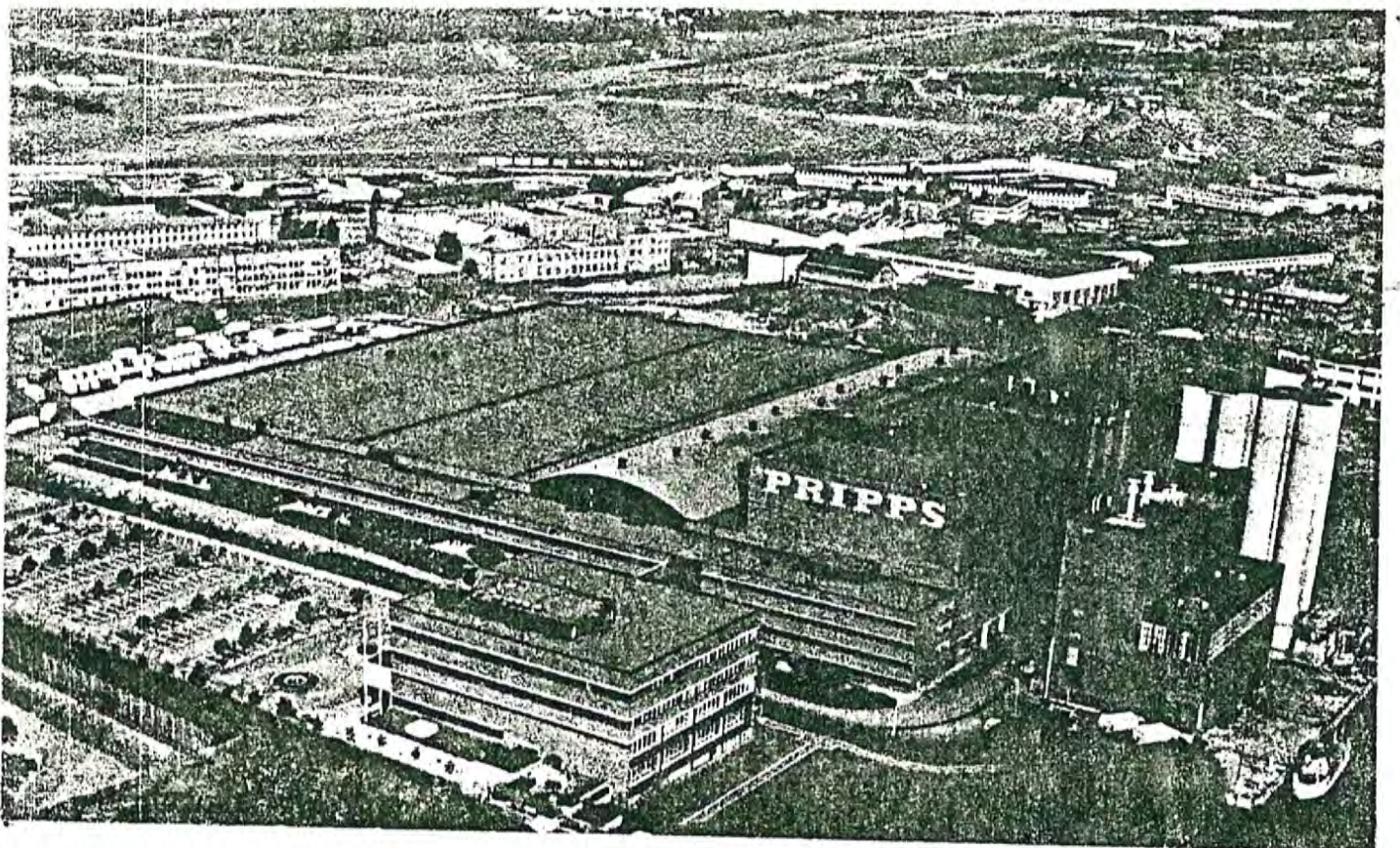
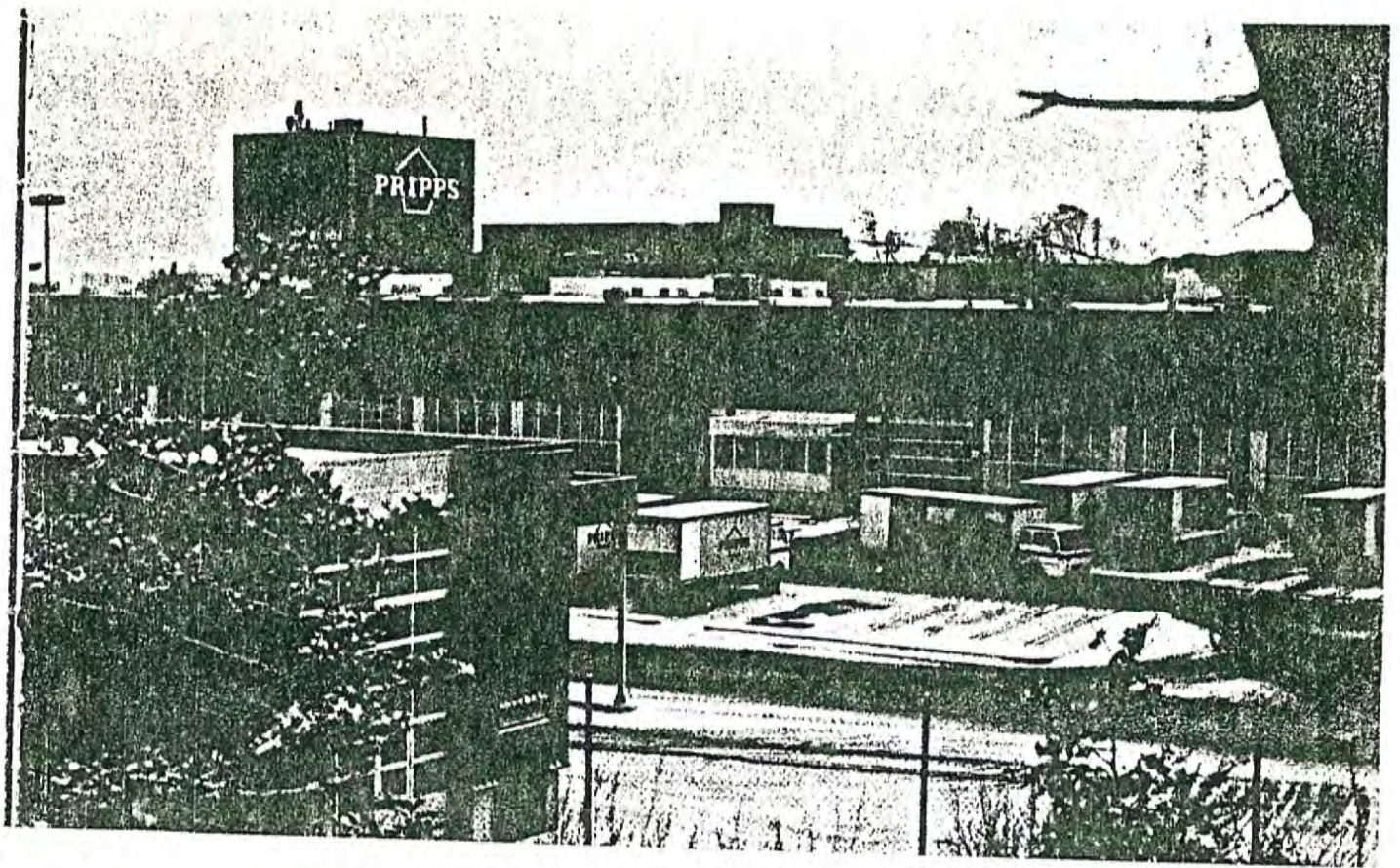
The architectural style of breweries in Europe is again typical for the rest of the world, the following features predominate:

- 1 Domestic scale during the Middle Ages.
- 2 Utilizes current Architectural themes during Industrial Revolution.
- 3 Becomes low scale building during the Twentieth century.

If one good example of a brewery in Europe could be found which would encompass the 3 points it would have to be the Swedish brewing company of Pripps. Fig. 5 shows some early scenes of an Nineteenth century brewery.



The modern facilities used by Pripps are large and low in scale. Pripps are a major industry in Sweden having cornered not only a large portion of the beer market but also they hold the exclusive license for the manufacture and production of "Coca Cola". To Pripps there public image is of upmost importance and they strive to improve and support that image at every available opportunity. The modern facilities used by Pripps are clean and efficient. The following illustrations (over) show some of the modern Pripps Breweries.

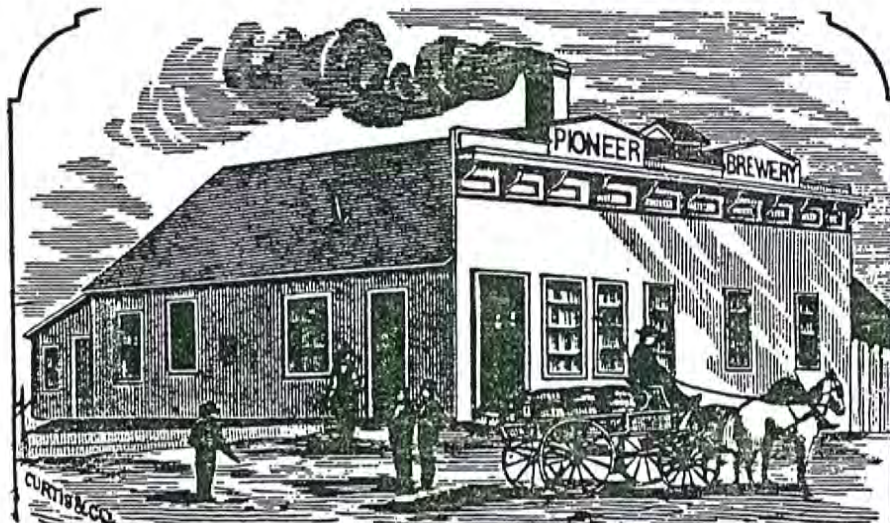


2.3.3 U.S.A.

The architectural style of breweries in the U.S.A. is a good example of several periods of style. The early days of the colonies brought small communities and small needs consequently the style of the breweries were very domestic in nature. By a series of cause and effect these early breweries were built from materials available locally. The two illustrations below show this cause and effect, the brewery to the left is a brewery from around 1860 in Portland, Oregon while the brewery on the right is Valentine Hoffman's brewery in Buffalo around 1840.

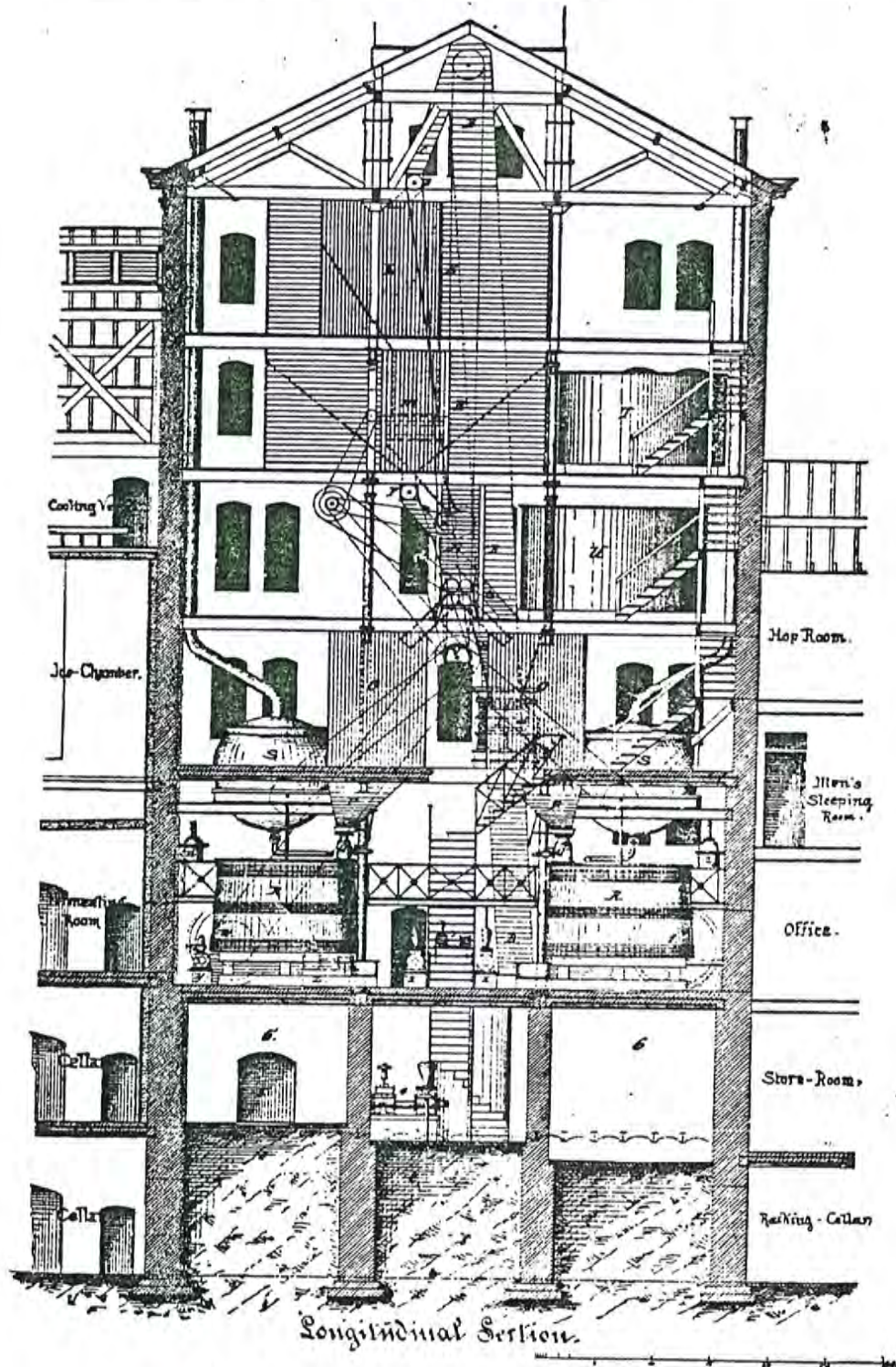


This domestic scale predominated throughout most of the U.S.A. to just prior to the Industrial Revolution. Fig 6 illustrates another example of the domestic scale, this time in Philadelphia.



2.3.3. U.S.A. (continued)

The vertical theme that predominates prior to the Industrial Revolution in Europe is carried through the early part of it in the U.S.A. Fig.7 shows a brewery in Staten Island, New York in 1879. Although it utilizes mechanization to transfer materials it still uses gravity in a major way.

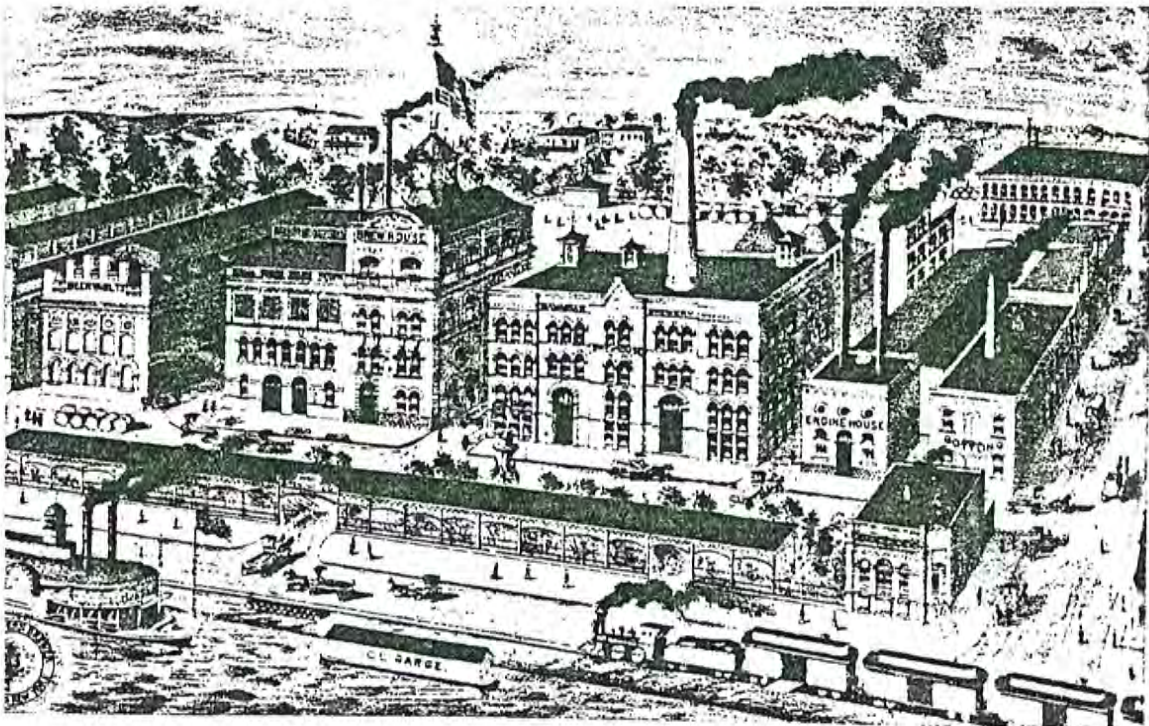


Plan of Rubsam and Horman's New Brewery, Staten Island,
New York, 1879. Annual capacity: 100,000 barrels

FIG 7

2.3.3 U.S.A. (continued)

The coming of steam had a big effect on the style of buildings of the industrial era. The brewing industry enjoyed a fast growth towards the latter part of the last century. With the influx of immigrants from other parts of the World, the demand for beer grew. The breweries had to cater to a larger population. The larger breweries could not be the domestic scale they once were, it was now expected of them that they should reflect this new, young country. Therefore in order to appear young you must take on young appearances. So the Brewery engineers (who were also the Architects) choose the current style - Gothic Revival. A good example of this is illustrated in Fig 8.



"E. Anheuser Company Brewing Association," St. Louis

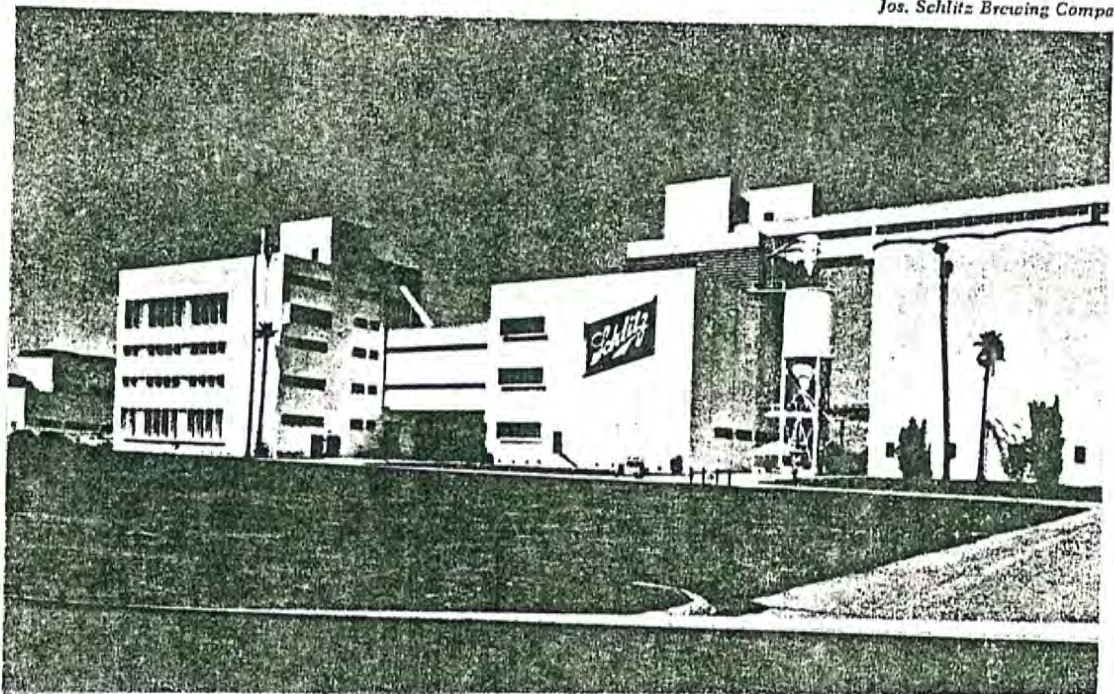
FIG 8

The breweries that dot the American landscape are mishapen, added on to derivatives of their former selves. The few new Breweries built since the Second World War still maintain this rule of building them in a current Architectural style. The Breweries of Schlitz in Van Nuys, California (1954) and Carling in Natick, Massachusetts (1956) show the theme of the international style as it relates to an industrial building type. The Carling Brewery is set into quite a romantic setting with rolling hills and a lake. Both the Carling and the Schlitz breweries reflect the process they each house, the breweries are squat, strung out boxes going from raw materials at one end to a finished product at the other. Most of these modern breweries have taken a closer

2.3.3 U.S.A. (continued)

look at their predecessors and realized the difficulty in expansion. Most breweries are set on large parcels of land and are designed with expansion and modification in mind.

