Final Environmental Impact Statement

WASTEWATER COLLECTION AND TREATMENT FACILITIES

Cranston, R.I.

Region I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

JOHN F. KENNEDY FEDERAL BUILDING - GOVERNMENT CENTER - BOSTON, MASSACHUSETTS 02203

FINAL

ENVIRONMENTAL IMPACT STATEMENT

on the

PROPOSED TREATMENT AND COLLECTION SYSTEM
for the
CITY OF CRANSTON, RHODE ISLAND

DATE: June 1, 1977

Prepared by:

U.S. ENVIRONMENTAL PROJECTION AGENCY
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EXHIBIT A

SUMMARY SHEET

Draft or Final:
FINAL

Agency:
ENVIRONMENTAL PROTECTION AGENCY
REGION I

1. *Action:*
Administrative

2. *Description:*
Includes consolidation, improvement and expansion of wastewater treatment facilities in the City of Cranston, a portion of Providence County in the State of Rhode Island

3. *Anticipated Impacts:*
Principal effects include:

a. improved water quality in the Pawtuxet River,
b. expansion of economic base and housing supply, and
c. elimination of odor nuisance.

Adverse effects include:

a. small increases in fuel use in, and air pollution from, solids incineration,
b. accelerate conversion of 7 square miles of forest and farm land to urban uses, and
c. accelerate creation of substantial increases of traffic and traffic noise in the once rural areas.

4. *Alternatives Considered:*
Alternatives considered included:

a. alternative methods of wastewater treatment,
b. alternative methods of treated effluent disposal including land application in western Cranston and piped discharge into the ocean, i.e. the Providence River estuary,
c. alternative methods of solids disposal including sanitary landfills and pasteurization and land application as a soil conditioner/fertilizer,
d. the alternative of not extending the sewer system into now rural lands, and
e. the alternative of more aggressively extending the system.

5. *Agencies from which Comments on this Draft Statement have been Requested.*

Advisory Council on Historic Preservation
American Littoral Society
Appalachian Mountain Club
Aquidneck Island Ecology
Audubon Society of Rhode Island
AWARE, Inc., Nashville, Tenn.
Blackstone River Watershed Association
Conservation Law Foundation
Cranston Historical Society
Ciba-Geigy Corporation
City of Cranston
Cranston City Council
Cranston Today
Coastal Resources Management Council
Council on Environmental Quality
Town of Coventry
Ecology Action for Rhode Island
Environmental Council of Rhode Island
Governor's Council on Environmental Quality
Historic American Engineering Record, RI
Town of Johnston
League of Women Voters of Cranston
League of Women Voters of Rhode Island
National Wildlife Federation
New England Interstate Water Pollution Control Commission
New England Interstate River Basins Commission
City of Providence
Providence Journal - Bulletin
Rhode Island Association of Conservation Commissions
Rhode Island Governor's Office, Policy and Program Review Section
Rhode Island Historic Preservation Commission
Rhode Island Department of Health
    Division of Air Pollution Control
    Division of Solid Waste Management
    Division of Water Quality and Pollution Control
Rhode Island Department of Natural Resources
Rhode Island Department of Community Affairs
Rhode Island Department of Transportation, Planning Division
Rhode Island Office of the Attorney General
Rhode Island Statewide Planning Program
Rhode Island "208" Program
Rhode Island Department of Administration, Budget Division
Rhode Island State Association of Conservation Districts
Rhode Island TB and RD Association
Rhode Island Water Resources Board
Save the Bay, Inc.
Town of Scituate

Sierra Club, New England Chapter
City of Warwick
Town of West Warwick
U. S. Environmental Protection Agency
U. S. Department of Health, Education and Welfare, Regional Environmental Officer
U. S. Coast Guard, First District
U. S. Department of Housing and Urban Development, Regional Administrator
U. S. Department of Interior, Northeast Regional Coordinator
U. S. Department of Interior, Assistant Secretary for Program & Policy
Bureau of Sports, Fisheries & Wildlife, Northeast Regional Administrator
National Parks Service, District Chief
Federal Aviation Administration
Federal Highway Administration, Regional Administrator
Farmers Home Administration
United States Geological Survey, Boston
U. S. Army, Corps of Engineers, N. E. Region
U. S. Department of Agriculture, State Conservationist
U. S. Department of Agriculture, Agricultural Stabilization and Conservation Service
National Oceanic and Atmospheric Administration, Office of Ecology and Environment Conservation
U. S. Department of Commerce, Deputy Assistant Secretary for Environmental Affairs
Honorable John O. Pastore
Honorable Claiborne deB. Pell
Honorable Fernand J. St. Germain
Honorable Edward P. Beard

6. *Agencies which have Contributed to the Formation of this Statement:*

Rhode Island Department of Health
- Division of Water Quality and Pollution Control
- Division of Air Pollution Control

Rhode Island Department of Natural Resources
- Division of Fish and Wildlife
- Division of Forest Environment
- Division of Planning and Development

Rhode Island Statewide Planning Commission
Rhode Island Historic Preservation Commission
Historic American Engineering Record, Pawtucket, Rhode Island
U. S. Department of Agriculture, Soil Conservation Service, West Warwick, RI
City of Cranston
- Department of Public Works
- Planning Commission
- Sewer Department
- Conservation Commission

Cranston Historical Society, Mrs. Gladys Brayton
Mr. Kenneth M. Mowry, Sr., resident of western Cranston
Mr. John T. Sollars, resident of Cranston
Ciba-Geigy Corporation

7. *Public Input to this Statement:*

Prior to preparation of the Draft EIS a public workshop was held at Cranston City Hall on 4/20/76. Issues discussed included:

a. odor problems in the Pontiac Avenue area,
b. sludge transportation problems,
c. extension of sewers into adjoining areas of Warwick,
d. coordination with regional and statewide planning, and
e. extension of the urbanization problem analysis beyond the area of proposed sewerage extension.

After publication of the Draft EIS a public hearing was held at the Hugh B. Bain School in Cranston on 11/18/76. Issues raised at the hearing are described in Exhibit E, appended below.

Letters received in response to the Draft EIS are appended below in Exhibit F.

WRITTEN COMMENTS RECEIVED ON DRAFT EIS

	Issues Raised						
	1. Water Quality	2. Loss of Farm Productivity	3. Population Forecasts	4. Land Use	5. Archeological Preservation	6. In-stitutional Problems	7. Other
U.S. Environmental Protection Agency	*		*	*			
U.S. Department of Housing & Urban Development			*	*			
U.S. Department of the Interior	*		*	*	*	*	*
U.S. Department of Agriculture		*					
U.S. Department of Transportation							
U.S. Department of Commerce	*						
R.I. Statewide Planning Program	*		*			*	
R.I. Historical Preservation Commission				*	*		
Cranston Conservation Commission		*		*			
Cranston League of Women Voters		*		*			
Ecology Action for Rhode Island	*	*		*		*	*
Concerned Citizens for Cranston's Future				*			
Robert A. Flynn, Sr., Cranston, Rhode Island			*	*			*
Ciba-Geigy Corporation							

EXHIBIT B

ISSUES RAISED IN RESPONSES TO THE DRAFT EIS

B.1 INTRODUCTION

The public and interagency responses to circulation of the Draft EIS raised a number of issues whose significance appears to warrant discussion beyond that offered in the Draft EIS. These issues include:

a. Water Quality Classification: Is the degree of treatment proposed for Cranston's wastewater justifiable both environmentally and economically?

b. Farms and Farm Productivity: Would the loss of farmland be more adverse than the effects described in the Draft EIS?

c. Population Forecasts: A number of questions including requests for specific numbers for specific future dates, differences in the size of forecasted increases, agreements in the size but differences in the reasons, and, perhaps most importanct, the question of whether it is the purpose of the proposed action to serve inevitable growth or to attract growth?

d. Land Use: A number of questions about the land uses assumed in the assessments of impacts and in the proposed mitigating actions. Perhaps the most important issue here, in an environmental planning sense, albeit not so as a matter of public discord, is whether "open space" should be provided in urbanizing areas in a manner other than proposed in the Draft EIS.

e. Archeological Resources: The Rhode Island Historical Preservation Commission pointed out the need to follow up on protection of possible archeological resources in the design and construction phases of the project.

f. Institutional Problems: The Draft EIS proposed a number of mitigating actions that could be taken to offset some of the adverse impacts of the proposed project. A number of correspondents questioned how the mitigating actions might be accomplished.

B.2 WATER QUALITY CLASSIFICATION

The existing condition of the Pawtuxet River in the worst reach below the Cranston Wastewater Treatment Plant is Class "E". (See Chapter III of the Draft EIS for definitions, locations, and criteria). The proposed condition of that reach, and its next adjoining reach upstream, has been classified by the State of Rhode Island as Class "D". This classification was the ostensible goal of the Cranston proposal. However, just prior to publication of the Draft EIS, a computer model of water quality in the Pawtuxet was completed. That model appears to indicate that Class "C" may be "attainable" in the worst reaches if all the discharges on the river are raised in quality to that proposed for Cranston's.

This most recent revelation raises a number of questions including:

1. Should the river classification in the reaches below the Cranston discharge be raised from Class "D" to Class "C"?

2. Should the Cranston treatment process be required to be even more effective than that proposed to achieve Class "C"?

3. Would Class "D" be attainable with a less elaborate and presumeably less costly treatment plant for Cranston?

4. And finally, as a frame of reference, is Class "E", the existing condition, adequate for the uses to which the river is to be put, or should the river be improved to Class "B"?

Taking these questions in reverse order:

1. on reclassification as Class "B": -- Reclassifying to Class "B" is not possible without eliminating all industrial and municipal waste discharges into the river. This does not appear to be economically or institutionally feasible for the foreseeable future.

2. on reclassification as Class "E": -- The Pawtuxet River flows through both residential and historic neighborhoods. The odors that would arise from time to time from Class E waters would be unacceptable.

3. on maintaining Class "D": -- The principal foreseeable recreational and habitat use of the river is for the seasonal passage of anadromous fish. Since these fish would normally use the river during high to moderate flow conditions, the annual low flows that are used for calculating classes "C" & "D" are not particularly relevant, or said differently, there is little difference between these classes so far as the highest likely use of the river is concerned (see Table B-1).

Table B-1

ENVIRONMENTAL EFFECTS OF WATER QUALITY CLASSIFICATIONS

Classification	Minimum Dissolved Oxygen in once in 10/yr. 7 day low flow	Said to be Suitable for	Duration of Actual Suitability for: Drinking	Swimming	Non-Migratory Fish Habitat	Migratory Fish Passage	Odor Condition
A	5 mg/l or more	drinking	at all times except for one in 100 year draught	at all times*	at all times*	at all times*	no odors *
B	5 mg/l or more	swimming	with treatment	at all times*	at all times*	at all times*	no odors *
C	4 mg/l	non-migratory fish habitat	never**	never **	except for extreme drought periods	every year except for extreme drought periods	normally no odors
D	2 mg/l	migratory fish passage	never**	never**	except for drought periods	every year except during low flow periods which usually occur between June 1 & Oct. 31.	only at times of extreme drought
E	1 mg/l	nuisance	never**	never**	unlikely	most or every year except during low flow periods which usually occurs between June 1 & October 31.	occasional odors from June 1 to October 31.
E-	less than 1 mg/l	nuisance	never**	never**	unlikely	most years except during low flow periods which usually occur between June 1 & Oct. 31.	frequent odors from June 1 to October 31

* No effluent discharge in RI in Class A & B

** No water supply or swimming in Class C or lower

4. on attaining Class "D" less expensively: -- The proposed improvements at Cranston (specifically the ammonia removal system) are essential to meeting the standards of Class "D" no matter what effluent quality is attained at other discharges on the river.

5. on attaining Class "C" by better treatment at Cranston alone: -- It is not possible to achieve Class "C" by further improving treatment at Cranston without similar improvements at all other large discharges along the river.

6. on reclassifying as Class "C": -- Reclassifying to Class "C" would not change the proposed action at Cranston, i.e. the proposed actions are necessary to meet Class "D" and further improvements to the process of Cranston would be both very costly and ineffectual.

In summary, the proposed project in Cranston is consistent with achieving the highest water quality "attainable", the water quality classification of the river cannot be met with any significantly less costly process, and reclassifying the river to Class "C" would not change what is "attainable". Essentially the issue of changing the classification from "D" to "C" is irrelevant to the proposed action.

The basis for these conclusions is outlined in Exhibit C, ERRATA & ADDENDA, as "Addendum to Chapter III."

B.3 FARMS & FARM PRODUCTIVITY

B.31 INTRODUCTION

A number of responses to the comments on farms and farm productivity in the Draft EIS disagreed with the scope and conclusions of the Draft in that area. The Draft EIS concluded "...the project will convert a relatively large amount of rural land to urban use, about 7 square miles, but this is not expected to reduce long-term productivity. At the present time most of this land is in small holder forest and farm. The forest is used only for firewood for the most part, with the actually farmed lands declining year by year. In general, the high labor costs, small field size, shallow stony soils, irregular topography, excessive nutrient leaching, etc. limit long-term commercial agricultural value. Conversion to house lots, while eliminating its commercial farming value, will not reduce its value for home garden crops, home fruit trees, flowers and microclimatic modifiers (shade and windbreakage) in residential areas. If and when this land is ultimately needed for food production in the very far future, (emphasis added) the large populations living on it might be able to supply the intensive labor, presumably as a hobby, necessary for high yields."

The disagreement with the conclusions were not substantiated but were expressed as doubt of the Draft's conclusion. The disagreement with the scope pointed out that CEQ has recently directed agencies to include in EIS's consideration of impact of projects on "prime" and "unique" farmlands. Each of these issues as well as a brief note on the history of this issue are discussed seperately below.

B.32 AGRICULTURAL PRODUCTIVITY

As stated in the Draft EIS, preservation of lands for agriculture is a complicated issue. Fear of hunger and dramatic photographs of starving children have exerted powerful influences on rational analysis of the issue. Mathematical extrapolations of world population and food supplies, from Thomas Malthus in An Essay on the Principle of Population in 1798 to Jay Forrester in World Dynamics in 1971 have "proved" that disaster lies not far into the future. The Reverend Malthus argued the logic that since populations grow geometrically and that since food supplies grow arithmetically, the population of the world must ultimately outrun its food supply while Professor Forrester used the full computer capabilities of the Massachusetts Institute of Technology and a very much more complex set of extrapolative assumptions to reach the same conclusions.

Taking these one at a time, Malthus's logic was impeccable but his assumptions are not, i.e. population growth rates appear to vary inversely with the economic prosperity of a society (as countries become industrialized and wealthier and their life expectancies increase, their birth rates decline) and food production growth is not arithmetic but appears to be allometrically related to population growth with its rate varying from somewhat less than that of population in more primitive societies to one substantially greater than that of population in more technological societies. The proof that Malthus was wrong however is quite simple, i.e. the much larger population of the world now than in 1798 and on the much higher food production per capita now as compared to then.

Forrester, however, cannot be so easily dismissed since his "future" has not yet occurred and his assumptions are much more complicated, but he and others like him have, fortunately, provoked much serious scholarly examination of his thesis, much of which is included in Scientific American's special issues on "The Human Population" published in September, 1974 and "Food and Agriculture" published in September, 1976, parts of which are quoted below and all of which are included herein by reference.

In the keynote article of the 1976 issue, which attempts to encompass the whole of the issue, Sterling Wortman, Vice President, Rockefeller Foundation, first isolates food shortage as a problem of lesser developed countries in contrast to food sufficiency or surplus in more developed countries... "By the end of World War II the less developed countries had lost their surplus... the export of grain from the developed world to the less developed one rose from 4,000,000 tons a year in 1948 to 25 million in 1964... Since then the flow of grain... has continued to rise... If the trends continue, the food grain deficit (in underdeveloped countries) will be 100 million tons per year by 1985..." He concludes that "...the problem is centered in the developing (non-industrialized) countries..." but he also notes that "...there are developing countries that export food and a few, such as China, that are virtually self-sufficient..."

As a solution for the food problems of those developing countries and elsewhere, Wortman submits with a caution, "... the first objective must be to increase food production, but more food is not enough..." That "...hungry people do not have money -- in the developing countries or in the U.S. or wherever else people are hungry..." that "... there are two components to the solution of the food problem: increased production of food, primarily in the developing countries, and widespread increases in family incomes, particularly among the poor..."

Wortman continues that "... the higher incomes will have to come primarily from increased productivity..., from the development of industry (...particularly in the ... areas where most people live), from employment in construction and public works, and from the generation of diverse services..."

On the expansion of food production specifically, he warns "... Let me mention three nonsolutions ... that are often proposed.

1. "Larger harvests in ... the U.S., Canada and Australia...," these "...are not a solution...it (would) simply allow (undeveloped nations') governments to put off the tedious and unglamorous task of helping their own people help themselves".

2. "The advent of synthetic foods ..., " these "... will not be a solution... they have to be bought before they can be eaten. The hungry have no money and the manufacture of novel foods does not provide any increase in income for the poor..." and

3. "The introduction into developing countries of Western-style, large-scale mechanized farming is also not a solution. Such methods may be appropriate for thinly populated areas... (but) perhaps most important, most large scale agriculture is less productive per unit area than small-scale farming can be."

Continuing from this third point, he ultimately concludes "... the only real solution to the world food problem is for poor countries to increase production of crops and animals -- and incomes -- on millions of small farms ..." that "... the farmer on a small holding can engage in intensive, high-yield gardening systems such as intercropping (planting more than one crop in the same field), multiple cropping (planting several crops in succession), relay planting (sowing a second crop between the rows of earlier maturing crops) or other techniques that require attention to individual plants. The (key) point is that mechanized agriculture is very productive in terms of output per man-year, but it is not as productive per unit of land as highly intensive systems are."

Note that these techniques are in fact gardening techniques, not small farming as practiced in Rhode Island, that they are appropriate to lots up to one acre and that they would not be necessary for food production in the United States for many generations or centuries or possibly never.

Note also that Wortman was concerned with food production only, not the totality of agricultural production described in the Draft EIS which proposed as also having value, "microclimatic modifiers" (shade trees and windbreakage). That such non-food product of the land has value

to the American people was ignored by the critics of the Draft EIS, but that it does in fact have such value, is attested to both by the vast sums spent annually for garden and lawn plants, fertilizers, tools, etc., and also by the society's literature which describes as a golden age, a utopian state, in I Kings 4, that there was "... peace on all sides round about. And Judah and Israel dwelt safely, every man under his vine and under his fig tree..."

B.33 PRIME LANDS

In the opinion of the State Conservationist, Mr. Austin Patrick, the Soil Conservation Service's Class I and II soils should be considered prime agricultural lands in Western Cranston. Class I soils are those having few limitations on their use for agriculture while Class II soils have moderate limitations including risk of erosion if cultivated, wetness that interferes with cultivation, and stoniness.

Measurement by CE Maguire, Inc. of Soil Conservation Service maps of western Cranston reveals only 130 acres of Class I soils with only 30 of these in the proposed sewered area and 3460 acres of Class II soils with only 1050 of these in the proposed sewered area. A city-wide analysis by the Soil Conservation Service indicates that 65% of Cranston's Class II soils tend toward wetness, 25% tend toward susceptibility to erosion, and the balance tends toward stoniness.

Aerial photo analysis of the proposed sewered area, shown in Figure B-1 , reveals that, of a total of 2500 acres of presumptively buildable land, only 1080 acres are Class I and II combined and that, of these, about 75 acres are already used for housing, about 220 acres are in forest and about 260 acres are cleared but not tilled. This leaves a net of Class I and II soils to be served by sewer of about 525 acres.

It might also be noted of the socio-economic milieu and the land market that surrounds this land that most of this actually used "prime" land is within the city's existing industrial zone; that, in the area of western Cranston not proposed to be sewered, there are 880 acres of Class I and II soils in forest and 170 acres in golf course; that, according to the Statistical Abstract of the United States, only one and one half percent of the United States' total land area is used for all urban purposes, and that, according to the Scientific American, September 1976, only 51% of North America's total arrable land is actively in productive use.

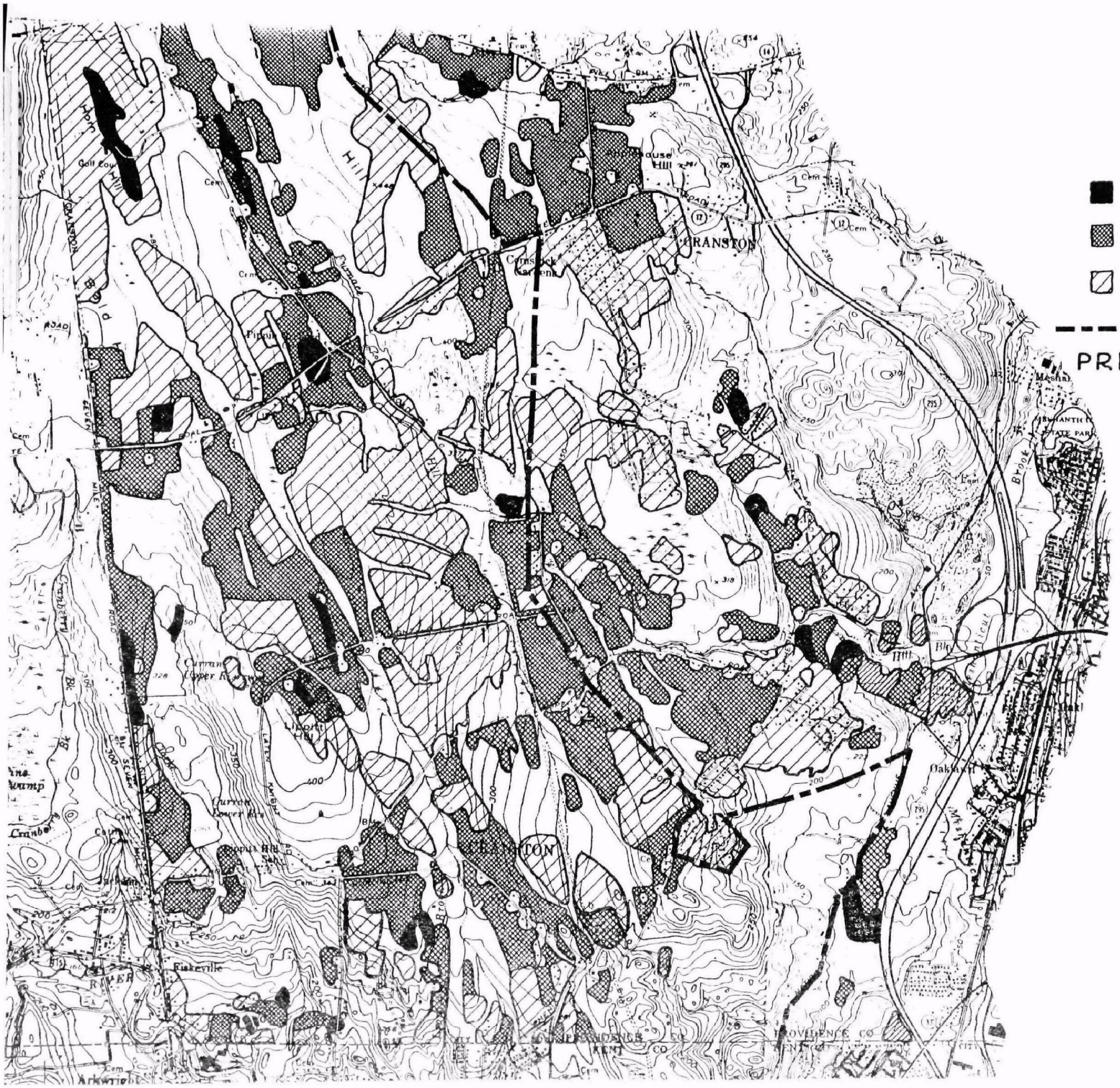


Figure B-1

CLASS I SOILS, NOT FORESTED OR USED FOR URBAN PURPOSES

CLASS II SOILS, NOT FORESTED OR USED FOR URBAN PURPOSES

CLASS I & II SOILS, FORESTED OR USED FOR URBAN PURPOSES

APPROXIMATE LIMIT OF PROPOSED SEWERED AREA

PRIME AGRICULTURAL LANDS

B.34 HISTORICAL CONTEXT

The decline of southern New England's agriculture and the issue of fostering agriculture or manufacturing is almost as old as New England itself. In "A History of Livestock Raising in the United States, 1607-1860," James W. Thompson for the US Department of Agriculture points out that "... agriculture in Massachusetts was visibly declining in the first half of the eighteenth century, and the same was true of Rhode Island and Connecticut... Wheat was imported from New York...Trade, manufacturing and fisheries grew much more than agriculture." Further, he notes that theses on the relative merits of agriculture versus manufacturing were presented at Harvard College in 1742, 1751, 1753, 1773, 1785, and 1787.

B.35 CONCLUSIONS

The conversion of farmland to suburbia in western Cranston does not appear to pose, other than in a very narrow, culturally-relative esthetic sense, any significant adverse environmental impact. In the short term there is no absolute need for this land for food production and in the long term (generations or centuries away) the proposed action may actually increase it food production value. As for the esthetics, the loss of the ability to enjoy an occassional scenic drive through the farm fields appears to be more than made up for by the ability to enjoy daily trees and flowers (and birds) at one's own doorstep.

Exhibit B-1

Boston Globe, April 30, 1977

On feeding the world

Specialist forecasts 5-fold increase in crops

By Loretta McLaughlin
Globe Staff

NEWPORT, R.I.—After decades of predictions that famine would sweep the world, mankind has won a respite from Roger Revelle, head of Harvard's Center for Population Studies.

An astounding turnabout in food production "brings the overwhelming hope that the world population can now taper off and be amply supported by presently foreseeable resources," according to Revelle, a world authority on the demographics of food supplies.

He told a Tufts Medical School alumni meeting here yesterday that sufficient arable land has been identified to increase world crops to five times the amount now reaped annually.

The yield will be enough, he said, to feed a world population that is expected to grow from its present four-plus billion to 10 billion by the year 2050.

Moreover, in the years ahead, Revelle said, areas of the world that have had to beg the greatest quantities of food to forestall mass starvation will become the new breadbasket nations.

"The southern Sudan, the great plains of Central Africa," he said, "could grow enough food to feed the present world population all by itself. And the Ganges plains of India turn out to be one of the most fertile regions on earth, capable of producing as much food—400 million tons of grain per year—as all of the US wheat lands."

The amazing improvement in food supply is largely the result of the "Green Revolution" that bred richer and hardier strains of corn, new fertilizers and scientific crop rotation.

Though a half-billion of the world's people still "go through life without ever having a square meal" and are tortured by chronic hunger, Revelle emphasized that developing nations are stepping up food production and bringing their populations under control.

> *"The southern Sudan, the great plains of Central Africa could grow enough food to feed the present world population all by itself."*
>
> — ROGER REVELLE

"Incomes are going up all over the world," he reported, "and food production goes up rapidly as income goes up. An increase in income also seems to be the key to population control.

"When there is enough food, it gives people hope that if they limit their family size, things will get better for them."

Within the span of a single generation, Revelle said, at least 12 of the hungriest nations of the world have brought their birth rates down rapidly. Among them are China, Chile, Korea, Taiwan, Hong Kong and Egypt.

Revelle's statements followed by a day a warning from World Bank president Robert McNamara that the world population explosion is a greater threat to global tranquility than anything save thermonuclear war. He spoke at MIT.

While the total world population continues to expand relentlessly at a 2 percent pace per year, Tufts University president and nutrition authority Jean Mayer pointed out, nowhere in the world is the birth rate rising any more.

This gain, however, is offset somewhat by a decline in the death rate and a lengthening of the average life span, Mayer said.

Sri Lanka (Ceylon) was cited as the "most beautiful example" of new food self-sufficiency. The nation's birth rate is 50 percent lower than in neighboring Pakistan and Bangladesh, life expectancy is more than 65 years and 80 percent of the populace are literate. Everyone in the country gets a small ration of food and two cents a week to purchase additional food for their household.

World supply expert Edwin Martin, former US ambassador to Argentina, warned that continued improvement in food supplies is dependent on other international factors.

"If we hope to be able to truly feed the people of the world globally," he said, "then we cannot permit the world economy to break down, nor can we have any major political upheavals to divert our manpower and disrupt supplies."

Martin and international food supply consultant Kenneth Schlossberg, a trustee of the American Freedom from Hunger Foundation, urged creation of an American and a world reserve of grain to stabilize the price of food and to fill in when bad weather destroys crops.

Exhibit B-2

City dwellers quit good life for farming — in backyard

By TONY LIOCE
Journal-Bulletin Staff Writer

PROVIDENCE — Five years ago, Edward Neri "didn't know anything about vegetable gardens and cared less. I'd work at my job all day fixing oil burners and then I'd go for four or five beers and I'd come home and that was it."

These days, though, Neri gets up every morning at 5 so he can spend two hours out behind his house at 173 Windmill St., taking care of his garlic plants, parsley, Romaine lettuce and iceburg lettuce, onions and mustard greens before he leaves for work.

When he gets back home in the late afternoon, he spends another hour or so in the garden. And on weekends, he's out there 10 or 12 hours a day.

"It's his fault," he jokes, pointing to his next door neighbor, Ernest Capaldi, a 69-year-old foundry worker who has been "raising up" vegetables in his backyard since moving here from his family's farm in Italy 53 years ago.

"He got me started," says Neri, 52. "I told him I was going to put a lawn back here. Put a little piece of garden in, he told me, just a little piece. So I planted some seeds on a 12-by-12 foot plot.

"Now look. I'm up to 40-by-80. I'll be planting peppers, eggplant, tomatoes, string beans, celery and basil in the next couple of weeks. And you see all that empty land behind the yard? I just bought that. I want to put potatoes and corn back there.

"I'd like to turn this whole thing into a real farm. A farm in the middle of the city."

Neri is only one of many city-dwellers who in recent years have put down beer cans and put aside the TV set for a hoe, a rake and a bag of seeds.

Yesterday, in Neri's neighborhood around Charles Street, several people weren't even thinking about the Celtics or the Red Sox. They were in their backyards, wearing old clothes and gloves, down on their haunches with their hands in the dirt.

Some of them started gardening when the prices at the supermarket vegetable counters started rising. But you don't keep getting up two hours early every day, and giving up your whole weekend every week, just to save a couple of bucks.

"Ernest and I end up giving most of the stuff away to friends and relatives," says Neri, "so it's not like we're out here for the money. It's fun. It's even better than fun.

"It's hard to explain, but it's really something to start with a 29-cent package of seeds — some of the seeds are so small you can hardly even see them — and end up with 100 quart bottles full of tomatoes preserved for the winter. I'm really proud of my vegetables. I really am."

"You learn an awful lot," said Neri. "For instance, I bought this book about tomatoes just the other night, and some of the stuff in there is amazing. If you do a certain thing at a certain time, it makes all the difference. I know about how the agricultural lime gives the plants the calcium, all sorts of things I never knew before."

He pauses and smiles again. "Imagine, me, buying books about tomatoes." He laughs. "That's really something, huh? But I'm telling you, I love these plants of mine and this garden here. In the morning, it's so nice out here, you can't believe it."

He invites a visitor to return in a few months, when the tomatoes will be ready, and his pride knows no bounds. "I'll take those tomatoes right off the plant, and make up a tomato salad, and you can't get any fresher than that.

"I was really lucky last year, and the year before, too. The very first year, in fact, people were flabbergasted. Me, too. The plants were coming up extra-large. It was a real abundance. This year, I'm hoping to have good luck again.

"How'm I doing, Ernest?," he shouts to the yard next door.

Ernest stops raking his own garden and looks over. "You're doing fine," he smiles. And they both go back to work.

—Journal-Bulletin Photo by ANESTIS DIAKOPOULOS

Backyard Gardener: Edward Neri in his Windmill Street vegetable patch

The Evening Bulletin, Monday, May 2, 1977

B.4 POPULATION FORECASTS

B.41 INTRODUCTION

The Draft EIS stimulated a number of questions and comments on the population forecasts in the Draft, including differences among forecasts, requests for specific numbers for specific dates, and the question of whether it is the purpose of the proposed action to serve inevitable growth or to attract growth.

B.42 DIFFERENCES AMONG FORECASTS

On the matter of what the future holds, and why, as stated in the Draft EIS, Section 1.4, the future is inherently unknowable and planning for it, other than with due regard to the uncertainty, is self-deluding. As an example, Figure B-2 shows the population of the United States from 1790 to 1970 (on a semi-logarithmic scale) and the worst past population projections of the U.S. Census Bureau (Statistical Abstract of the United States, 1943 & 1965). Note that these were the best available projections by the most expert demographers, note that in 1970 the U.S. had 30% more people than was forecast for that date in 1943, and note that in 1965 the Bureau expected twice as many people in the U.S. by the year 2000 as it did in 1943.

B.43 FORECASTS USED IN THE FACILITIES PLAN

For the purpose of selecting size of facilities and for economic comparisons of alternatives, the Wastewater Facilities Plan for Cranston by Universal Engineering Corporation used 96,700 people in 20 years and 119,000 people in 50 years.

B.44 GROWTH OBJECTIVES OF THE PROPOSED ACTION

On whether it is the purpose of the proposed action to serve inevitable growth or to attract growth from other areas, it is the objective of the proposed action to (1) attract and support jobs and tax base to meet the economic needs of the people of Cranston and to (2) provide for the future housing needs, so far as possible, of Cranston's children.

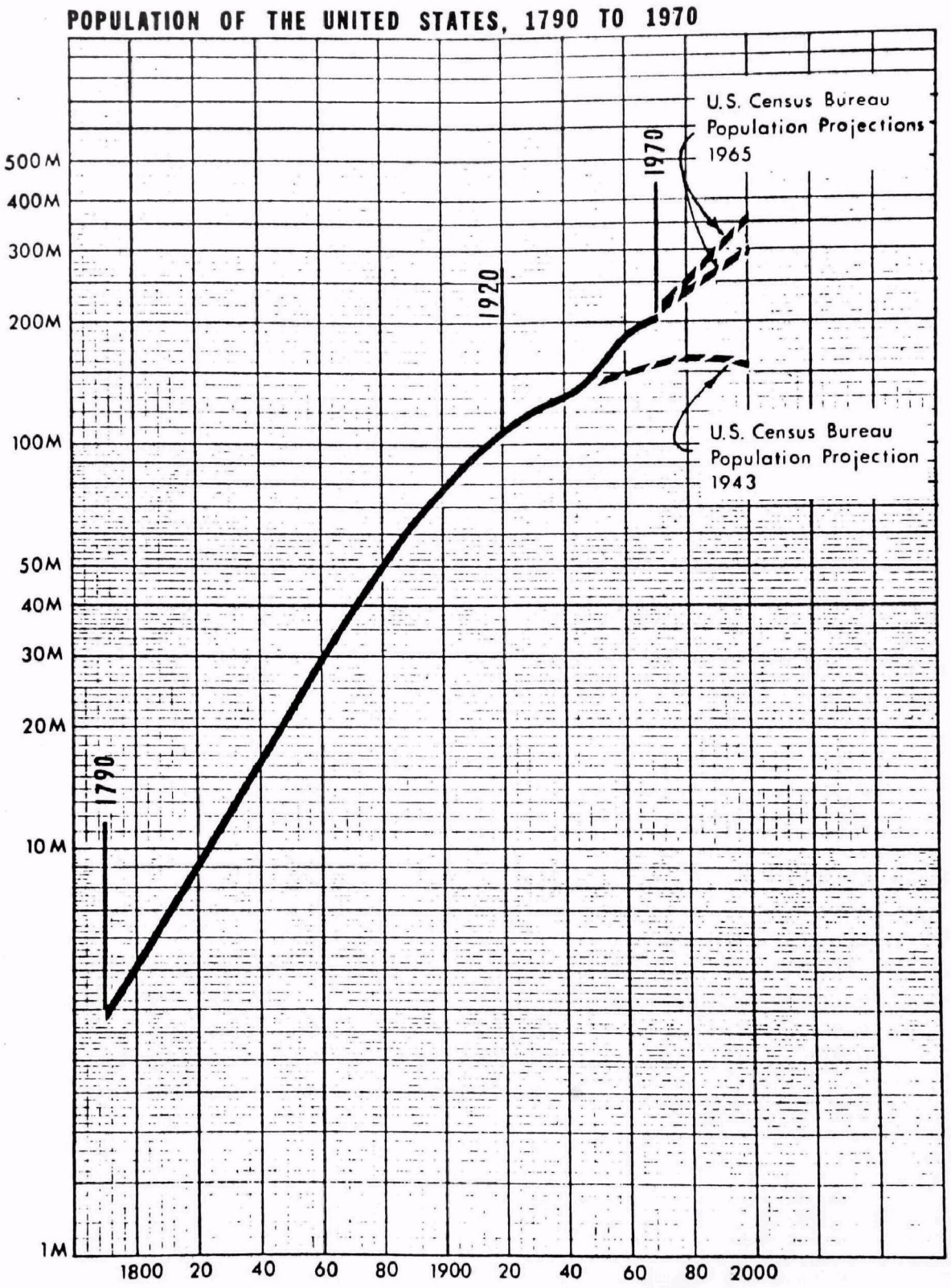

POPULATION OF THE UNITED STATES, 1790 TO 1970
U.S. Census Bureau
Population Projections
1965
1970
1920
U.S. Census Bureau
Population Projection
1943
1790
500 M
400M
300M
200M
100M
50M
40M
30M
20M
10 M
1M
1800
20
40
60
80
1900
20
40
60
80
2000

Figure B-2

B.5 LAND USE

B.51 INTRODUCTION

Land use questions raised in the comments on the Draft EIS included whether open space should have been considered as a special problem seperate from the noise and streamflow buffering problems, whether the land zoned for industry along the Plainfield Pike should be used for industry, and whether offices, apartments or neighborhood convenience shopping should be provided in new urban growth areas.

B.52 OPEN SPACE

The Draft EIS suggested that open space for recreation, etc. in new urbanizing areas could be provided by providing adequate noise buffering space along needed new roads and adequate stream flow buffering impoundments in all new land development projects. These two actions were expected to systematically provide recreation of a variety of types throughout the urbanizing areas with good physical continuity, optimum spatial distribution and maximum esthetic values at minimum cost to the community without relying on arbitrary standards of open space adequacy. (The anticipated effectiveness of the proposed linked open space/environmental mitigation program, if implemented, in this case, depends on the conversion of almost entirely rural land to urban use so that the mitigations can be required universally throughout the urbanizing area. This solution would probably not work in areas already heavily urbanized.) It does not apear that any seperate urban open space program would be as effective either as open space or as an environmental buffer between traffic noise and housing.

B.53 INDUSTRIAL ZONING

Several residents of western Cranston questioned whether industry should be allowed in western Cranston as shown in the Draft EIS. The areas shown to be developed for industry in the Draft EIS are also so shown in the State of Rhode Island's Statewide Land Use Guide Plan, the City's Master Plan and the City's land use zoning ordinance. The need for industrial growth in explored in the Draft from several viewpoints (Chapters II & III) and the comments appear to offer no new data bearing on this issue.

B.54 OFFICE, APARTMENTS & CONVENIENCE SHOPPING

The Draft EIS indicated, as a concept only, two land uses changes in western Cranston (see Figure VI-26), an office building site and a neighborhood commercial center, that became the object of strong objec-

tion by neighboring residents, the Mayor and an opposition-party city council member. The land use changes were submitted as part of the environmental buffering of a new roadway suggestion, also submitted as a mitigating action necessary to avert adverse environmental effects of urban growth. The key concept behind the submitted land use changes is that housing has no place along main thoroughfares, that the noise likely to be generated at night on such streets is disruptive of sleep and that the traffic itself is a potentially lethal hazard to the residents, particularly children. As alternative to housing along main streets (the level between expressways and sidestreets) the Draft submitted that all lands along such streets be either dedicated open space or used for commercial or industrial purposes with proper traffic access controls. (From an environmental safety and welfare point-of-view either open space or commercial/ industrial land use is acceptable.)

Unfortunately (as it turned out) the City's zoning ordinance, as presently worded, permits apartment buildings in office zones and both the neighboring residents and city officials took the suggestion of office use (buildings where 3 AM traffic noise would be unobjectionable) to be a recommendation of apartment use (buildings that would be very sensitive to 3 AM traffic noise).

Compounding this confusion was the coincidence that the City's most recently published "Master Plan" (1975) recommends apartment use for the area in question for reasons quite different from those that were the basis of the Draft EIS suggestion. So far as the EIS is concerned no recommendation for apartments was intended and the conclusion that lands along major thoroughfares <u>not be residential</u> is still valid.

On the neighborhood commercial zone suggestion, it is not clear whether the neighboring residents and local officials object to this suggestion specifically or because it was indicated concommitently with the office use suggestion. This suggestion was made in part as a land use alternative to open space for traffic noise buffering and in part <u>to reduce traffic and fuel consumption</u> by intercepting some shopping trips from future residential areas in western Cranston to commercial areas in eastern Cranston. Again the confusion about this suggestion was compounded by a recommendation in the City's Master Plan for commercial use in the subject area which appears in this case to be based on similar reasoning. Further, it might be noted that the subject site is already used for commercial purposes, i.e. a dairy products retail delivery company and a data processing service, and so its ultimate use may already have been determined. So far as the EIS is concerned and the responsibility of EPA to offer advice on restoring, maintaining, and enhancing the environment this suggestion is also still valid.

During the time the Draft EIS Statement was being prepared, the City Planning Department and City Planning Commission were making preliminary proposals and holding public hearings to amend the zoning ordinance. As a result of its continuing revisions, the Planning Commission's latest recommendations do not include office building sites or commercial sites. The latest proposed zoning ordinance is designed to achieve the same results by providing open space along main streets by means of increased setbacks, permitting and encouraging cluster development and other techniques. Consequently, the reference to the office building site and neighborhood commercial center indicated on Figure VI-26 (Pg. 176) should be deleted.

This alternative of using open space and deleting apartments, offices and commercial uses is receiving the support of the Mayor, the Planning Commission and those members of the City Council who have spoken on the issue.

B.6 ARCHEOLOGICAL RESOURCES

As pointed out by the Rhode Island Historical Preservation Commission, the apparently very significant resources of the Furnace Hill Brook vicinity must be carefully protected both from the direct impacts of sewer construction and from the concurrent or following secondary urbanization.

To do this, so far as the direct effects go, plans of the proposed sewers will be submitted to the Commission when they are developed and the State Archeologist will be invited to monitor the necessary excavations as they occur. For the other effects, EPA has called the problem to the attention of the Federal Regional Council for New England with the suggestion that that agency convene an interagency committee including the Federal Highway Administration, the Department of the Interior, the Department of Housing and Urban Development, the Environmental Protection Agency, the Mayor of Cranston and the relevant state agencies to jointly plan the development of this very special (and in some ways very normal) problem.

B.7 IMPLEMENTATION OF MITIGATING ACTIONS

B.71 INTRODUCTION

The Draft EIS proposes a number of mitigating actions that could be taken to offset some of the adverse impacts of the proposed project. Comments on the Draft EIS raised the question of how these actions would be implemented.

Review of the proposed mitigating actions indicate that some of them can be implemented by the City of Cranston as administrative actions as part of the proposed project with EPA and State financial assistance; some can be implemented by the City of Cranston as legislative actions of the local government without outside assistance; and still others can be implemented with substantial assistance from State and Federal agencies other than EPA. To accomplish the mitigating actions, EPA will require the City to include within the proposed project those actions which can be included within that project, it will require the City to amend its land subdivision and building codes to control the quality of storm water runoff, and it will urge the City to undertake to accomplish the rest of the actions, insofar as it is within the City's power to do so, as a condition of the EPA grant for construction of the proposed action. Actions beyond the City's capabilities, outside the scope of EPA's programs, and not being provided for by other agencies are called to the attention of the Council of Environmental Quality for further consideration.

B.72 MITIGATING ACTIONS TO BE INCLUDED WITHIN THE PROPOSED PROJECT

A number of diverse mitigating actions will be included within the scope of the proposed project including:

1. reduction of chlorine content of effluent discharges to levels not inimicable to anadromous fish;

2. reduction of night noise levels in the vicinity of Cranston wastewater treatment plant to those acceptable for sleep as specified in the City's current zoning ordinance;

3. rehabilitation of areas now or formerly used for sludge disposal in the vicinity of the Cranston wastewater treatment plant as described on pages 92 and 93 of the Draft EIS;

4. relocation of new pipelines in western Cranston away from areas of special resource value in the vicinity of Furnace Hill Brook ravine; and

5. submission of design drainage for sewer construction in western Cranston to the Rhode Island Historical Preservation Commission and inspection of such sewer construction by the State Archeologist as required.

B.73 MITIGATING ACTIONS TO BE REQUIRED OF THE CITY

One action that will protect water quality that can be accomplished by the City, primarily as legislative action of the local government, will be required as a condition of EPA's grant, i.e. amendment of the City's building and land subdivision codes to require that land developments of 10 or more acres be so designed that peak stormwater runoff after development (for peak runoff likely to occur in one year out of one hundred years) not exceed that which existed before development, calculation of both to be by the method referred to in the Draft EIS.

Note that this requirement is consistent with the intent and the specific wording of the State's Wetlands Act, that such calculations are usually required by the State's Department of Natural Resources if the project directly impacts on a wetlands (other than by changing runoff characteristics), and that a universal requirement, except for very small developments, would be in the interests of the City as a public works maintenance agency, of all downstream abuttors, and of land developers in that it would insure equal treatment of all developers.

B.74 MITIGATING ACTIONS TO BE RECOMMENDED TO THE CITY

Two actions that can be accomplished by the City as administractive actions to enhance the City's future environmental quality, but that are not believed to be required by any statute or regulation are recommended to the City, i.e.:

1. agreement by the City that any public development projects by the City of Cranston in areas served by the proposed project will be subject to the same cultural resource protection proceedures as are required of EPA under Executive Order 11593, and

2. adoption by the City of Cranston of a Master Plan for western Cranston showing both the proposed land use and a network of roads aeequate to provide for future traffic, safely and without congestion, with adequate provision for keeping residential buildings away from traffic noise levels that would interfer with sleep or with normal daytime use of the buildings.

Notice that this last point is not an imposition of any specific land use or transportation plan on the City of Cranston but rather a recommendation that the City have an internally consistent plan for balanced and orderly growth, similar to what HUD would call a "workable program", but with the elements of the program designed to satisfy current environmental standards.

B.75 MITIGATING ACTIONS PROBABLY BEYOND THE CITY'S FINANCIAL CAPABILITIES & OUTSIDE EPA's JURISDICTION -- N.B. CEQ

A number of mitigating actions identified in the Draft EIS appear to be beyond the financial capabilities of the City of Cranston and outside the scope of EPA assistance authorizations, specifically construction of new, acoustically-attenuated, controlled-access, limited-speed roadways in the urbanizing fringe.

Possibly these actions can be accomplished by interagency cooperation with the Bureau of Outdoor Recreation and the Department of Transportation, and EPA has brought the problem to the attention of the Federal Regional Council for New England to try to arrange such cooperation.

Further, since the problems for which the proposed mitigations are suggested exist in many urbanizing areas and the proposed mitigations are suggested exist in many urbanizing areas and the proposed mitigations may be a widely effective remedy, the attention of the Council on Environmental Quality is specifically directed to this problem. Note that, while under NEPA, Section 102(2)F, EPA is required to "make available to municipalities advice and information useful in restoring, maintaining, and enhancing the quality of the environment," under Section 204 it is the duty of the CEQ "to review the programs of the Federal Government for the purpose of determining the extent to which such programs are contributing to the achievement of the policy (set forth in title I of NEPA) - and "to develop and recommend to the President national policies to foster and promote the improvement of environmental quality."

EXHIBIT C

ERRATA & ADDENDA, THE DRAFT EIS, SIGNIFICANT TO UNDERSTANDING THE ISSUES

Under the pressure to examine a great variety of environmental effects, simultaneous with the planning of the project, and to produce the EIS in a timely fashion, a number of errors and ommissions were made in the Draft. In general these errors are typographical and do not change the sense of the analyses or the conclusions that were drawn. This section is included to clarify only those parts of the Draft EIS where the errors (or unclear information) are believed to be significant to understanding the issues.

Page 218 - The debt service costs shown in Table VIII-1 include both the costs of enlarging and improving the wastewater treatment plant and of extension of sewers into western Cranston as shown in Figure I-4. The 1980 debt service cost to the City of Cranston of the treatment plant alone was estimated in the Draft Wastewater Facility Plan by Universal Engineering Corporation, dated September, 1976, to be $380,000 with that of the sewer extension estimated to be $810,200.

Page 177 - Figure VI-26 should be entitled "Possible Future Development of Western Cranston: A Concept for a Program Suggested for the Adequate Mitigation of the Adverse Environmental Impacts of Sewering Western Cranston." The note "Office Building Site (Proposed Zoning Change)" should read "Park Buffer or Non-Residential Building Site," the note "Neighborhood Commercial Site (Proposed Zoning Change)" should read "Park Buffer or Non-Residential Building Site," and the note "Signalized Intersection" should read "Signalized Intersection and/or Traffic Circle."

Other errors included:

Preface - The 3rd paragraph should read "CE Maguire, Inc. was charged with the task of independently reviewing the Facilities Planner's efforts as they relate to environmental impacts, performing..."

Page 2 - Item 1 should read "enlargement of the City's wastewater treatment plant, consolidation of existing seperate industrial and institutional wastewater discharges into the city facility and increase the efficiency of the city's plant,"

Page 3 - The 1st paragraph should read "The purposes of the proposed action are to forestall immediate overloading of the existing treatment plant when Ciba-Geigy, the State Institutions at Howard and the Howard Industrial Park are tied into the Cranston Sewer System, to eliminate existing nuisance conditions (both air and water) in and near the lower reaches of the Pawtuxet River, to meet new water quality classification of the reaches of the Pawtuxet below the municipal treatment plant, to comply with NPDES permit requirements of EPA, and to provide a public utility which will be adequate for the future planned needs of the community."

Page 5 - Mitigation item 5 should be amended by deleting the word "neglect" and substituting the word "failure" so that the item reads ... "5. Destruction of areas of special resource value by failure to rehabilitate areas partially destroyed by operation of the existing Cranston wastewater treatment plant. Recommended mitigating actions include regrading the subject areas to restore their values esthetically and as wildlife habitat."

Page 7 - The 2nd paragraph should read "The water quality improvement will include overall upgrading of the entire river below the outfall of the treatment plant to the officially designated classification including:"

Page 19 - Issue #1 of Chapter II should be redefined ... "1. Given that an ultimate purpose of the proposed project is to provide a public utility to accommodate orderly urban growth, is continued urban growth really necessary?"

Page 42 - The end of the second paragraph should read "... the 'tofts' of 'toft and croft' agriculture." (In feudal agriculture, a toft was the fenced house lot of a tenant peasant on an estate while the croft was the peasant's share of the estate's physically unsubdivided fields.) Note that the agriculture productivity issue is discussed further in Exhibit B of this Final EIS.

Page 45 - The list of "givens" that describe the existing physical and programmatic circumstances that surround the proposed action should be expanded to include... "5. and that there does now exist a portion of the Pawtuxet River in which 'nuisance' conditions can exist from time to time during most years (see page 50)."

Page 45 - The list of issues, or questions, proposed to be treated in Chapter III - WATER QUALITY should be amended toread..."1. will the proposed action be effective in improving water quality to the adopted water quality classifications, 2. will the proposed action violate any presently proposed minimum water quality standards, and 3. will the proposed action tend to preclude any preferable longer-term alternatives or tend to commit the river to less than optimum quality in the long term?"

Page 50 - On figure III-3, the section of the Pawtuxet River east of the Ciba-Geigy Corporation, index no. 171 on the map, is Class E.

Page 51 - The last sentence should read ..."The more polluted condition further north in the estuary, the Class 'SD' area, reflects much larger pollutant loads discharged by the City of Providence's sewage treatment plant and by its combined sewer overflows."

Page 58 - The following corrections should be made in Table III-3:

98% should read 92%
305 should read 1305
30111 should read 30222

Page 65 - In the first paragraph, the parenthetical phrase "and possibly Class C" should be deleted.

Page 67 - At the end of the discussion of dechlorination alternatives, the following sentence should be added: "The final Facilities Plan will recommend Sulfur Dioxide dechlorination."

Page 70 - It should be noted of the discussion of solid wastes to be generated by the proposed facility, that while large amounts of sludge will be generated within the process, this sludge is only an intermediate product. Incineration of the sludge, a integral part of the proposed action, will reduce the volume of the solid material by over 90%, so that considerably less solid will remain for ultimate disposal in the future (after the proposed action) than at present.

Page 87 - The last paragraph should be deleted and the following substituted ... "Existing sludge that is excavated for construction of the proposed treatment plant additions will be disposed of in a State approved sludge disposal site".

Addendum #1: Chapter III WATER QUALITY, Section 3.1 BACKGROUND, Sub-Section 3.11 THE PAWTUXET RIVER

A. Introduction

Since publication of the Draft EIS there have been three changes in its programmatic milieu:

1. The computer model of the Pawtuxet River has been completed,

2. Consideration of revising upward the goals for water quality in the Pawtuxet River has been initiated, in part because the computer model results indicate that higher qulaity conditions are possible, or said otherwise, technologically "attainable", with advanced wastewater treatment (AWT) or NH removal (see figure Addendum-1), and

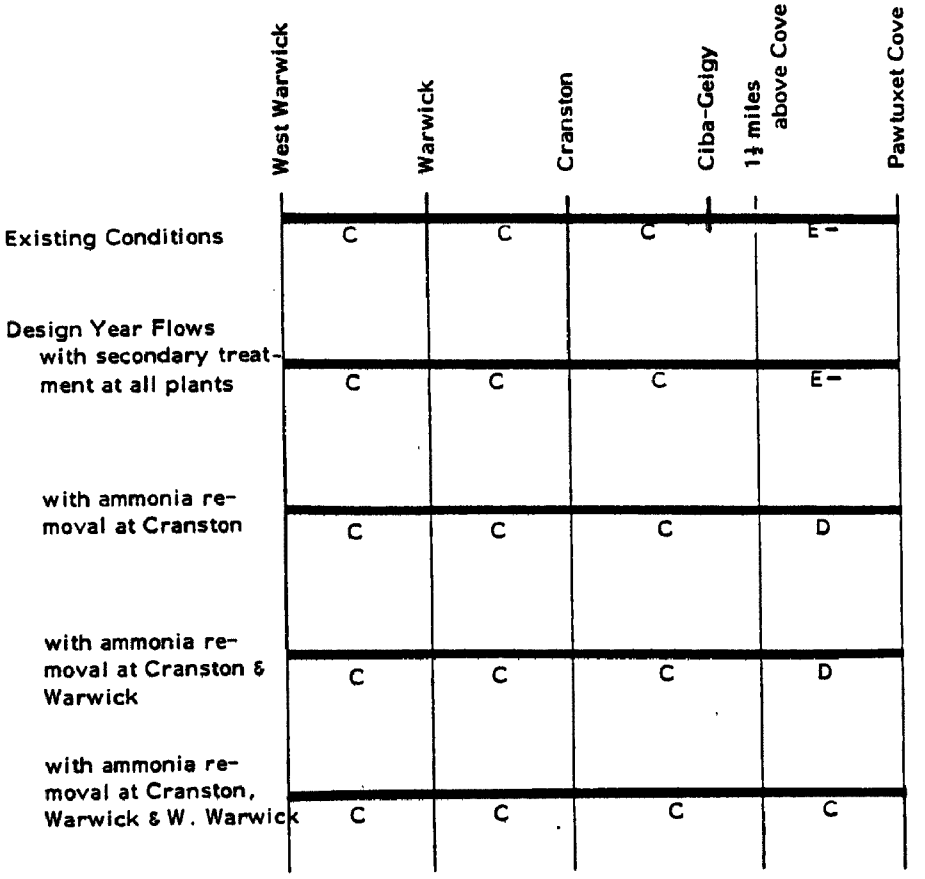
3. EPA national policy toward funding AWT is being reviewed as a result of criticism by the United States General Accounting Office (GAO) that, in many cases, AWT has been expensive compared to secondary treatment and that without reliable data and sound plans, these AWT's may not be the most effective and efficient means for achieving water quality goals.