Schlitz Plant at Van Nuys, California, completed 1954



Jos. Schlitz Brewing Compa



Carling Brewing Compa

Carling Plant at Natick, Massachusetts, completed 1956

2.3.4. Canada.

In Canada the brewing industry has followed much the same path as its neighbour to the south. It is therefore obvious that the architectural style of the breweries is not that much different either. Canada has never really had any architectural style as such to warrant its use in a brewery. The major breweries of the last part of the nineteenth century and early part of the twentieth were designed by engineers working on similar projects in the U.S.A. (Molsons Brewery, Edmonton for example).

Early pioneers like their southern friends built with whatever they could get their hands on (Fig 9).

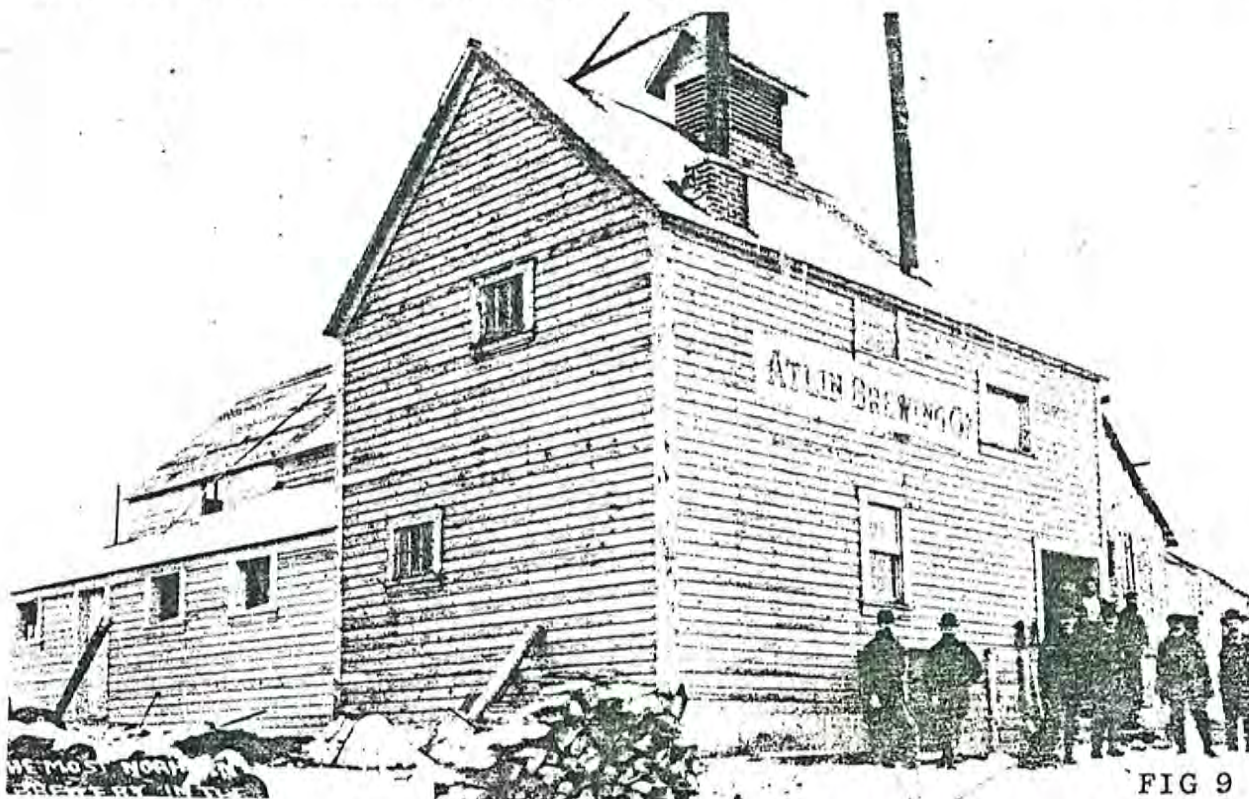
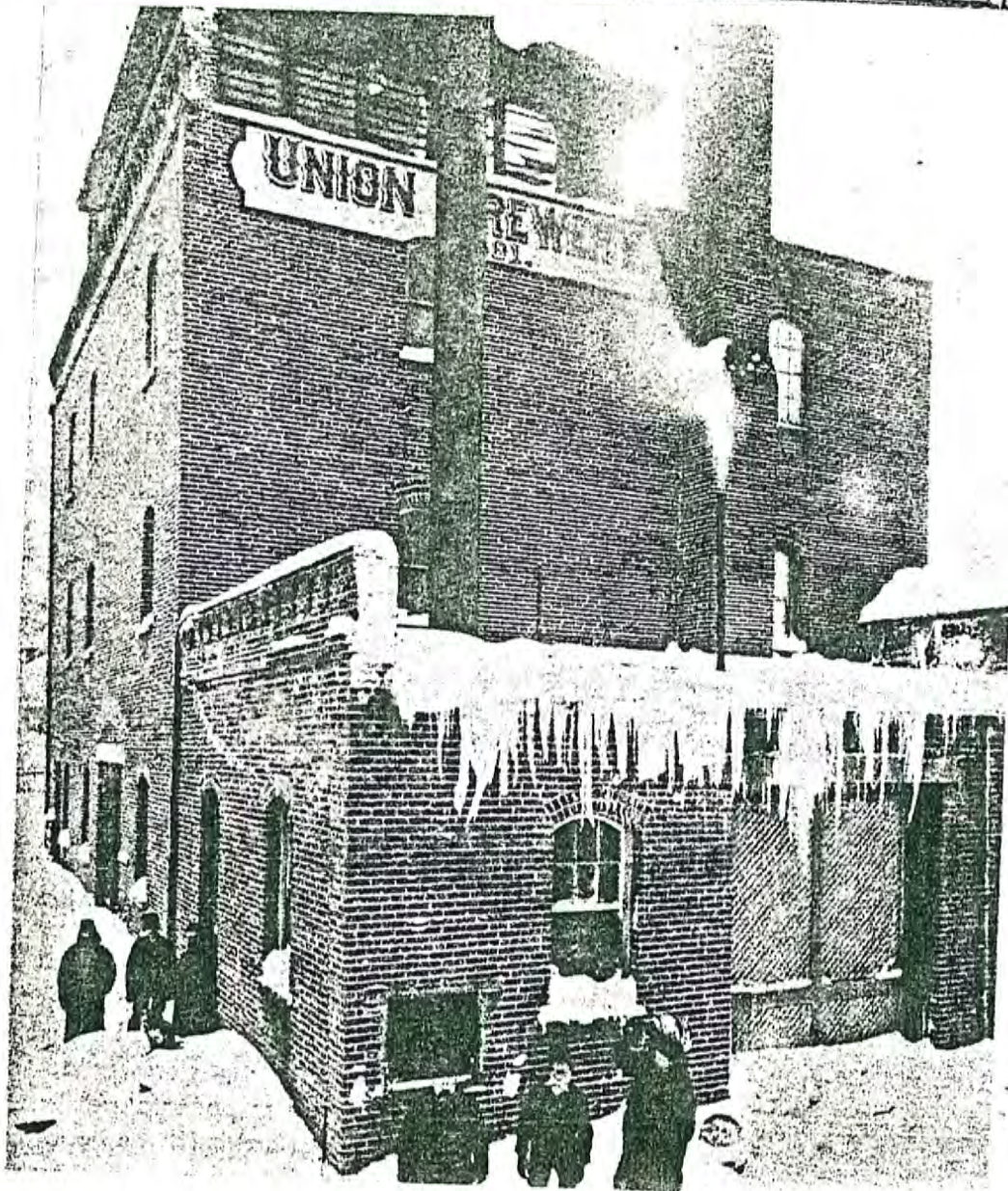
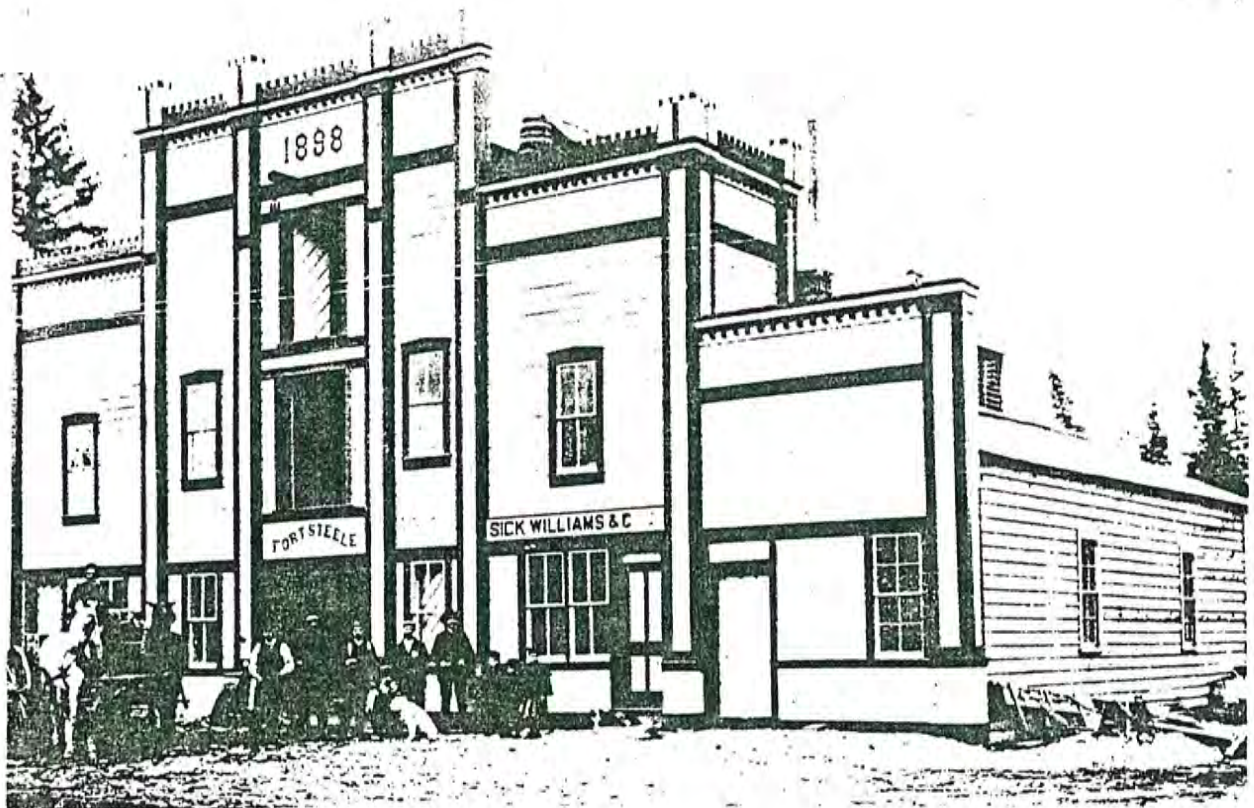
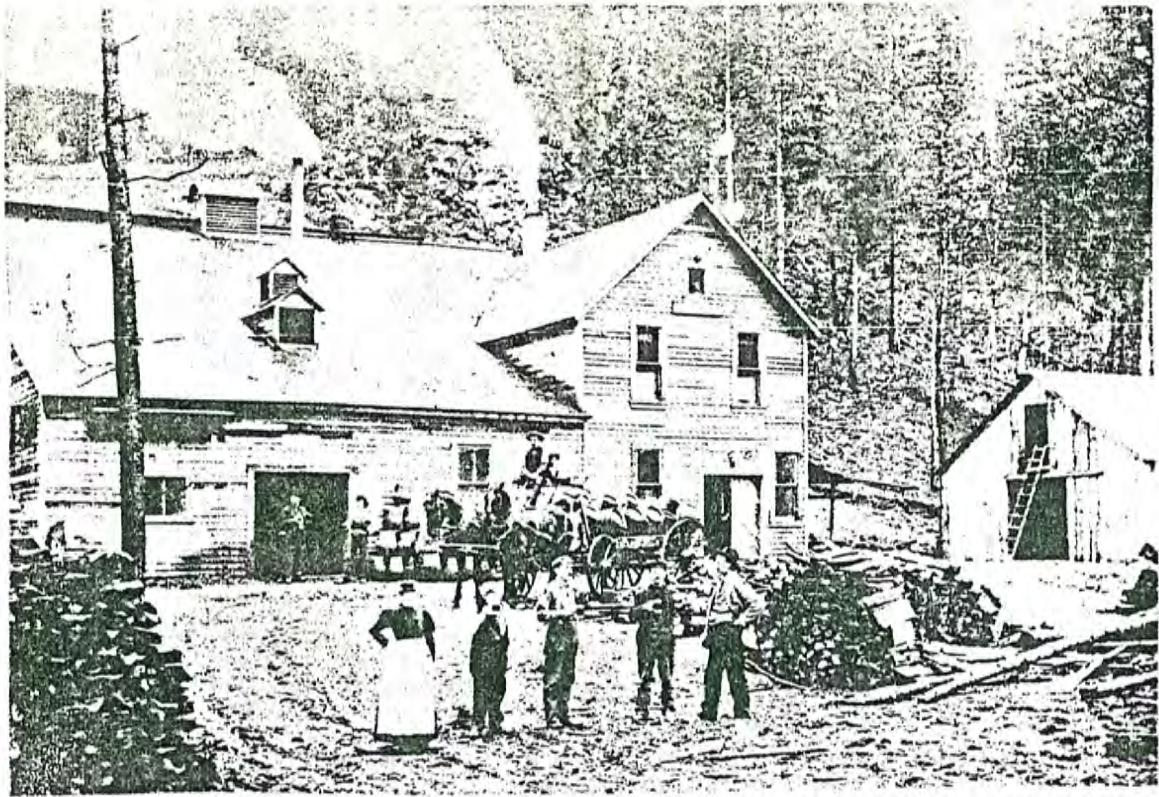


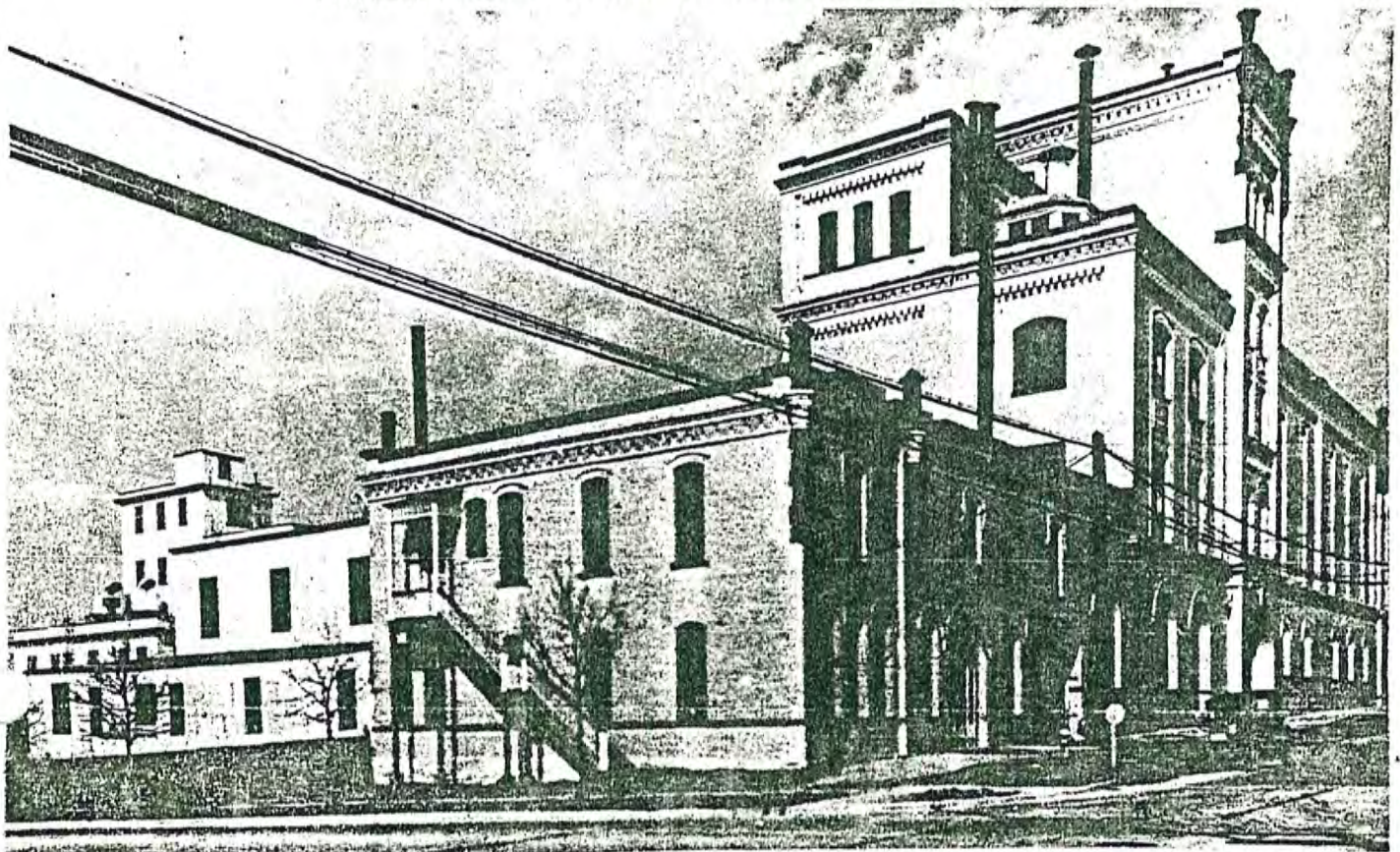
FIG 9

Many of the earlier breweries had some features which tend to predominate through all breweries of the same period. One feature is the loading door at the top of the brewhouse. This feature was common amongst breweries; its existence is a direct result of storage occurring at the top of the brewhouse, where by utilization of gravity the material is dropped into the kettles.

These early breweries were a place to get a beer until legislation prevented the breweries from participating directly in the sale of beer. Most of the breweries of this time were small often only producing 280 gallons a day. The following pages show the types of breweries that have existed, specifically, in these instances in British Columbia.







2.3.5 The Brewery - Architectural Conclusions

The following points are listed in note form and reflect some of the observations which have an impact on the design and construction of a Brewery today.

1. Form.

The architectural language of breweries has responded to the time and place. Unlike other processing plants it depends on its public image. It must appear modern as more younger people begin to drink. The shape of breweries since the Second World War has been governed by the need to build in an ability to expand without excessive cost and the compromise of the process.

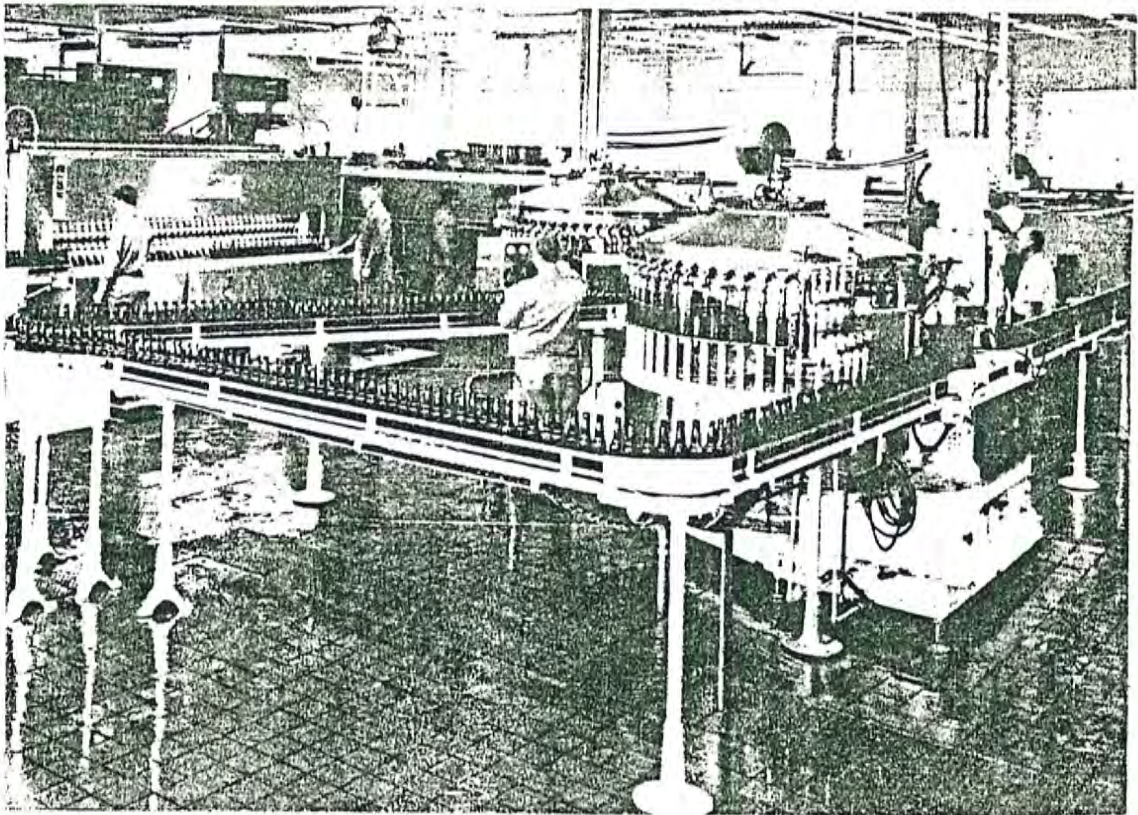
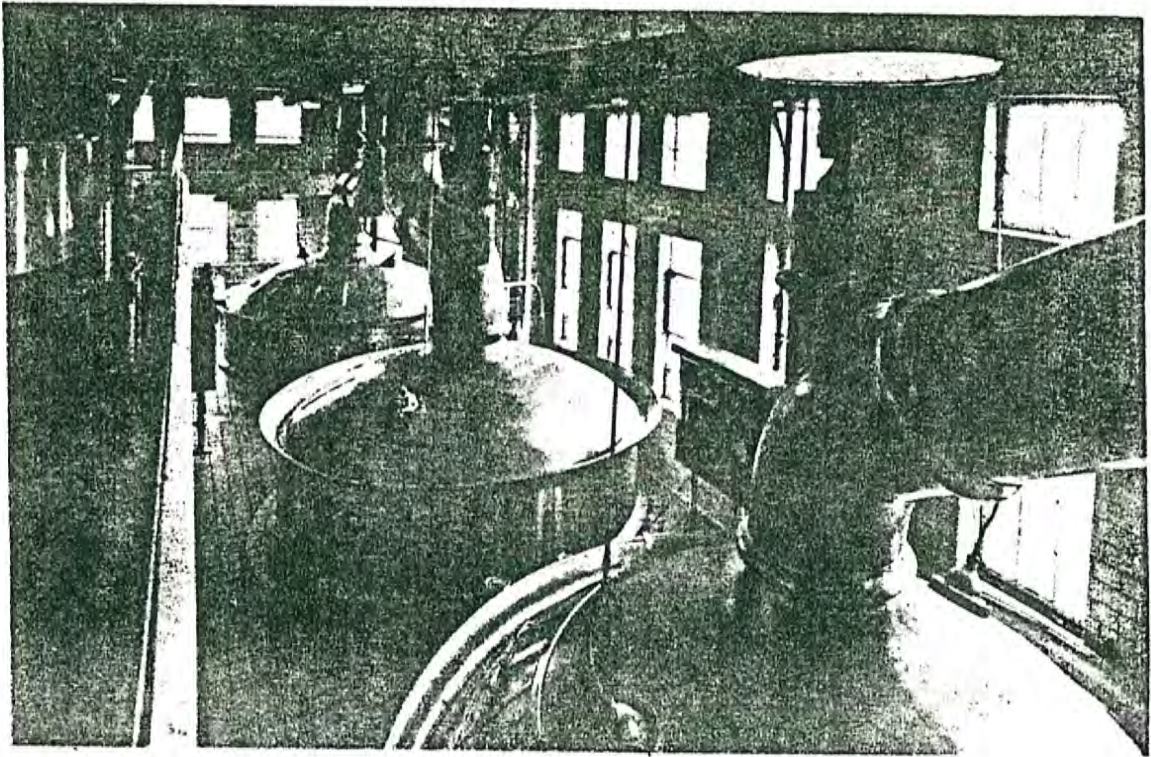
2. Process

The process has a large influence over the shape of the brewery. Land costs have varied over time and these now play a big in the design of a brewery.

2.3.6 Summary.

Over the last chapters it has been indicated the way in which the Brewing Industry is woven into our societies on a universal basis. The production of beer is unlike the production of any other food or beverage; it enjoys a position of being a food beverage and has been proven, in reasonable amounts, to have tonal and mineral benefits¹. Unlike distilled spirits it shares a public respect that is borne out of its long history and association with communities. Although the emphasis today is on advertising and promotion, the industry still maintains a high standing by returning a portion of their profits into worthy causes. Apart from the damage done by the Prohibition Era the Brewing industry still manages a reasonable growth rate each year.

3.0 THE BREWERY- STUDY OF PROCESS.



3.0 THE BREWERY - A STUDY OF PROCESS

3.1 Introduction.

3.1.1 A brief history of the process.

The brewing process is fundamentally a natural process. The art and science of brewing is in using and controlling to convert natural food materials into a pure, pleasing beverage.

This is a point which should be emphasized. Although the most modern, sanitary methods are used, and great strides forward have been made in the techniques of beer production, beer is still brewed in the ageless, traditional methods.

3.1.2 Effects of Technology.

The effect of major technological breakthroughs has played an integral part in the brewing industry. For example, ice was used to produce lagers (cold storage). As this could only be farmed from a frozen river (Fig.1) it meant that lagers could only be made during the winter months.

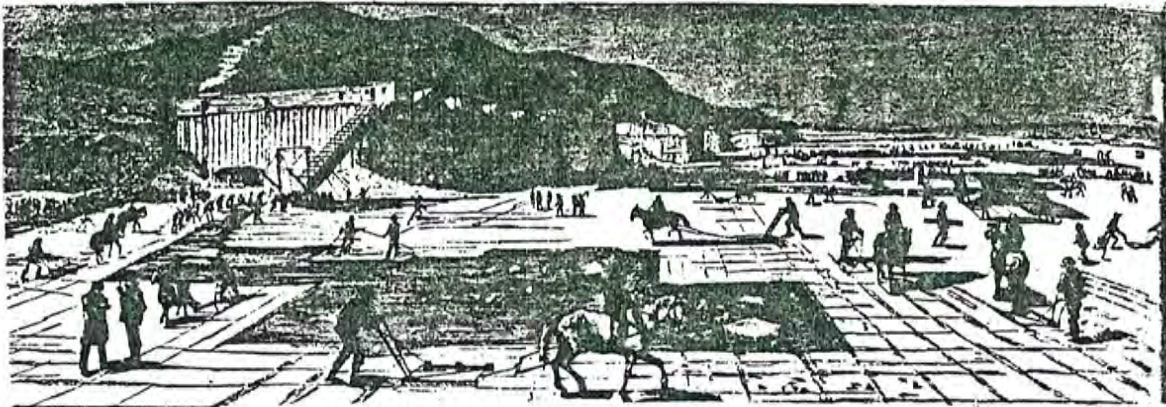
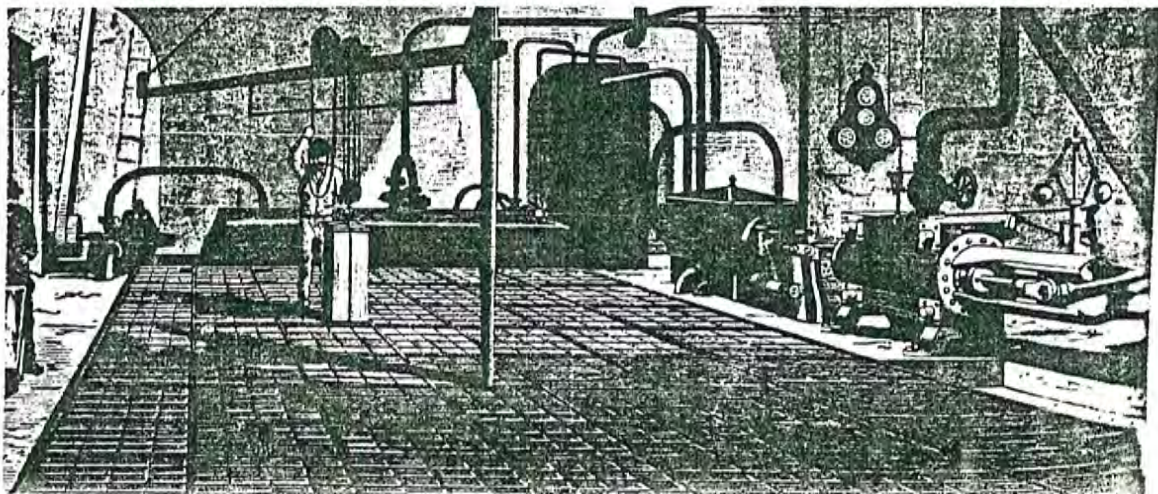
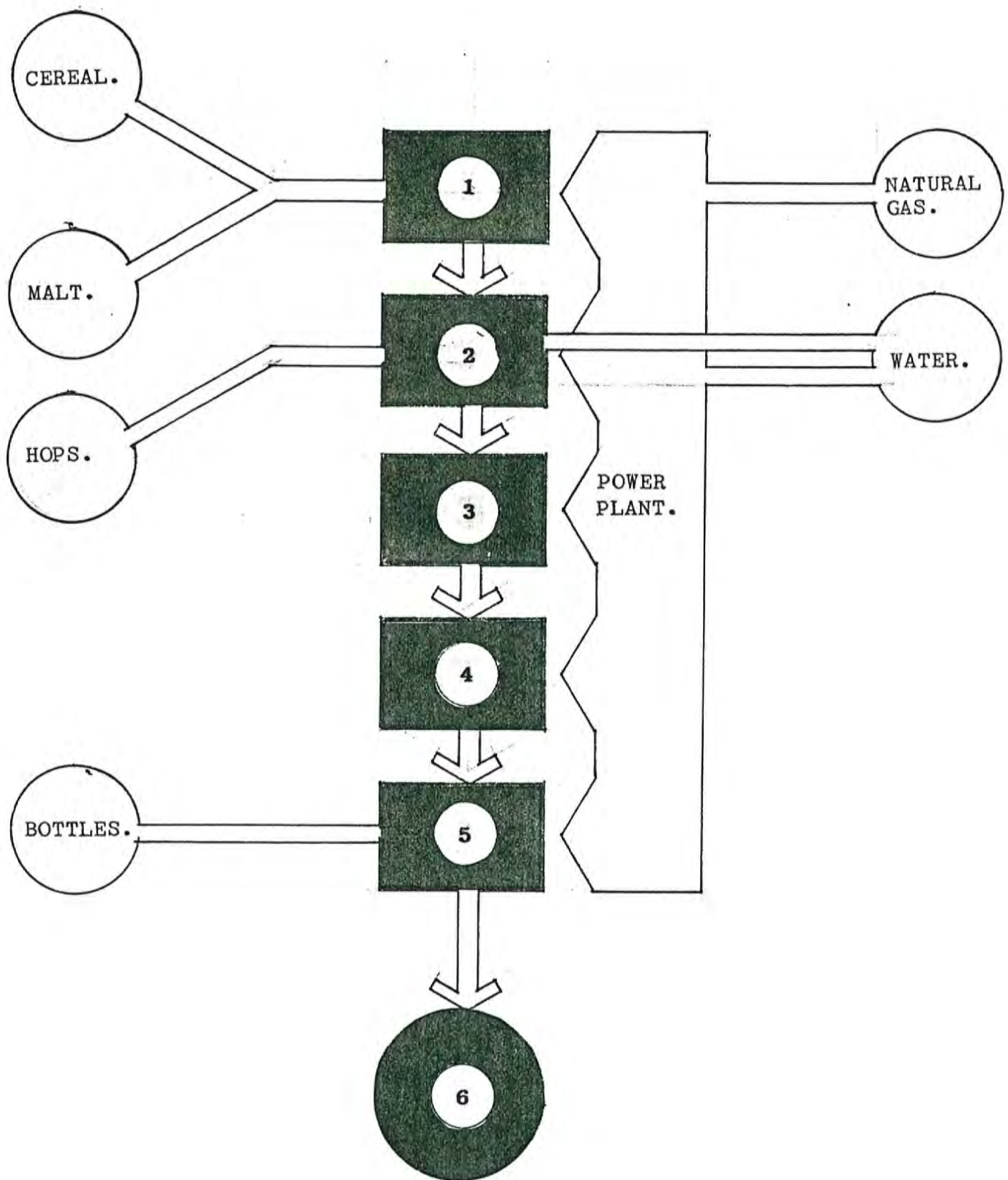


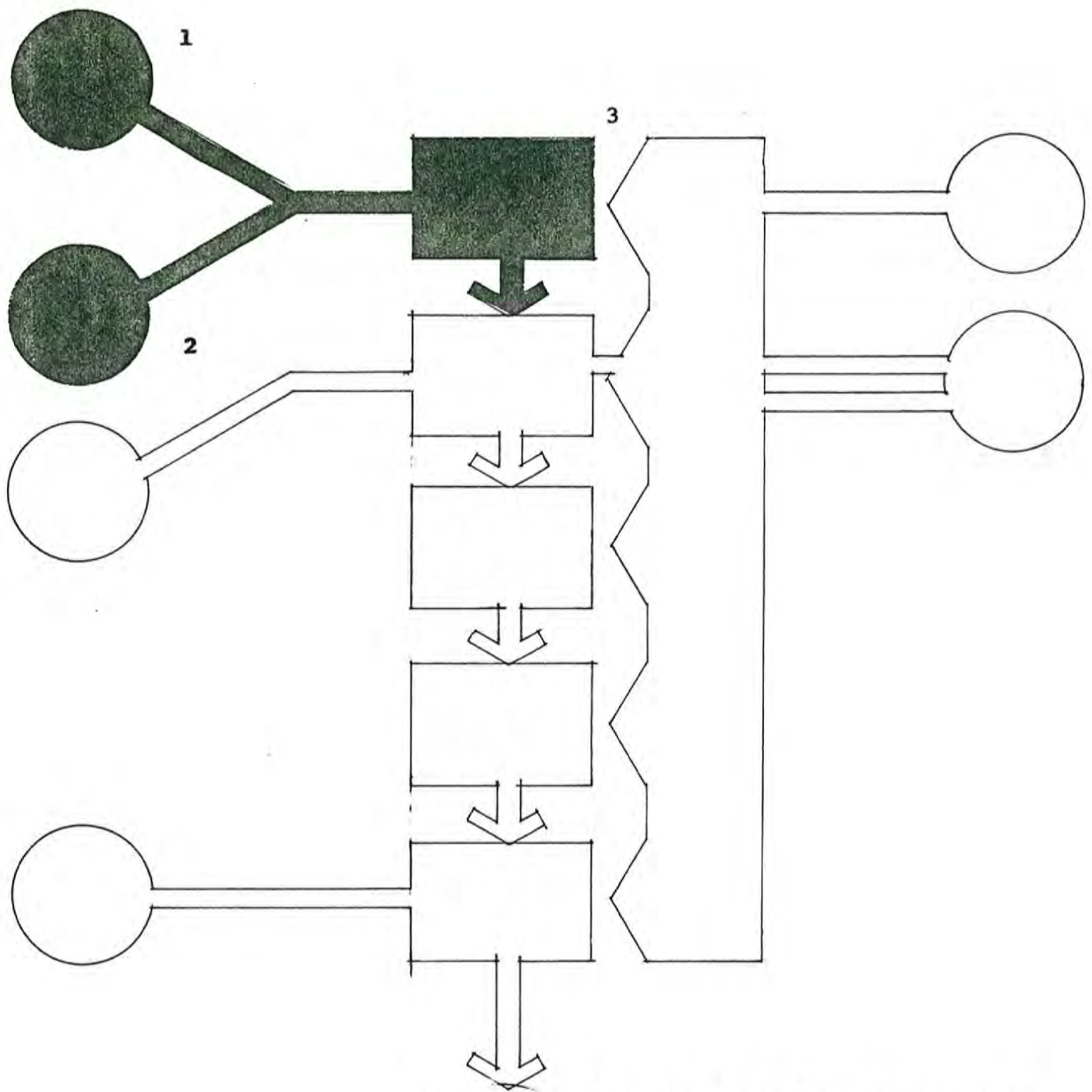
FIG 1.

With the invention of compressors, ice could now be made all year round (Fig.2).



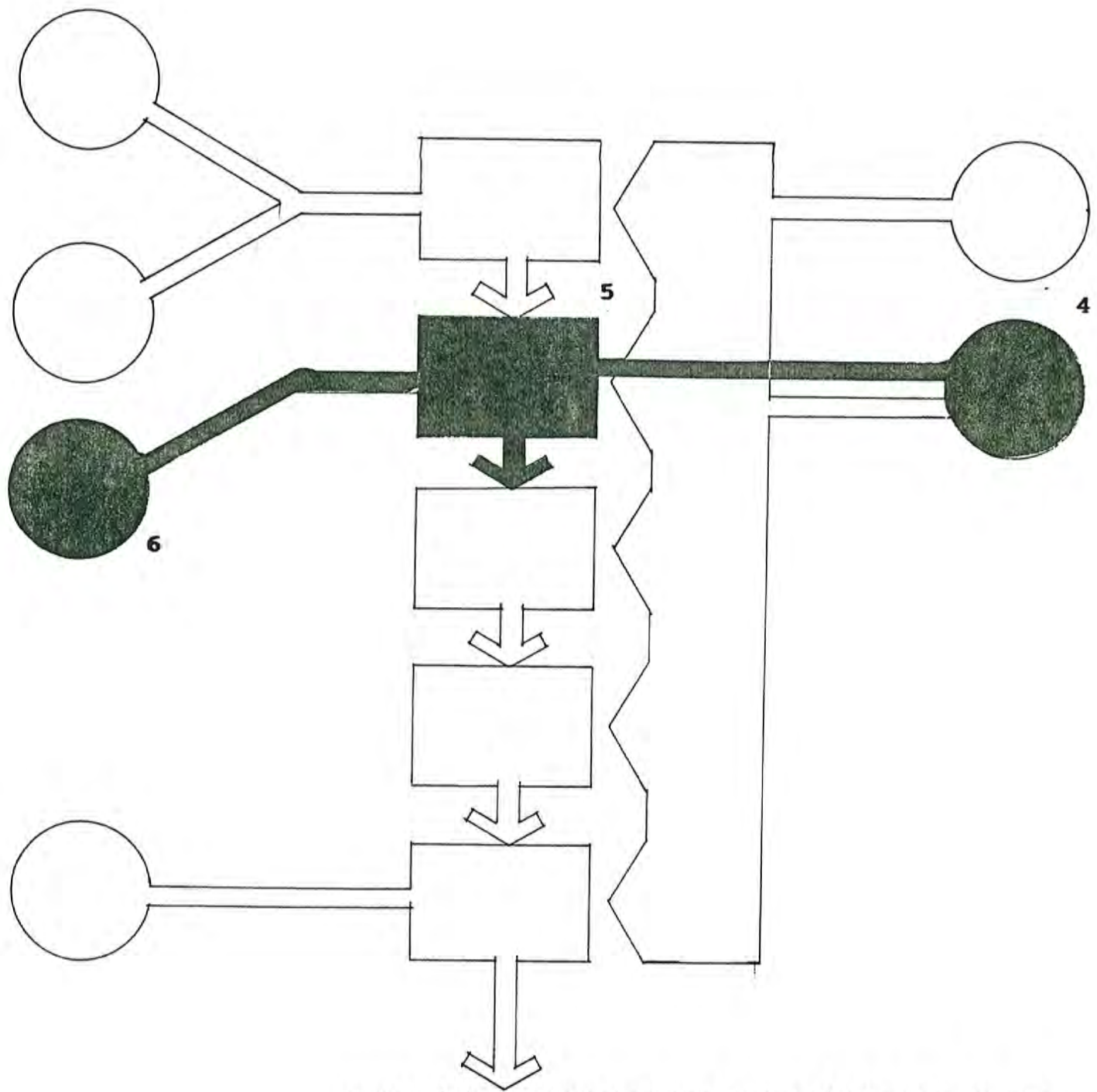


- 1 RAW MATERIAL PREPARATION.
- 2 BREWING.
- 3 FERMENTATION.
- 4 AGING.
- 5 BOTTLING.
- 6 WAREHOUSING.



MALT (1) AND CEREALS (2) MOVE FROM STORAGE
TO THE WEIGHT HOPPERS TO BE WEIGHED. (3)

MALT IS CRUSHED IN THE MALT MILL. (3).