B. The Computer Model

As part of the Water Quality Classification study, amodel (a computer simulation) of the Pawtuxet River was prepared. This model was briefly referred to in the Draft EIS but it was substantially refined after publication of the Draft. The model, called RECEIV-II, dynamic hydraulic and water quality model for the Pawtuxet River Basin, was developed by the Raytheon Company as part of the New England River Basins Modeling project funded by EPA. The effort was coordinated by EPA and the rhode Island Department of Health. The model was based upon water quality studies of the Main Stem of the Pawtuxet River conducted in 1968, 1971, 1973, and the time of travel studies and sediment oxygen demand studies conducted in 1975 and 1973 respectivly. EPA and the State both believe that it does represent the river hydraulics and the dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Nitrogen and Coliform Bacteria characteristics of the river.

Figure Addendum - 1

COMPUTED WATER QUALITY
AT LOW FLOW
PAWTUXET RIVER - WEST WARWICK TO PAWTUXET COVE



C - conforms to the minimum standards of Class C at 7 day, 1 in 10 year low flow
D - conforms to the minimum standards of Class D at 7 day, 1 in 10 year low flow
E - conforms to the minimum standards of Class E at 7 day, 1 in 10 year low flow

Source: EPA Region I

Using the model, various "wasteload allocations" were developed for point source discharges to the river based upon the total Oxygen Demand (TOD). This procedure allowed both the computation of the effect on the receiving stream of any given set of discharges and also an "allocation" of a maximum amount of discharge to achieve any given water quality.

C. Results of the Computer Model

Figure Addendum-1 shows the water quality conditions that will obtain at low flow at a number of hypothesized wastewater treatment discharges. In summary, it indicates that less effective treatment than that proposed at Cranston, (i.e. AWT with ammonia removal, and secondary treatment at Warwick and West Warwick) will preclude achievement of Class D in the lowest reaches of the river, and it also indicates that Class C is possible throughout the river if all three treatment plants include ammonia removal.

Further the model points out that without ammonia removal at all three treatment plants, at high summer temperatures and low flow conditions, the ammonia concentrations in the river would violate the ammonia criterion in EPA's Quality Criteria For Water. It is important to note of this ammonia problem that the "Rationale" accompanying the criterion, explaining the setting of the criterion level states: "Levels of un-ionized ammonia in the range of 0.20 to 2 mg/l have been shown to be toxic to some species of freshwater aquatic life. To provide safety for those life forms not examined, 1/10th of the lower value of this toxic effect range results in a criterion of 0.02 mg/l of un-ionized ammonia. This criterion is slightly lower than that recommended for European inland fisheries..." and it is also important to note that the maximum concentration expected at low flow in the Pawtuxet would be about 0.026 mg/l or about 1/8th of the lower value of the toxic effect range.

D. Revisions of Pawtuxet River Classification

The Water Pollution Control Act Amendments of 1972 (P. L. 92-500), the law which governs EPA in this area, specifically states as a national goal the highest water quality "attainable" (without defining that term). The Century Dictionary, An Encyclopedic Lexicon of the English Language defines attainable as being capable of being attained and then goes on to differentiate attain from some of its synonyms as follows: "attain involves the idea of considerable effort, obtain does not necessarily imply effort at all, and procure only a small degree of it. Thus we may obtain by inheritence, procure a book by purchase, but we can attain an end only by exertion." Just how much effort is "considerable" remains a matter of judgement, but just as clearly the concept connotes more than simply achieving the best water quality for the money, the best "procurement" as it were. Similarly, and also implicit in the word "attain" and its definition is that there be a valid "end" to be achieved, in this case say, a substantive improvement in the environment rather than a change in letter grade on a regional map.

Said otherwise, relating the issue to the Pawtuxet River, the question is not whether the change from Class D to Class C is attainable, but rather whether a real improvement in the habitat for fish, and in the opportunity for fishing, can be attained.

E. Economic Constraints on Attainability

It is important to note that just as all parts of the environment are interrelated, so all parts of the economy are interrelated. Just as the Draft EIS describes the linkage of sewer construction to population growth, of population to traffic increase, of traffic increase to noise, and of noise to sleep interference, so labor, materials and credits spent to excess in any one area will limit the supply available in other areas, which shortage in turn could lead to lower maintenance of other components of the environment.

A recent study by the Government Accounting Office (GAO) for the Congress, has questioned the propriety of spending large amounts of Federal funds for AWT facilities merely to achieve paper classifications of water quality. It is inescapable that treatment levels beyond secondary treatment are extremely costly per unit of pollutant removed. GAO is recommending to Congress that the Federal Water Pollution Law be amended in such a way as to preclude funding of AWT unless satisfactory justification of the cost vs. benefits can be made. This policy is not in effect at this time, it is not known when or if it will go into effect, but the point has been made and is noted.

F. Applicability to the Pawtuxet River and the Cranston Wastewater Treatment Plant

Resolution of the preceding conflict, so far as Cranston's ammonia removal system is concerned, must take into account the following facts:

1. That the State of Rhode Island, after hearing and considering the arguments for and against the various possible upgradings of the river's quality, has selected and adopted Class D for the reach of the river between the Pocasset River junction and Pawtuxet Cove.

2. That EPA must, under Executive Order 11593 (see Chapter VII of the DEIS), if it is "prudent and feasible", insure that there will be no nuisance conditions (Class E) at the Pawtuxet Village Historic District.

3. That Class E with a dissolved oxygen level of less than 1 mg/l at low flows is not avoidable without ammonia removal at the Cranston Wastewater Treatment Plant. Therefore elimination of odor and nuisance conditions in the 1.5 mi reach of the Pawtuxet above Pawtuxet Cove cannot be achieved, at low flows, without the ammonia removal capabilities.

Clearly these facts admit no alternative but to include ammonia removal at Cranston as part of the proposed project.

To go further, and look into the question of changing the State's water quality classification for the entire river to Class C, however, is a seperable issue. The facts that bear on it include:

1. That reclassification would require no further upgrading at the Cranston treatment plant.

2. That the reaches of the river that are Class D are of little value to fish other than as a migration route for anadromous fish (shad & herring) in spring and early summer, according to State game managers.

3. That Class D standards met at low flow during the late summer will generally create quite adequate water quality conditions for shad and herring during most of their seasons of migration.

4. That while restoration of the migratory fish suitability in the lower Pawtuxet will have very large and visible, beneficial impacts on the environment, including opening the entire river system to migratory fish, creating a beneficial food chain effect in the adjoining waterbodies, eliminating odor nuisance, etc., upgrading the river further to Class C will only add a relatively very small number of rather small fish to a relatively very short reach of the river.

5. That the Pawtuxet River, in its lower reaches, is a sluggish stream with limited reaeration opportunities, running through a heavily urbanized region, with storm drains discharging street dirt from a multitude of high density land uses (with limited opportunity available for treatment or settlement of the storm drainage) and with a substantial part of the headwaters runoff diverted for public water supply purposes.

6. And finally, that achieving Class C standards apparently would require ammonia removal at both the Warwick and West Warwick treatment plants.

In summary, the question of whether the lowest reaches of the Pawtuxet should be Class C or Class D cannot be answered here, it is beyond the level of analysis included in the Cranston Wastewater Treatment Plant's investigations, and it appears that it might require careful analysis of just what real benefits would be achieved. The only certain thing that can be said of it is that it is not relevant to the decision to be made at Cranston since Cranston would require about the same degree of ammonia removal for either classification.

Addendum #2: Chapter III WATER QUALITY, Section 3.2 PROPOSED ACTION FOR WASTEWATER TREATMENT AND DISPOSAL, Sub-Section 3.22, ALTERNATIVES

The costs and evaluations of the alternative wastewater disposal strategies and treatment processes considered in the facilities plan are shown in Tables A-1 and A-2.

Table A-1 shows among the costs, the Present Worth of Future Operations and Maintenance (O + M). This figure is equal to the sum of money that would have to be invested today to produce income adequate to pay for future annual O + M costs. It is used herein to permit addition of construction costs (a one time cost) and O + M costs (a recurring annual cost) so that the alternatives can be compared fairly.

Table A-2, taken directly from the Facilities Plan report, is an attempt to compare all the characteristics of the various alternatives. It should be noted of this comparison that it is not, and cannot be, a rigorous economic or scientific method, but rather is an attempt to combine in one figure a very diverse set of economic, environmental and engineering evaluations.

Table A-1

SUMMARY OF COSTS
ALTERNATIVE WASTEWATER TREATMENT METHODS

	TREATMENT ALTERNATIVE	2nd Q. 1977 Construction Cost	Present Worth of O & M	Total
	Secondary/Discharge to Providence River	$ 38,797,320	$ 20,476,360	$ 59,273,680
	Secondary/Land Disposal of Effluent	36,583,450	31,331,960	67,968,040
	Single Stage Biological Nitrification (1)	26,815,000	22,722,700	49,537,700
*	Two Stage Biological Nitrification	28,335,000	21,620,830	49,955,380
	First Stage Biological, Fixed Film Nitrification (2)	26,114,290	21,467,430	47,581.720
	Physical-Chemical	32,780,000	27,791,220	60,571,220

* Recommended Alternative

(1) Single Stage Biological Nitrification Alternative: not selected although slightly less costly than recommended alternative for the following reasons:

a. This alternative does not provide protection against toxic substances in the wastewater which would hinder the nitrification process. It was felt that, with considerable industrial flows of a variable nature in the Cranston system, there was a high probability of such toxic substances being transmitted to the plant. The selected alternative provides good protection against most toxicants.

b. This alternative has only moderate stability of operation whereas the selected alternative is a stable operation.

c. This alternative has considerably less flexibility of operation than the selected alternative and savings in operational costs may be realized by the selected alternatives.

(2) First Stage Biological, Fixed Film Nitrification Alternative: not selected although slightly less costly than recommended alternative for the following reasons:

a. No performance records are currently available for a facility of this size in operation. Loading rates used to develop cost estimates may be higher than what can actually be achieved for a plant of this size.

b. Bench scale studies conducted at Cranston showed difficulty in achieving biological growth at 15°C (59°F). Nitrification is to be required during period of June 1 thru October 31 for the Cranston facility, therefore it was concluded that reliability of this alternative was not favorable.

c. This alternative is less controllable and has less flexibility of operation than the selected alternative.

d. This alternative does not achieve as high a degree of ammonia removal efficiency as the selected alternaive. Although this alternative would theoretically be able to achieve required ammonia removals necessary to meet effluent standards it was concluded, based upon above factors, that this alternative may in fact have some difficulties in achieving the effluent standards whereas the selected alternative was more fully capable of achieving the standards.

Sources: Universal Engineering Corporation
EPA Technology Transfer Process Design Manual, Nitrogen Control
EPA Advanced Wastewater Treatment Laboratory, Cincinnati, Ohio

Table A-2

SUMMARY EVALUATION MATRIX OF

WASTEWATER TREATMENT ALTERNATIVES

	WEIGHTING FACTOR MULTIPLIER	SECONDARY TREATMENT WITH LAND DISPOSAL EFFLUENT	SECONDARY TREATMENT WITH DISCHARGE TO PROVIDENCE RIVER	SINGLE STAGE BIOLOGICAL NITRIFICATION	TWO STAGE BIOLOGICAL NITRIFICATION	FIRST STAGE BIOLOGICAL FIXED FILM NITRIFICATION	PHYSICAL-CHEMICAL WITH EFFLUENT DISCHARGE
CONSTRUCTION COST	1/3	5	5	3	3	3	4
OPERATING AND MAINTENANCE COST	1/2	5	2	3	3	3	4
ENVIRONMENTAL EFFECTS	1/3	3	2	2	2	3	3
PERFORMANCE RECORD AND RELIABILITY	1	3	2	3	2	4	2
OTHER FACTORS*	1/4	3	3	3	2	2	2
WEIGHTED TOTAL		8.9	6.1	6.9	5.7	8.0	6.8

Integers of: 1 represent the most favorable rating
5 represent the least favorable rating

*Includes:

Ability to degrade wastewater; handle industrial wastes and shock loads
Flexibility, simplicity and expandability of operation
Disruption to existing system; ease of implementation
Ability to meet future standards
Protection of nitrifiers against heavy metals, shock loadings, biological interference

Source: Universal Engineering Corporation

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

on the

PROPOSED TREATMENT AND COLLECTION SYSTEM
for the
CITY OF CRANSTON, RHODE ISLAND

DATE: October 18, 1976

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region I
JFK Federal Building
Boston, MA 02203

CITY OF CRANSTON
City Hall
Cranston, Rhode Island

With Technical Assistance by:

CE MAGUIRE, INC.
Architects • Engineers • Planners
Providence • Waltham • New Britain

Responsible Officials:

John A. S. McGlennon
Regional Administrator
Environmental Protection Agency
Region I

James L. Taft, Jr.
Mayor
City of Cranston, Rhode Island

SUMMARY SHEET

Draft or Final:
DRAFT

Agency:
ENVIRONMENTAL PROTECTION AGENCY
REGION I

1. *Action:*
Administrative

2. *Description:*
Includes consolidation, improvement and expansion of wastewater treatment facilities in the City of Cranston, a portion of Providence County in the State of Rhode Island

3. *Anticipated Impacts:*
Principal effects include:

a. improved water quality in the Pawtuxet River,
b. expansion of economic base and housing supply, and
c. elimination of odor nuisance.

Adverse effects include:

a. small increases in fuel use in, and air pollution from, solids incineration,
b. accelerate conversion of 7 square miles of forest and form land to urban uses, and
c. accelerate creation of substantial increases of traffic and traffic noise in the once rural areas.

4. *Alternatives Considered:*
Alternatives considered included:

a. alternative methods of wastewater treatment,
b. alternative methods of treated effluent disposal including land application in western Cranston and piped discharge into the ocean, i.e. the Providence River estuary,
c. alternative methods of solids disposal including sanitary landfills and pasteurization and land application as a soil conditioner/fertilizer,
d. the alternative of not extending the sewer system into now rural lands, anc
e. the alternative of more aggressively extending the system.

5. *Agencies from which Comments on this Draft Statement have been Requested:*

Advisory Council on Historic Preservation
American Littoral Society
Appalachian Mountain Club
Aquidneck Island Ecology
Audubon Society of Rhode Island
AWARE, Inc., Nashville, Tenn.
Blackstone River Watershed Association
Conservation Law Foundation
Cranston Historical Society
Ciba-Geigy Corporation
City of Cranston
Cranston City Council
Cranston Today
Coastal Resources Management Council
Council on Environmental Quality
Town of Coventry
Ecology Action for Rhode Island
Environmental Council of Rhode Island
Governor's Council on Environmental Quality
Historic American Engineering Record, RI
Town of Johnston
League of Women Voters of Cranston
League of Women Voters of Rhode Island
National Wildlife Federation
New England Interstate Water Pollution Control Commission
New England Interstate River Basins Commission
City of Providence
Providence Journal - Bulletin
Rhode Island Association of Conservation Commissions
Rhode Island Governor's Office, Policy and Program Review Section
Rhode Island Historic Preservation Commission
Rhode Island Department of Health
    Division of Air Pollution Control
    Division of Solid Waste Management
    Division of Water Quality and Pollution Control
Rhode Island Department of Natural Resources
Rhode Island Department of Community Affairs
Rhode Island Department of Transportation, Planning Division
Rhode Island Office of the Attorney General
Rhode Island Statewide Planning Program
Rhode Island "208" Program
Rhode Island Department of Administration, Budget Division
Rhode Island State Association of Conservation Districts
Rhode Island TB and RD Association
Rhode Island Water Resources Board
Save the Bay, Inc.
Town of Scituate

Sierra Club, New England Chapter
City of Warwick
Town of West Warwick
U. S. Environmental Protection Agency
U. S. Department of Health, Education and Welfare, Regional Environmental Officer
U. S. Coast Guard, First District
U. S. Department of Housing and Urban Development, Regional Administrator
U. S. Department of Interior, Northeast Regional Coordinator
U. S. Department of Interior, Assistant Secretary for Program & Policy
Bureau of Sports, Fisheries & Wildlife, Northeast Regional Administrator
National Parks Service, District Chief
Federal Aviation Administration
Federal Highway Administration, Regional Administrator
Farmers Home Administration
United States Geological Survey, Boston
U. S. Army, Corps of Engineers, N. E. Region
U. S. Department of Agriculture, State Conservationist
U. S. Department of Agriculture, Agricultural Stabilization and Conservation Service
National Oceanic and Atmospheric Administration, Office of Ecology and Environment Conservation
U. S. Department of Commerce, Deputy Assistant Secretary for Environmental Affairs
Honorable John O. Pastore
Honorable Claiborne deB. Pell
Honorable Fernand J. St. Germain
Honorable Edward P. Beard

6. *Agencies which have Contributed to the Formation of this Statement:*

Rhode Island Department of Health
    Division of Water Quality and Pollution Control
    Division of Air Pollution Control
Rhode Island Department of Natural Resources
    Division of Fish and Wildlife
    Division of Forest Environment
    Division of Planning and Development
Rhode Island Statewide Planning Commission
Rhode Island Historic Preservation Commission
Historic American Engineering Record, Pawtucket, Rhode Island
U. S. Department of Agruculture, Soil Conservation Service, West Warwick, RI
City of Cranston
    Department of Public Works
    Planning Commission
    Sewer Department
    Conservation Commission
Cranston Historical Society, Mrs. Gladys Brayton
Mr. Kenneth M. Mowry, Sr., resident of western Cranston

Mr. John T. Sollars, resident of Cranston
Ciba-Geigy Corporation

7. *Public Input to this Statement:*

Consequent to advertisements placed in the Providence Journal, 4/13, the Cranston Herald Today, 4/14, and the Evening Bulletin, 4/15, an open public meeting was held to discuss the proposed project at the Cranston City Hall on 4/20/1976. Questions discussed included:

a. odor problems in the Pontiac Avenue area,
b. sludge transportation problems,
c. extension of sewers into adjoining areas of Warwick,
d. coordination with regional and statewide planning, and
e. extension of the urbanization problem analysis beyond the area of proposed sewerage extension.

PREFACE

This Environmental Impact Statement (EIS) is the product of the cooperative and concurrent efforts of

1. *U.S. EPA, Region I*
2. *City of Cranston, Rhode Island*

and their consultants

1. *Universal Engineering Corporation*
2. *CE Maguire, Inc.*

Universal Engineering Corporation is the "Facilities Planner" for the proposed project and was charged with the responsibility to investigate the City of Cranston's wastewater problems and treatment needs and to develop a program for solving those problems and satisfying those needs, including identification and analysis of all environmental constraints and influences and of all reasonable alternatives to that program.

CE Maguire, Inc. was charged with the task of independently reviewing the Facilities Planner's efforts, performing additional investigations where necessary, identifying and describing the environmental impacts of the proposed program, formulating a program of supplementary actions to mitigate adverse impacts of the proposed wastewater program, and to prepare a "Draft" of the EIS.

This concurrent effort is referred to, in in-house government jargon, as "piggybacking," and this EIS is the first use of piggybacking by Region 1. Its advantages are acceleration of the planning and review process and that it makes the environmental reviews available to the Facility Planner earlier than would otherwise be possible, hopefully broadening environmental sensitivity and reducing adverse effects. Its disadvantages include some degree of inconsistency in detail as the proposed action was repeatedly modified to satisfy the most recently identified environmental problems.

In addition it should be noted that this is also a Draft EIS and that some of the mitigating actions suggested in this Draft are likely to be incorporated into the proposed project prior to completion of the project planning and of the Final EIS, reducing thereby the need to explore both the adverse effects to be obviated by the mitigating actions and the mitigating actions themselves within that Final EIS.

For detailed exposition of the proposed project and its characteristics (other than environmental impacts and mitigating actions) the reader is referred to the Facilities Plan by Universal Engineering Corporation. Copies of the Facilities Plan and additional copies of this EIS can be reviewed at

Public Works Department
City Hall
Cranston, Rhode Island

All Cranston Libraries

and

U. S. Environmental Protection Agency
Region 1, Room 2203
John F. Kennedy Federal Building
Boston, Massachusetts 02203

A public hearing on the proposed project, as described in the Draft EIS and the Draft Facilities Plan will be held at:

Hugh B. Bain School
135 Gansett Avenue
Cranston, Rhode Island

ON: November 18, 1976

at 7:00 p.m.

Public comment on all aspects of the proposed project is invited both at the public hearing and by mail to EPA Region 1 at the address above.

All public comments will be included in the Final EIS, will be used in revising the proposed project as described in the Draft EIS and Draft Facilities Plan, and will be answered, as appropriate, within the Final EIS. Copy of the Final EIS will be mailed to everyone who submits a comment on the Draft.

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Chapter I INTRODUCTION & SUMMARY

1.0 INTRODUCTION

The proposed project consists of improvements to and enlargements of the wastewater collection, treatment,and disposal system of the City of Cranston, Rhode Island.

The City of Cranston is a fairly steadily growing community of about 73,000 people (1970) and 28.6 square miles within the Providence-Pawtucket-Warwick urbanized area. Figures I-1 and I-2 show the urbanized area's location within the United States and the city's location within the urbanized area

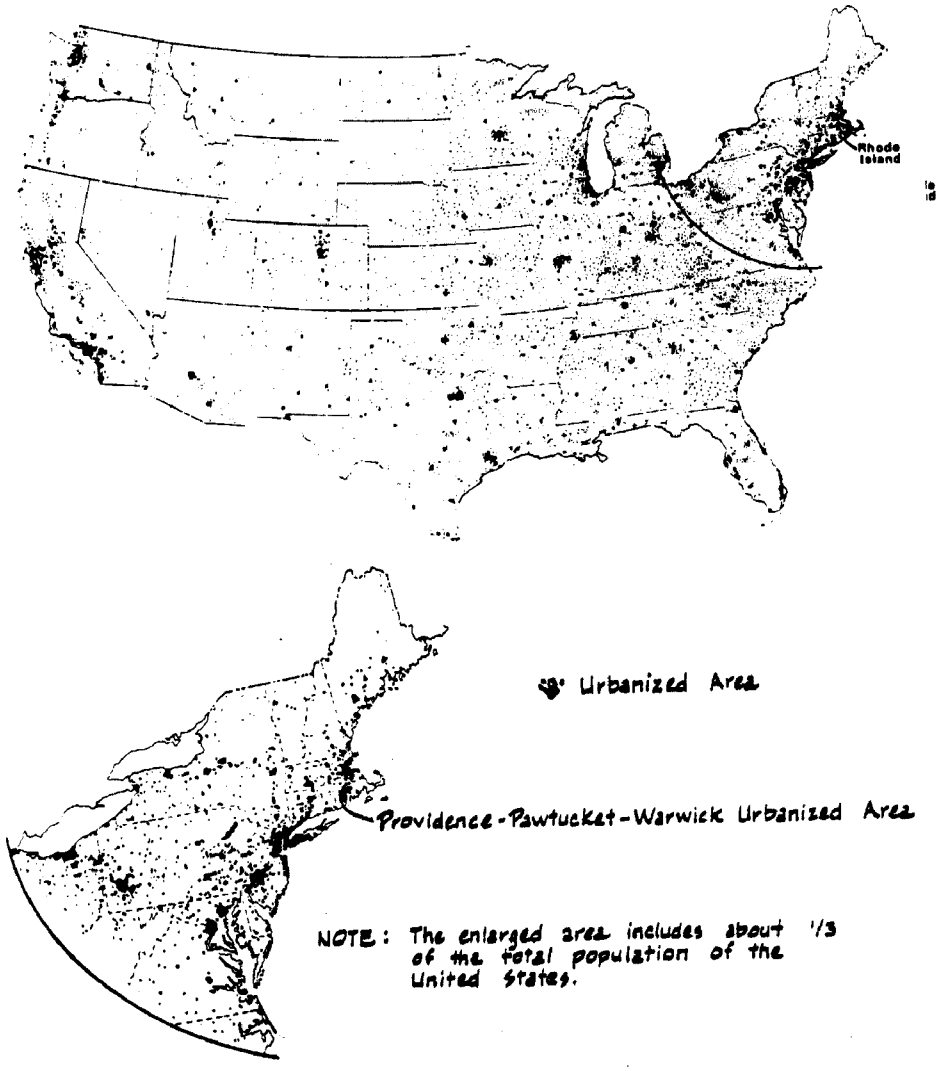


Figure I-1 URBANIZED AREAS OF THE UNITED STATES

Source: The National Atlas of the United States of America, 1970.

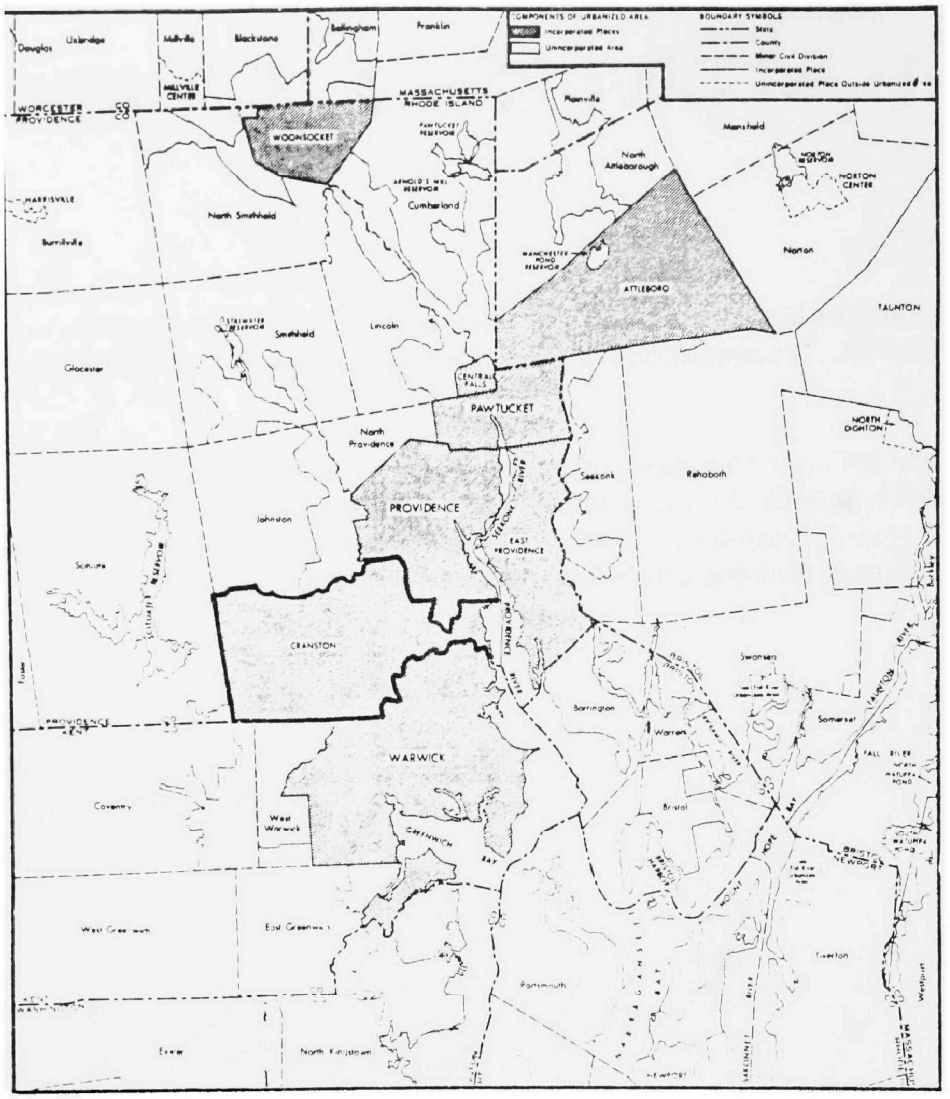


Figure I-2 CRANSTON & THE PROVIDENCE-PAWTUCKET-WARWICK URBANIZED AREA as defined by the U.S. Bureau of the Census.

Source: U.S. Census of Population, Rhode Island, 1970.

The specific improvements and enlargements of the project include:

1. enlargement of the city's wastewater treatment plant and consolidation of existing separate industrial and institutional wastewater discharges into the municipal facility,

2. extension of the city sewer system into primarily rural lands in western Cranston to allow for future growth of the city, and

3. reduction of storm water inflows and ground water infiltration into the existing sewers to eliminate costly waste of treatment plant capacity.

The purposes of the proposed action are to forestall forecasted, future overloading of the existing treatment plant, to eliminate existing nuisance conditions (both air and water) in and near the lower reaches of the Pawtuxet River, to meet new water quality classification of the reaches of the Pawtuxet between the municipal treatment plant and these lower reaches, and to facilitate the orderly and balanced growth of the community.