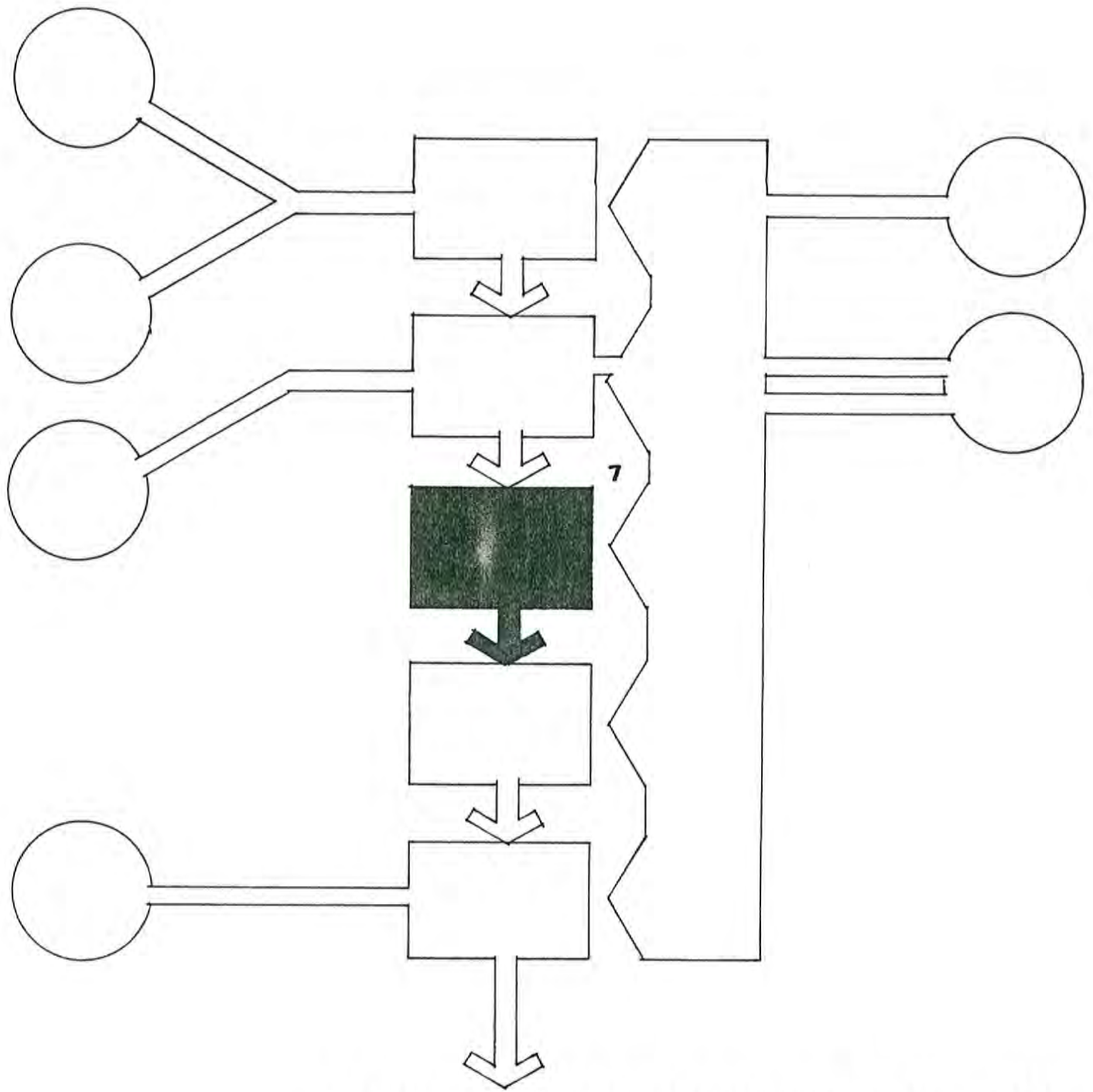


WATER (4) IS ADDED TO THE CEREAL/MALT MIX IN THE CEREAL COOKERS WHERE THEY ARE HELD AT VARIOUS TEMPERATURES AND THEN BOILED. THE CEREAL/MALT MASH NOW ENTERS THE MASH COOKER WHERE THE ENZYMES IN THE MALT CONVERT THE STARCHES INTO FERMENTABLE SUGARS AND DEXTRINS. (5).

THE MIXTURE NOW ENTERS THE LAUTER TUB WHERE THE SPENT GRAINS (CATTLE FEED) ARE SEPARATED FROM THE LIQUID NOW CALLED THE "WORT". (5).

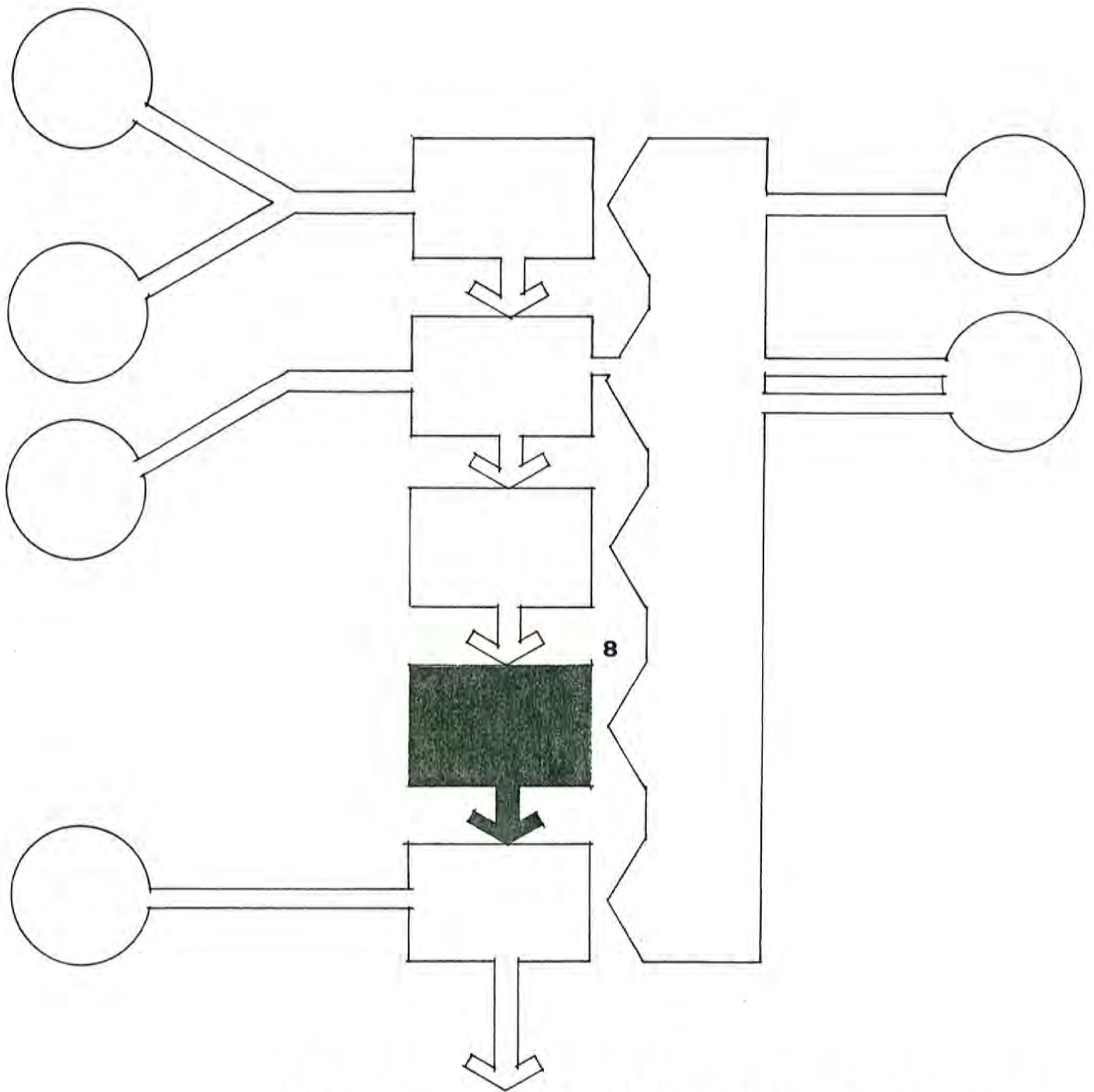
HOPS (6) IS NOW ADDED TO THE WORT AND BOILED IN A BREW KETTLE

THE HOPS ARE THEN SEPARATED AND THE HOT WORT IS THEN COOLED AND FILTERED. (6).



THE COOLED WORT IS NOW PUMPED INTO THE FERMENTING TANKS WHERE YEAST IS ADDED (7).

ONE OF THE PRODUCTS OF FERMENTATION IS CO₂ GAS WHICH IS REMOVED AND STORED.

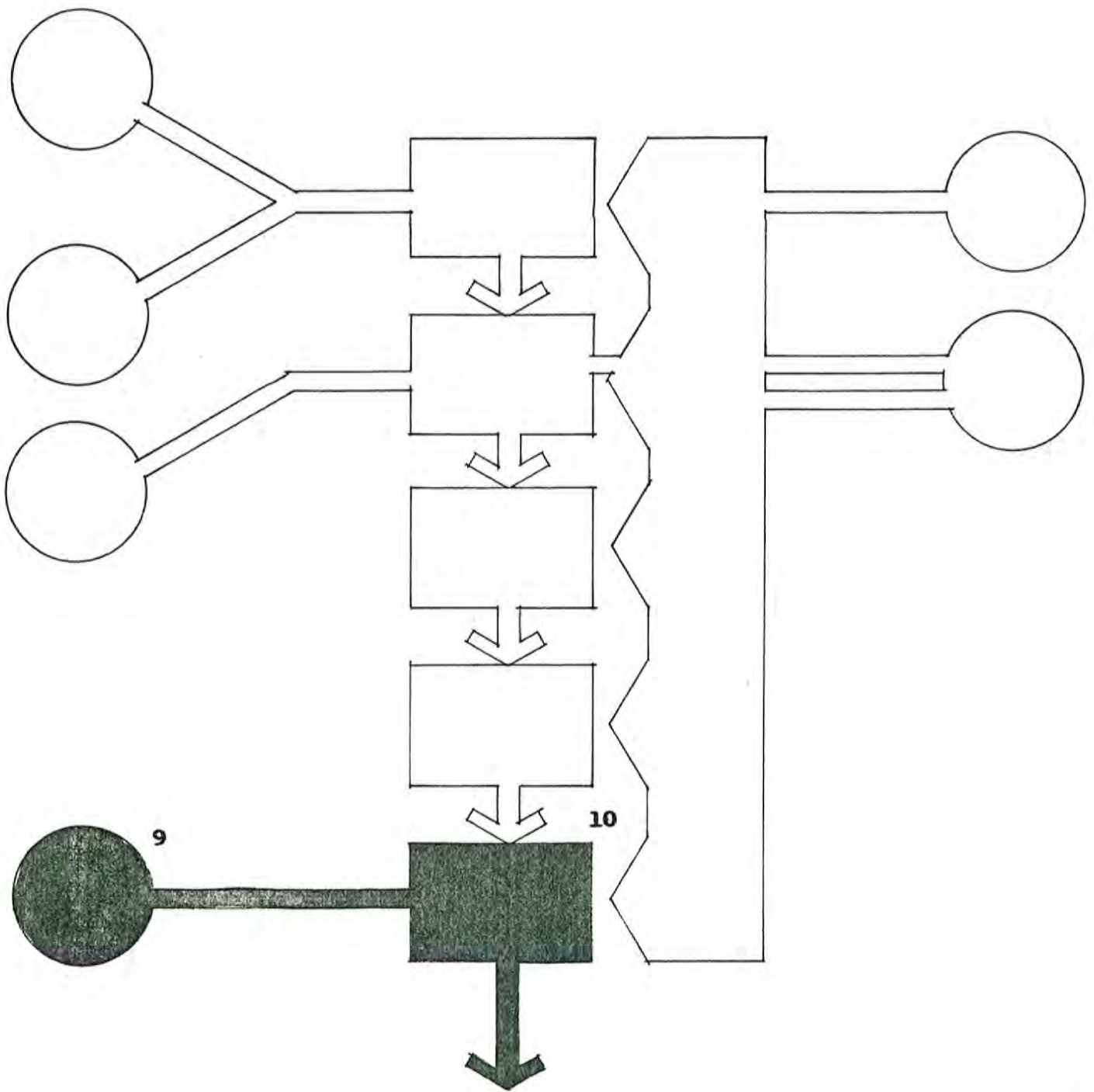


FROM THE FERMENTATION TANKS THE MIXTURE IS PLACED IN AGING TANKS FOR A PERIOD OF 6 TO 8 WEEKS (8).

FROM THE AGING TANKS THE MIXTURE IS PASSED THROUGH FILTERING AND CARBONIZATION PROCESSES (8).

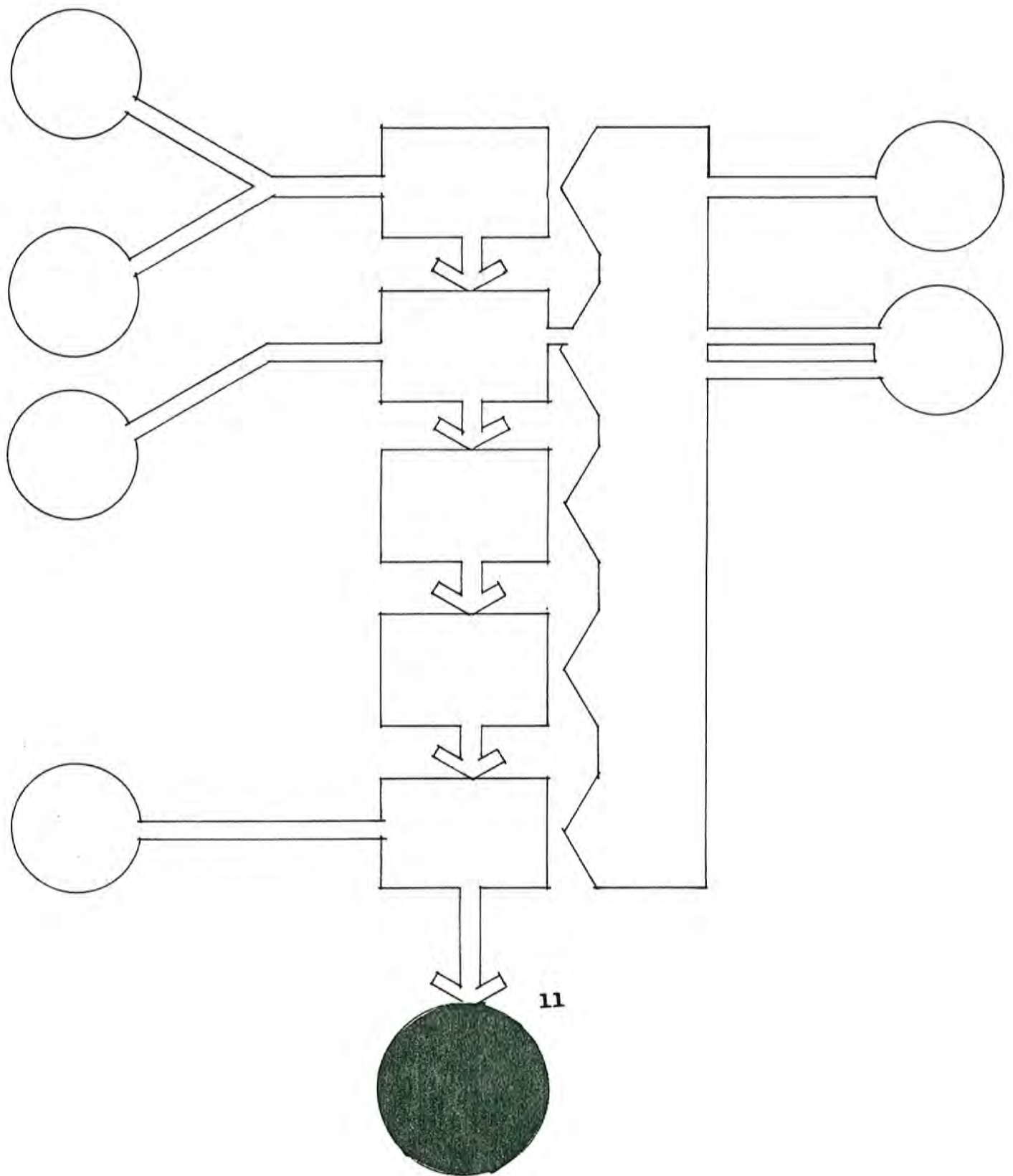
THE MIXTURE IS NOW STORED THE SECONDARY AGING FOR A SHORT PERIOD OF TIME (8).

AFTER FURTHER FILTERING AND CARBONATING THE BEER NOW IS TRANSFERRED TO STORAGE TANKS (8).

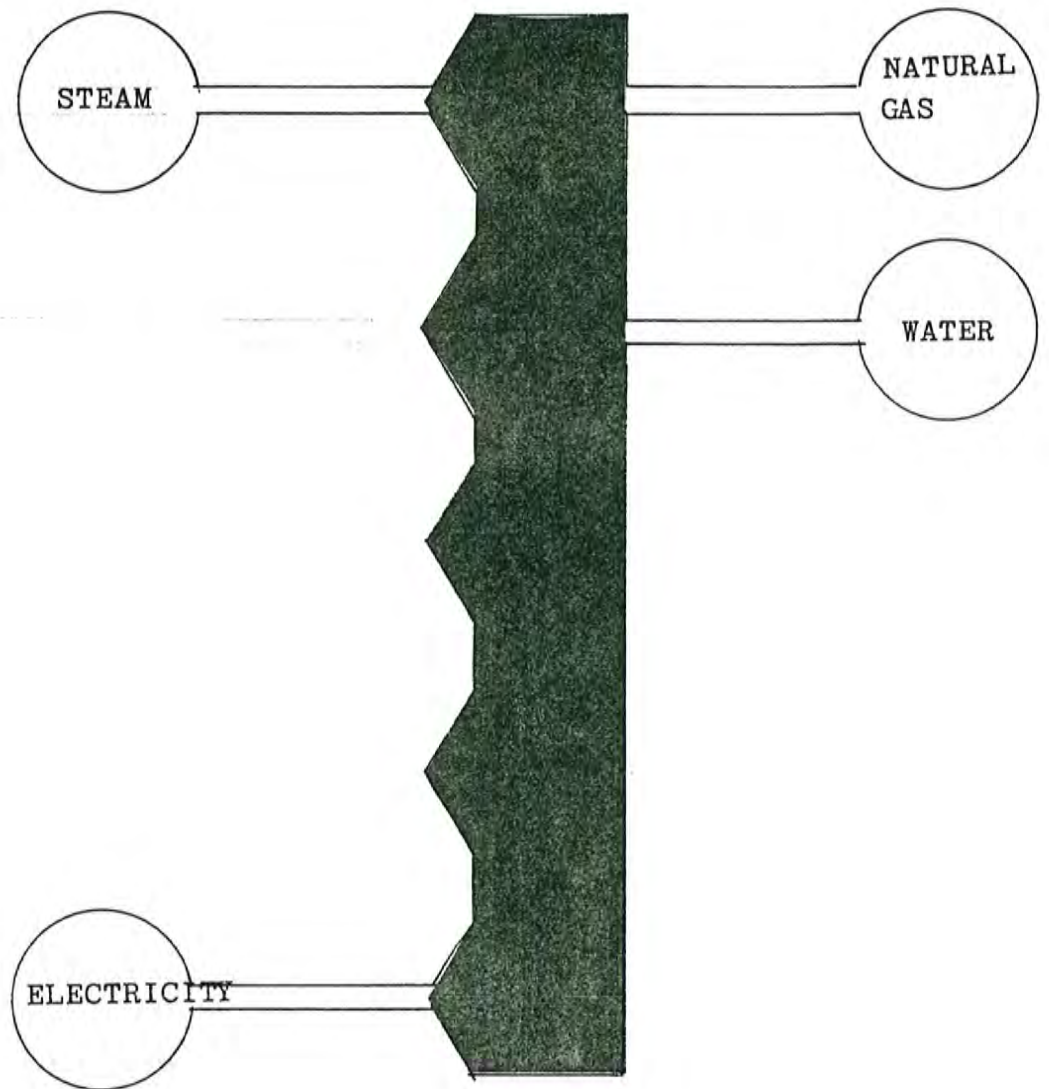


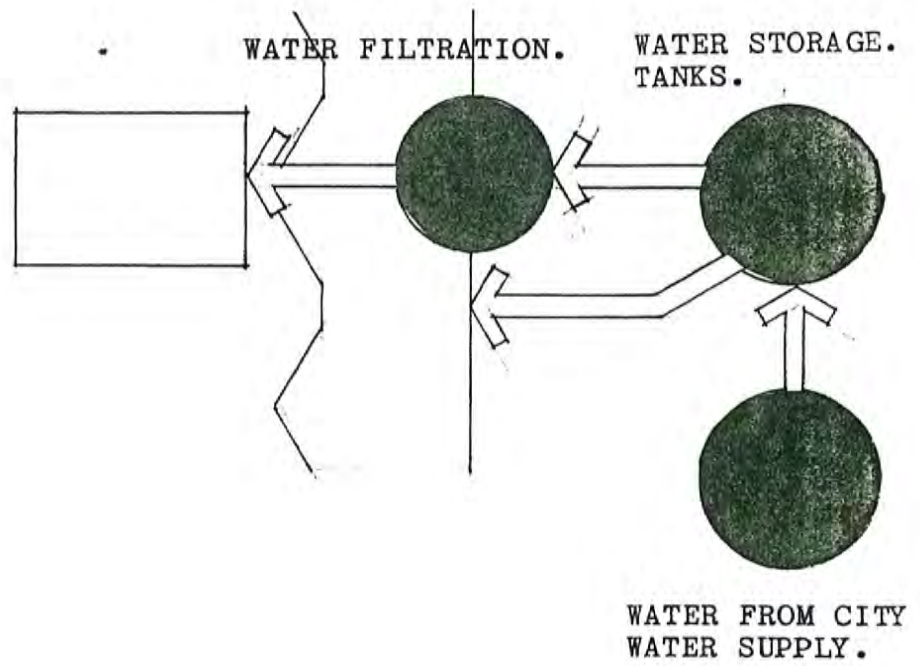
THE BEER IS NOW MOVED TO THE BOTTLING AREA FOR FILLING INTO BOTTLES OR KEGS. (9).

BOTTLES ARE NOW FILLED AND PROCEED TO THE PASTEURIZER AND ON TO THE PACKAGING (10).



CONVEYORS MOVE THE PACKAGED BEER TO THE PALETIZER AND
TO THE STORAGE AREA (10)
THE PALETIZED BEER IS THEN PACKED INTO TRUCKS FOR
DISTRIBUTION.





4.0 PROGRAMME AND CONSTRAINTS.

4.1 Introduction.

In establishing the following programme there were certain constraints placed upon the ultimate design and location of a brewery. As a means of introduction, the following areas are isolated and the specific constraints are listed in note form.

Site

- * The site must have access to a railway spur for delivery of raw materials.
- * Site must have reasonable visibility to the public.
- * Based on the control site, the site must be approx. 20 acres.
- * Site must have access to a good water supply of approx. 15 to 20 Hl per minute.

Building.

- * Basis of design is 550 000 Hl capacity brewery (same size as control brewery).
- * Assume 4 stage process (brewing, fermenting, primary aging, secondary aging.).

For the purposes of reading the architectural programme the following abbreviations apply:

E	Enclosed space.
O	Open space.
1	1 Storey high.
2	2 " "
3	3 " "

Per Capita Consumption of Beer
1977



Per Capita Consumption in Imperial Gallons.

Domestic Beer Sales in Canada
Past 25 Years

<u>Calendar Year</u>	<u>Draught</u> Hectolitres	<u>Packaged</u> Hectolitres	<u>Total</u> Hectolitres
1954	2,144,739.16	6,852,356.28	8,997,095.44
1955	2,195,731.64	7,187,520.35	9,383,251.99
1956	2,166,141.72	7,593,050.83	9,759,192.55
1957	2,192,322.14	7,915,552.03	10,107,874.17
1958	2,152,392.35	7,663,897.97	9,816,290.32
1959	2,252,155.45	8,285,340.71	10,537,496.16
1960	2,212,958.71	8,508,418.62	10,721,377.33
1961	2,238,556.09	8,686,813.88	10,925,368.97
1962	2,342,875.43	9,108,324.69	11,451,200.12
1963	2,431,659.95	9,352,388.06	11,784,048.01
1964	2,660,802.21	9,722,666.58	12,383,468.79
1965	2,712,395.90	9,973,721.70	12,686,117.60
1966	2,879,635.29	10,389,080.63	13,268,715.92
1967	2,850,053.33	10,984,746.42	13,834,799.75
1968	2,754,586.19	11,161,300.56	13,915,886.75
1969	2,883,030.01	11,904,869.32	14,787,899.33
1970	2,833,180.85	12,627,285.55	15,460,466.40
1971	2,889,469.42	13,711,250.83	16,600,720.25
1972	2,729,251.33	14,727,656.88	17,456,908.21
1973	2,613,399.93	16,004,544.18	18,617,944.11
1974	2,415,594.38	16,626,301.74	19,041,896.12
1975	2,312,530.88	17,204,594.99	19,517,125.87
1976	2,136,442.71	17,344,901.59	19,481,344.30
1977	1,970,198.90	17,630,336.98	19,600,535.88
1978	1,649,982.00	17,515,462.00	19,165,444.00

Per Capita Consumption of Beer, Spirits and Wine in Canada
for Past 20 Years

<u>Fiscal Year Ended March 31</u>	<u>Beer Litres</u>	<u>Spirits Litres</u>	<u>Wine Litres</u>
1957	61.16	3.68	1.79
1958	61.22	3.70	1.87
1959(1)	57.40	3.89	2.06
1960	60.95	3.74	2.02
1961	60.03	3.77	2.12
1962	60.28	3.83	2.19
1963	61.64	3.95	2.26
1964	63.37	4.16	2.42
1965(2)	64.62	4.06	2.35
1966	64.76	4.69	2.78
1967	66.90	4.83	2.88
1968	68.13	5.12	3.06
1969(1) (2)	67.88	5.03	3.18
1970	70.83	5.17	3.70
1971	74.64	5.42	4.16
1972	78.58	6.10	4.88
1973	81.75	6.53	5.29
1974	85.18	7.15	5.62
1975	85.92	7.82	5.90
1976	86.99	7.95	6.24
1977	85.09	8.14	6.57

- (1) Consumption figures reflect the effect of the strike in the brewing industry in Ontario.
- (2) Consumption figures reflect the effect of the strike in distribution system for spirits and wine in Quebec.

Source of original data: Statistics Canada, "The Control and Sale of Alcoholic Beverages in Canada".

4.2.4 Data Conclusions

From 4.2.1, it can be seen that Canada and the U.S.A. share much the same position, ranked 12th in the world. The average Canadian consumes more packaged beer than his European counterpart. This steady increase in the consumption of packaged beer (see 4.2.3) indicates a turning away from the taverns where much of the draft is sold. Also, it may well reflect the hotel and tavern's intent to sell more bottled beer than kegged.

From 4.2.2 we see in comparison that the amount of disposable income spent on alcohol is steadily increasing in all areas.

4.3 Financial Data.

4.3.1 Capital costs.

The retrieval of data pertaining to the capital costs for a brewery is an extremely difficult one to carefully quantify. The historical data shows the way in which the industry deals with the individuality of each brewery. In trying to obtain accurate information as to costing it became apparent that in this instance one would have to deal with information gleaned from several sources. In discussions with various Brewmasters it was felt that a cost of \$150.00 to \$200.00 per hectolitre (Hl) was not unreasonable. This seemingly high cost may well be attributed to the degree of sophistication that a brewery has to contend with. Translated into area terms we find the following:

$150 \times 550\,000 = 82\,500\,000 \text{ min.}$

$200 \times 550\,000 = 110\,000\,000 \text{ max}$

now take these estimated costs and divide them by the NET AREA we have:

$82\,500\,000 / 19\,600 = \$4\,200/\text{m}^2 \text{ min.}$

$110\,000\,000 / 19\,600 = \$5\,600/\text{m}^2 \text{ max.}$

It is anticipated that, through the assistance of Labatts and the allied industry that these figures can be refined in stages 7 and 8.

4.3.2 Operational Costs.

Again the difficulty of obtaining specific operating costs are, to this study, premature. The operating costs between Molsons and Labatts here in Edmonton vary immensely. The operating costs on water vary some 15% to 20%. Without the specifics of boiler capacities or a design for that matter a true picture cannot be given. It is suggested that when the schematics are completed an energy audit based on the preliminary capacities will be done.

4.4.1 Power Plant

Space Name	Staff	Space Type	Area m ²
Power and Generating		0/2	700
Maintenance Area	1	E/1	50
Power Plant Manager	1	E/1	20
Locker/Staff Facilities	5	E/1	30
SUB-TOTAL AREA			800

4.4.2 Raw Material Storage

Space Name	Staff	Space Type	Area m ²
Silos		E/3	300
Water Tanks		E/3	150
Filtering System		E/1	100
Spent Grain Area		E/3	50
SUB-TOTAL AREA			600

4.4.3 Brewhouse

Space Name	Staff	Space Type	Area m ²
Brew Room		O/2	600
Hop Blending Room		E/1	30
Control Centre	2	E/1	30
Offices:			
Brew Master	1	E/1	15
Asst. Brew Master	1	E/1	15
Union Office	1	E/1	10
Malt Grinding		E/1	20
Storage		E/1	20
Cleaning Storage		E/1	20
SUB-TOTAL AREA			750

4.4.4 Fermentation and Aging

Space Name	Staff	Space Type	Area m ²
Fermenting Room		O/1	1100
Yeast Room		E/1	100
Primary Aging Room		O/1	1500
Secondary Aging Room		O/1	1500
Fan Room (3 reg.)		E/1 (Total)	300
Maintenance Room		E/1	100
Staff Washrooms	2	E/1	10
SUB-TOTAL AREA			4700

4.4.5 Bottlehouse

Space Name	Staff	Space Type	Area m ²
Bottleshop		O/2	4000
Bottling Storage		O/1	700
Uncasing Area		O/1	300
Keg Washing		O/1	300
Kegging Room		O/1	200
Caustic Handling Room		E/1	250
Staff Washrooms and Lockers	25		250
SUB-TOTAL AREA			6000

4.4.6 Warehousing

Space Name	Staff	Space Type	Area m²
Warehouse		O/2	2600
Covered Dock		O/2	700
Rail Dock		O/2	300
Car Storage		E/1	250
Staff Washrooms	4		150
SUB-TOTAL AREA			4000

4.4.7 Central Maintenance and Plant Services

Space Name	Staff	Space Type	Area m²
Maintenance	15	E/1	250
Staff Locker/ Lunch and Washrooms		E/1	600
Quality Control	3	E/1	250
SUB-TOTAL AREA			1100

4.4.8 Administration and Public Relations

Space Name	Staff	Space Type	Area m²
Administration		O/E/1	800
Reception	1	O	100
Hospitality Room		E/1	500
Washrooms	25	E/1	250
SUB-TOTAL AREA			1650

4.4.9 Retail Beer Outlet (ALCB)

Space Name	Staff	Space Type	Area m²
Beer Sales			125
Offices			125
Washrooms			30
Mechanical Room			20
SUB-TOTAL AREA			300

4.4.10 Summary

Space Name	Staff	Space Type	Area m ²
1. Power Plant	6		800
2. Raw Material Storage			600
3. Brew House	6		750
4. Fermentation and Aging Room	2		4700
5. Bottlehouse	25		6000
6. Warehousing	4		4000
7. Central Maintenance & Plant Services	18		1100
8. Administration & Public Relations	25		1650
9. Retail Beer Outlet (ALCB)	2		(300)
NET AREA			19,600

Note: Summary area is assuming a single storey facility, ie. maximum condition is 19,600m².

The area allotted for the Bottlehouse is assuming that at this juncture the brewery will be exclusively a bottle opertation. The possibility of going to a canning line does exist and will be adressed in stages 7 and 8.

4.5 Preliminary Building Code Analysis.

The following preliminary analysis is brief in nature as specific information such as final area, construction materials, building height, etc., are at this stage unqualified. The object of this preliminary analysis is to pursue certain options given in the governing code, the Alberta Building Code 1981.

This preliminary analysis outlines, at this stage items which determine the possible areas of concern.

Assuming that the building faces one street, then:

1 storey max. area 6 000m².

Group F Division 1 up to 4 storeys, sprinklered.

2 storeys max. area 1 200m². (2 400m² if sprinklered)

Group F Division 1 up to 4 storeys, unsprinklered.

3 storeys max. area 2.000m².

Group F Division 1 up to 4 storeys, sprinklered.

4 storeys max. area 1 500m².

Group F Division 1 up to 4 storeys, sprinklered.

3.2.2.40.(2) The building shall be of noncombustible material.

(a) floor assemblies above basements and cellars shall be a 3 hour fire separation.

(e) roof assemblies shall have a 1.5 hour fire resistance rating.

3.1.8.1.(4) 4 hour firewall required.

3.1.8.1.(7) Firewall to extend 900mm above roof.

3.2.5.4.(1) Stand pipe and hose system is required where:
Building is greater than 3 storeys high or 14m.
Building is greater than 3 000m².

4.7.2 Analysis - Site 1

Nisku Industrial Park, Nisku, Alberta

Nisku Industrial park is approximately 20 km south of Edmonton, just adjacent to Highway 2, which carries 20% of Alberta traffic. It shares the unenviable right of being Alberta's geographic popular centre. All areas are serviced by water from the local supply though lacking a sewage treatment and a sewer system. A brewery would have to have a small sewage treatment system comprising a series of interceptors.

In discussions with Mr. Ray Garstad of Sparrow Realty Ltd. it was discovered that they would encourage any density of development and that some buildings and industrial plant are quite large.

This site is specifically chosen to pursue a vertical Brewery where the symbolism is very evident if approached by car, train or aircraft.

The current site anticipated is 19.54 acres, though at this time it is felt that a study of using one of the lots at 11.14 acres may be worthwhile pursuing. The general cost of the land is approximately \$125,000.00 per acre.

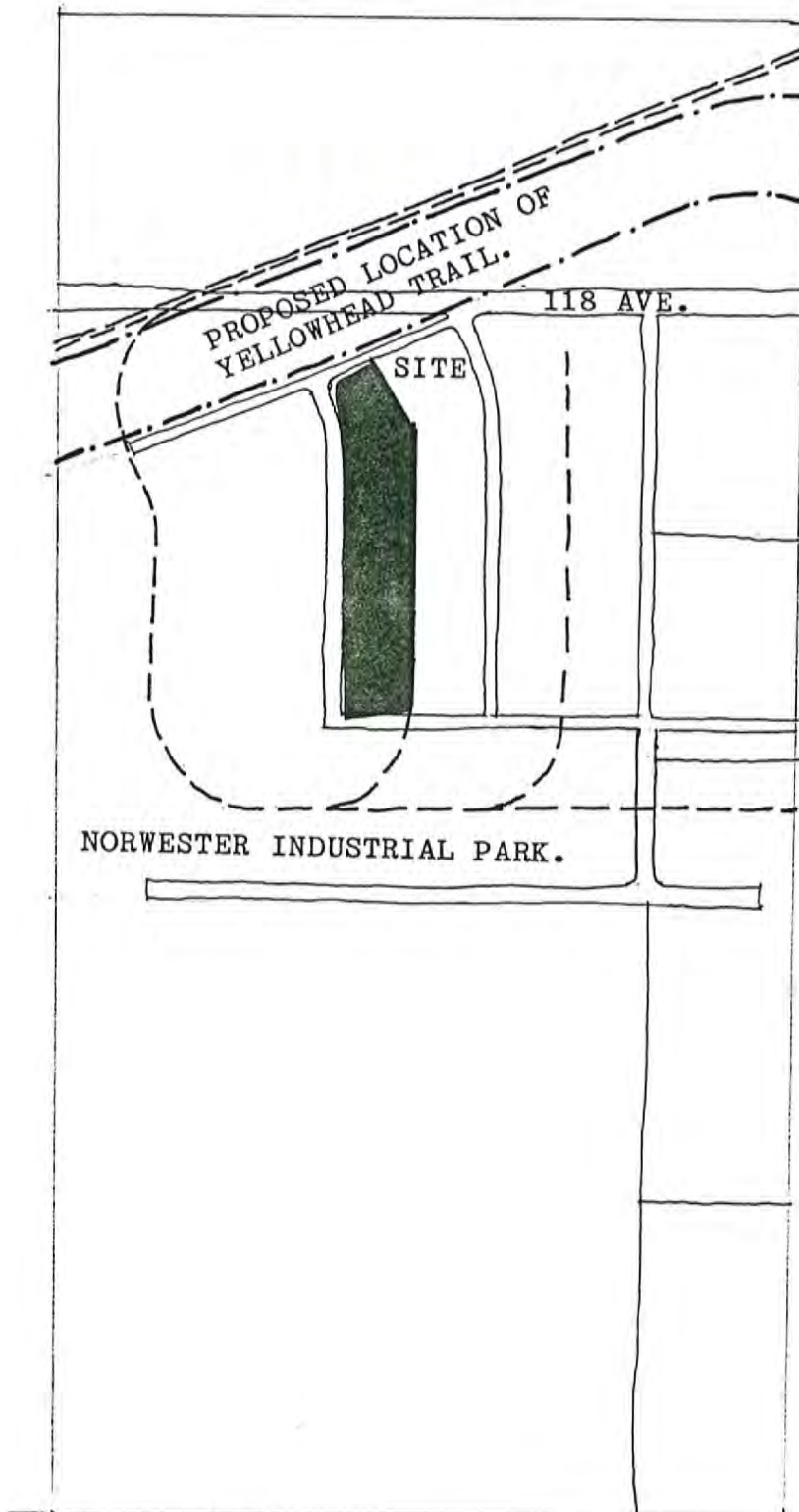
4.7.3 Analysis - Site 2

Yellowhead Trail (West)

The site along the Yellowhead Trail (West) is in the Norwester Park presently zoned IM, which could govern a brewery. The site is south of 118 Avenue and west of 170th Street. The west end of Edmonton has enjoyed a phenomenal growth rate and is being built-up at a steady pace. The proximity of the Yellowhead Trail will give a Brewery a strong and positive visibility. The zoning regulation that prohibits developments above 18m allows an opportunity to pursue a linear horizontal building, low in scale - perhaps only 1 or 2 storeys high.

Discussions with Mr. R. Young of Centurion Realty place this land at approximately \$150,000.00 per acre with an 18 acre parcel currently available.

NORTH



EDMONTON

NORTH



CALGARY

5.0 PRELIMINARY ANALYSIS.

5.1 Introduction

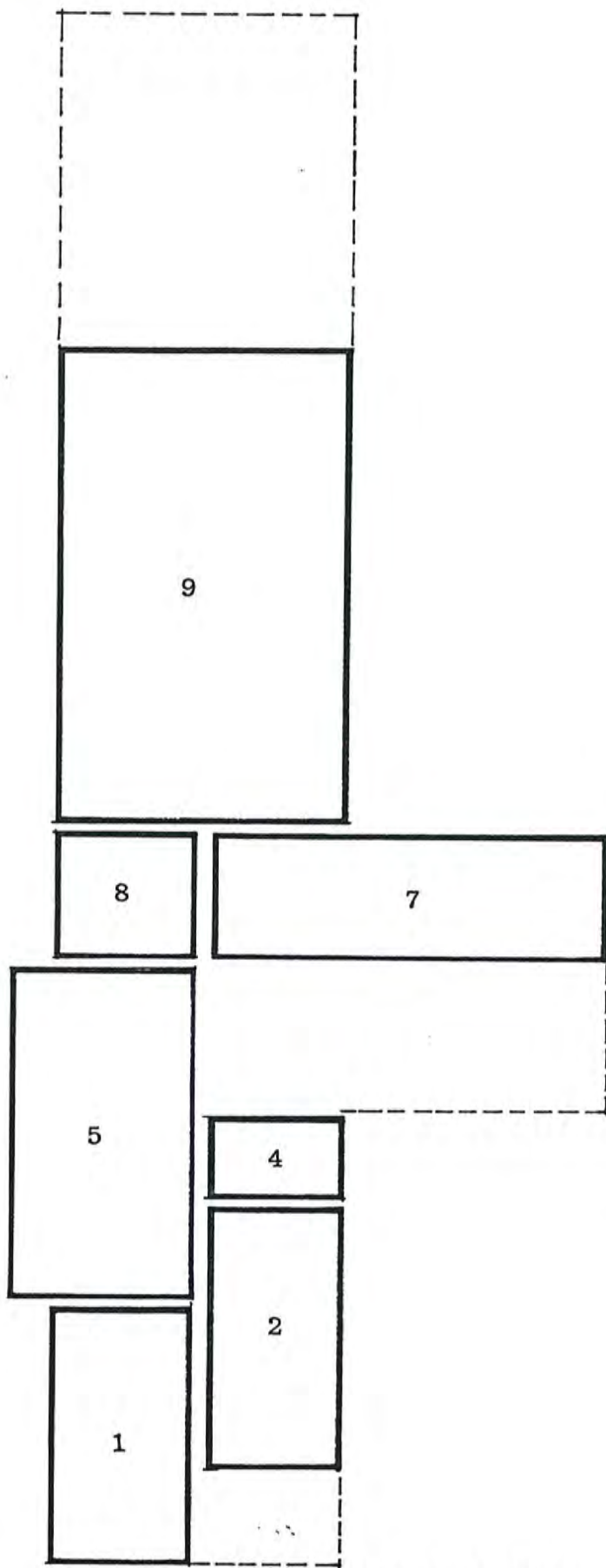
The following conceptual possibilities are intended as general possible arrangements of the various processes outlined in Chapter 3. The areas given in Chapter 4 are approximated (+10%) on the arrangements.

It should be understood that at this time these conceptual possibilities do not reflect a final arrangement and in Stage 7, 2 schemes in "hard edged bubble diagram" form will be pursued until some of the questions mitigated in previous chapters are answered.