Figure I-3 shows the location of the treatment plant, the industrial and institutional discharges to be eliminated, the existing extent of municipal sewerage within Cranston and the area of the city into which sewerage extensions are proposed.

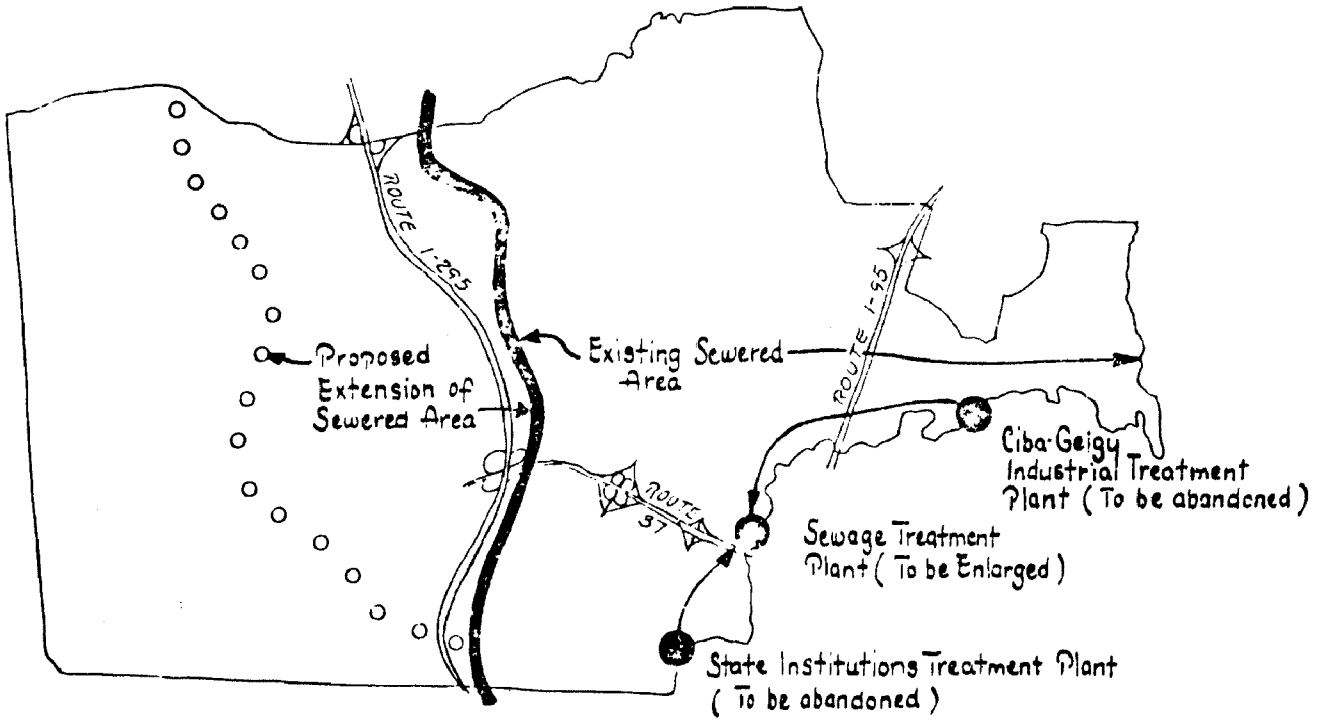


Figure I-3 LOCATION OF PROPOSED ACTION
Western Cranston

The principal characteristics of the existing and proposed wastewater treatment plants are shown in Table I-1.

Table I-1

PRINCIPAL CHARACTERISTICS OF EXISTING AND PROPOSED WASTE-WATER TREATMENT PLANTS

	Existing	Proposed
Extent of treatment	secondary	secondary and ammonia removal
Plant capacity	11.4 mgd	23.0 mgd
Limiting water quality condition downstream	Class E	Class D
Population served	68,000	93,000
Sludge disposal method	anaerobic digestion & on-site stockpiling	incineration with on-site ash disposal

The major elements of the cost and proposed sharing of costs is shown in Table I-2.

TABLE I-2

SUMMARY OF COSTS AND PROPOSED SHARING OF COSTS

	Wastewater Treatment Plant	Sewers for Western Cranston	Other Improvements	Total
Total Cost, not including operations and maintenance	$37.0 mil.	$12.0 mil.	$3.5 mil.	$52.5 mil.
Cost Sharing, non-city				
Federal	27.7	4.4	2.6	34.7
State	5.6	0.9	0.5	6.9
Ciba Geigy	0.9	-	-	1.0
Net Cost				
City of Cranston	2.8	6.8	0.4	9.9

Source: Universal Engineering Corporation

Figure I-4 shows the proposed location of the sewer extensions.

PAGE NOT

AVAILABLE

DIGITALLY

1.1 SUMMARY OF SIGNIFICANT IMPACTS

The section below presents in summary form:

1. In Section 1.11, the environmental impacts of the project,

2. In Section 1.12, a program of mitigating actions that should be explored and, where appropriate, implemented concurrently with the wastewater treatment facilities improvements included in the proposed action.

1.11 REQUIREMENTS OF SECTION 102(2) (C) OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

The National Environmental Policy Act of 1969, pursuant to which this statement has been prepared, specifies in section 102(2) (C) that every recommendation for major Federal actions significantly affecting the quality of the human environment include a detailed statement on:

(i) the environment impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided....

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action....

In general, this statement attempts to do this for the significant, long-term impacts of the proposed set of actions, with the scope and detail of each effect tailored to the specific nature of the effect. The sections below summarize all the included analyses and expositions of the statement within the framework of the statutory items (i) to (v) above.

(i) *THE ENVIRONMENTAL IMPACT OF THE PROPOSED PROJECT*

The proposed project is expected to have three principal environmental effects:

1. significantly improve the water quality of the Pawtuxet River,

2. expand the economic base and housing supply of the City of Cranston, and

3. eliminate an odor nuisance in and near a residential area.

The water quality improvement will include:

1. upgrading of the conditions of a short but critical section on the lower reaches of the river so that the entire river system will be reopened to anadromous fish,

2. upgrading of conditions of a short but critical section of river just below the outfall of the treatment plant to allow migration of the indigenous fish between the main stem of the river above the treatment plant and a major tributary, the Pocasset River, just downstream, and

3. preclusion of nuisance conditions in the urban areas through which the river flows including the Pawtuxet Village, a major 17th century settlement listed in the National Register of Historic Places.

The expansion of economic base and housing supply will result from expansion of the wastewater system's capacity and from extension of sewers into undeveloped lands. This expansion is expected to have the following effects:

1. significantly increase the supply of fully serviced industrial land in the Providence metropolitan area, an area with substantial and persistent unemployment, and

2. significantly increase the supply of fully serviced land available for housing in the City of Cranston, again a clearly needed addition.

The impact of these effects will include increased sewage flows, change of rural land to urban uses, possible increase in stormwater runoff, increased traffic and traffic noise, possible increase in traffic accidents, increased air pollutant emissions, increased employment, increased incomes and increased local tax base. It is not expected that the proposed actions or their effects will generate so much new employment or incomes as to induce a net in-migration into the region or to cause population growth in excess of the region's natural increase.

The elimination of odor nuisance in and near a residential area will be accomplished by shutting down an inadequate existing industrial wastewater treatment plant and consolidating the industrial wastewater into the expanded upgraded municipal treatment plant.

(ii) ADVERSE EFFECTS WHICH CANNOT BE AVOIDED

The adverse effects which cannot be avoided include:

1. those related to disposal of solid wastes resulting from the wastewater treatment process, and

2. those related to urban growth.

The unavoidable adverse effects of solid wastes disposal include:

1. a small increase of total suspended particulates (TSP), sulfur dioxide (SO_2) and lead (Pb) in the air at concentrations believed to pose only a negligible impact on public health, and

2. increased use of fuel for solid wastes incineration.

The unavoidable adverse effects of urban growth include:

1. short-term generation of noise, vibration, dust, stream siltation, and traffic congestion during the construction period both, on a small scale, at the treatment plant site and, on a much larger scale, generally throughout the city, as growth occurs,

2. permanent loss of rural lands, mostly forest with some farms, to urbanization but not necessarily resulting in permanent loss of the agricultural productivity of the rural lands, and

3. long-term generation of traffic, traffic noise, and increased air pollution emissions.

(iii) *ALTERNATIVES TO THE PROPOSED ACTION*

Alternatives to the proposed action that were studied and evaluated included:

1. alternative methods of wastewater treatment,
2. alternative methods of treated effluent disposal,
3. alternative methods of solid waste disposal,
4. the alternative of not extending the sewer system and rezoning now rural lands for urban use, and
5. the alternative of more aggressively extending the sewer system and rezoning now rural land for urban use .

The alternative methods of wastewater treatment included:

1. single stage biological nitrification,
2. two stage biological nitrification,
3. first stage biological, fixed film nitrification,
4. high rate biological, fixed film nitrification,
5. physical-chemical treatment, and
6. biological-physical treatment.

The alternative methods of treated effluent disposal included:

1. land application in western Cranston after secondary treatment and
2. discharge directly into the Providence River estuary after secondary treatment.

The alternative methods of solid waste (sludge) disposal included:

1. off-site disposal in a sanitary landfill,
2. pasteurization and land application, and
3. incineration and off-site disposal of the ash in a sanitary landfill.

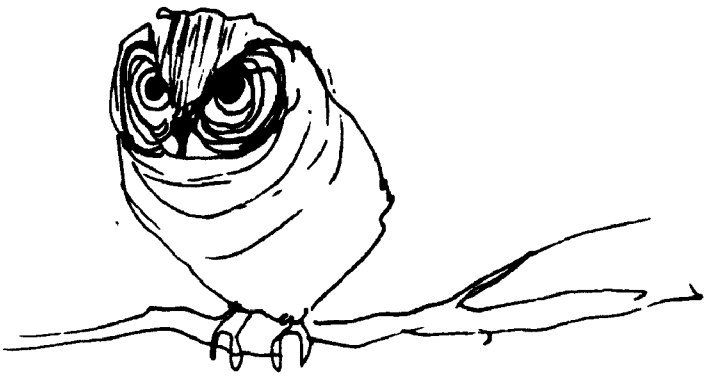
(iv) *RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT-AS PROPOSED IN THE PROPOSED PROJECT - AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY*

The proposed project is not expected to sacrifice the long-term productivity of the environment for short-term benefits. In the water environment, the project initially will improve the quality of the Pawtuxet River benefiting the general welfare by enhancing the surrounding neighborhoods' esthetics and recreation opportunities including restoration of the anadromous fishery, a significant productivity gain of itself. In the longer term, the proposed action will not preclude further improvement of water quality in the future, since it leaves open the possibility of upgrading the plant, of future pumping of the effluent to the sea, to land irrigation use, or even back to the headwaters reservoir with further treatment for complete recycling. This is in contrast to one of the alternatives that was considered, lesser treatment with discharge into Narragansett Bay, an alternative that would tend to preclude reuse of the water or deepwater discharge in the future.

On the land environment, the project will convert relatively large amounts of rural land to urban use, about 7 square miles, but this is not expected to reduce long-term productivity. At the present time most of this land is in small holder forest and farm. The forest is used only for firewood for the most part, with the actually farmed lands declining year by year. In general the high labor costs, small field size, shallow stony soils, irregular topography, excessive nutrient leaching, etc., limit long-term commercial agricultural value. Conversion to house lots, while eliminating its commercial farming value, will not reduce its value for home garden crops, home fruit trees, flowers and microclimatic modifiers (shade and windbreakage) in residential areas. If and when this land is ultimately needed for food production in the very far future, the large populations living on it might be able to supply the intensive labor, presumably as a hobby, necessary for high yields.

(v) *IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES*

The proposed project requires a commitment of money, manpower and materials for its construction; of money, manpower, chemicals and fuel for its operation; and of land, in very small amount, for the treatment plant and, in fairly large amounts, for urban growth.



1.12 REQUIREMENTS OF SECTIONS 102 (2) (D) and 102 (2) (F) OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Section 102(2) (D) requires that all agencies study, develop, and describe appropriate alternatives to proposals which involve conflicts concerning uses of resources, and section 102(2) (F) requires that all agencies make available to states, municipalities, individuals, etc, advice and information useful in restoring, maintaining, and enhancing the quality of the environment.

This statement includes such alternatives, advice and information. Specific attention is called to the analysis of the difficulties of accepting "no-growth" as an alternative to the proposed action in the chapter titled "Need For Growth".

Advice and information on maintaining and restoring environmental quality is included as proposed "mitigating actions" wherever there appears to be a possibility of avoiding an adverse environmental effect by implementation of the mitigating action. These potentially adverse but avoidable effects and the mitigating actions that appear to be most likely to either obviate or soften their adverse effects, include:

Runoff related effects - western Cranston:

1. Increased stormwater runoff and runoff pollution resulting from increased paving of urbanizing areas.

   Recommended mitigating actions include:

   a. requirement by the City of Cranston that all development permitted under either a building permit or a land subdivision permit be designed to store enough of its runoff waters on-site so that the developed stormwater runoff will not exceed the undeveloped runoff, and

   b. construction by the City of Cranston of stormwater impoundment reservoirs on the main streams of the major tributaries, where feasible, to supplement the on-site run-off regulation measures described above.

   Collateral adverse effects of these mitigating actions would include:

   a. increased cost of land development, and

   b. possible loss of cultural (archeological) resources at the main stream dam sites.

   Second stage mitigating actions would include:

   a. compensatory relaxation by the City of Cranston of zoning and building requirements not essential to precluding adverse environmental and/or performance characteristics of proposed developments, and

   b. submission by the City of Cranston to the same cultural resource protection procedures in planning and design of stormwater impoundment reservoirs as are required of EPA under Executive Order 11593.

   Collateral benefits of all these mitigating actions are expected to include:

   a. enhancement of the appearance of the future urbanization by increasing its visual variety and preserving open and/or wooded spaces, and

   b. enhancement of the wildlife habitat values of the urbanizing area by providing a greater variety of size and type of habitat areas than would otherwise be likely to occur.

Traffic related effects - western Cranston:

2. Increased traffic congestion, traffic accidents and traffic noise resulting from increased urbanization.

Recommended mitigating actions include:

construction of a new acoustically-attenuated, controlled-access, limited-speed roadway westward from the end of Route 37 through western Cranston to serve the urbanizing area.

Collateral adverse impacts of the mitigating action include:

commitment of substantial land areas to the roadway and to its acoustical buffer zones, reducing municipal tax base and urban growth areas.

Mitigation of this collateral adverse impact would include:

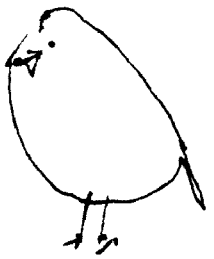
intensification of land use (by rezoning by the City of Cranston) along the proposed new roadway and its buffer zones where consistent with adjoining land uses.

Collateral benefits of these mitigating actions include:

a. enhancement of the appearance of the future urbanization by preserving significant, and readily visible, unbuilt areas,

b. enhancement of the recreation opportunities, i.e. bicycleways, bridle trails, streamways, etc. of western Cranston by preserving significantly large and continuous unbuilt areas, and

c. enhancement of the future wildlife habitat of western Cranston by preserving significantly large and continuous unbuilt areas.



Impacts on special resource values - western Cranston:

3. Destruction of areas of special resource value (cultural, historical, ecological, esthetic, geological) by construction of pipelines through the resource site

Recommended mitigating actions include:

a. identification of the areas of special resource value to permit appropriate state and local agencies to plan their programs in such manner that the special areas can be protected,

b. relocation of the proposed pipelines away from the areas of special resource value, and

c. acquisition of all or key portions of the special areas as public reservations.

4. Destruction of areas of special resource value (cultural, historical, geological, esthetic and ecological) by inducing increased stormwater runoff and traffic through the resource site as a consequence of urban growth.

Recommended mitigating actions include all the actions recommended to mitigate similar adverse effects in non-special resource value areas as described in items 1 and 2 above.

Collateral benefits of the entire set of mitigating actions could lead to establishment of a new park that:

a. protects and sets forth the rather complete evolution of man's changing relationship to his environment from pre-colonial days to the present as attested to by the special resource areas of Western Cranston, and

b. sets a tone of quality for the inevitable urbanization of the surrounding areas.

Impacts on vicinity of Cranston wastewater treatment plant:

5. Destruction of areas of special resource value by neglect to rehabilitate areas partially destroyed by operation of the existing Cranston wastewater treatment plant.

   Recommended mitigating actions include regrading the subject areas to restore their values esthetically and as wildlife habitat.

6. Reduction in value and in utility of residences in the vicinity of the proposed treatment plant improvements by noise likely to be generated by the sludge incinerators.

   Recommended mitigating actions include monetary compensation, receptor building soundproofing, and erection of noise barriers.

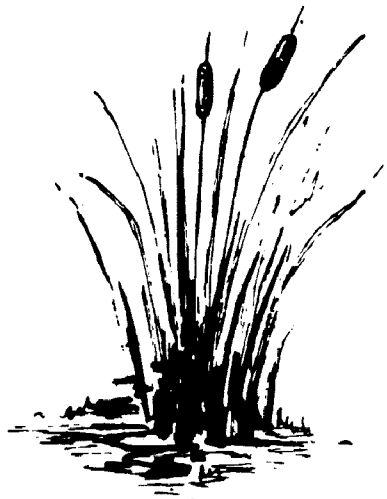
Impacts on water quality in the Pawtuxet River below the treatment plant:

7. Creation of residual chlorine concentrations in excess of those appropriate to the water quality classifications of the river as a result of chlorination of the treated effluent.

   Recommended mitigating actions include use of alternative disinfectants or dechlorination of the effluent.

1.2 RESULTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT IN THE "FACILITIES PLAN"

As part of the development of their "Facilities Plan", the master plan for sewerage for the City of Cranston, the proposed actions for which this statement has been prepared, a comprehensive survey of Cranston's physical, social and cultural environment was compiled and analyzed in a systematic, interdisciplinary manner by the facilities planners, Universal Engineering Corporation of Boston, Massachusetts, as required by the National Environmental Policy Act, section 102 (2) (A). This systematic analysis identified all the expected impacts of the proposed action, negative and positive, short-term and long-term, major and minor. The results of this analysis are shown in Table 1-3. Note that the impacts described, in detail, in this Environmental Impact Statement are those identified in Table 1-3 as negative, major, and long-term.



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1.3 SCOPE OF THIS STATEMENT

The preparation of any Environmental Impact Statement requires its authors to establish some middle ground between:

* compilation of an encyclopedic analysis of all possible areas of environmental impact, comprehensible only to patient experts, and

* oversimplification into a summary that does not allow its readers to fully appreciate the consequences of the proposed action,

and between:

* analysis limited to those few parts of the environment traditionally within the scope of the proposing agency, omitting consideration of other important parts of the environment, and

* analysis of the impact of the project on all parts of environment however trivial, with the result that important impacts might be obscured.

The Council of Environmental Quality has, over the years, sought to identify the middle ground, specifying in its Guidelines for Preparation of Environmental Impact Statements, Section 1500.8 (6) that

> "...agencies should make every effort to convey the required information succinctly...giving attention to the substance rather than form.."

Further, in its most recent annual report, CEQ noted that

> "...too many statements have been deadly, voluminous and obscure... with too much space devoted to unnecessary description rather than to analysis of impacts and alternatives..."

And finally, in its Memorandum For Head of Agencies on EIS's dated February 10, 1976, CEQ stated

> "It is the Council's position, therefore, that descriptions of the existing environment and the proposed action should be included in an EIS only to the extent that they are necessary for a decisionmaker to understand the proposal, its reasonable alternatives, and their significant impacts. The EIS should explain how the scope of the statement and its level of detail have been carefully delineated in accordance with the significant environmental issues and problems foreseen by the agency. Data and analyses in an EIS should consequently be commensurate with the importance of the impact as determined by the agency's environmental analysis. Less important material should be summarized, consolidated or simply referenced."

The major issues foreseen by the agency, EPA Region I, and identified in its Notice of Intent to Prepare an EIS and in its agreements with the City of Cranston included, but were not limited to;

1. discharge to a water quality limited stream,

2. possible adverse air quality impacts of sewage sludge incineration,

3. possible violation of environmental laws, regulations or standards resulting from development of presently undeveloped areas as a result of the proposed project ,

4. odors related to wastes of the Ciba-Geigy Company, and

5. possible impacts on properties eligible for listing in the National Register of Historic Places.

In analysis of each of the above issues, regardless of the desire for succinctness, it still remains necessary to comply with the requirements of the National Environmental Policy Act to evaluate the alternatives to the proposed action (Section 102 (2) (D)), to consider the trade-offs between the short-term effect of the proposed action and its long-term, irreversible effect (Section 102 (2) (C) (iv) & (v)), to identify supplementary actions that might mitigate adverse effects (Section 102 (2) (F)), and to do all the above in an interdisciplinary manner utilizing not only the natural sciences but also the social sciences and the design arts (Section 102 (2) (A)).

Given the complexity of the above objectives, given the broad range of issues, and given the variance in scale and scope of analysis required within each area of issue, this statement has been organized to treat each issue (or problem) separately, in turn, with each issue treated at a scale and level of detail appropriate to itself, each as an independent statement.

a. Chapter No. II
Title: Need for Urban Growth as an Issue

Issues:

1. Given that an ultimate purpose of the proposed project is orderly urban growth, is continued urban growth really necessary?

2. If it is, should some of it be in Rhode Island rather than in other places?

3. If it should be in Rhode Island, should some of it be in Cranston rather than in other communities?

b. Chapter No. III
Title: Water Quality

Issues:

1. Will disposal of treated wastewater into the Pawtuxet River, a water quality limited stream, violate present minimum water quality standards?

2. Will the proposed action, designed to meet the present minimum water quality standards within the timeframe specified in current law, tend to preclude alternative actions that may be desirable in the long-term (but not feasible immediately) or will it tend to commit the Pawtuxet River, the Providence River Estuary, the Pawtuxet Village Historic District and the surrounding urban areas, in an irretrievable manner, to less than optimum quality ?

Alternatives:

1. Effluent discharge into the Providence River Estuary, into Narragansett Bay, or into Block Island Sound.

2. Regionalization of sewerage.

c. Chapter No. IV
Title: The Impacts of Sludge Treatment and Disposal

Issues:

1. Is incineration of sewage sludge the best method for disposing of Cranston's sludge? Evaluation of this can be considered from at least two points-of-view, i.e., possible violation of clean air standards and comparison with alternative disposal methods.

2. Will the proposed action tend to preclude more desirable , alternative disposal methods that might be developed in the foreseeable future either as a result of changing technology or changing political or administrative institutions?

Alternatives:

1. Landfill, on or off treatment plant site.

2. Coincineration in a future regional resource recovery system.

3. Land application as a composted soil conditioner, as a fertilizer, or as a component of a substitute for natural topsoil.

d. Chapter No. V
Title: Neighborhood Nuisance

Issues:

1. Will there by any adverse effect upon the surrounding neighborhoods as a result of odor or noise? at the treatment plant? at sludge disposal sites? along the river downstream from the treatment plant?

2. Are there alternatives that would preclude nuisance?

3. Are there actions that can be taken to mitigate nuisance?

4. If adverse impacts are unavoidable, are the adverse impacts justified by the anticipated benefits?

e. Chapter No. VI
Title: General Impacts of Urban Growth

Issue :

1. What effects would urban growth in western Cranston have on the environment, physically, socially, esthetically?

2. What alternative growth patterns or standards are available to preclude adverse effects?

3. What alternative growth patterns or standards are available to mitigate adverse effects?

f. Chapter No. VII
Title: Specific Problems of Urban Growth in Western Cranston

Issues:

1. Will the proposed action and its associated secondary effects have any adverse impact on any specific sites, facilities or locations of special cultural, historical, social, esthetic or ecological significance?

2. Are there prudent and feasible alternatives that preclude the adverse impacts?

3. Are there prudent and feasible actions that might be taken to mitigate the adverse impacts?

g. Chapter No. VIII
Title: Overall Impacts on the City as a Whole

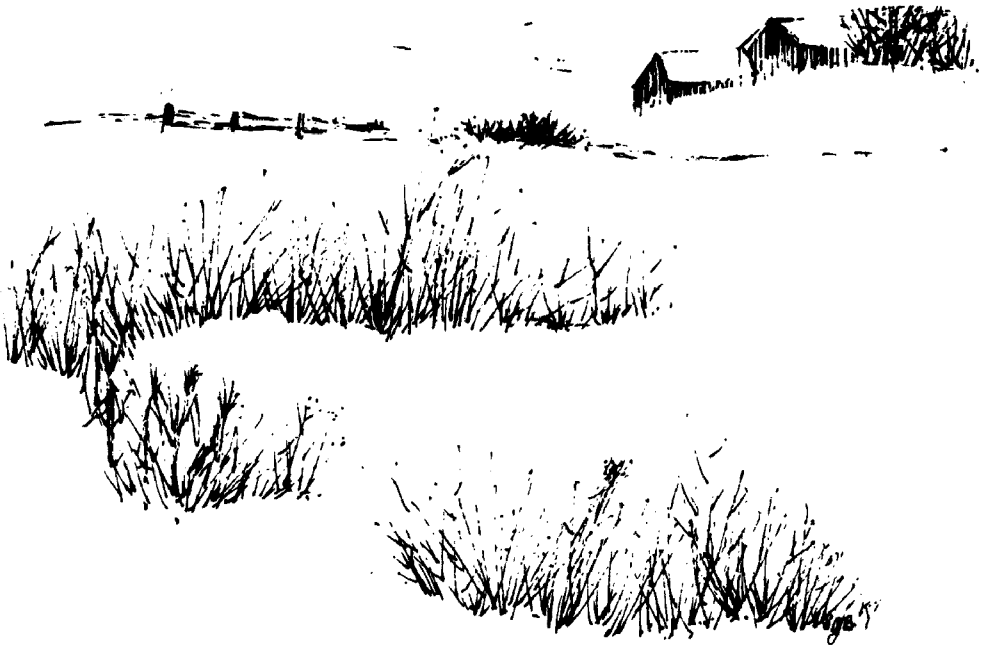
Issue

1. What effect will the set of actions proposed have on the city as a whole in the long term, given the city's overall socio-economic milieu?

1.4 NOTE ON THE CONSISTENCY OF DATA AND ON INTERPRETATIONS OF FORECASTS

And finally, it is important to note at the outset, that the data, forecasts and assessments of impact presented in this statement, in the Facilities Plan, and in the various city and state planning reports were derived from a variety of sources, by a number of agencies and individuals, with varying experience, fields of expertise, and points of view, at different points in time. As a result there are discrepencies between this statement and other planning reports. These discrepencies should not be construed as evidence that any of the documents are in error or have not been researched and prepared by competent professionals, but rather they should be taken as evidence of the rapid development of the environmental sciences, their data resources, and analytical techniques.

On the matter of discrepencies between forecasts, it should be noted that the future is inherently unknowable, that unforeseen conditions can and do occur with distressing frequency and regularity, and that to act on the assumption that the future is indeed known is probably one of the surer courses to error. It is suggested that the reader upon coming to such a discrepancy in forecasts not take the discrepancy as evidence of error, but rather as a caution on accepting any forecast at face value.



Chapter II THE NEED FOR GROWTH AS AN ISSUE

2.0 INTRODUCTION

The proposed action includes both pollution abatement and capacity expansion. It is assumed that pollution abatement is not a controversial environmental issue but that capacity expansion can imply some fundamental environmental issues including that:

there is a need to expand, and

the proposed expansion would be best served in the proposed manner at the proposed location.

As a basis for evaluating these assumptions, as applied to the proposed project, the following subjects are briefly explored below:

1. National growth needs.

2. Rhode Island's fitness for urban growth in comparison with other geographic regions of the nation.

3. Cranston's fitness for urban growth in comparison with other regions of Rhode Island.

The growth alternatives that might be adopted, their probable impacts, and actions that might be taken to mitigate those impacts are explored below:

2.1 NATIONAL GROWTH NEEDS

As the birth rate of the United States continues to decline for the 20th consecutive year, from a peak of about 25 births per thousand persons per year in 1957 to something under 15 at the present time, the questions of whether any new utilities are indeed required, and if so, on what scale, do appear to be legitimate.