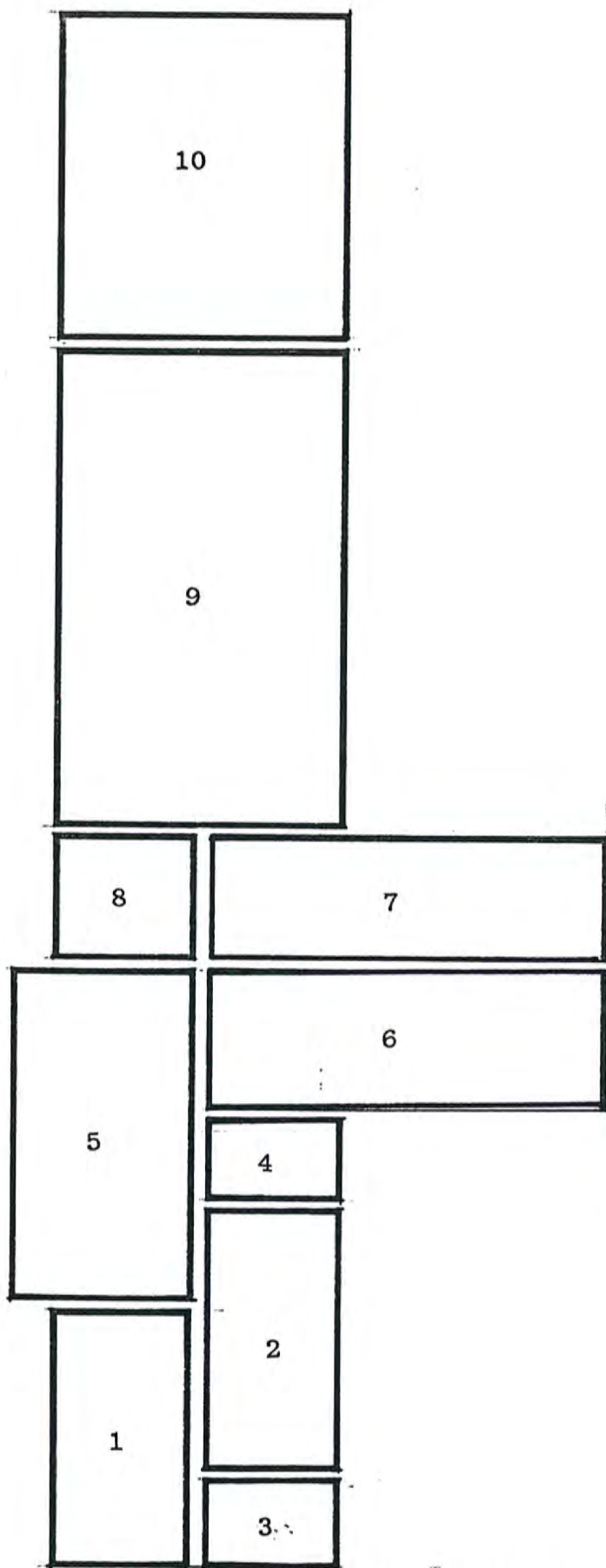
5.2 Summary of Data

The summary sheet 4.4.10 will serve as a guide in the analysis of the conceptual possibilities. For information the numbers which appear in the various boxes are keyed as follows:

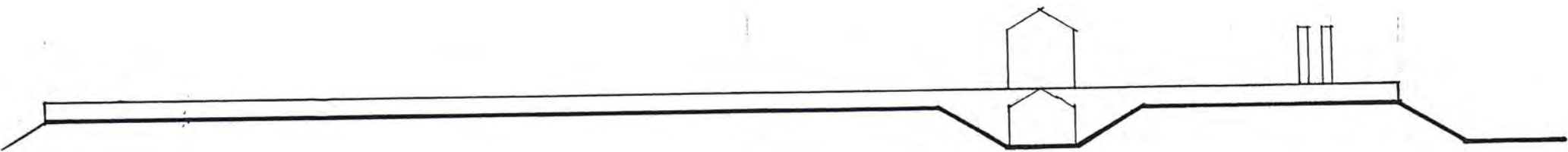
1. Power Plant.
2. Brewhouse
3. Brewhouse Offices
4. Raw Material Storage
5. Administration
6. Fermentation and Aging
7. Fermentation and Aging
8. Maintenance
9. Bottleshop
10. Warehouse



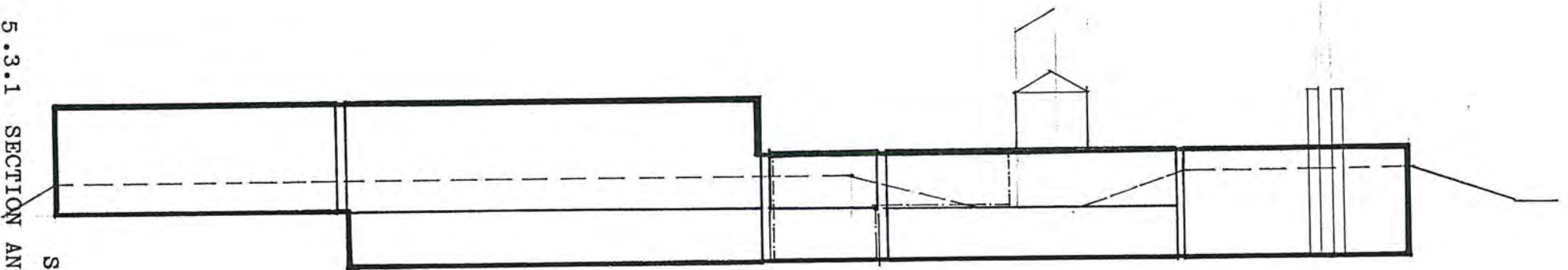
SCALE 1:1000.



SCALE 1:1000.

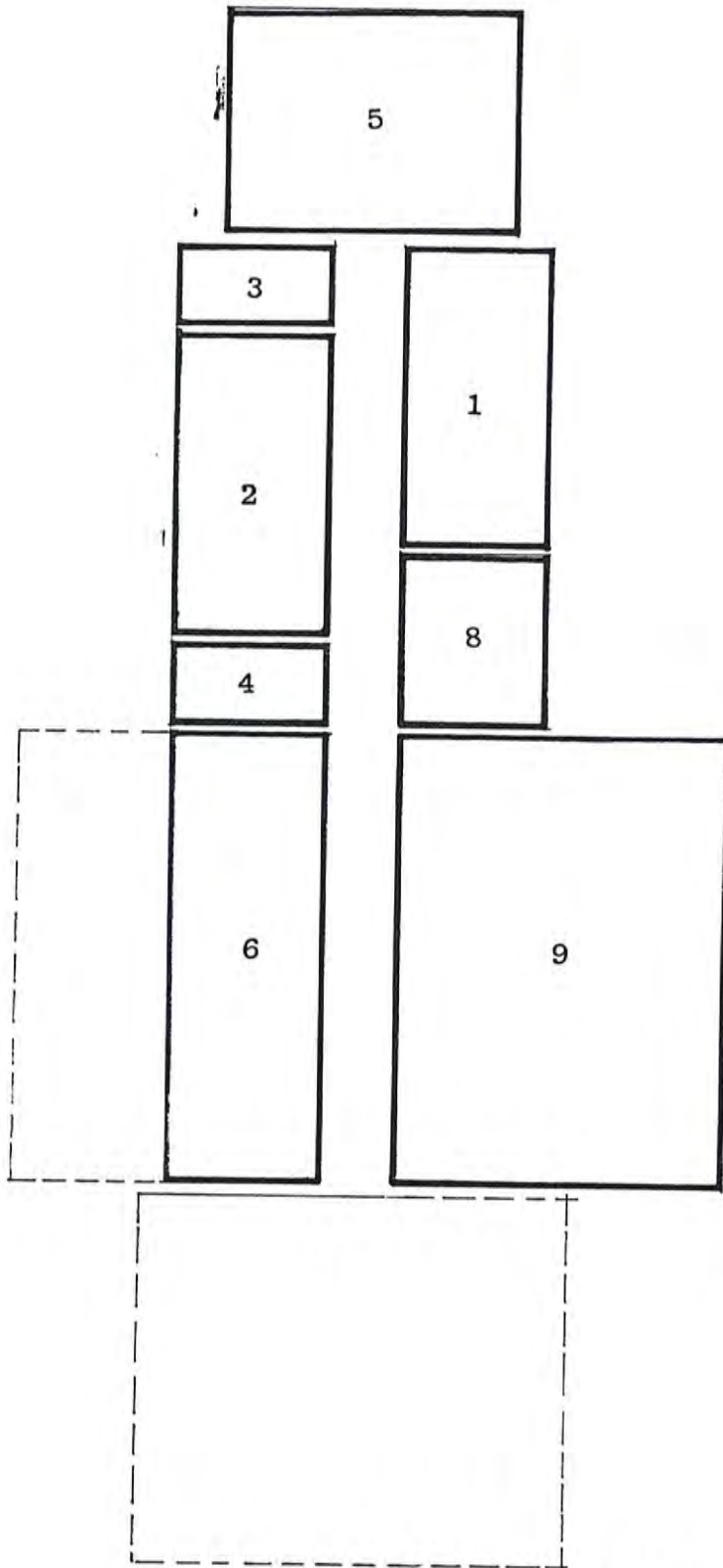


ELEVATION

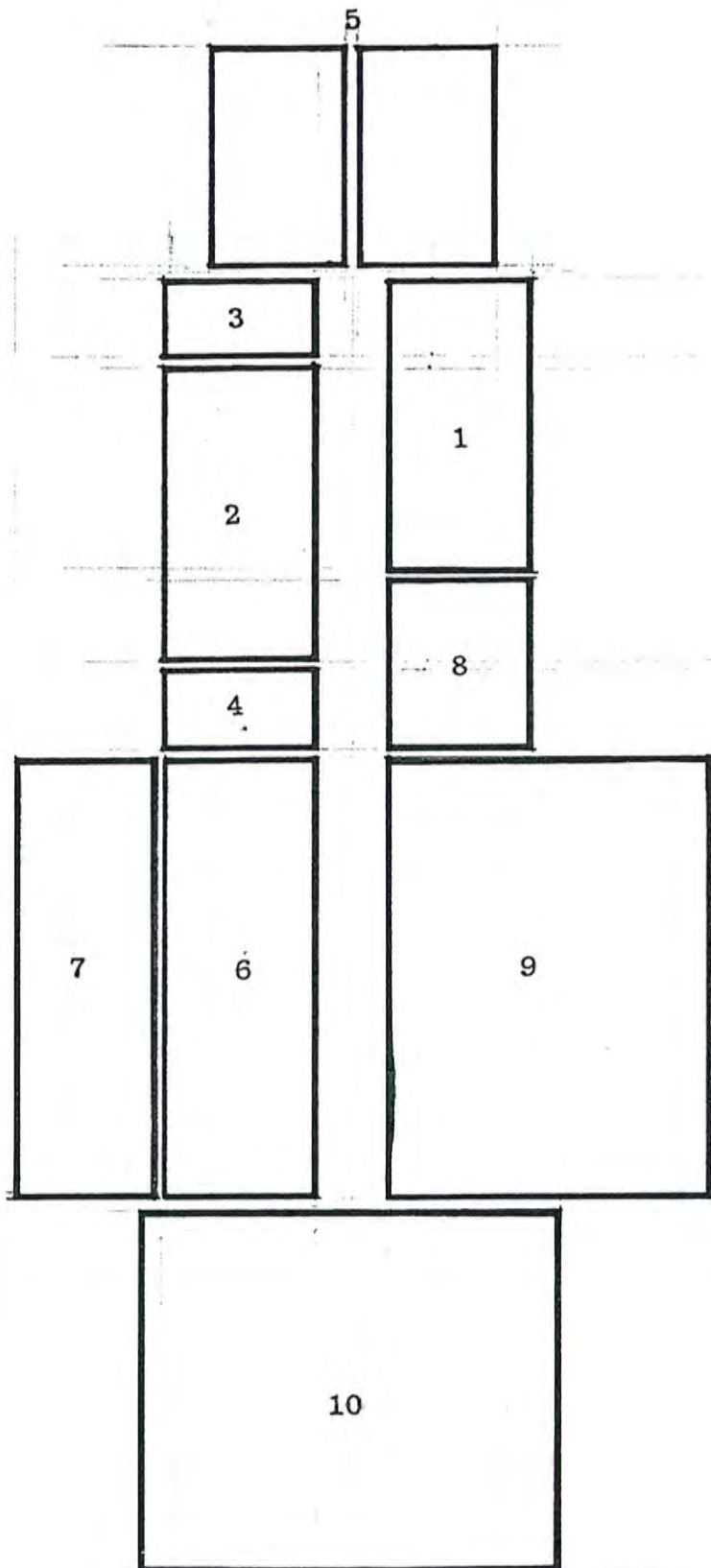


SECTION

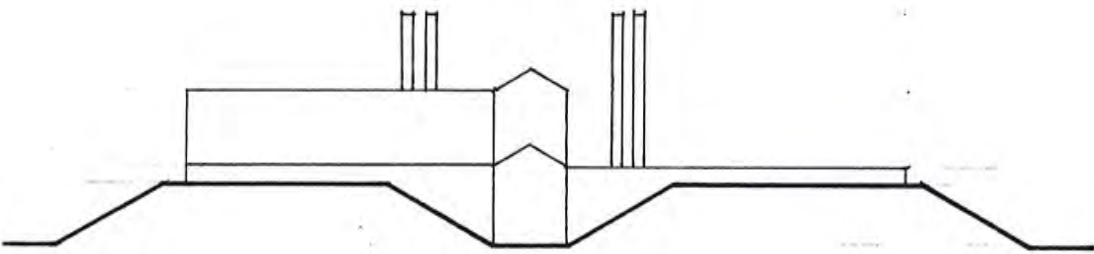
5.3.1 SECTION AND ELEVATION.
SCALE 1:1000.



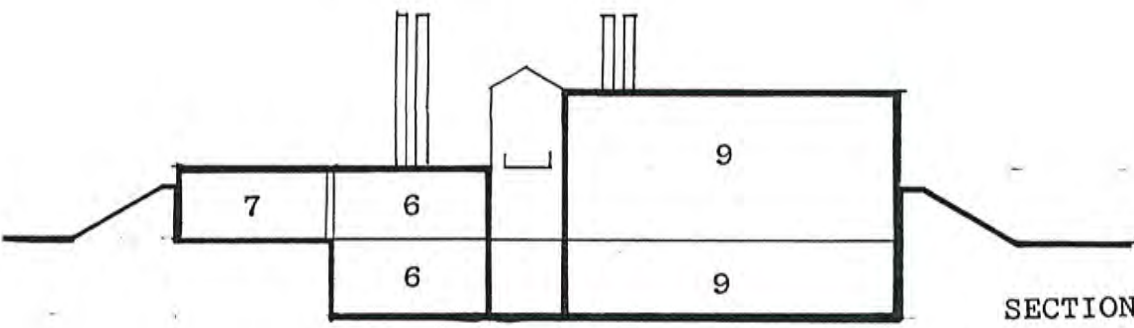
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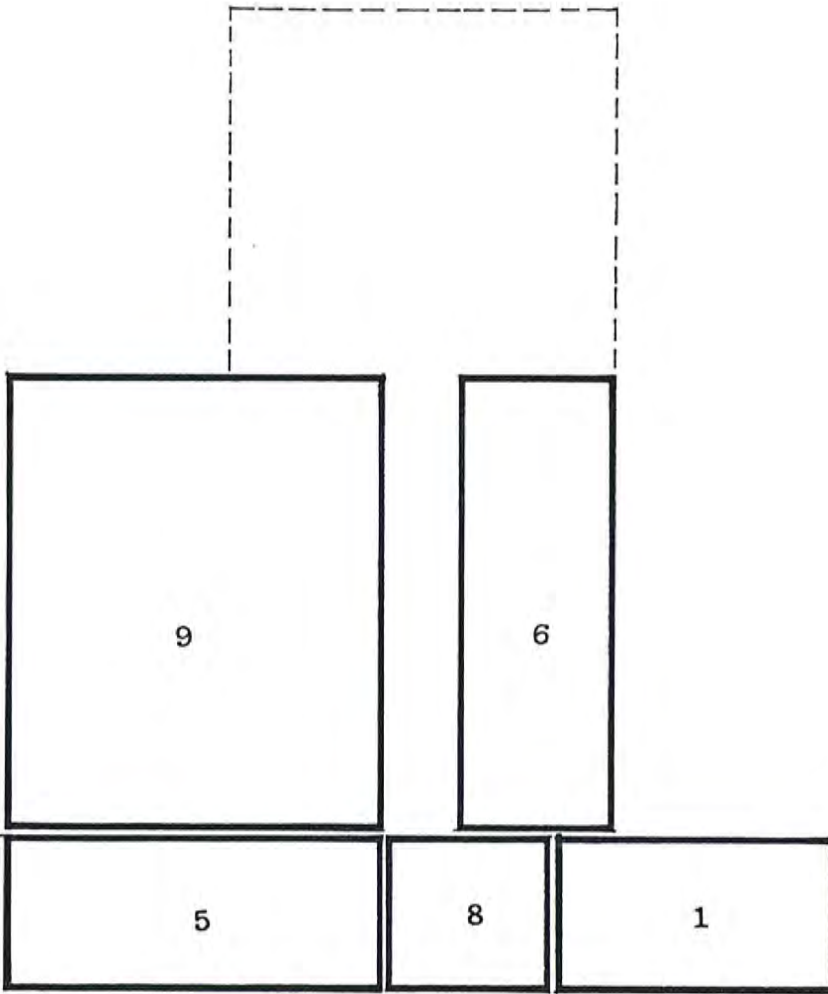


ELEVATION

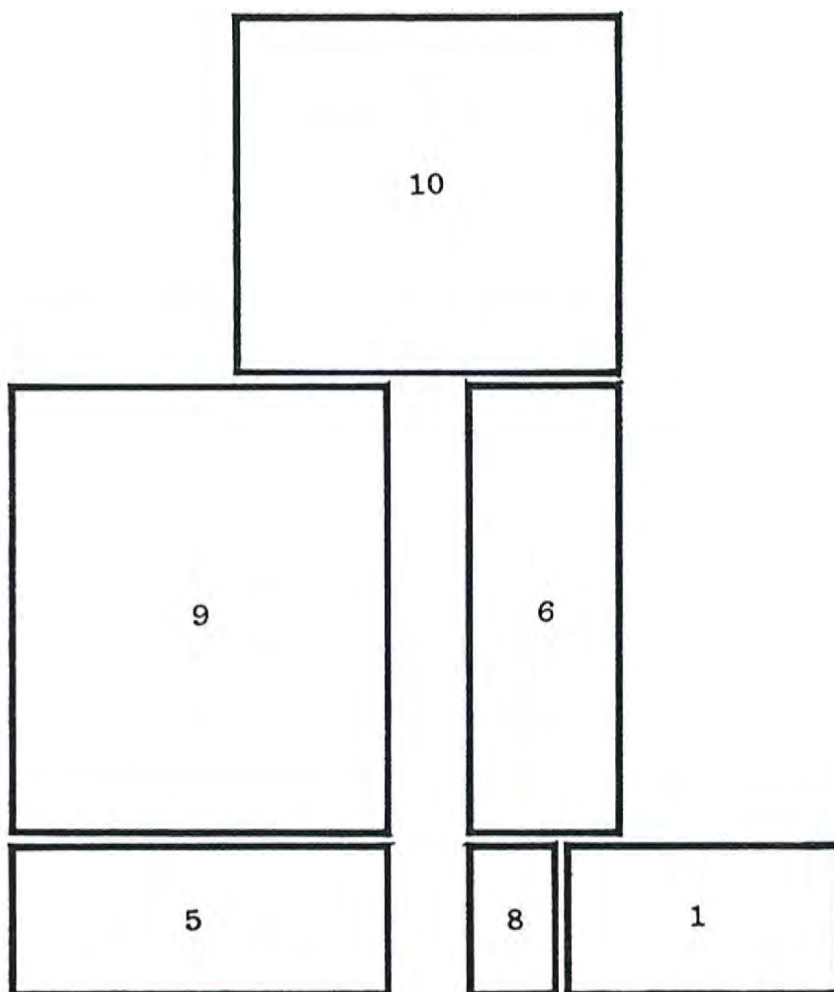


SECTION

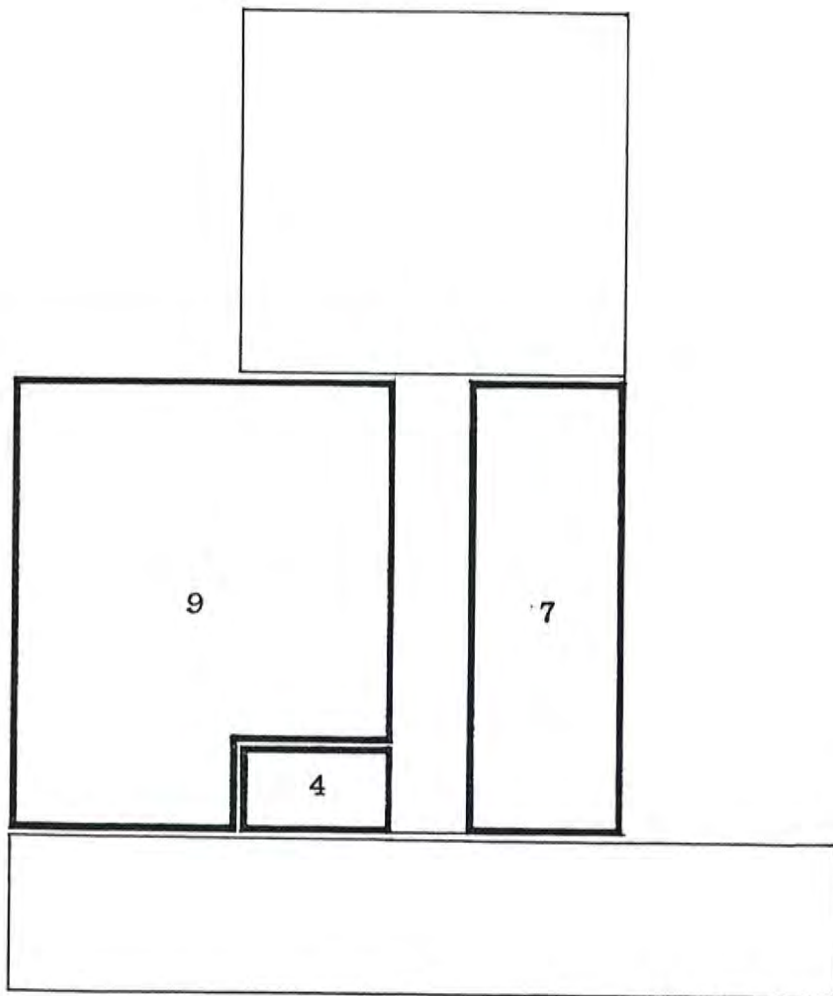
SCALE 1:1000



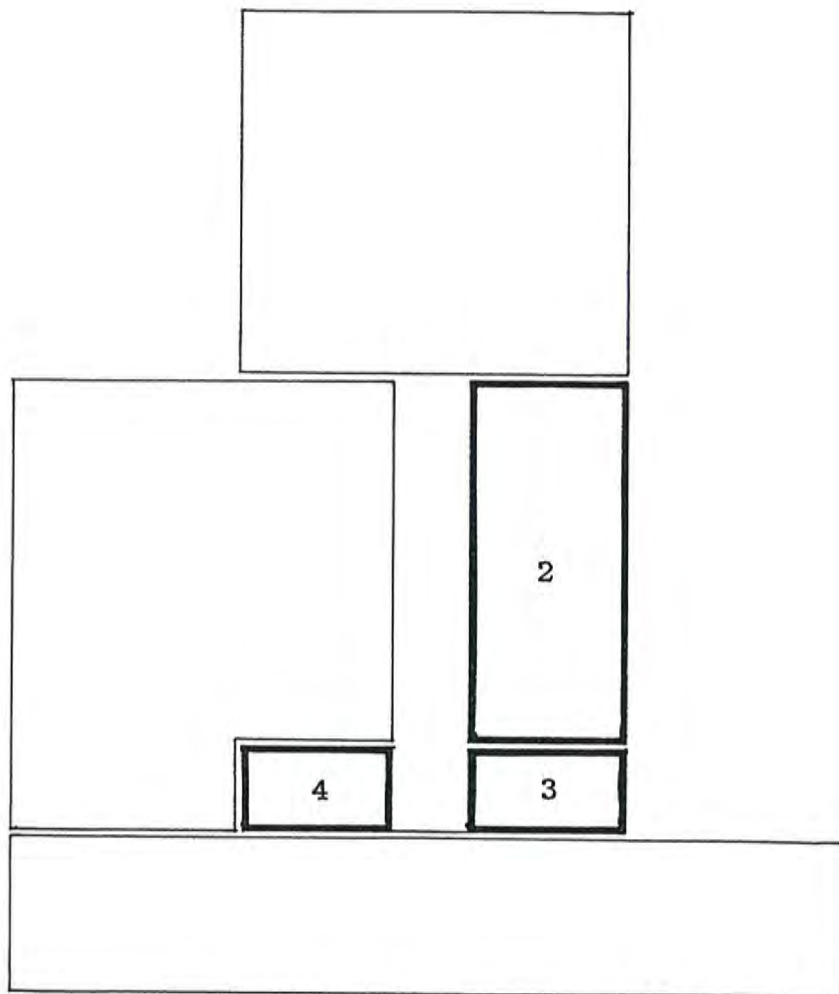
SCALE 1:1000.