The answers to these questions, paradoxically, are, yes, new utility expansions are necessary somewhere in the nation, and they are necessary on a large scale in the near future.

The basis of the answers can be found in analysis of the totality of the nation's demographic characteristics and primarily in the phenomenon that as the nation's population of children is declining, its population of adults in increasing. Simply viewed, as the post-World War II "boom babies" mature, the adult population will increase rapidly for some time into the future regardless of what happens to the birthrate. Figure II-1 United States Population by Age, 1970-1990, from the U.S. Bureau of Census, shows the broad outline of the anticipated maturation of the population.

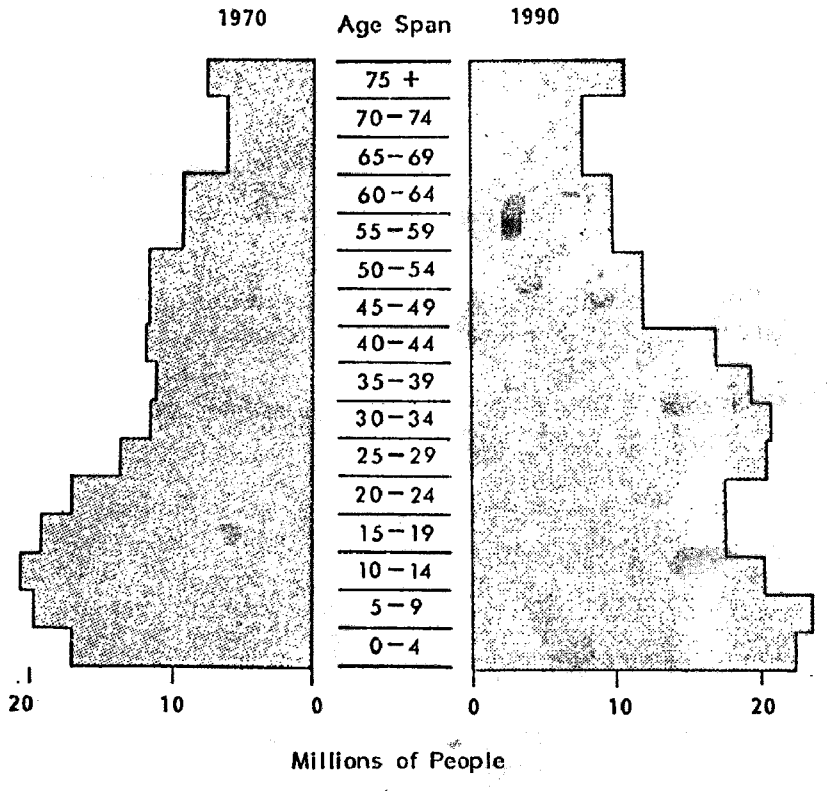


Figure II-1 UNITED STATES POPULATION BY AGE 1970 AND 1990

Source: Statistical Abstract of the United States, 1973.

The elements of this maturation will include:

a. Decrease in the number of teenagers in the population,

b. Substantial increase in both the percentage and absolute number of young adults, say from 25 to 34 years old,

c. Decrease in the percentage of people 45 to 54 years old,

d. Significant increase in the percentage and absolute number of senior citizens, say people over 65 years old, and perhaps most interestingly,

e. Significant increase in the number of younger children resulting from the ultimate reproduction of the post World-War II boom-babies.

The social and economic consequences of this prospective change are well described in "Population and the American Future", the Report of the Commission on Population Growth and the American Future, submitted to the President and Congress of the United States in March 1972:

> "Now, as the youth culture of the sixties evolves into the young adult society of the seventies, the impact is being felt in the housing and job markets. In the two decades before 1965, about 48 million Americans reached the age of 20. Between 1965 and 1985, over 78 million will cross this important threshold.
>
> "As those born during the baby boom move off the campus or leave their parents' homes, we can expect a 33-percent jump in annual household formation by the end of this decade. Between 1950 and 1966, the number of households grew at a relatively steady rate of around 900,000 per year. After that, the rate began to climb, and last year we added well over one million households. Our research shows that the rate will increase to almost 1.5 million households added each year by the end of the seventies, and will remain at that level until about 1985. These figures understate future demand for the construction of new housing, since additional new housing units will be required to replace part of the older housing stock.
>
> "Along with increased housing demands will come greater demand for employment opportunities. The highest rates of joblessness are found among the young. Consequently, one factor to be considered, irrespective of the state of the economy itself, is the sheer increase in the numbers of young people seeking work. The Bureau of Labor Statistics tells us that we can expect about 3 1/2 million persons to make their initial entry into the labor force each year during the 1970's. This level of prospective job seekers exceeds the annual average for the 1960's by about 700,000 persons a year. Here again, we can attribute the large numbers to a heavy influx of new job-seekers who were born during the baby boom.
>
> "In sum, it should be evident that, even if the recent unexpected drop in the birthrate should develop into a sustained trend, there is little cause for complacency. Whether we see it or not - whether we like it or not - we are in for a long period of growth, and we had best prepare for it."

2.2 SUITABILITY FOR URBANIZATION, RHODE ISLAND & CRANSTON

If one grants, based on the foregoing analysis, that new housing and work-places will be needed in large amount in the near future, several new questions arise, i.e. should part of the growth occur in Rhode Island; if in Rhode Island, should it occur in Cranston; and if so, how much. The section below explores the first two of these, i.e. the issue of Rhode Island's suitability for growth vs. other parts of the United States, and the issue of Cranston's suitability vs. other areas of Rhode Island. The question of how much growth is appropriate for Cranston is largely a matter of what environmental impacts various amounts of growth would generate, the subject of Chapter VI.

2.21 RHODE ISLAND VS. UNITED STATES

The issue of whether Rhode Island should play a continuing role in supplying the growth needs of the nation can be viewed as a social or moral issue, as an ecological issue, and as a geographic phenomenon.

2.211 As a Social Issue

In a moral sense, (or alternatively as an issue of social justice, social equity, social stability, or protection of the general welfare) it has long been a tenet of the culture of the overwhelming majority of the population of the United States that they are, to some extent, their brothers' keepers, that they have been brought up to feel an obligation to provide for both their own individual progeny and for their neighbors'. They do tax the employed to feed the unemployed; they do tax the childless to pay for the schooling of their neighbors' children; and they do require, under penalties prescribed by law, fathers to support their children. The post-war "boom babies" are, in part, their own children and their neighbors' children and it can be said the society will feel an obligation to insure that their children can find both jobs and housing in the reasonably near future.

2.212 As an Ecological Issue

In an ecological sense, comparisons can be made between Rhode Island and the rest of the United States as a suitable urban habitat, specifically with regard to their relative potential for high air pollution, their relative availability of water, and their climate.

2.2121 Air Quality Resources

Figure II-2, Days of High Air Pollution Potential Forecasted taken from THE NATIONAL ATLAS of United States of America published by the United States Geological Survey, based on data provided by the National Center for Air Pollution Control, shows the relative susceptibility of the various parts of the country to air pollution problems, or the relative difficulty of controlling air pollution concentrations in those areas.

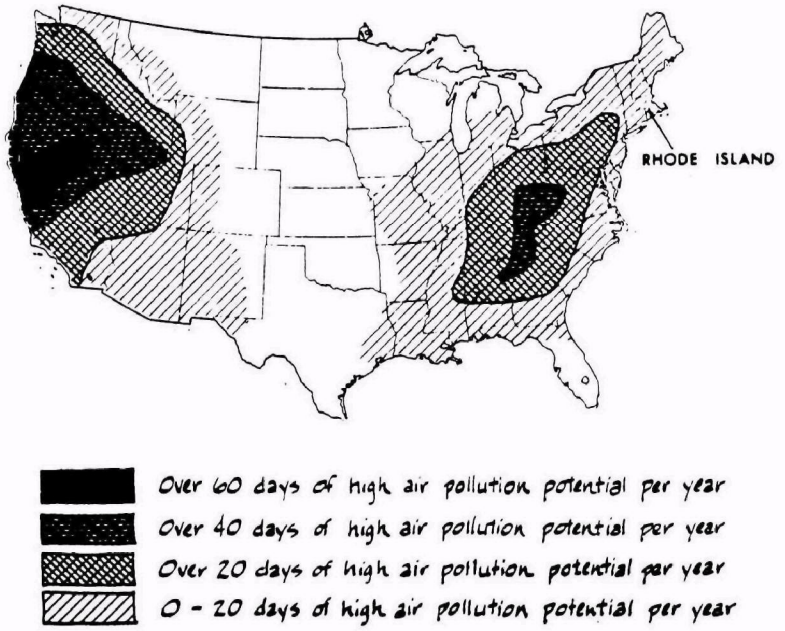


Figure II-2 DAYS OF HIGH AIR POLLUTION POTENTIAL FORECASTED

Sources: National Atlas of the United States of America, 1970

The numerical values on the map represent the total number of days of high air pollution that were forecast since the national air pollution potential forecasting program began (1960 in the East and 1963 in the West) through December 31, 1966.

Note that Rhode Island falls just above the zero line, and is exceeded in its relative freedom from forecasted high air pollution potential only by eastern Maine, Cape Cod, southern Florida and the Great Plains region.

2.2122 Water Supply Resources

Figure II-3, Anticipated Water Shortages in the United States taken from POPULATION AND THE AMERICAN FUTURE based on a paper on "Future Water Needs and Supplies" by Ronald G. Ridker for the Commission on Population Growth shows the relative availability of potential water supply in excess of demand in the United States.

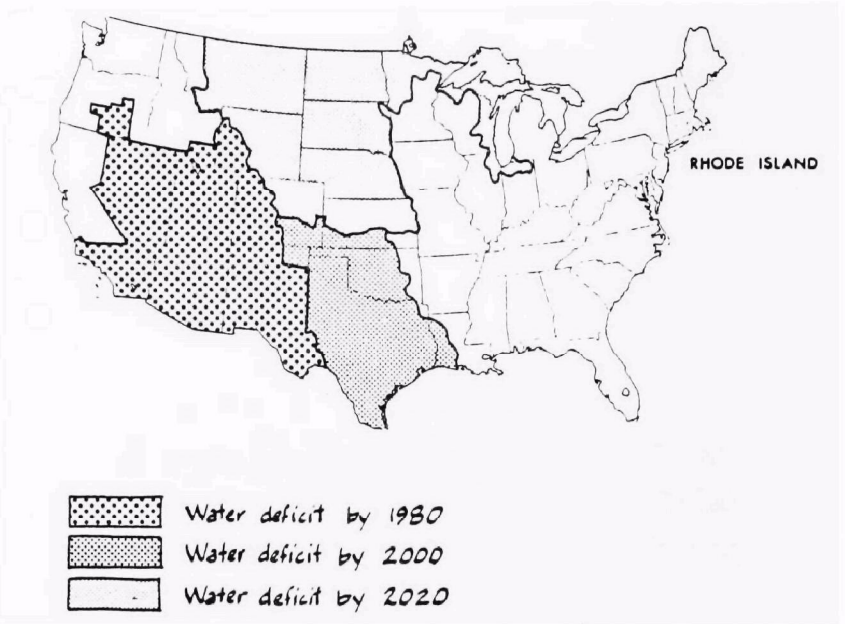


Figure II-3 ANTICIPATED WATER SHORTAGES IN THE UNITED STATES

Source: Ronald G. Ridker, "Future Water Needs & Supplies," for the Commission on Population Growth, 1972.

Note that Rhode Island is well into the zone of excess potential supply over demand and note also that the regions of impending shortage include some of the fastest growing states in the nation.

Figure II-4, Basic Resource Availability simply superimposes Figures II-2 and II-3. Note that the regions of low forecasted air pollution potential and abundant

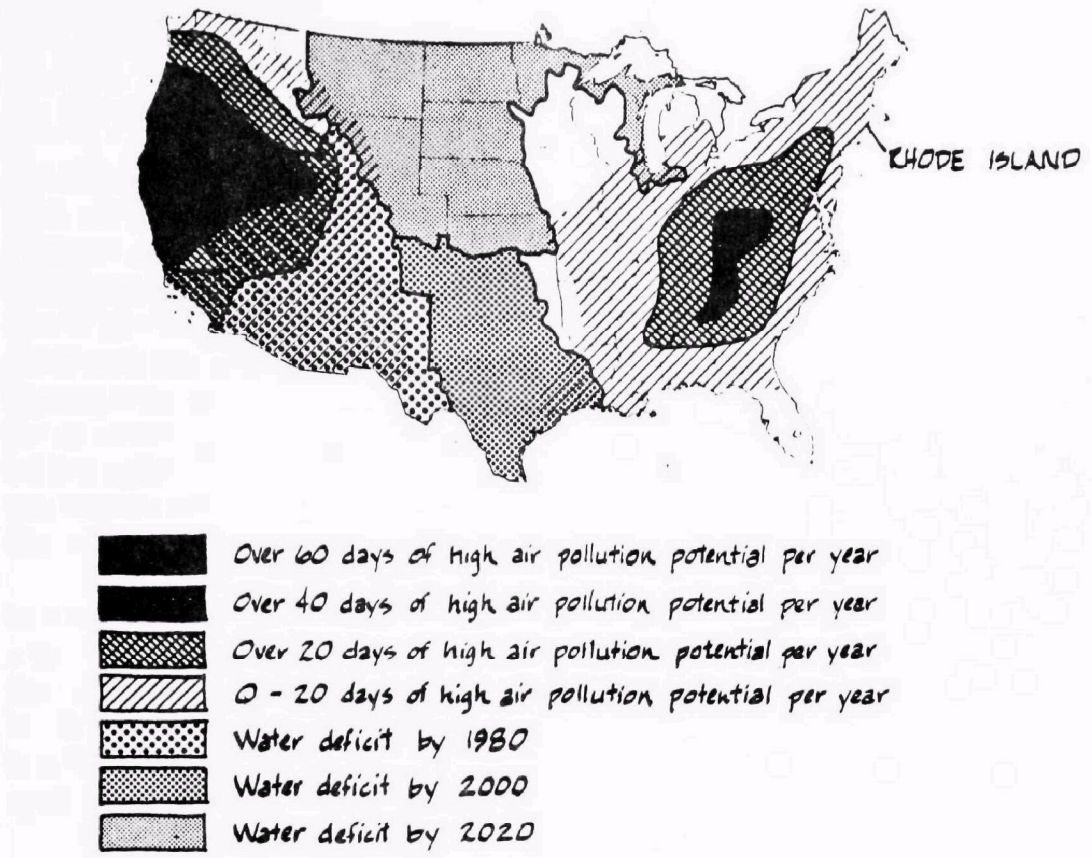


Figure II-4 BASIC RESOURCE AVAILABILITY

Sources: National Atlas of the United States of America, 1970, and Ronald G. Ridker, "Future Water Needs & Supplies," for the Commission on Population Growth, 1972.

water include only eastern Maine, Southeastern New England, the Carolina Capes, central Florida, the upper Mississippi Valley and the western Ozarks.

The major urbanized areas of these favored regions include Bangor, New Bedford/Fall River/Providence, Tampa/St. Petersburg, Palm Beach/Ft. Lauderdale/ Miami, Minneapolis/ St. Paul, Cedar Rapids/Des Moines, and Tulsa/Ft. Smith.

2.2123 Climate

Rhode Island enjoys a relatively moderate and even climate, tempered by its location on the seacoast, surrounded by the ocean on two sides. Its temperatures range from a normal minimum for January of 20.6° F to a normal maximum for July of 81.1°F with record peaks of -15°F in winter and +100°F in summer. The moderation that this range in temperature represents can, perhaps, be best grasped by noting that of the 70 major cities whose climate is reported on in the Statistical Abstract of the United States (at least one in each state), 33 had lower winter record temperatures than Cranston and 57 had higher summer record temperatures.

This moderation in temperatures is reinforced by Rhode Island's relatively low relative humidity, averaging 74% at 7:00 a.m. and 55% at 1:00 p.m., for the year. This compares well for comfort with the rest of the 70 cities, 57 of which exceeded Rhode Island's 7:00 a.m. relative humidity and 46 of which exceeded its 1:00 p.m. relative humidity.

Rainfall is both ample and well distributed throughout the year. The average annual precipitation is 42.75 inches with no month normally having less than 2.65 inches and none having more than 4.52 inches. The number of days of some rain per month ranges from 8 to 12 with 6 months averaging 11.

Sunshine is similarly well distributed throughout the year but is limited to occurring only 56% of the time, somewhat less than 60% that is the median of the 70 cities.

The state is well-ventilated with an average annual wind speed of 10.9 miles per hour, well above the median of 9.3 miles per hour of the 70 cities and exceeding the annual average of 58 of them. The region's winds are well distributed through the year and range from a monthly peak of 12.6 mph in April to a low of 9.7 mph in July, August, and September.

2.213 As a Geographic Phenomenon

Looking at Rhode Island's relative suitability for growth in terms of classical economic geography (or, alternatively, social ecology), note, as introduction, the words of Preston E. James in A Geography of Man:

> Most parts of the earth's surface are empty of human inhabitants. Vast areas are only very thinly peopled, with small communities separated by many miles of empty land. In southeastern Asia, on the other hand, about half of all the people in the world are crowded into less than a tenth of the world's habitable area. In Europe a little less than a fifth of mankind is occupying an area which amounts to less than one twentieth of the habitable world.
>
> Yet to draw the conclusion that a great movement to the empty lands of the world is about to take place would be quite wrong. People are concentrated in certain parts of the world because these parts offer greater opportunities for the support of human life than other places. These opportunities are in part the result of the resources of the earth itself, and in part are man-made. But the tendency today, as always, is for people to move from areas of lesser to areas of greater economic opportunity. The population in areas of concentrated settlement is becoming more concentrated; the population of thinly peopled areas is becoming thinner.

Rhode Island historically has been an area into which people have moved, for hundreds of years, despite its economic ups and downs, despite its limited mineral resources, despite its limited agricultural resources, despite its limited fuel. Presumeably, compared to other areas, it has nonetheless been

an area of greater economic opportunity, and it appears to offer as its major development resource, its social infrastructure and its existing urban services nucleus. The importance of these kinds of resources was noted by Richard L. Morrill in his introduction to The Spatial Organization of Society in 1974:

> Geography has traditionally pointed out that certain areas are more useful or attractive than others. They might be favorable for specific economic activities, or they might be focal points for trade factors....as the abstract characteristics of space (for example, distance and accessibility), and the variable quality of the earth's surface....and upon other factors that are not strictly geographic....including economic, political, and cultural determinants....Perhaps the most important determinant of all is the sheer force....of past patterns of development.

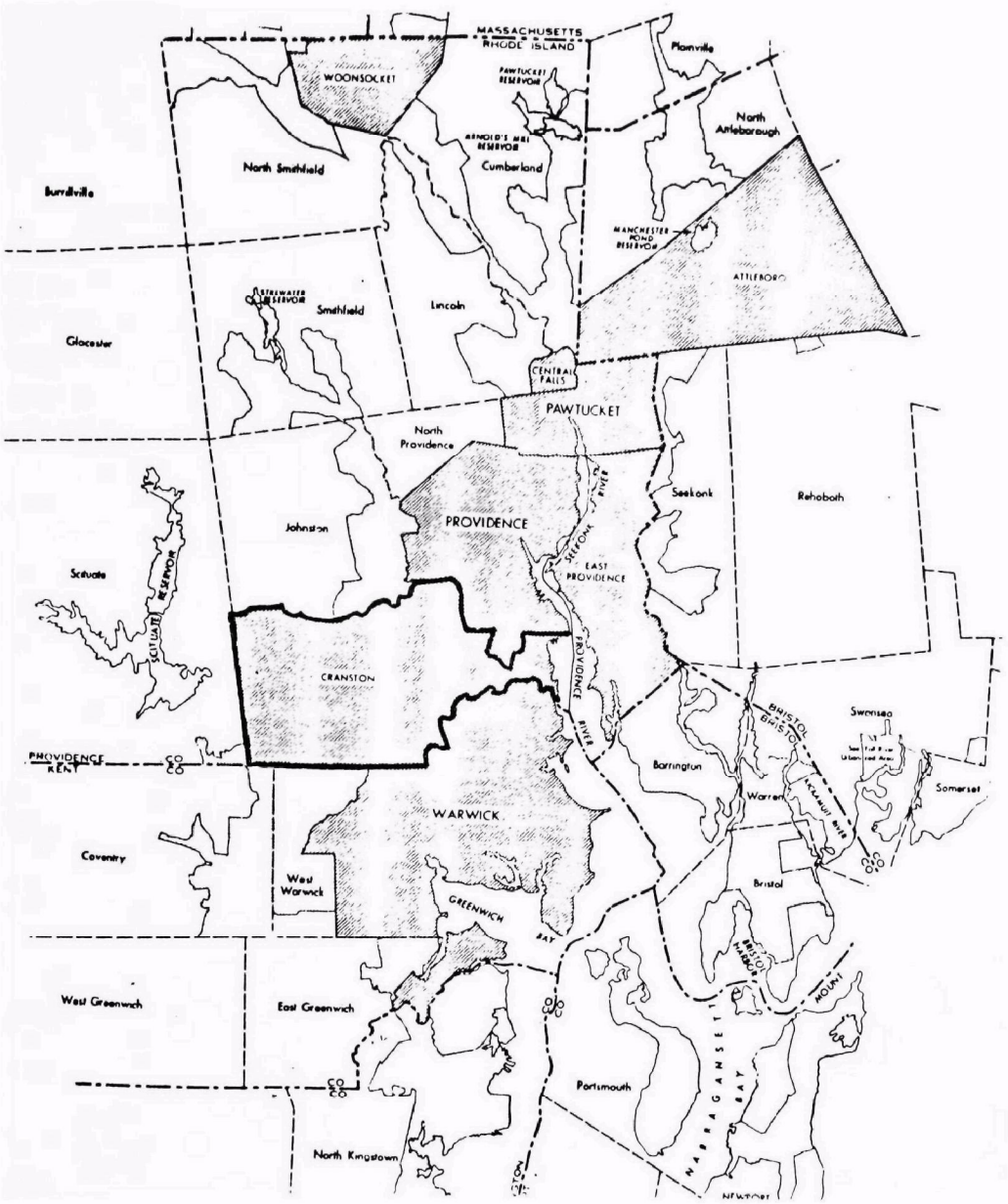
On the mechanism by which the past pattern operates he pointed out:

> Economically, production efficiency is increased by associations of related industries, such as the clustering of small subcontractors around large automotive and aircraft complexes. Distribution efficiency is gained by grouping the buyers and sellers of goods and services in such places as fairs, the market town, and the shopping center. The proximity of various shops stimulates impulse-buying, thus increasing business turnover and regional consumption in the area. Not only does agglomeration reduce the total distance that people travel, satisfying a geographic goal, but it enables them to satisfy many purposes with little effort.

On the size of city that does this most effectively he pointed out:

> Not until a city reaches a size of 250,000 to 350,000 people does it attain a threshold that can provide some self-sufficiency in central place services, support high-quality cultural and educational amenities, and also attract modern industry. It is not surprising, then, that as transportation improves, larger places are the locus of most net growth. Places from about 200,000 to perhaps two million appear most attractive at the present time, evidently because they can support a very wide range of services and activities, are rather self-sufficient, and can support an efficient internal transport system without the severe social costs and congestion of the giant metropolis.

Note that the Providence Metropolitan Area falls right in the center of Morrill's optimum size range.



2.22 CRANSTON VS. OTHER COMMUNITIES IN RHODE ISLAND

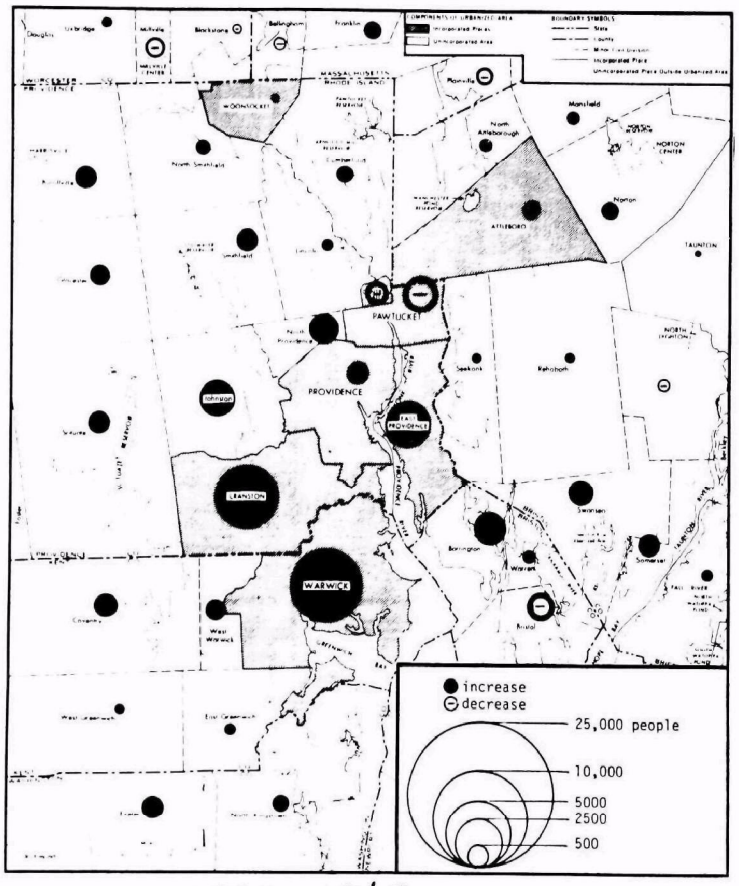
The issue of whether Cranston, or more precisely, western Cranston, should play a significant role in accommodating the growth of population of Rhode Island is, in some senses, similar to the issue of whether Rhode Island should do so with regard to national growth. The social/moral issue and the geographic phenonema are similar to the larger ones that apply when one considers Rhode Island with respect to the nation, the resource use factors, in contrast, are not so clear cut and militate both for and against development in western Cranston, and the economics/jobs/industrial development issue achieves special significance.

2.221 As a Social Issue

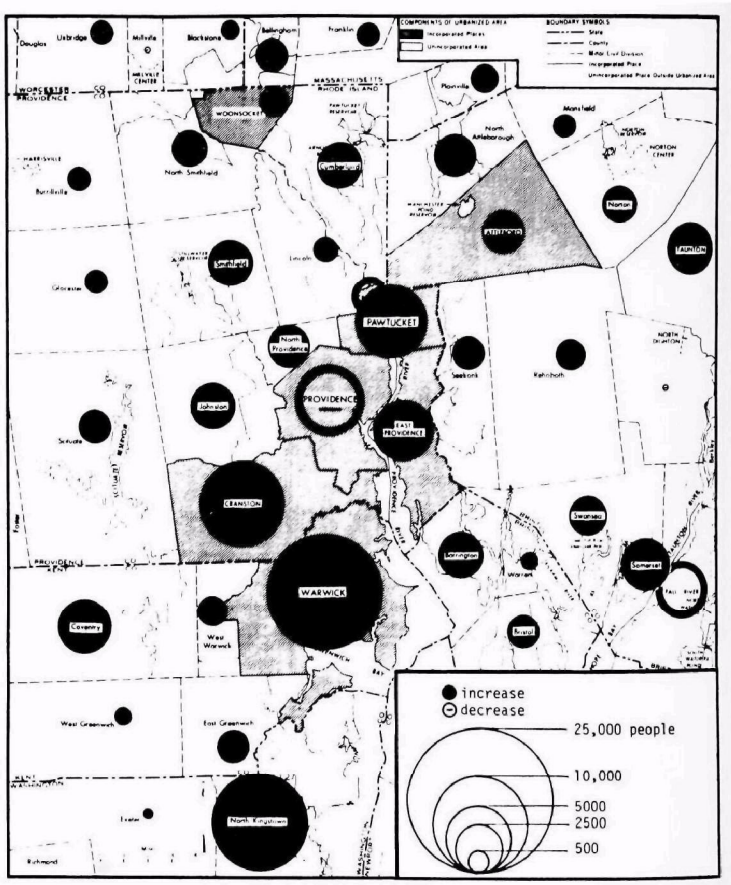
This issue is virtually identical to that of the Rhode Island growth issue and need not be separately discussed.