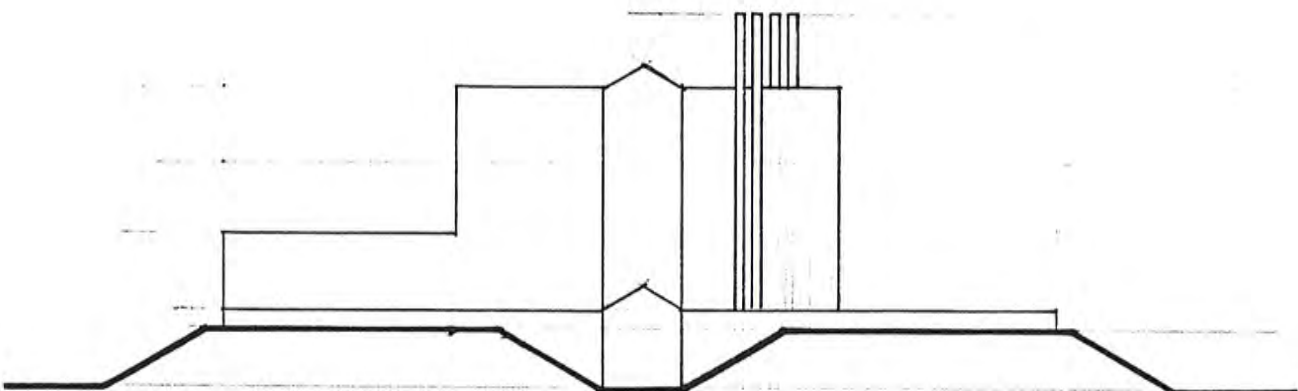
SCALE 1:1000.



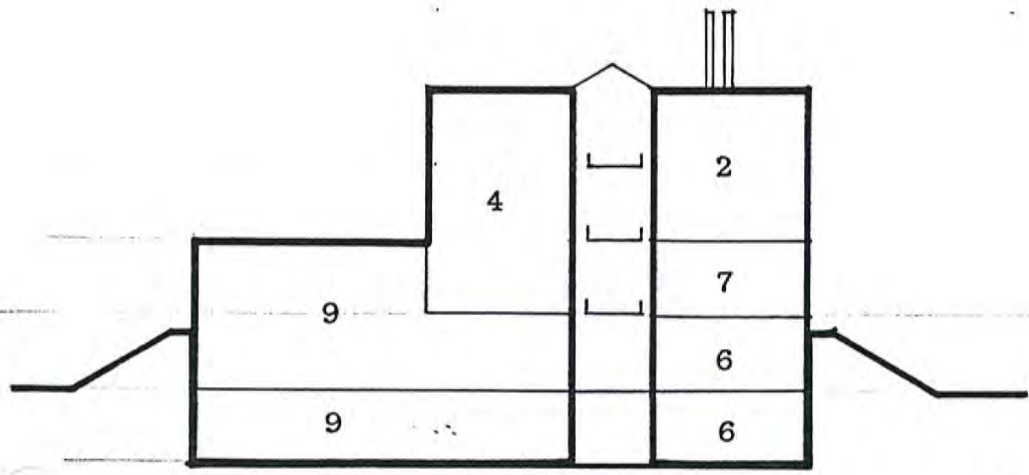
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.SCALE 1:1000.



ELEVATION



SECTION
SCALE 1:1000.

5.4 Conclusions

In concluding this dissertation, it is important not only to arrive at a conclusion but also to arrive at the turning point en route to a final solution. The importance of research has a two fold effect. It allows the designer/architect to reach into the past and future to dream of the potential.

At the beginning of this thesis, it was not apparent the depth Brewing has. Apart from its obvious characteristics of brewing beer, it has a hidden, latent meaning - its place in society not only here in Canada but across the world where the process is still much the same.

Yet each brewery is different - a compilation of its owners and brewmasters. In all the building types that have been put forward, each one is a statement in itself - it is this essence of the built form that the writer hopes to achieve.

It is therefore important to pursue two schemes as each are viable for their point in time; being the present and, hopefully, the future.

6.0 DESIGN DEVELOPMENT

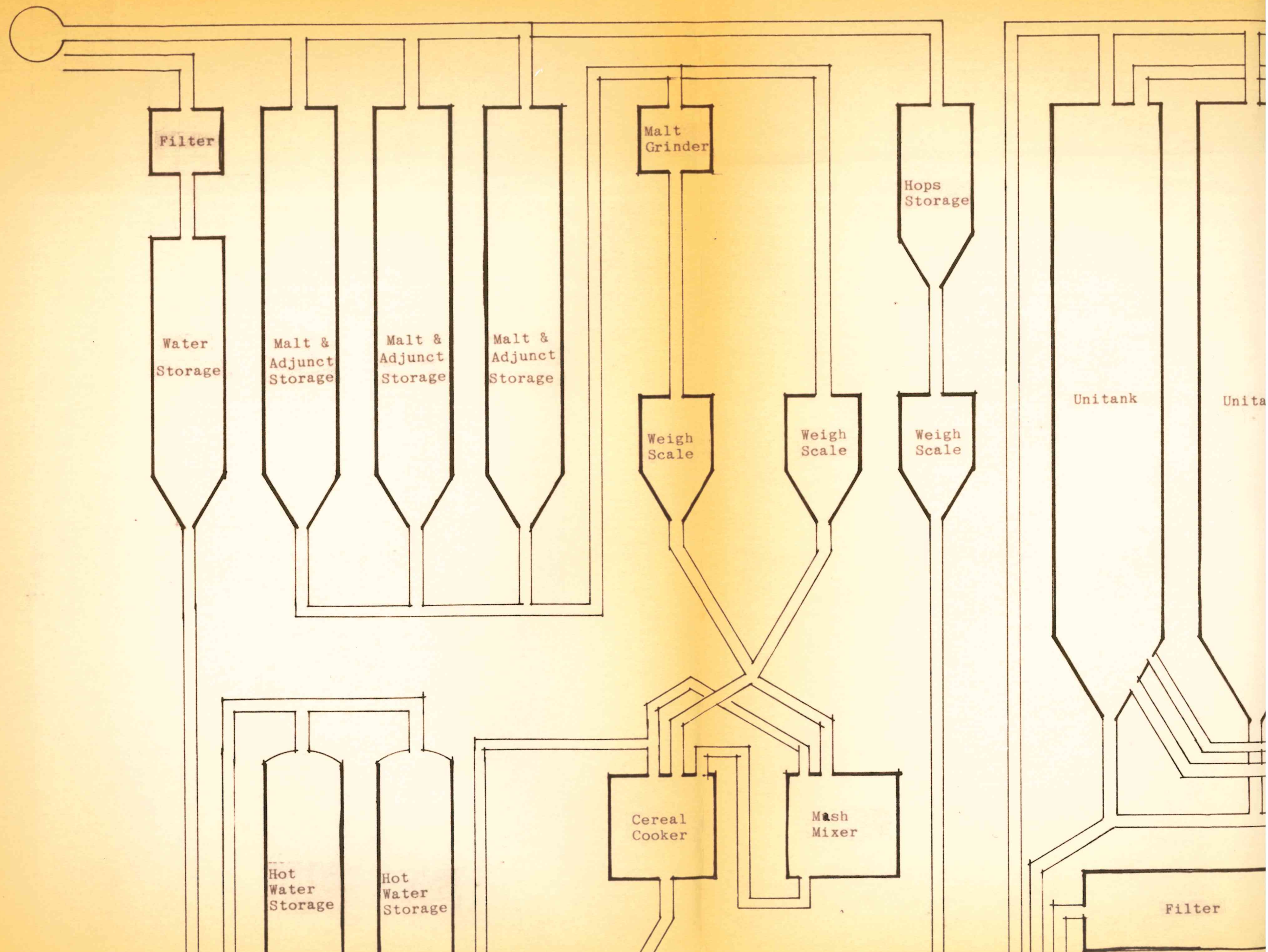
6.1 Conceptual Brewing Process

The following sheets summarize the process which will be further refined during the design development of the Brewery infrastructure and building envelope.

For the purpose of this section, the process has been analyzed in four main areas:

1. Raw Material Storage and Preparation.
2. Brewhouse
3. Fermentation and Aging
4. Packaging.

The processes contained herein do not reflect certain inherent processes necessary for the functioning of the brewery. In light of this brewery being visible to the public the main process points are of relevancy. It is anticipated that items such as caustic cleaning system, steam tracing, etc. will be developed as secondary processes throughout (but not neglected) the design development. It is apparent that a certain heirarchy of space is obvious and the following overview will address that item.



A schematic diagram of a CO2 storage system. It features three vertical rectangular tanks at the top, each with a trapezoidal bottom section. The leftmost and middle tanks are labeled 'Unitank'. The rightmost tank is labeled 'CO2 storage'. Below these tanks is a horizontal network of pipes. At the bottom of the diagram is a large rectangular tank labeled 'Surge Tank'. Lines connect the bottom of the three unit tanks to the pipe network, which then leads to the surge tank. The diagram is drawn with simple black lines on a light-colored background.