2.222 As a Social Ecological Phenomenon

As a social phenomenon, American cities historically have grown by accretion of new development, mostly housing, around their perimeters with gradual change of the older core to non-residential services. The extensive urban renewal activities of the 1950's and 1960's did not reverse this trend and in fact may have accelerated it. Figure II-5, Population Changes in the Providence Urbanized Area, 1930-1970, show this tendency quite clearly.



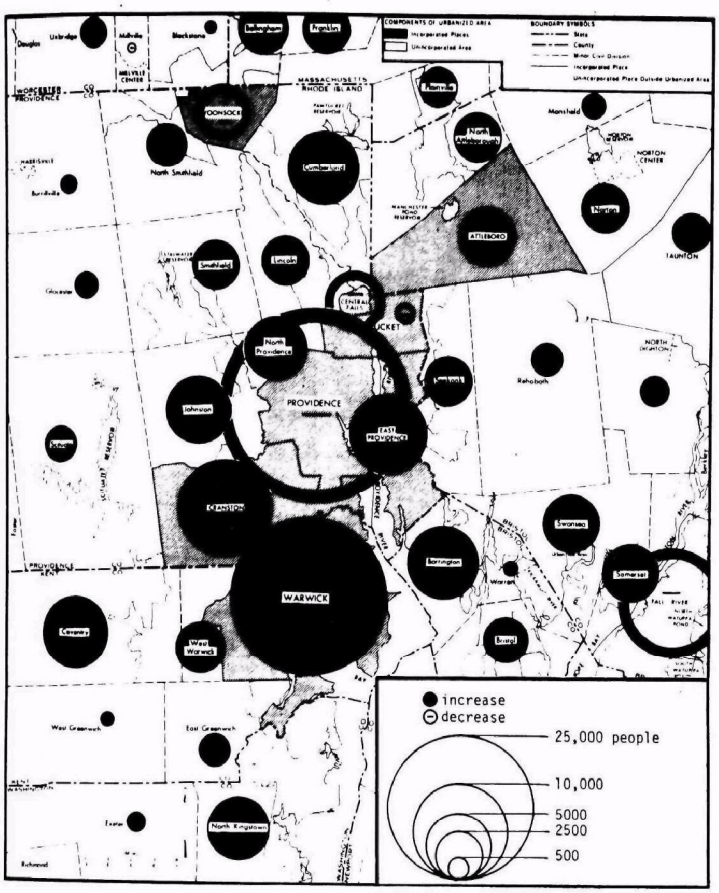
1930-1940



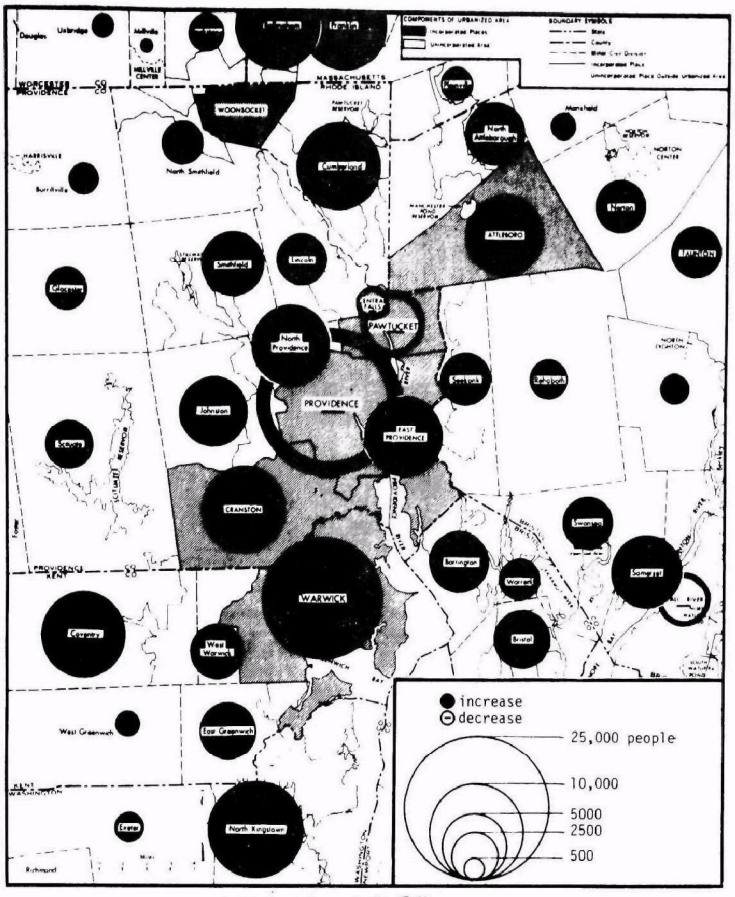
1940-1950

Figure II-5 POPULATION CHANGES IN THE PROVIDENCE URBANIZED AREA, 1930-1970

Source: U.S. Census of Population, 1930-1970.



1950 - 1960



1960 - 1970

In the future, it does not appear reasonable to expect so long-standing a phenomenon to change. The Commission on Population Growth and the American Future agrees and stated in its report:

"A third problem lies in the expanding periphery of metropolitan areas. During the rapid expansion of suburban areas since World War II, we failed to plan for anticipated growth, instead, we allowed it to spread at will. Whether or not we are past a population explosion, it is clear that the land use explosion of 'spread city' is currently in full bloom. In the 1970's and 1980's the baby-boom generation will marry, have children, and set up house in the suburbs creating a tremendous demand for the conversion of rural land to urban use."

Exactly where this conversion of rural to urban land will occur in the Providence region is part of the decision implicit in the proposed project, i.e. should this conversion occur in western Cranston or elsewhere. Figure II-6, Cranston and the Providence Urbanized Area, shows the relationship between Cranston and the Providence Urbanized Area as defined by the United States Geologic Survey in its 1:250,000 map series. Note that western Cranston lies quite close to the center of the urbanized area and suggests that urbanization of western Cranston would minimize urban sprawl and its associated costs.

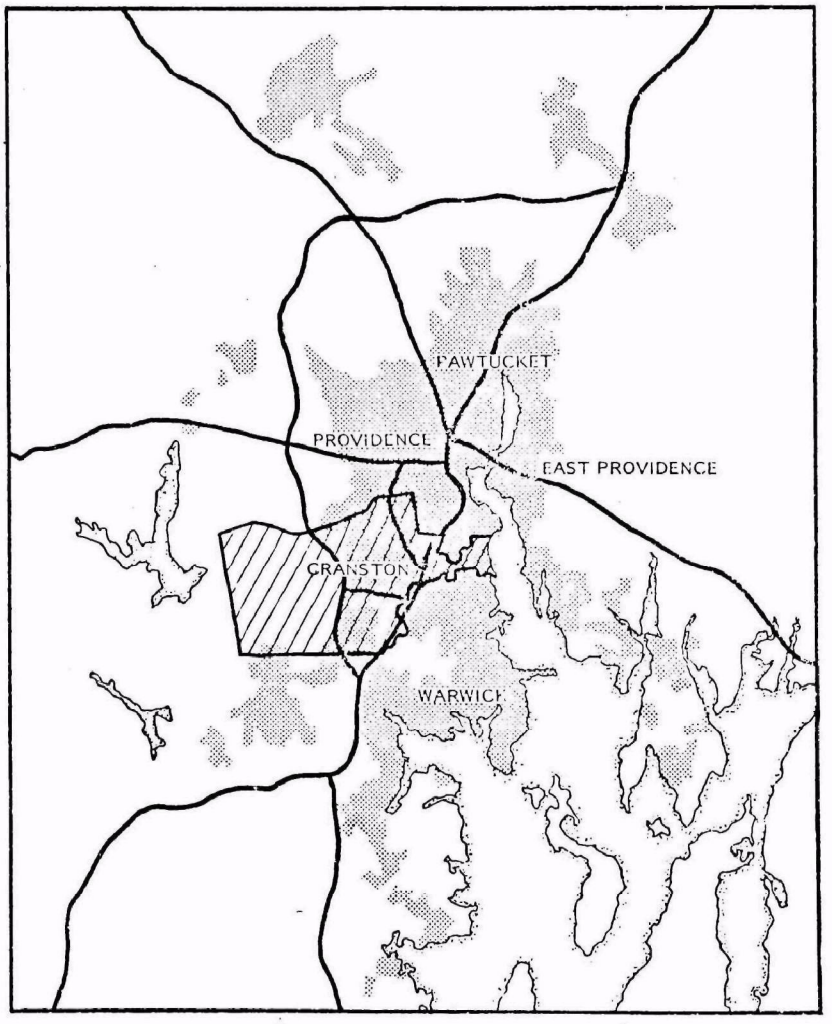


Figure II-6 CRANSTON AND THE PROVIDENCE URBANIZED AREA.

Source: U.S. Geological Survey.

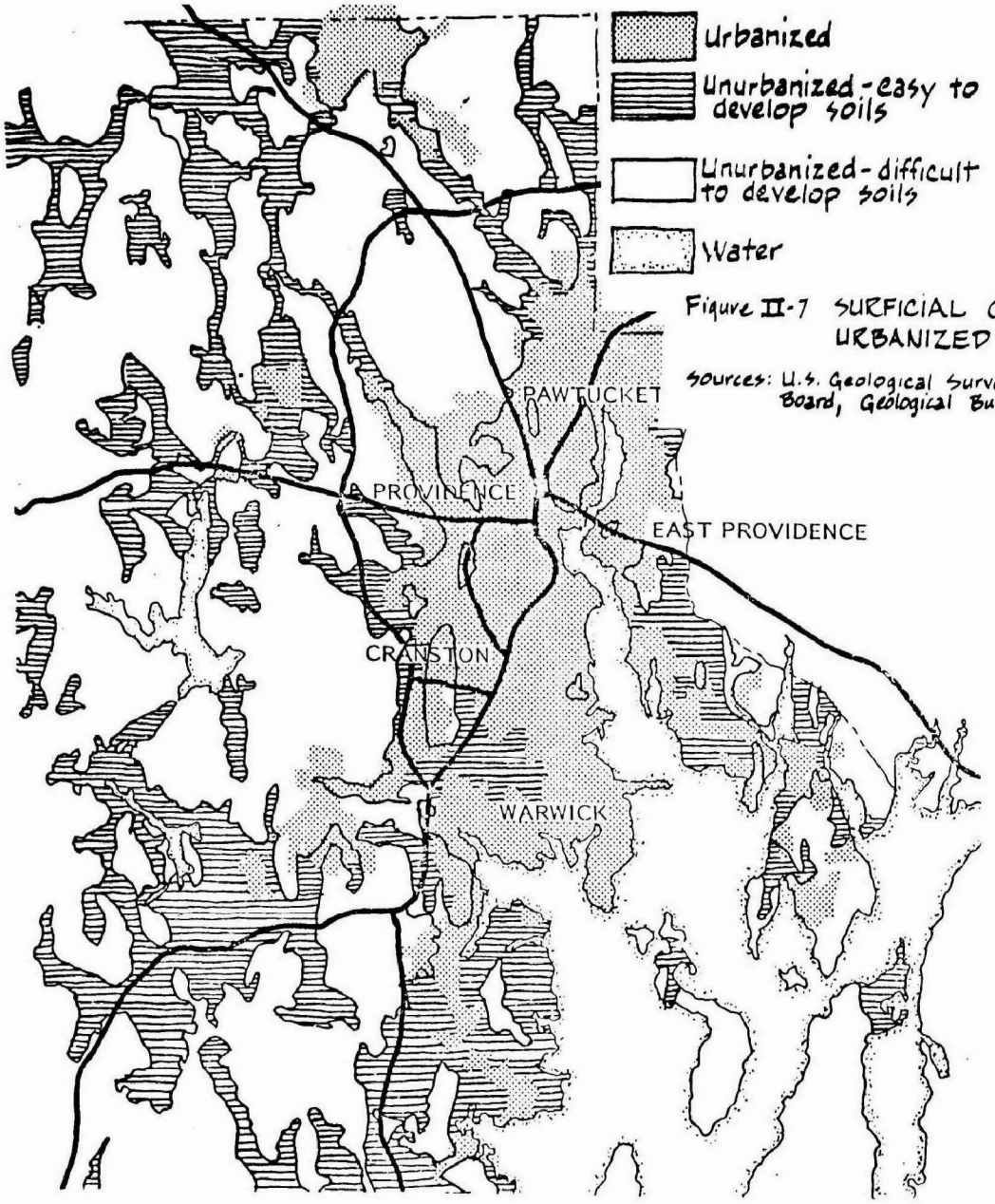


Figure II-7 SURFICIAL GEOLOGY IN THE PROVIDENCE URBANIZED AREA

Sources: U.S. Geological Survey, and R.I. Water Resources Coordinating Board, Geological Bulletin #11, 1961.

Figure II-7, Surficial Geology in the Providence Urbanized Area, in contrast, shows the patterns of urbanization and relative soil developability for the same areas. Note that past urbanization corresponded closely with easy to develop soils, that western Cranston is mostly hard to develop soils, that there is an abundance of easy to develop soils in other suburbs, as in Coventry and North Kingston, and, finally, that there is a close correspondence between the suburbs whose growth has accelerated most dramatically in recent years, see Figure II-5, and the large areas of easy to develop soils. All these taken together suggest that without overcoming Cranston's soils problems, i.e. installing public sewers, urban growth in Rhode Island would tend to spread even further out into more distant rural areas.

2.223 As an Environmental Resource Use Issue

The principal resource-use issues that bear on the development of western Cranston vs. other Rhode Island suburbs centers on the preservation of productive and attractive farmlands. Figure II-8, Status of Agricultural Lands in the State of Rhode Island, from the state's Land Use Policies and Plan indicates that western Cranston contains some of the best agricultural land in the state and certainly the best near the urbanized areas; and Figure II-9, Cleared Lands, shows the extent of lands either farmed or pastured, now or in the

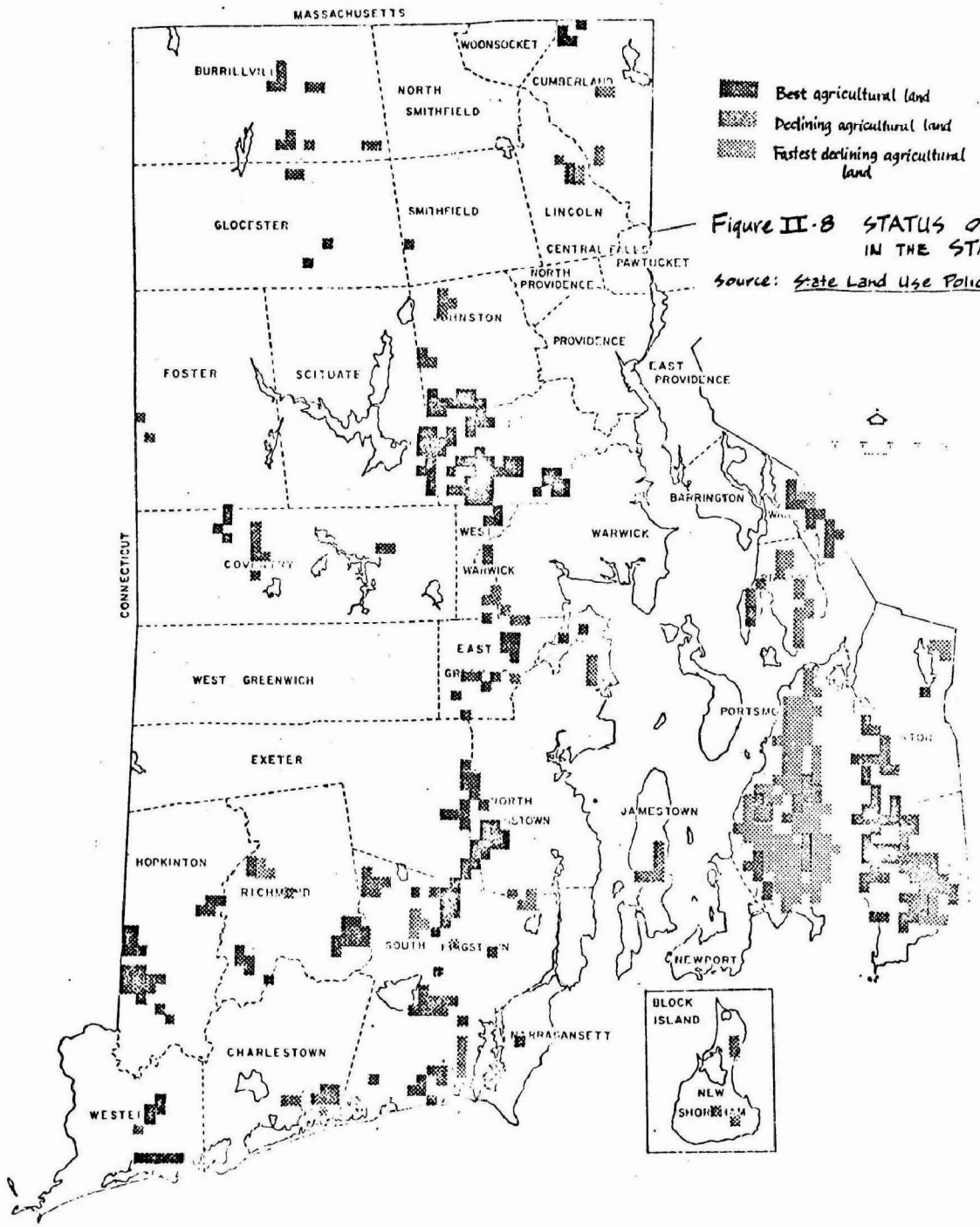


Figure II-8 STATUS OF AGRICULTURAL LANDS IN THE STATE OF RHODE ISLAND

Source: State Land Use Policies & Plan, Statewide Planning, 1975.

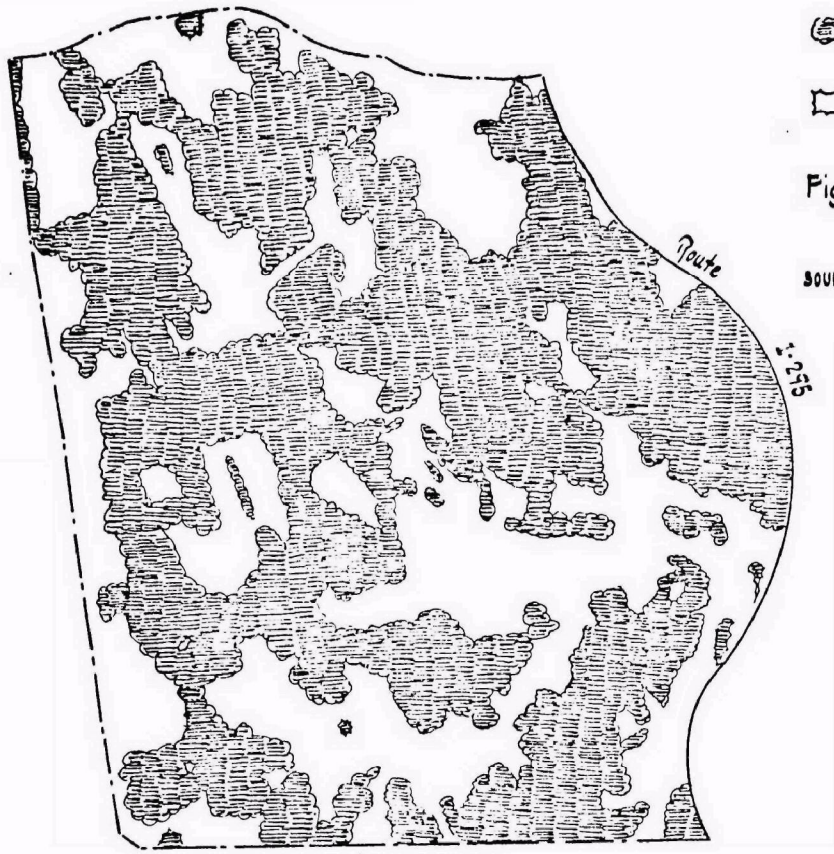


Figure II-9 CLEARED LANDS
Western Cranston

SOURCE: U.S. GEOLOGICAL SURVEY

fairly recent past, in western Cranston as indicated on recent U,S, Geological Survey maps. Whether these lands should be preserved for agriculture is a complicated issue and can be viewed in many ways including as infringement on private property beyond the business of the state, as an irreplaceable productive resource, as a component of the state's economic base, as an esthetic resource, etc.

The agricultural lands in question are privately owned and the owners generally cannot be deprived of their rights to develop, subject to the same limitations placed on other lands, without compensation. In part, it can be assumed, that some of this land has been kept in agricultural use only for the purpose of generating cash flow while the development market has been ripening.

The question of preserving the agricultural land as a needed food production resource for that time in the distant future in which the world's population will be pressing sorely upon the world's productive capacity can be viewed from at least two viewpoints, i.e., the question of whether Rhode Island's total agricultural land or output is meaningful when compared to its food needs and the question of whether residential development really precludes food production.

On whether Rhode Island's agricultural lands or food production is statistically meaningful, the U.S. Census Bureau's County and City Data Book, 1972 indicates that Rhode Island as a whole included only 1/15000th of the nation's farmland and produced only 1/3000th of its total retail food purchases. Looked at another way, Rhode Island's retail food purchases were about $325 million per year in the late 1960's while its annual commercial agricultural output was only about $15 million. Adjusting these figures for the spread between farm and retail prices to allow for distribution costs, Rhode Island's production amounted to only about 10% of its purchases.

On whether residential development will permanently preclude food production it is important to note that the large-scale agriculture of the American Mid-west is oriented toward low-cost production in an economic (return on investment) sense and not on highest yield per acre. High yields usually are achieved by intensive care, a condition that can exist in backyard gardens, or as they used to be called, the "tofts of croft" agriculture.

Comparison of the value of Rhode Island's agriculture with that of its other basic production industries, from the County and City Data Book, 1972 shows commercial agricultural output at about $15 million, mining output at about $5 million and manufacturing output at about one billion three hundred and fifty million, all per year in the late 1960's. Of these basic production industries, agriculture in Rhode Island constituted only 1%. Adding the service industries, i.e. trade, construction, finance, education, repair, etc., to the total, agriculture would constitute less than 1/2 of 1% of Rhode Island's total economy.

And finally while much of the farmland in western Cranston is visually attractive, it must be noted that farmland, and the specialized structures usually associated with it, is not always attractive and that urban development, if properly designed in an esthetic sense, with sufficient preservation of vegetation and open spaces, can be fully as attractive. In the final analysis, beauty is in the eye, and in the cultural heritage, of the beholder.

2.224 As an Economics/Jobs/Industrial Development Issue

Key points to note with respect to economics/jobs/industrial development issues are:

1. Rhode Island currently has, and has had for some time, one of the worst unemployment problems in the nation and in the developed world, with about 1 out of every 8 people in the active labor force out of work and countless others either working fewer hours than they would elect or not seeking work because they have no hope of finding it. In all, about 50,000 people in the state are or have recently been out of work and actively seeking jobs.

2. The potential annual increase in labor force of Rhode Island (youths leaving school minus retirees) is now larger than it ever was before as a result of the maturation of its own youth, about 5,000 to 10,000 new potential job seekers each year.

3. The environmental costs of the income foregone as a result of unemployment are extensive including, as a result of:

   a. increased crime and violence:

      1) increasing flight of the middle-class from the cities to the suburbs,

      2) urban neglect and decay, and

      3) increased commuting and consequent air pollution;

   b. reduction of revenue to cities and states, in turn reducing:

      1) capital expenditures for parks, recreation areas, and sewage treatment plants, and

      2) housekeeping functions such as street and park maintenance, etc.

4. Cranston, particularly in the areas along its expressways, at their interchanges, (given the city's excellent accessibility and its public services, i.e. sewers, water, police and fire protection, etc.) is one of the best locations in Rhode Island for new industrial, commercial, and services growth with such growth likely to result in minimum aggregate commuting cost and minimum increase in public service costs.

5. The industrially zoned areas of Cranston, developed with the kind of industry typical of southern New England in recent years, could provide about 10,000 to 15,000 new jobs.

2.3 SUMMARY & CONCLUSION

In sum, in answer to whether there should be growth in Rhode Island and to whether some of it should be allowed to occur in Cranston, it appears that:

1. such growth is inevitable, i.e. the children born during the boom of the 1950's and early 1960's will mature and take their places in adult society,

2. the United States as a society accepts the responsibility of each generation to provide for its successors,

3. Rhode Island, in general, and Cranston, in particular, are more suitable for urban growth than most of the rest of the United States,

4. the loss of farmland in Cranston is not likely to lead to a significant loss of long-term productivity in any large sense,

5. urbanization of western Cranston can be viewed as the "least sprawl" alternative of the feasible growth choices available, and

6. the economic benefits, direct and indirect, immediate and long-term, that would be generated by the proposed growth supporting action, are sorely needed by Cranston and the State of Rhode Island.

The answer ultimately lies in the question of alternatives, i.e. is there a responsible alternative to urban growth, generally, and to urban growth in Cranston, specifically?

Chapter III WATER QUALITY

3.0 INTRODUCTION

The proposed action includes continued discharge of treated wastewater into the Pawtuxet River at the site of the existing (and proposed) wastewater treatment plant. Given:

1. that it will be necessary to expand Cranston's wastewater discharges to serve the orderly and balanced growth of the community.

2. that the water quality of the river must be improved to meet adopted water quality standards,

3. that the low flows of the river are relatively small compared to the wastewater discharges, and

4. that there are substantial pollution discharges into the river over and above those from the facilities directly related to this project,

the following questions arise:

1. will the proposed action violate presently proposed minimum water quality standards.

2. will the proposed action tend to preclude any preferable longer-term alternatives or tend to commit the river to less than optimum quality in the long term?

The sections below describe the river system into which wastewaters are to be discharged, the wastewaters, the proposed treatment process, alternatives that have been considered, and the effects of the treated wastewater discharge on the river.

3.1 BACKGROUND

This section includes a description of the river environment into which the wastewaters will be discharged, both present and future, and of the wastewaters to be discharged, quantitatively and qualitatively, at the present time and over the design life of the proposed plant.

3.11 THE PAWTUXET RIVER

The Pawtuxet River, the stream that receives the treated wastewaters of the City of Cranston and most of its industries now, and that is proposed to continue to receive them in the proposed project, is a relatively small river in central Rhode Island, lying in large part within the Providence Standard Metropolitan Statistical Area and including along its lower reaches a substantial portion of the Providence urbanized area.

Figure III-1 shows the extent of its watershed reaching from the uplands along the Connecticut state line in the west, to the Providence River estuary, an arm of Narragansett Bay, on the east. The City of Cranston lies along the lowest reach of the Pawtuxet on its north side, the City of Warwick lies across the river to the south, the City of Providence lies just outside the Pawtuxet watershed to the northeast.