Unitank

Unitank

CO2
storage

Surge Tank

Make Up
Heat

Spent
Grain

Lauter
Tub

Brew
Receiver

Brew
Kettle

Heat
Exchanger

Hot
Wort
Tank

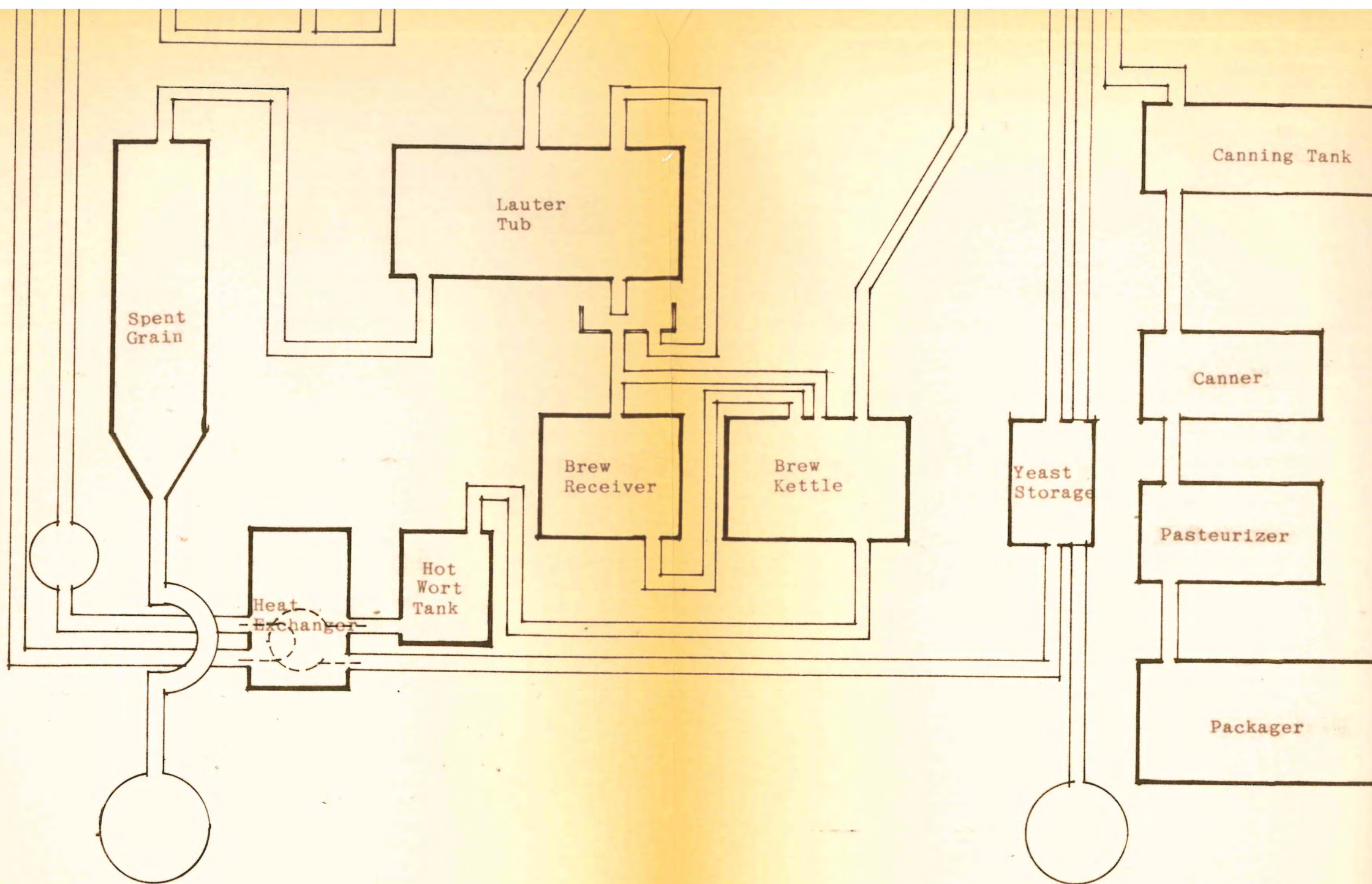
Yeast
Storage

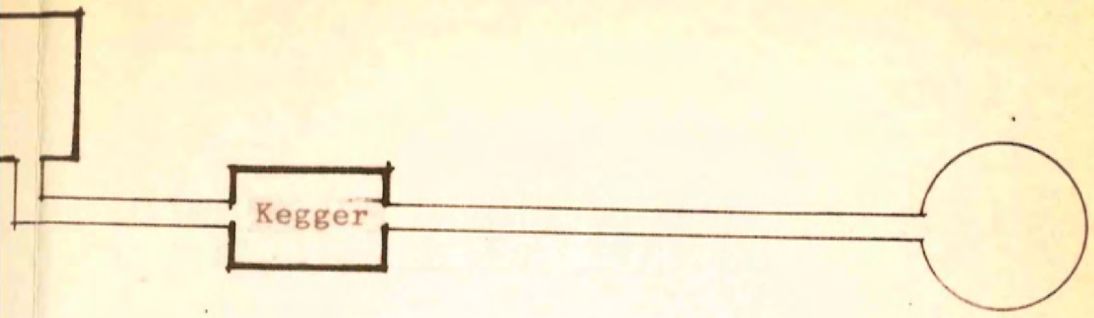
Canner

Pasteurizer

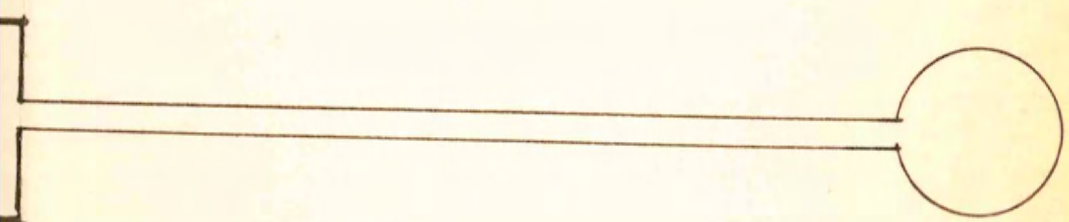
Packager

Canning Tank

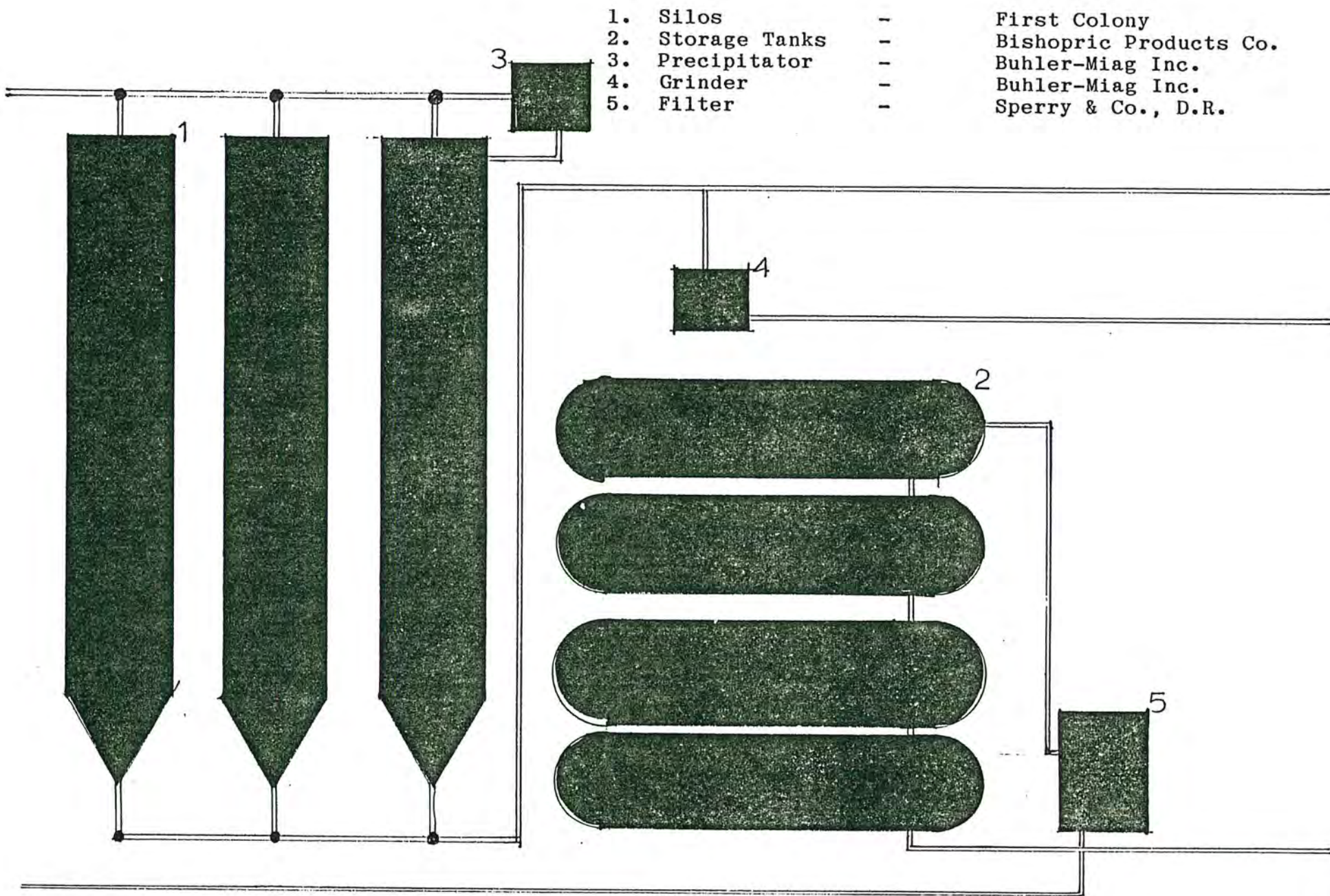




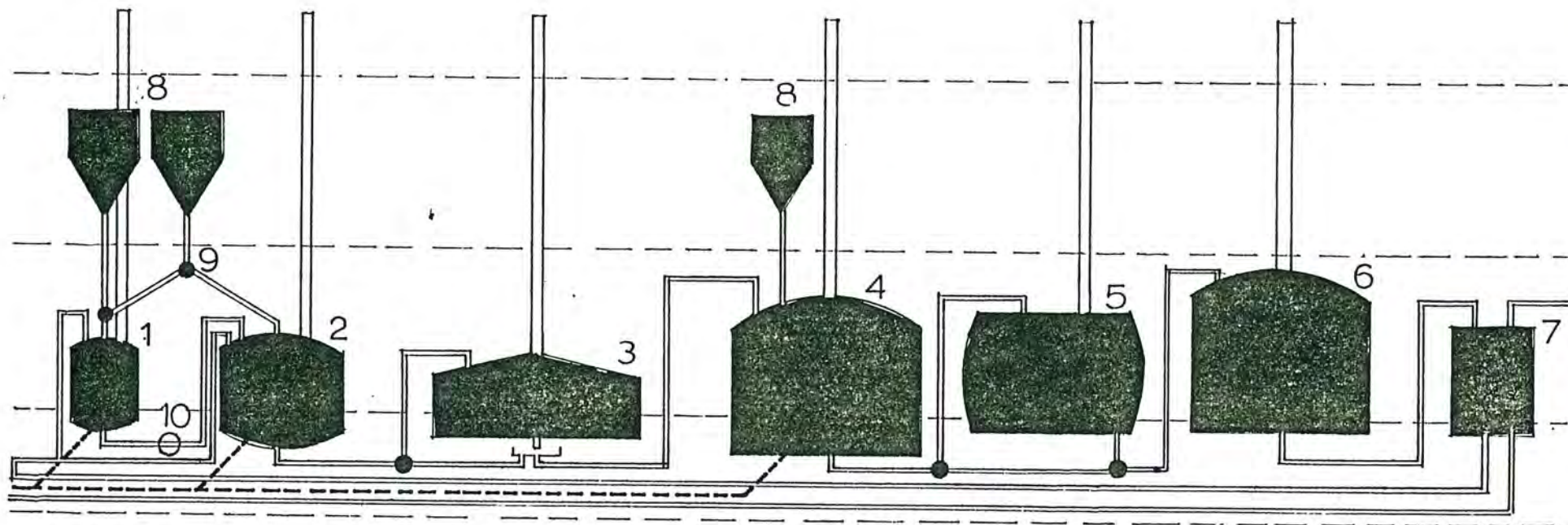
Kegger



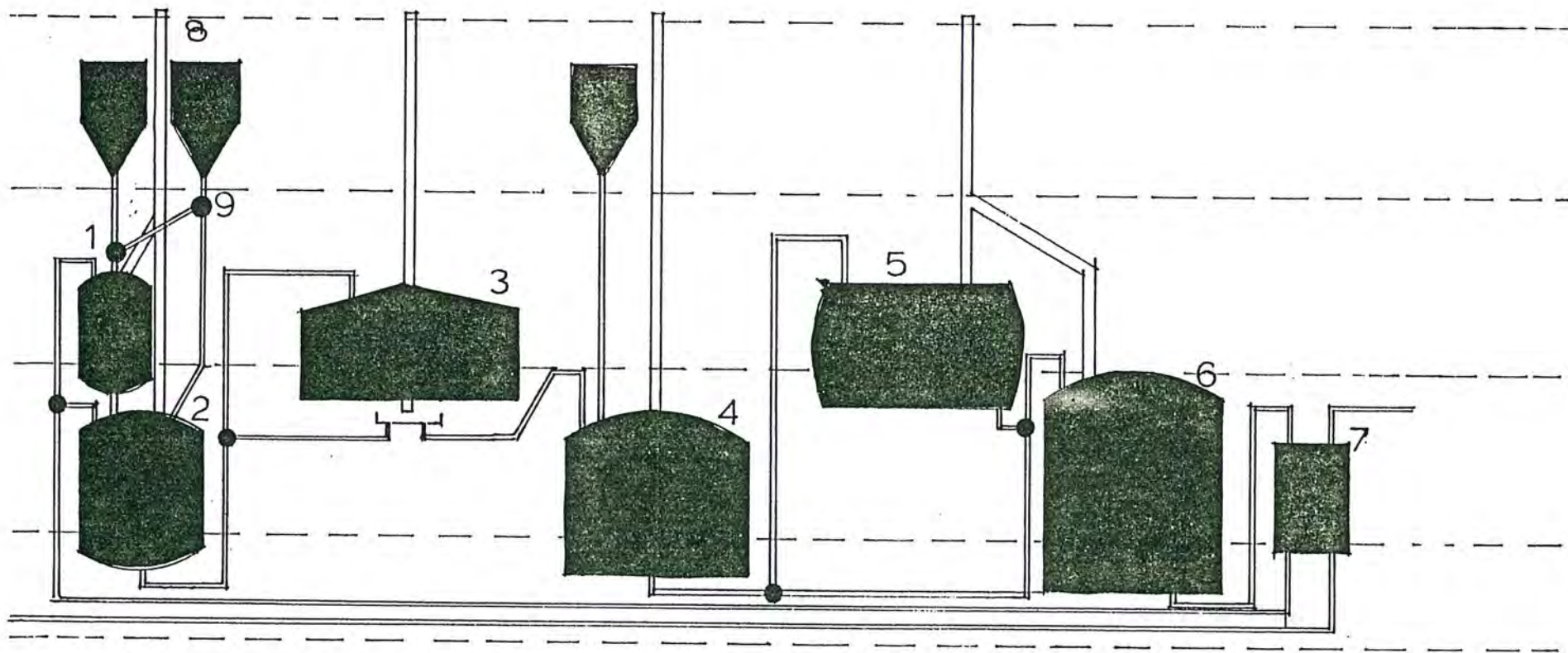
6.1.1 Overview



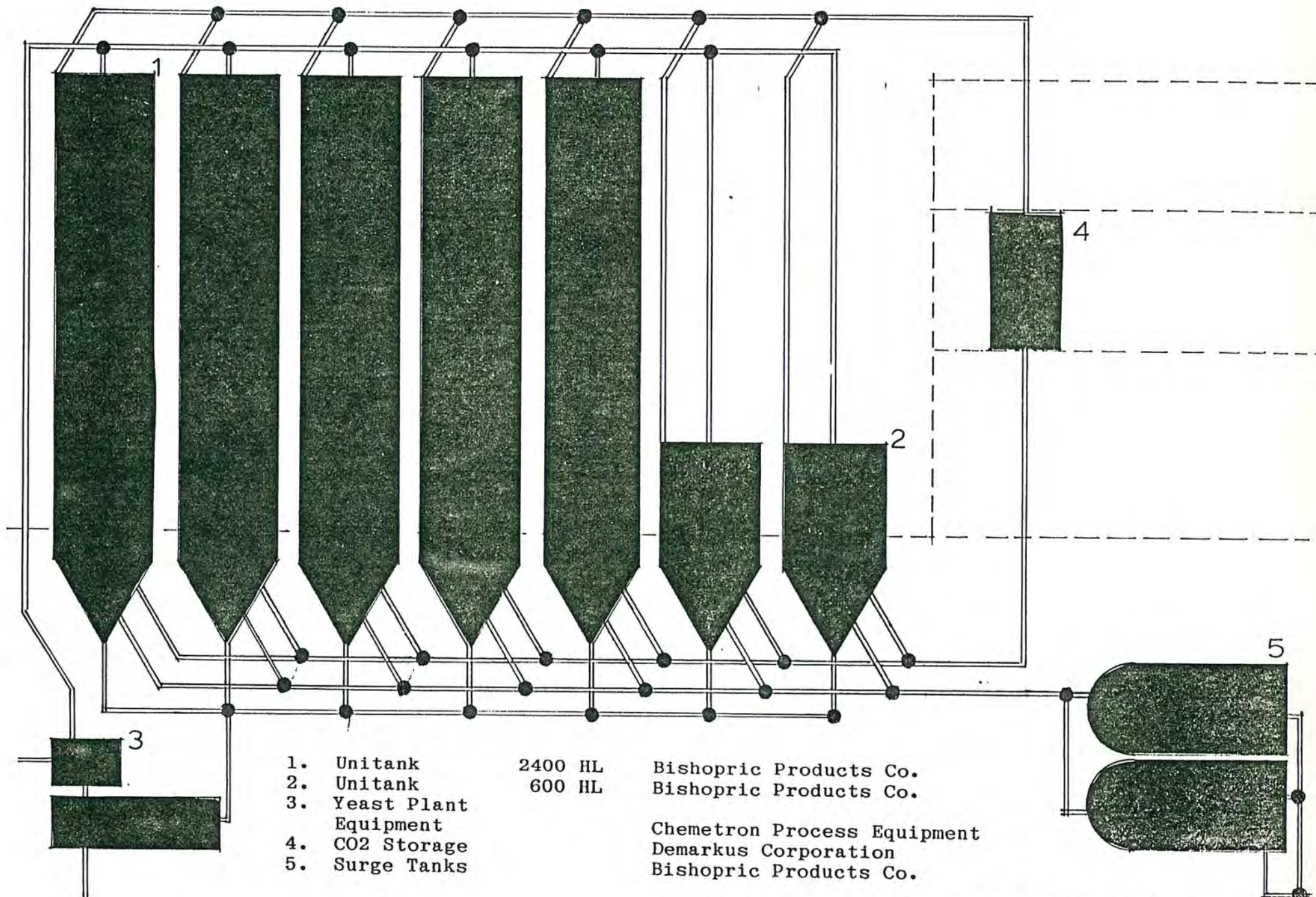
6.1.2 Raw Material Storage and Preparation

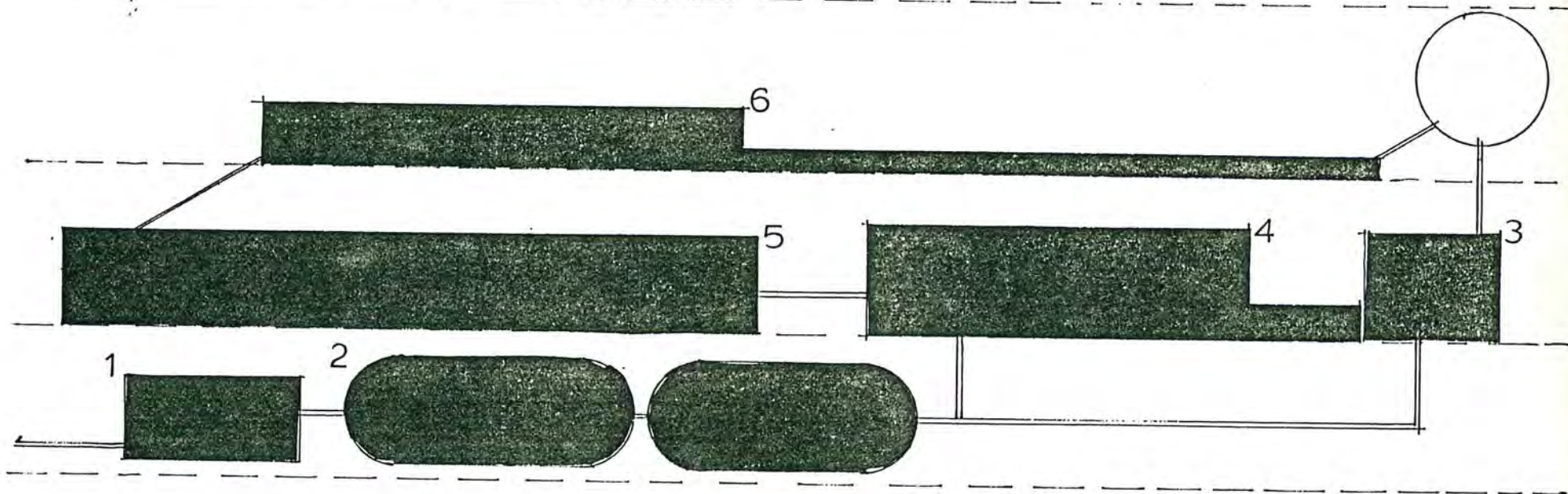


1. Cereal Cooker	50 HL	Pfaudler Co., Rochester
2. Mash Mixer	150 HL	Pfaudler Co.
3. Lauter Tub	150 HL	Pfaudler Co.
4. Brew Kettle	330 HL	Pfaudler Co.
5. Brew Receiver	330 HL	Bishopric Products Co.
6. Wort Receiver	330 HL	Pfaudler Co.
7. Heat Exchanger	330 HL	Pfaudler Co.
8. Weigh Scales	-	Howe-Richardson Co.
9. Control Valves	-	Bishopric Products Co.
10. Pumps	-	Goulds Pumps Ltd.



6.1.3b Brewhouse (Option b)





1. Filter (Beer)
2. Canning Tanks
3. Kegging Equipment
4. ((Package) Canning
5. Pasteurizer
6. Packager

Sperry & Co.
 Bishopric Products Co.
 Draught Systems Inc.
 Angelus Sanitary Can
 Machine Co. Ltd.
 Pfaudler Co. Inc.
 Barry Wehmiller Co.

6.2. Design Solution.

6.2.1. Introduction.

To recap, the major objectives stated in 1.1. were as follows:

1. The successful integration of a specific process into a building form.
2. Creation of a Place of Work that is pleasant environment within a Place of Products.
3. To understand the evolution of a building type as it relates to a specific process.
4. To pursue energy efficiency in an industrial building.

It is the conviction of the author that these objectives have been met and a general discussion of this statement is presented as follows:

6.2.2 Objective #1.

For a process to be successfully integrated into a building form one must first illustrate a broad understanding of the process.

From several workshop sessions with Mr. Bill White of Labatts, a sound understanding of the process was achieved. With confidence the design team generated process layouts which as time passed became clearer through discussion and analysis.

The notion of extending the procession of entry to become a tour brought a rationalization that the linear process of brewing could adopt and exploit.

The utilization of the tour theme presented some interesting possibilities. It could help clarify the process; if the two could work in harmony then the concept would begin to address basis of objective #1.

The solution stands as a testament to this objective that the interaction of "tour/procession" and "process" interweaving are in their simplicity quite potent.

6.2.3 Objective #2.

One of the areas that is often ignored in industrial building forms is the lack of attention given to the aesthetics so that the work place is not a pleasing environment for the employee. To alleviate this concern the "central" rotunda began to be a place where the worker could find respite, act as an internal node to define order to the plan and be the hub from where the various processes spring.

6.2.3 Objective #2 (cont.)

The central rotunda acts as a breather space both for the worker to "get away" and for the clarity of the process. In addition this space has the perception of being extended by virtue of its accessibility to the courtyard which is the roof over the Fermenting and Aging Room. This courtyard is enclosed by the encirclement of the Unitanks. Physiologically, as no mechanical or process elements penetrate this space the user will perceive this courtyard as being special to him and not being dominated by the machine. The result is that the Unitanks are seen as sculptural elements rather than mechanical entities.

In addition the Administrative component is dealt with in the solution as it should be, a separate unit. Not only does this make sense programatically but it allows the utilization of a structural system appropriate to the nature of its use. The sunken patio area, which will be heavily landscaped will afford the feeling to the worker of not being in an industrial park.

6.2.4 Objective #3

One cannot fail to use historical data enough. In the history of brewing can be found a wealth of information which when carefully analyzed can impact the final form whether it be an element from process or form. To re-iterate the basis of 6.2.1 an understanding of the process establishes a palate of historical precedents from which a design is drawn. The research document found earlier in this document serves as a basis for common understanding. The findings and conclusions from that document are obvious in the design that follows.

6.2.5 Objective #4.

The pursuit of energy efficiency is beginning to be apparent in many of our buildings today. In the design of previous breweries many energy efficient concepts are already in effect. These range from sale of by-products for the agricultural Industry to the re-cycling of heat and water.

A major energy concern in this design was to lower the building profile below the ground to reduce the amount of exposed building face to the elements. The additional cost of excavation is offset against savings in exterior skin and cooling costs as the major concern with a brewery is the energy load to keep the facility cool. The added mass will therefore assist in tempering the internal environment.

Another aspect of this design is the building systems which facilitate easy retrofit or extension in the future.

6.3 Design Drawings.

The design drawings are recorded onto transparencies. A key and number is provided under each window.

6.4 Elemental Cost Analysis.

The elemental cost analysis is presented in the standard QS format. For the purposes of this thesis the prices are based on September 1983 historical data obtained with the assistance of Hanscomb and Associates. The prices for actual equipment vary from supplier to supplier, therefore for expediency, the actual costs for equipment is based on broad estimate basis.

Project: **RAP'S BREWERY**
NISKU, ALBERTA

PRELIMINARY COST PLAN
Date: **23rd October 1983**

Sheet
N°: **1**

Element	Ratio to GFA	Elemental Cost		Elemental Amount		Rate per M ²		%
		Quantity	Unit Rate	Sub-total	Total	Sub	Total	
1 Substructure (a) Normal foundations (b) Basement excavations (c) Special conditions		2835 m² 55,000 m³	\$423/m² \$4/m³	1,199,205 220,000	1,419,205		87.20	13.0
2 Structure (a) Lowest floor construction (b) Upper floor construction (c) Roof construction		12,200 m² (24,000 m²)	\$20/m² \$55/m²	244,000 1,342,000	1,586,000		97.90	17.6
3 Exterior Cladding (a) Roof finish (b) Walls below ground floor (c) Walls above ground floor (d) Windows (e) Exterior doors & screens (f) Balconies & projections		12,200 m² 2,835 m² 2,000 m² 90 m² 2200 m²	\$25/m² 130/m² 170/m² 230/m² 330/m²	305,000 368,550 220,000 20,700 726,000	1,640,250		101.25	15.2
4 Interior Partitions (a) Permanent partitions (b) Movable partitions (c) Doors		1000 m²	100/m²	100,000 40,000 20,000	160,000		9.87	1.5
5 Vertical Movement (a) Stairs (b) Elevators (c) Escalators		16 Flights 2	4500/flight 50,000 EA	72,000 100,000	172,000		10.61	1.6
6 Interior Finishes (a) Floor finishes (b) Ceiling finishes (c) Wall finishes		} 1300 m²	50/m²	165,000	165,000		10.18	1.5
7 Fittings & Equipment (a) Fittings & fixtures (b) Equipment		" BREWING EQUIPMENT N.I.C. "						

ELEMENTAL
COST SUMMARY
Part 1 of 2

GROSS FLOOR AREA : **16,200 m²**

Project: **RAP'S BREWERY**
NISKU, ALBERTA.

PRELIMINARY COST PLAN

Date: **23rd October 1983**

Sheet

14

Element	Ratio to GFA	Elemental Cost		Elemental Amount		Rate per M ²		%
		Quantity	Unit Rate	Sub-total	Total	Sub	Total	
8 (a) Electrical **								
(i) Service & distribution								
(ii) Lighting & power								
(iii) Systems								
8 (b) Mechanical **								
(i) Plumbing & drainage								
(ii) Fire protection								
(iii) HVAC								
9 Overheads & Profit								
Net Building Cost								
10 Site Development								
(a) General								
(b) M & E site services								
(c) Alterations								
(d) Demolition								
11 Contingencies								
(a) Design contingency								
(b) Escalation contingency								
(c) Construction contingency								

NOTE - A CONSERVATIVE ESTIMATE WOULD PLACE EQUIPMENT FOR A BREWERY AT BETWEEN \$150 - \$175 PER HV

$$\begin{aligned}
 &= 550,000 \times 150 = \$82,500,000 \\
 &= 550,000 \times 200 = \$110,000,000
 \end{aligned}
 \left. \begin{array}{l} \\ \end{array} \right\} 96,250,000 \text{ AV.}$$

Budget:

\$12,139,242

$$\text{TOTAL EST PROJECT} = \$7,000,000 (\text{LAND}) + \$12,139,242 (\text{BUDG}) + \$96,250,000 (\text{EQUIP}) = \$115,389,242$$

ELEMENTAL
COST SUMMARY
Part 2 of 2

GROSS FLOOR AREA: **16,200m²**

(7122 dollars per m²)

7.0 BACKGROUND.

7.1 Footnotes

2.1 Beer - The Universal Drink

- 1 "Did man live by bread alone?" - American Anthropologist, October 1953.
- 2 The Greek Myths - Graves, Page 83, 1955.
- 3 Reference from Metropolitan Museum, New York - Newsletter.
- 4 Romance of Beer, George Strong, 1951.
- 5 Romance of Beer, George Strong, 1951.
- 6 Romance of Beer, George Strong, 1951.
- 7 Romance of Beer, George Strong, 1951.
- 8 Romance of Beer, George Strong, 1951.
- 9 The Worshipful Company of Brewers - Mia Ball, 1977.

2.2 Beer in the Americas

- 1 Brewed in America
- 2 Brewed in America
- 3 Brewed in America
- 4 Brewed in America
- 5 Brewed in America
- 6 Brewing Industry in Canada
- 7 Brewing Industry in Canada

2.3.6 Summary

- 1 Information Summary - Brewers Association of Canada

Bibliography

History

- | | |
|--|-------------------------------------|
| Pripps - 150 Years | Torsen Ehrenmark, 1978 |
| A Draught of Contentment | |
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