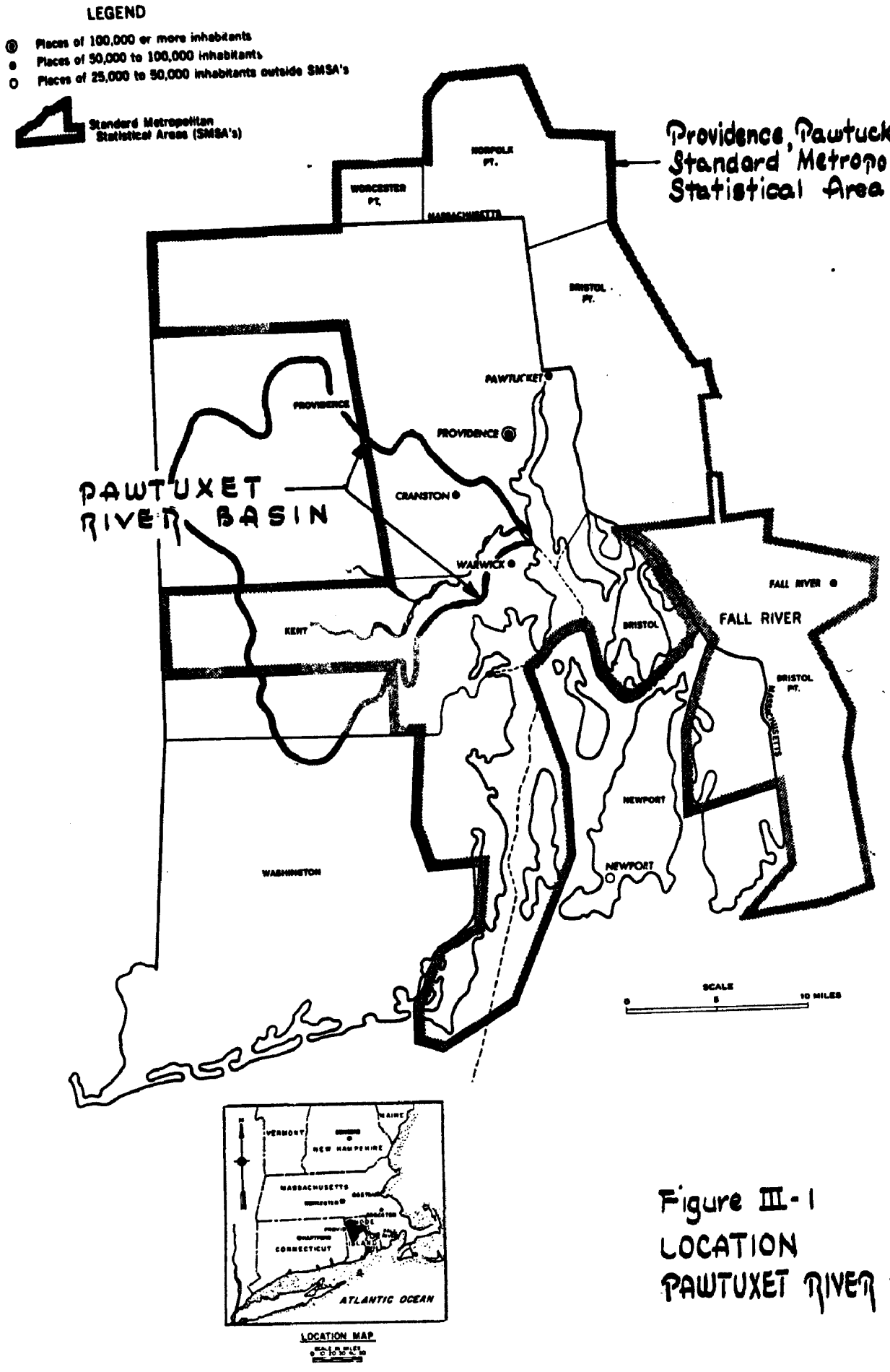


Figure III-1
LOCATION
PAWTUXET RIVER BASIN

Figure III-2 shows the principal water bodies within the watershed including:

1. the Scituate Reservoir system, the water source of the cities of Providence, Cranston and Warwick, on the North Branch of the Pawtuxet,

2. the North Branch itself,

3. the South Branch with a series of smaller industrial and flow augmentation reservoirs, and

4. the "Main Stem" of the Pawtuxet.

Attention is called to the Pocasset River System in eastern Cranston, the Meshanticut River in central and western Cranston, to Furnace Hill Brook, the major tributary of the Meshanticut, and to the proposed Big River Reservoir on the South Branch, an expansion of the Scituate Reservoir system.

The overall area of the watershed is 232 square miles of which about 120 square miles is or will be intercepted by the Scituate Reservoir system.

The flow of the river, measured just above the Cranston treatment plant, has averaged 406 cubic feet per seond (cfs) or 262.5 million gallons per day (MGD) with a record maximum of 3,110 cfs and a record minimum of 22 cfs. The one-in-ten year seven-day low flow, the minimum weekly flow that is likely to occur once in ten years, the flow used in calculating compliance with water quality standards, is 74.93 cfs or 48.4 MGD. Note that this low flow is only 5 times Cranston's existing wastewater discharges (all outfalls) and 2½ times the project average annual design flow, both relatively small supplies of effluent dilutant. (The reader's attention is called to the fact that, in general, the more the flow in the waste receiving stream, the more, or dirtier, effluent that may be discharged without lowering stream quality below any set quality limit).

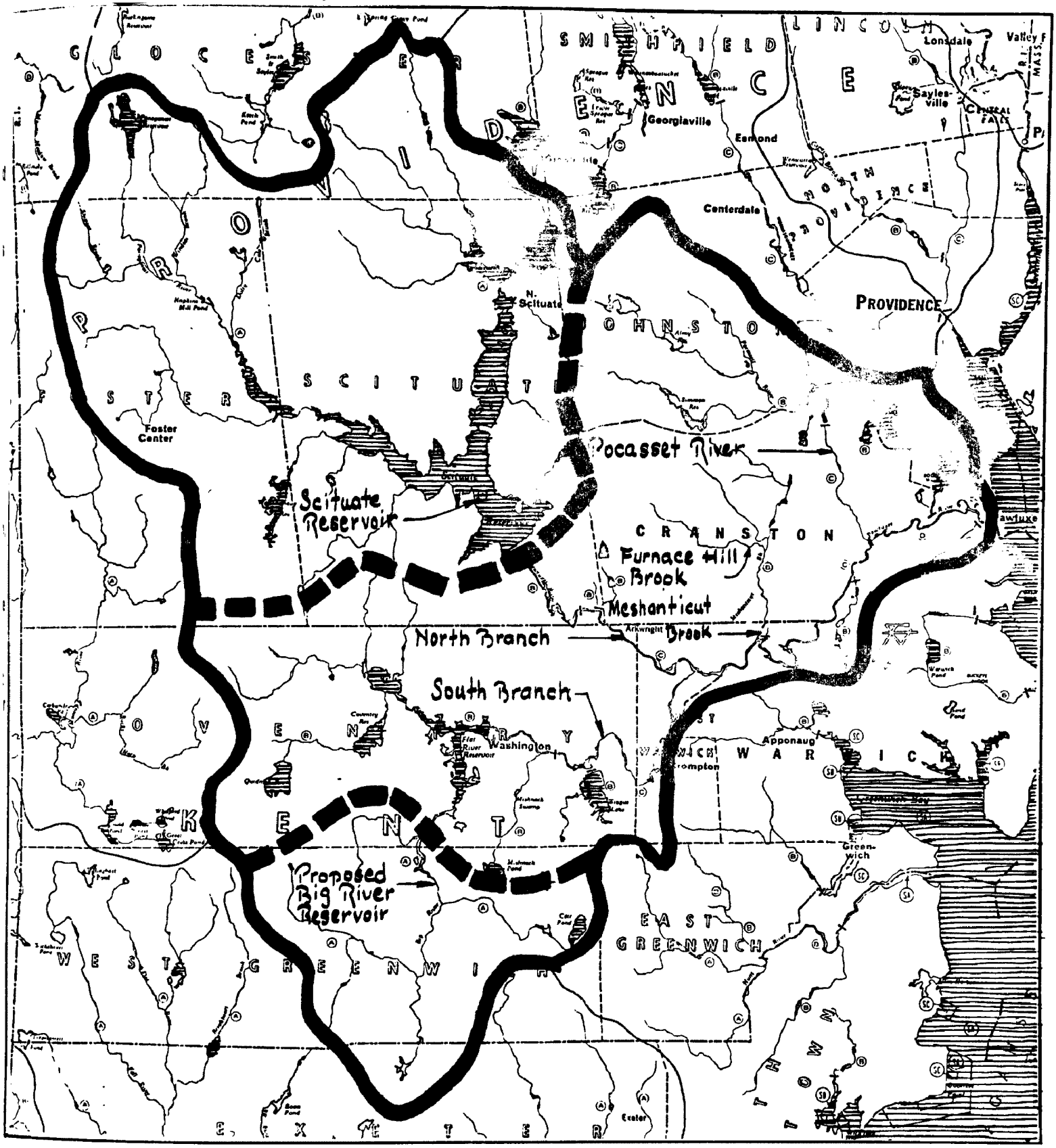


Figure III-2 PRINCIPAL FEATURES
PAWTUXET RIVER BASIN

Source: R.I. Dept. of Health, Div. of Water Pollution Control, 1975.

The existing quality of water in the stream and the nearby bay is shown in Figure III-3, along with the location of the "point source" pollutors, i.e. municipal sewer and industrial discharges. The key to the water quality condition is shown in Table 3-1 and to the point sources in Table 3-2. The readers attention is called specifically to the lowest reach of the river (to the right) which is Class "E", a potentially malodorous, nuisance condition; to point source discharge #171, the Ciba-Geigy Company; #13, the Cranston municipal treatment plant, to #234, the Warwick municipal plant, and to the Meshanticut and Furnace Hill Brooks (in central and western Cranston) which are Class "B", suitable for bathing, fishing, and, if treated, for water supply. Note also that the portion of the Providence River estuary (to the right), into

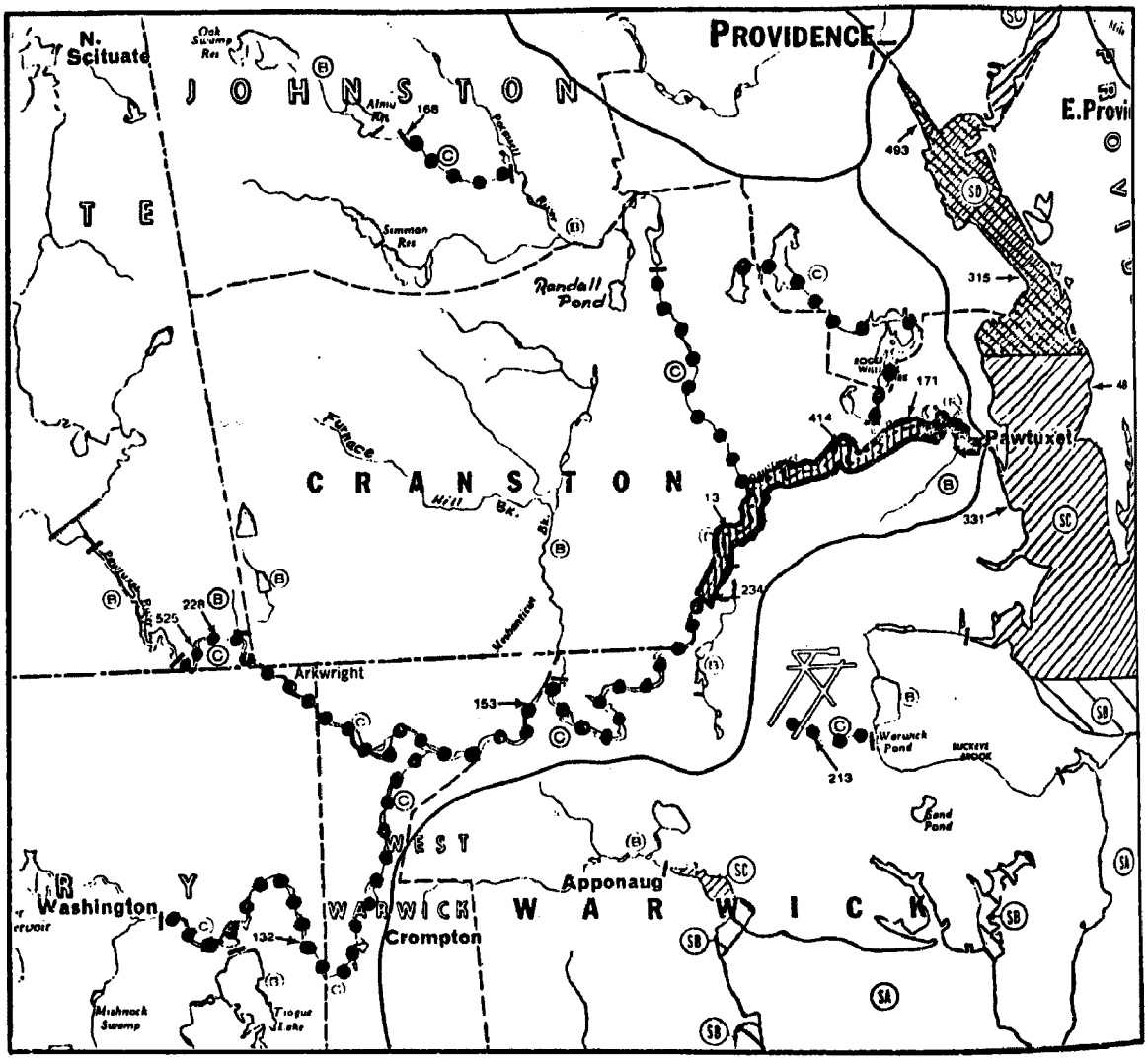


Figure III-3 PRESENT WATER QUALITY CONDITION

Source: Rhode Island Dept. of Health, Division of Water Pollution Control, 1975.

TABLE III-1

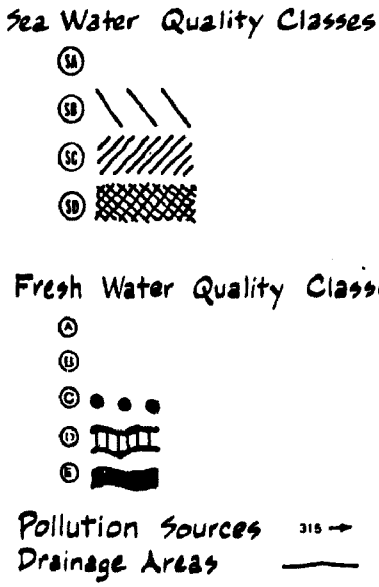
KEY TO WATER QUALITY CLASSIFICATION

Class A	Suitable for water supply.	Class SA	Suitable for shellfish harvest for direct human consumption.
Class B	Suitable for bathing, acceptable for public water supply with appropriate treatment.	Class SB	Suitable for bathing and shellfish harvesting for human consumption after depuration.
Class C	Suitable for fish habitat.	Class SC	Suitable for habitat.
Class D	Suitable for industrial processes and migration of fish; good aesthetic value.	Class SD	Suitable for industrial cooling and migration of fish; good aesthetic value.
Class E	Nuisance; unsuitable for most uses.	Class SE	Nuisance, unsuitable for most uses.

TABLE III-2

KEY TO POINT SOURCE DISCHARGES

Discharge Number	Name
13	Cranston STP
132	American Hoechst Corporation
153	West Warwick STP
168	Briarcliffe Nursing Home STP
171	Ciba-Geigy Corporation
213	Leesona Corporation
228	Falvey Linen Supply
234	Warwick STP
315	Providence STP and combined sewer overflows
331	Narragansett Village STP
414	United Wire & Supply Corporation
493	Narragansett Electric Co.
525	Hope Sanitary Dist. Sewer

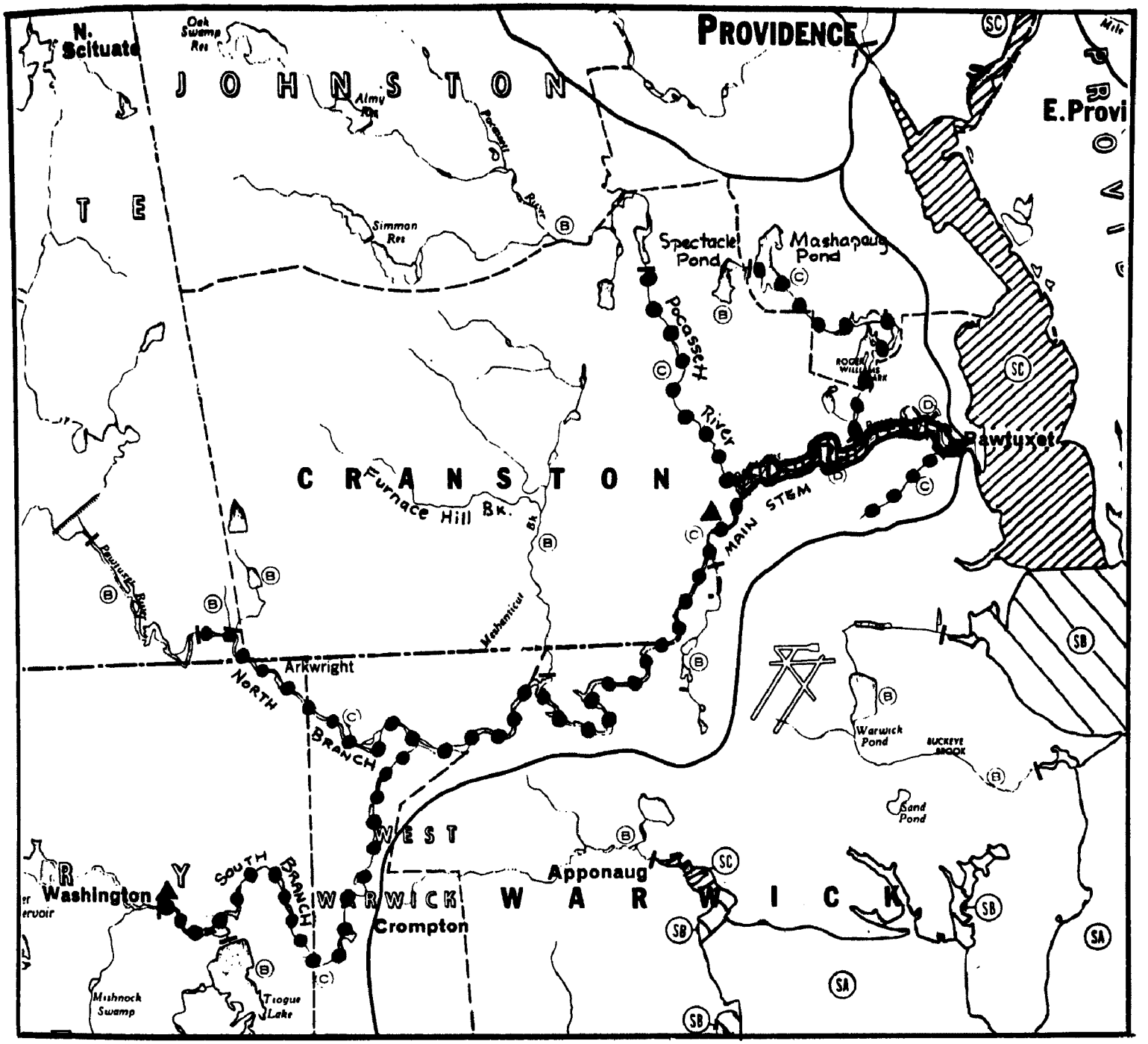


which the Pawtuxet discharges, is Class "SC", a good recreational fish and wildlife habitat (but not for bathing) despite the Pawtuxet River discharge, an abrupt upward jump in class attributable in part to the massive aeration of the river as it passes over the Broad Street dam just above tidewater and in part to the much larger volume of the estuarine waters. (The more polluted condition further north in the estuary, the Class "SD" area, reflects much larger pollutant loads discharged by the City of Providence's sewage treatment plant).

Figure III-4 shows the water quality standards that have been adopted by the State of Rhode Island for the future. The proposed project is required by law not to preclude attainment of these conditions. Note that the Class "E" reach at the east end of the Pawtuxet is to be upgraded to Class "D" and the Class "D" reach from the Warwick treatment plant to the mouth of the Pocasset River is to be upgraded to Class "C".

The objectively sensible results of these proposed changes would include elimination of nuisance potential in Pawtuxet Village and improvement of the river as an aquatic habitat. Abatement of nuisance conditions generally can be considered desirable for the public welfare, but, in this case, given that the entire neighborhood around the mouth of the Pawtuxet River, Pawtuxet Village, is listed on the National Register of Historic Places, such abatement cannot be precluded by any Federal action by law (Executive Order 11593, see Chapter VII below).

The aquatic habitat changes called for would result in restoration of anadromous fish, e.g. shad and herring, to the entire Pawtuxet River System and connection of the Class "C" and better waters of the Pocasset with similar waters of all the Pawtuxet system above the Warwick treatment plant creating a condition that could lead to the growth of "lunker" sport fish, e.g. big bass and pickerel, in both rivers but particularly in the Pocasset.



Fresh Water Quality Classes

Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ

Sea Water Quality Classes

SA
SB
SC
SD

Drainage Areas —

Gaging Station ▲

Figure III-4 WATER QUALITY STANDARDS

Source: Rhode Island Dept. of Health, Division of Water Pollution Control, 1975.

Flood control on the river is provided as a by-product by its many dams but urban encroachment along the lower reaches including the existing treatment plant has created economic justification for a Corps of Engineers project for further control. Figure III-5 shows the actions that are currently being considered for such control. Note particularly the "Natick Diversion" just upstream from the Warwick treatment plant. This diversion would divert peak flows out of the river directly to the bay, but would not alter low flows, so necessary for effluent dilution, at all.

Other water quality related projects being considered for the river include the section "208" planning program (Sec. 208 of the Water Pollution Control Act Amendments of 1972) which will analyze all the water related problems of the Pawtuxet River in an intergrated, basin-wide manner. Key elements of this program, as related to the specific proposals herein, include evaluation of regionalization of the wastewater facilities in the basin and analysis of basin-wide non-point source pollution of the river including the effects of agriculture, sanitary land fills, on-site sewage disposal, drainage from street gutters, boating, etc. Chapter VI of this report does further describe a part of this problem, i.e. drainage from street gutters in the areas proposed to be sewered in western Cranston as part of this project, including a discussion of the paucity of research that has been done in these areas.

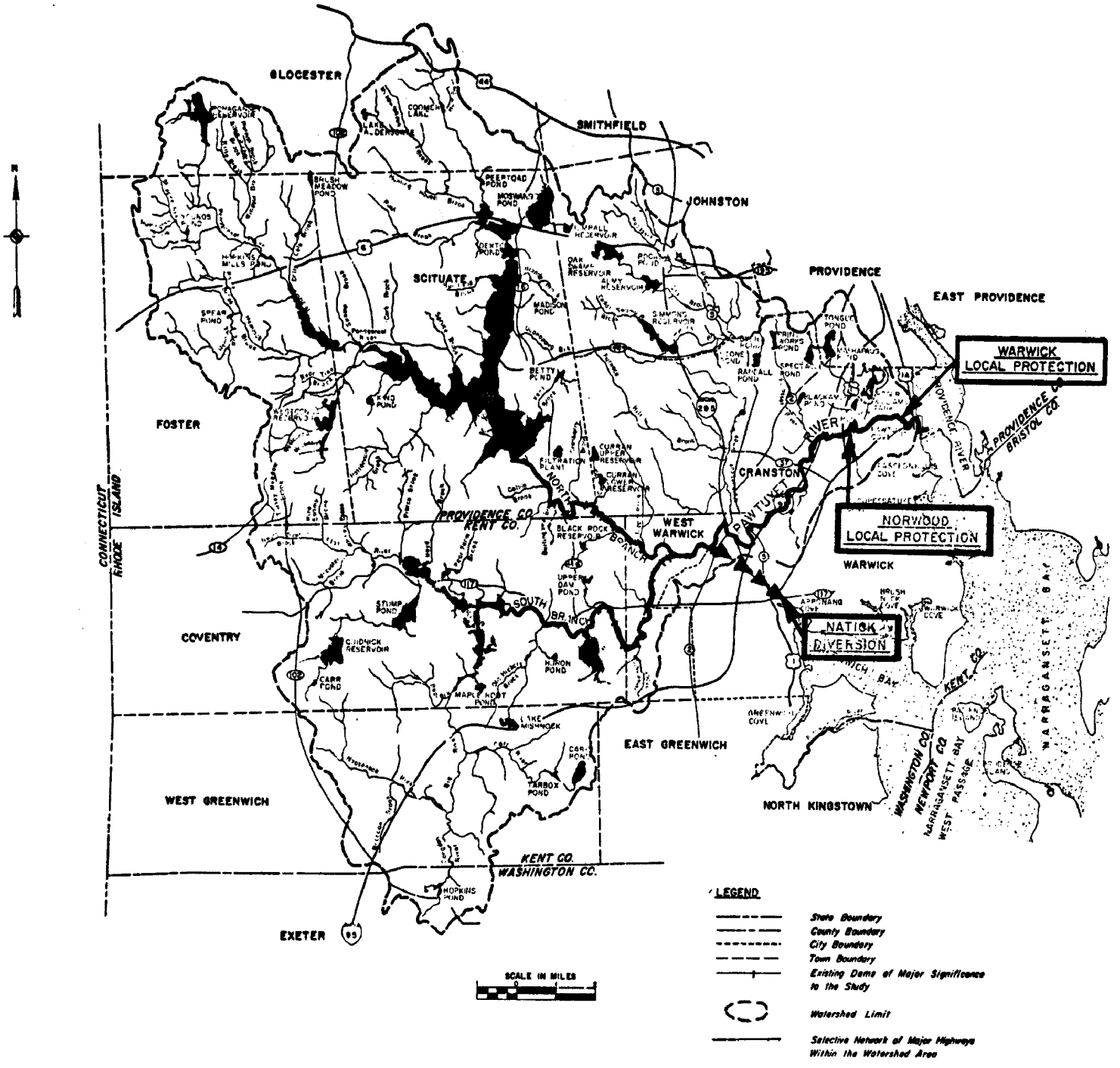


Figure III-5 FLOOD CONTROL CONSIDERATIONS

Source: U.S. Army Corps of Engineers, New England Division.

On ground water, it should be noted that while there is a theoretically massive, local natural resource on the order of yield of 100 million gallons a day, it has been essentially cancelled out by total urbanization of the aquifer's permeable surface. Figure III-6 shows the urbanized area superimposed on the surficial geology. The areas of outwash include all the principal aquifers of the locality, and, in all the areas downstream from the various parts of the proposed project, these areas are all served by public (out-of-locality based) water supplies. Note further that there are no known, significant bedrock aquifers in the vicinity of Cranston.

And finally, on public water supplies, it should be noted that the Scituate Reservoir System of the Providence Water Supply Board is both the principal withdrawer of the Pawtuxet River's waters and the principal supplier of potable water in the eastern portions of the river's watersheds. The Scituate Reservoir's safe yield is estimated to be 84 MGD, of which 12 MGD must be discharged to maintain the river, leaving 72 MGD for public water supply purposes. By 1974 actual usage had reached 66 MGD leaving a surplus of only 6 MGD, without assuming restrictions on lawn irrigation. The proposed addition of the Big River Reservoir on the South Branch is expected to increase the safe withdrawal by 26 MGD creating a total surplus of 33 MGD, exactly 50% over existing demand (again without assuming usage restrictions), an ample provision for the foreseeable future.

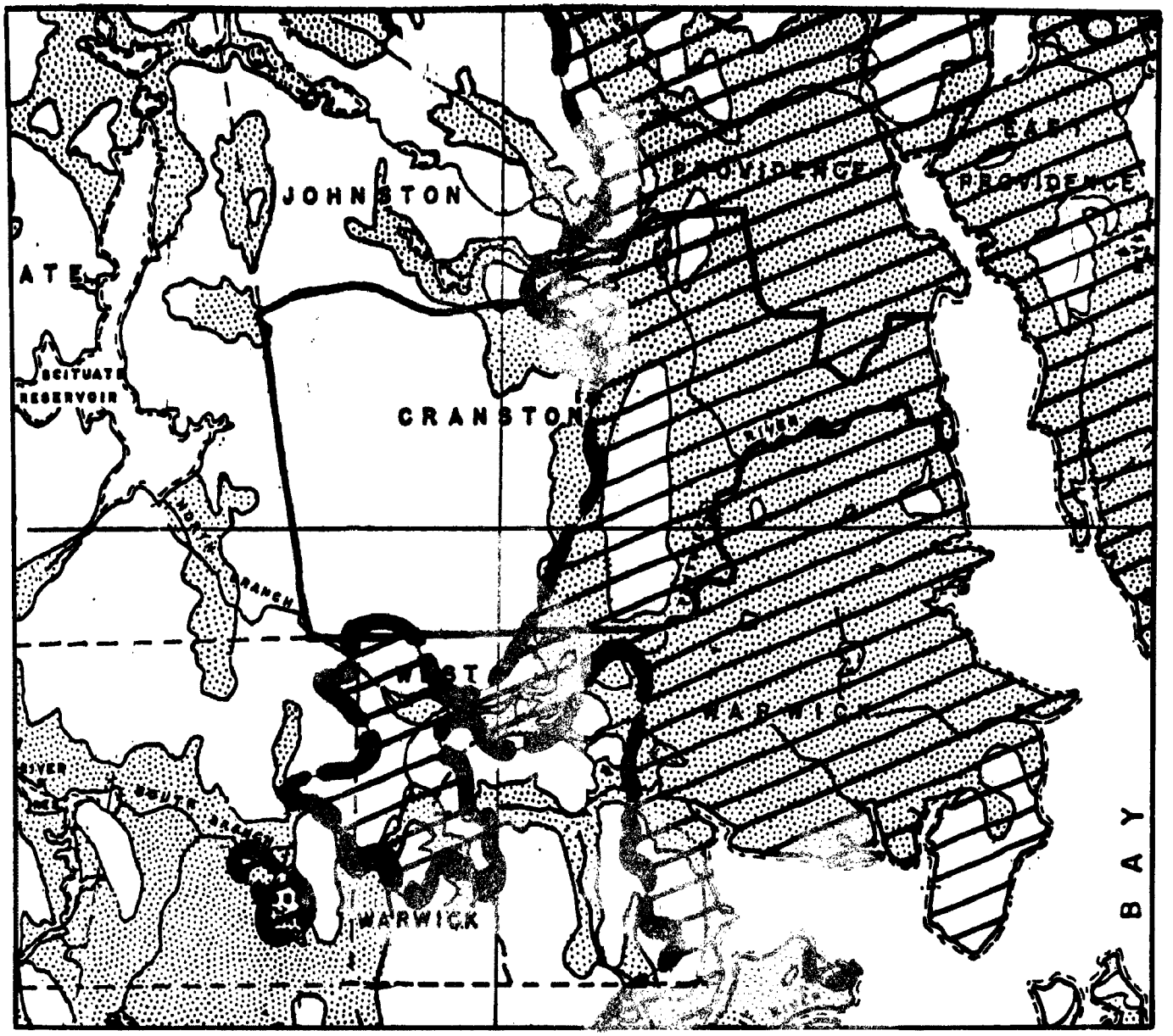


Figure III-6 GROUNDWATER RESOURCES

Source: R.I. Water Resource Coordinating Board, Geological Bulletin #11, 1961.

3.12 WASTEWATER

Table III-3 shows the present annual average waterwater discharges into the Pawtuxet River from the City of Cranston, including from the Ciba-Geigy Chemical Company and the State of Rhode Island institutions, and from the Warwick and West Warwick municipal treatment plants. The data in the table shows the total

TABLE III-3

EXISTING WASTEWATER DISCHARGES
LOWER PAWTUXET RIVER

(Average of one sample per month for calendar year 1975)
(Weekdays)

		Untreated			Treated	
	MGD	BOD_5 mg/l	BOD_5 lb/day	reduction %	BOD_5 mg/l	BOD_5 lb/day
Cranston	10.04	179	14988	98%	14	1172
Ciba Geigy	1.25	305	13604	50%	653	6807
R.I. Inst.	1.13	173	1630	62%	66	622
Sub-Total	12.42	292*	30111	72%*	83*	8601
Warwick	.84	340	2382	85%	51	357
W. Warwick	2.74	168	3839	79%	35	800
Total	16.00	273*	36443	73%*	73*	9758

Source: R.I. Dept. of Health, Division of Pollution Control.

*Weighted averages

wastewater discharge from each source in millions of gallons per day, the "strength" of wastewater both before and after treatment in terms of milligrams of BOD_5 per liter, the total BOD_5 (the most significant index of "pollution") and the percentage of BOD_5 removed by the various treatment facilities. (BOD = biological oxygen demand - the weight of oxygen that could be absorbed from a water body by biological decomposition of the organic compounds dissolved or suspended in the water. BOD_5 is the amount of oxygen that could be absorbed in the first five days of decomposition at 20°C.) Usual current standards for such discharges include 85% to 90% removal of BOD_5 with treated effluent discharges not to exceed 30 mg/l

in any case. In the case of water quality limited streams, streams with relatively low low flows when compared to their pollution loads, as is the case for the Pawtuxet, these standards would be increased to meet the characteristics of the stream, in this case assumed to require treatment to 15 mg/l of BOD_5 as well as including removal of inorganic chemicals (ammonia compounds) that also combine with oxygen in water.

Inspection of the table suggests that the City of Cranston is in fact doing an excellent job of treating its wastes, that Ciba-Geigy is doing the least adequate job, and that the State of Rhode Island's institutions are doing only slightly better. Further it appears that improvement of the Ciba-Geigy discharge would be the single biggest improvement to the system as a whole followed by improvements at the state institutions and West Warwick.

In the future, as Cranston's wastewater flows increase, as a result of both industrial and residential growth, and allowing for some growth of Ciba-Geigy and the state institutions, the total of Cranston's output will increase substantially as shown in Table III-4. Note that wastewater output is expected to increase faster than population and that BOD_5 content is expected to increase faster than wastewater volumes. Both these effects reflect Cranston's continuous shift from rural to suburban to urban land uses, in turn a reflection of the spread of the Providence urbanized area.

TABLE III-4

EXPECTED FUTURE INCREASES IN WASTEWATER DISCHARGE

CRANSTON

(Weekdays)

	Wastewater Flows: MGD				BOD_5 CONTENT: lbs/day			
	1975	2000	Increase MGD	%	1975	2000	Increase BOD_5	%
Cranston	10.04	20.1	10.06	100	15,000	38,200	23,200	155
Ciba Geigy	1.25	1.8	.55	44	13,600	20,000	6,400	47
R.I. Inst.	1.13	1.1	-	-	1,630	1,840	210	13
	12.42	23.0	10.61	85	30,230	60,040	29,810	97

Source: Universal Engineering Corporation.

3.2 PROPOSED ACTION FOR WASTEWATER TREATMENT AND DISPOSAL

3.21 THE PROPOSED ACTION

To abate existing excess waste discharges into the Pawtuxet River, to provide for anticipated increases in waste flows likely to be generated in Cranston, and to provide for near future orderly and balanced growth of the City of Cranston, residentially and industrially, all without creating undue constraints for future improvements of water quality in the Pawtuxet or for additional future growth of the City of Cranston or for incorporation into a regional wastewater system, it is proposed to:

1. discharge the now inadequately treated wastes of the Ciba-Geigy Chemical Company and the State of Rhode Island's institutions into the municipal wastewater treatment and disposal system and

2. enlarge and improve the existing municipal wastewater treatment plant to adequately treat the resulting increased waste flows.

The specific treatment process proposed for the enlargements and improvement, two-stage biological nitrification, was selected because it will:

1. over the design life implicit in the plant capacity, about twenty years, permit very effective removal of oxygen demand from the wastewater flows so that direct discharge of those flows into the Pawtuxet River will not violate its proposed water quality classification,

2. beyond its design life, if and when future flows exceed the capacity for which it will provide adequate oxygen demand removal for direct discharge into the Pawtuxet, permit the plant to be economically converted into a much higher capacity plant (say 40 MGD) producing an effluent adequate for discharge into a larger, less limited receiving water body such as the Providence River estuary or Block Island Sound rather than into the Pawtuxet, and

3. provide the most economical method for achieving the proposed effluent quality.

The location and extend of the proposed actions are shown in Figures I-3 and I-4. Figures III-7 and III-8 show the proposed treatment process both for its design life and for its future possible conversion to a larger, secondary plant for out-of-basin discharge.

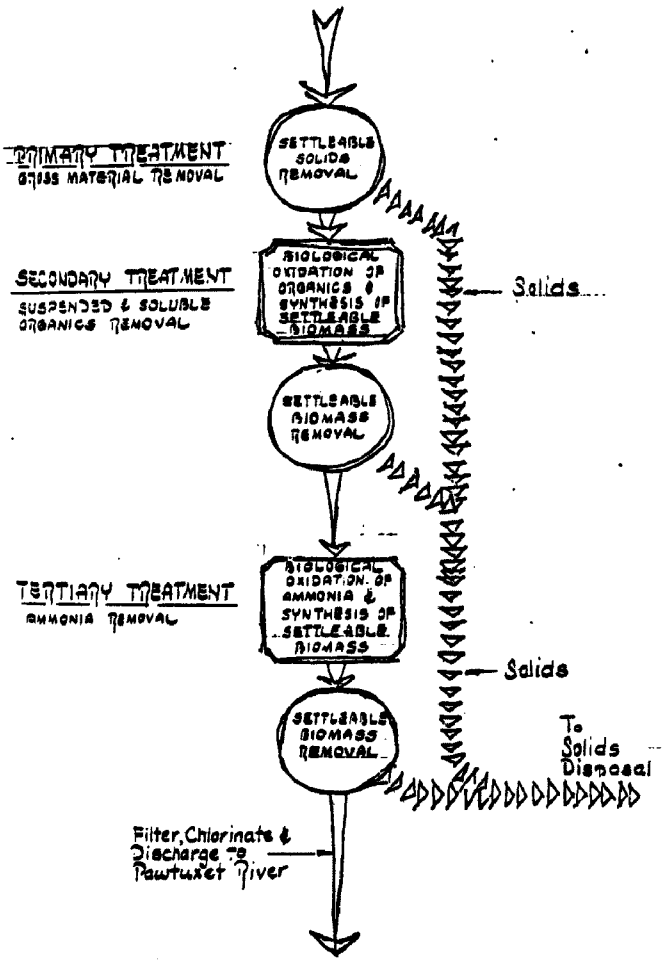


Figure III-7
SCHEMATIC DIAGRAM:
PROPOSED TREATMENT PROCESS

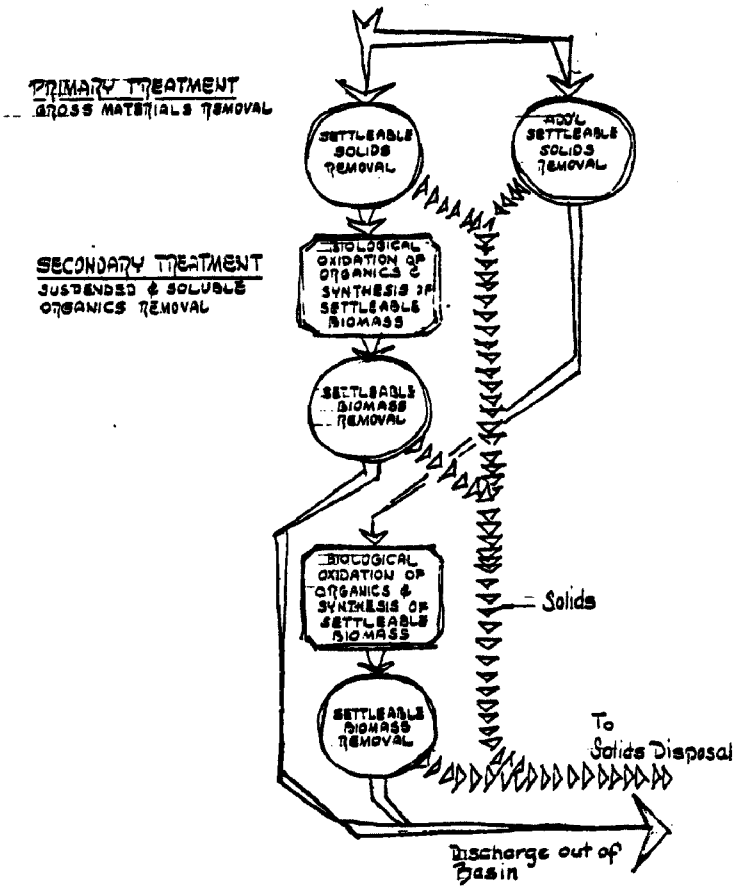


Figure III-8
SCHEMATIC DIAGRAM:
FUTURE ENLARGEMENT FOR OUT-OF-BASIN DISCHARGE

3.22 ALTERNATIVES

Alternative waste disposal strategies considered and discarded included:

1. Improvement of wastewater treatment at the Ciba-Geigy Chemical Company

2. adding a second municipal treatment plant in western Cranston to provide for future user increases in that area

3. limiting treatment at the enlarged municipal plant to secondary treatment only and discharge of the effluent, by gravity pipeline, to the Providence River estuary

4. limiting treatment to secondary and using the effluent for irrigation in western Cranston, and

5. injecting treated influent into the underlying geologic structure

Alternative treatment processes for the readying of effluent for dis-discharge to the Pawtuxet River included:

1. single stage biological nitrification

2. alternative methods of two stage biological nitrification, the proposed process

3. physical-chemical treatment, and

4. biological-physical treatment.

All would achieve similar effluent quality and some would be slightly less costly than the proposed process, but they were discarded because they are not believed to be as consistently reliable as the proposed process and because they do not offer the future expansion flexibility.

Of the alternative strategies, the reasons for discard included:

1. for improvement of treatment at Ciba-Geigy:

    a. lack of land for expansion in the surrounding, congested neighborhood;

    b. persistent odor nuisance in the surrounding neighborhood as a result of the treatment processes used for the concentrated industrial wastes, and

    c. probable inability to achieve the same degree of BOD_5 removal from the concentrated industrial waste.

2. for a separate treatment plant for western Cranston:

    a. duplication of personnel

    b. inadequate receiving waters

    c. probable inability to achieve the same consistent degree of treatment as would be likely at a single larger plant

3. for secondary treatment and effluent discharge to the Providence River estuary:

    a. excessive costs

    b. environmental disruption all along the proposed pipeline

4. for irrigation use of the effluent:

    a. very limited agriculture in Rhode Island

    b. limited prospect that the existing agriculture will survive for the design life of the project

5. for deep-well injection of the effluent:

    a. unsuitable bedrock geology

3.3 ANTICIPATED ENVIRONMENTAL EFFECTS

The proposed actions are expected to have a variety of effects on the environment including, but not necessarily limited to, those on water quality, on flood storage, on air quality, on neighborhood liveability, on growth of the city, on citywide environmental resources, and on the city's long term fiscal well-being. The sections below describe the project's impacts on the water quality of the Pawtuxet River both long term and short term.

The impacts on air quality and on the adjoining floodplain as a result of proposed solid waste disposal are described in Chapter IV; the impacts on the surrounding neighborhood's liveability, i.e. noise and odor are described in Chapter V; the general environmental impacts of urban growth are described in Chapter VI; impacts on specific valuable natural and cultural resources that would be threstened by additional urban growth are described in Chapter VII; and the long-term impacts on the municipal fiscal position are described in Chapter VIII.

3.31 WATER QUALITY IMPACTS

The sections below describe the impacts of the proposed project on the water quality of the Pawtuxet River including:

1. long-term dissolved oxygen levels, the most general indicator of water quality,

2. long-term quality impacts other than oxygen levels, and

3. short-term construction effects

3.311 Long Term Water Quality Impacts - Oxygen Levels

Analysis of dissolved oxygen levels in the Pawtuxet River was made by the Rhode Island Dept. of Health, Division of Pollution Control, in the summer of 1976, using a computer model developed by the Raytheon Company for EPA. This model relates effluent discharges, water reaeration rates, initial river dissolved oxygen concentrations, biological oxygen demand concentration and rates of oxidation of that demand, ammonia concentrations and rates of oxidation of that ammonia, temperature, flow of the river, etc. to dissolved oxygen likely to obtain all along the river, assuming that non-point source pollution remains constant.

The results of this analysis indicated that:

1. if the proposed action is completed in Cranston and if both the Warwick and West Warwick treatment plants are improved to discharge not over 30 milligrams of BOD_5 per liter at their current discharge rates of 1.0 and 2.8 MGD respectively, then the dissolved oxygen in the river would meet the proposed water quality classifications, i.e. no less than Class D (and possibly Class C) in its lower reaches, and

2. if the proposed action is completed in Cranston and if both Warwick and West Warwick treatment plants are improved to discharge not over 15 milligrams of BOD_5 and the equivalent 3 milligrams of ammonia oxygen demand per liter at future discharge rates of 5.0 and 7.5 MGD respectively, then the dissolved oxygen in the river would also meet the proposed classifications, i.e. Class D.

3.312 Long Term Water Quality Impacts - Other Parameters

Beyond protecting the public health and abating nuisance conditions, the objectives of water quality standards established for the Pawtuxet River include creation of suitable habitat for migratory fish in its lowest reaches. The proposed action is expected to generate chlorine concentrations substantially in excess of those that would permit such fish to survive. The maximum chlorine residual tolerable by fish is about 0.01 milligrams per liter for most fish expected in the river (and 0.003 for salmonid fish). Table III-5 shows the chlorine residuals expected for the river at low flow. Note that for the effluent design at low river flows, the chlorine residual will be 85 times greater than the toleration level (for non-salmonid fish) and that,at average river flows, the exceedance will still be over 15 times greater than the toleration level.

3.313 Short Term Construction Impacts

During construction, it is expected that excavation and grading will create a potential for severe erosion of soil particles into the river. This impact is only a small part of a much larger construction impact that could result from the continuing growth of the city. This larger problem and methods recommended for its mitigation are discussed in Chapter VI.

TABLE III-5

TOTAL RESIDUAL CHLORINE (TRC) CONCENTRATION

SITUATION	WEST WARWICK DISCHARGE	WARWICK DISCHARGE	CRANSTON GAGE (LOW FLOW)	CRANSTON DISCHARGE	END RESULT (CALCULATED)	
Existing	2.74 2.0	0.85 2.0	48.4 0.148	12 2.0	60.4 0.52	Flow (MGD) TRC (mg/l)
Dechlorination Cranston Only	2.74 2.0	0.85 2.0	48.4 0.148	12 0.0	60.4 0.119	Flow TRC
Dechlorination Cranston, Warwick, West Warwick	2.74 0.0	0.85 0.0	48.4 Trace*	12 0.0	60.4 Trace*	Flow TRC
Design Flow	5 2.0	5 2.0	54.81 0.365	23 2.0	77.81 0.85	Flow TRC
Dechlorination Cranston Only	5 2.0	5 2.0	54.81 0.365	23 0.0	77.81 0.257	Flow TRC
Dechlorination Cranston, Warwick, West Warwick	5 0.0	5 0.0	54.81 Trace*	23 0.0	77.81 Trace*	Flow TRC

*Due to sources upstream of the Main Stem.

ASSUMPTIONS: (1) Discharge TRC concentration maintained at 2 mg/l.
(2) Complete mixing of discharge and river at calculated end result.
(3) TRC does not decrease with time.
(4) Cranston gage low flow value includes existing flows from Warwick and West Warwick.

Source: CE Maguire, Inc.

3.4 MITIGATION OF IMPACTS

The only expected adverse impact on river water quality resulting from the proposed action, not included elsewhere in this statement, is increase in chlorine concentration in the river. This chlorine, added to disinfect the effluent, will make the river unsuitable for restoration of both anadromous and sedentary fisheries, a significant part of the purpose of the existing water quality goals, and should be removed or eliminated.

Two basic strategies for accomplishing this are evident:

1. substitution of non-chlorine using disinfection techniques, or

2. removal of residual chlorine after disinfection.

Specific methods for these include:

Alternatives to Chlorination:

(1) Ozone: used for sixty years to treat water supplies in Europe and Canada. Its application to wastewater is limited to pilot plants. Ozone is produced by applying an electrical discharge across oxygen or air. Research is still required to find a parameter for controlling the ozone dosage.

(2) Ultra Violet Irradiation: requires a high quality effluent so that the energy dose can reach the organisms. Low pressure mercury lamps emit most of their energy at the proper wave-length for a good bactericidal effect.

(3) Bromine Chloride: similar to chlorine in its germicidal qualities. An advantage is that bromamines are far superior to chloramines in bactericidal and virucidal activity yet are less stable in water. Existing chlorination facilities would require only minor modifications to convert from chlorine to bromine chloride.

Dechlorination Alternatives:

(1) Sulfur Dioxide: available commercially as liquified gas and applied to the chlorinated effluent with equipment very similar to that used for chlorination. Because the reaction of sulfur dioxide with both free and combined chlorine is almost instantaneous, only rapid and complete mixing is required rather than contact chambers. Research indicates that sulfur dioxide dechlorinated effluents have no adverse effects on fish. However, carelessness of application could cause an overdose of sulfur dioxide and a subsequent decrease in dissolved oxygen. Therefore, reaeration is sometimes required to increase the dissolved oxygen content of the dechlorinated effluent.

(2) Activated Carbon: can be used for dechlorination. The technique is a physical process of adsorption although there are some chemical reactions between the carbon and residual chlorine producing carbon monoxide and dioxide. The operation of a carbon column does not require the safety precautions required with chlorine or sulfur dioxide use. However, dechlorination with activated carbon is the most costly of the alternatives.

And finally, it should be noted that mitigation measures for the reduction of residual chlorine from Cranston must also be applied to the discharges from Warwick and West Warwick treatment plants as well to be effective.

Chapter IV THE IMPACTS OF SLUDGE TREATMENT AND DISPOSAL

4.0 INTRODUCTION

Any wastewater treatment plant will generate large volumes of solid wastes, ultimately the pollutants removed from the wastewaters, which solid wastes in turn have ultimately to be put somewhere. The solid wastes from this proposed wastewater treatment plant will primarily be in the form of sludge which is proposed to be incinerated both to reduce its volume and to kill all pathogens, and the resulting ash is to be buried in a sanitary landfill adjacent to the treatment plant.

The questions implicit in this proposed action, given that the surrounding Providence Air Quality Maintenance Area appears not to meet air quality standards and that incineration will unavoidably increase air pollution emissions, include:

1. will incineration preclude improvement air quality ?

2. are there better alternatives to incineration? and

3. will the proposed action tend to preclude more desirable, alternative disposal methods that might be developed in the foreseeable future?

The sections below include a description of the materials to be discharged, the air environment into which incinerator emissions are proposed to be discharged, the areas in which residual solids are to be stored, the proposed methods of solid waste disposal, alternatives that have been considered and reasons for selecting the proposed disposal methods, the probable environmental effects of the proposed method, and finally a strategy for mitigating the unavoidable adverse effects.

4.1 BACKGROUND

This section includes a description of the solid wastes to be disposed of, quantitively and qualitatively; the existing and future air environment into which incinerator emissions are to be discharged, and the areas in which residual solids are temporarily or ultimately to be stockpiled both adjacent to the treatment plant and elsewhere in the vicinity.

4.11 SOLID WASTES

The solid wastes to be disposed of at the treatment plant will consist in part of raw solid materials separated from the incoming wastewater flows and in part of microorganisms grown within the treatment process to absorb suspended and dissolved chemicals from the wastewaters. The proposed enlarged and more effective plant is expected to generate larger amounts of both types of solids than are generated in the existing, in part because of the increased wastewater flows to the plant, in part because of the higher concentration of pollutants within the wastewater, and in part because of the higher degree of pollutant removal. Overall the solids are expected to increase from 470,000 cubic feet per year (1974-75) to 1,521,000 cubic feet per year at peak plant capacity, with the bulk of increase to consist of the secondary microorganisms grown in the plant processes.

Table IV-1 shows the overall amounts and composition of the solid wastes, existing and future. The screenings include primarily cloth fragments, branches and other course materials that are mechanically screened out of the wastewaters; the grit in sand, foodwastes such as eggshell, bone, coffee, etc. and other dense substances that can be quickly settled out of the wastewater; the grease includes fats, oils and other floatable materials that can be easily skimmed off the wastewaters, with the "sludge" including everything else.

At the existing plant the sludge includes primary sludge, the particles in the wastewaters which can be settled out in one to two hours, and secondary sludge, microorganisms grown in the plant's aeration tanks to decompose and absorb the organic materials in solution or in suspension. Both are then processed through digestion tanks to further decompose the solids (about 50%), to reduce odor, and to kill the bulk of the pathogens, about 97%, with the resulting digested material dewatered on a vacuum filter. Chemical analysis of this dewatered digested sludge, still 84% water, indicates, as shown in Table IV-2, that, after complete drying, the sludge contains about 58% of its dry weights as combustible materials, mostly organics with some ammonia compounds and about 41% incombustible ash.

TABLE IV - 1

Solid Wastes Produced at the
Cranston Wastewater Treatment Plant

Existing and Proposed
(cubic feet per year)

COMPONENT	PRESENT	FUTURE
Screenings	2,200	32,000 (1)
Grit	4,400	11,000
Grease	42,000 (Skimmings)	28,000 (Concentrated)
Sludge	422,000 (2)	1,450,000 (3)
Total	470,600	1,521,000
Ash	0	118,000

(1) Due to smaller (1") screen size of new barscreen resulting in greater screenings capture

(2) Avg. moisture content = 84.3%

(3) Avg. moisture content = 65.0%

Source: Universal Engineering Corporation

TABLE IV - 2

Analysis of Existing Sludge
Cranston Wastewater Treatment Plant

Constituent	Quantity
I. Combustibility Analysis (% by wt. of dried sludge):	
Ash	41.47
Combustible Solids	58.53
Calorific Value, BTU/lb	6,566
II. Elemental Analysis of Combustibles (% by wt. of total dried sludge):	
Carbon	35.2
Hydrogen	5.9
Nitrogen	4.03
Sulfur	0.76
Oxygen, by difference	12.64
III. Heavy Metals Analysis (mg/kg of dried sludge):	
Mercury	0.1158
Lead	197.642
Zinc	202.358
Cadmium	9.9875
Copper	1050.656
Nickel	446.206
Arsenic	2.683
Chromium	90.822
Manganese	303.458

*Source: New York Testing Laboratories, Inc.

Metals in the sludge that might, in sufficient concentration pose a hazard to health or environmental quality, are also shown in the table as milligrams per kilogram of dried sludge or parts per million. The concentrations found in the existing Cranston sludge are consistent with that of other similar areas and do not of themselves appear to pose any special environmental hazards if so placed as to not have ready, concentrated entry to the food or water supply chain.

Current disposal practice for this digested sludge consists of stockpiling in the lowlands adjacent to the treatment plant with removal of a corresponding volume of soils to maintain the floodplain volume. With the passage of time however, this stockpile shrinks considerably (75%) in weight and volume as its moisture content gradually evaporates.

At the proposed plant the sludge will include the same kind of primary and secondary sludges plus a tertiary sludge derived from microorganisms grown in the plant's aeration tanks to decompose and absorb the ammonia compounds dissolved in the wastewaters. Unlike the present process, these materials will not be digested but will be pressure filtered to reduce their water content to about 65% and the resultant mass will be burned, autogenously, in an incinerator to reduce its volume and to kill all the pathogens. The proposed incineration process and its environmental impacts are described below in section 4.2 and 4.3. The composition of the raw sludge expected to be generated by the proposed treatment plant is described in the next paragraph in this section, the expected air emissions are described in Section 4.12 below and the residual ashes are described in Section 4.14.

Table IV-3 shows the chemical composition of sludge from a pilot plant for the proposed wastewater treatment process. Comparison with the existing sludge analysis shows the much smaller percentage of mineral materials, ash and metals, and a higher percentage of oxygen, differences that can be attributed to the lack of digestion, to the addition of Ciba-Geigy's wastes to the city sewage and to the higher percentage of secondary sludge components.

TABLE IV - 3

Analysis of Sludge From Pilot Plant for Proposed Cranston Wastewater Treatment Plant

Constituent	Quantity
I. Combustibility Analysis (% by wt. of dried sludge):	
Ash	21.31
Combustible Solids	78.69
Calorific Content (BTU/lb)	7942.
II. Elemental Analysis of Combustibles (% by wt. of total dried sludge):	
Carbon	43.2
Hydrogen	6.5
Nitrogen	4.43
Sulfur	0.75
Oxygen by Diff.	23.81
III. Heavy Metals (mg/kg of dried sludge):	
Mercury	0.0755
Lead	194.278
Zinc	177.990
Cadmium	3.0754
Copper	412.537
Nickel	131.048
Arsenic	2.428
Chromium	121.450
Manganese	97.943
IV. Pesticides (mg/kg of dried sludge):	
alpha BHC	*
beta BHC	*
Total BHC	*
Lindane	*
Heptachlor	*
Aldrin	*
Heptachlor Epoxide	*
P, P' DDE	*
Dieldrin	*
Endrin	*
O, P' TDE	0.062
P, P' TDE	*
O, P' DDT	*
P, P' DDD	0.080
Total DDT	*
PCB's	8.471

*Not Detected
Source: New York Testing Laboratories, Inc.

4.12 EXPECTED AIR EMISSIONS

Incineration of the proposed treatment plant's solid wastes are expected to generate large volumes of carbon dioxide and water vapor, relatively small amounts of sulphur dioxide, (SO_2) and suspended particlates (TSP) and only traces of mercury vapor. The carbon dioxide and water vapor are not considered to be atmospheric pollutants except in a global climatoligical sense, and they would be the ultimate end product of the solid wastes proposed to be incinerated anyway, no matter how disposed of. The sulphur dioxide, particulates and mercury vapor in contrast are significant air pollutants, even in small amounts.

At maximum capacity it is expected that the proposed incinerator will produce the emission rates listed in Table IV-4.

TABLE IV-4

EXPECTED AIR EMISSION RATES

Sulfur dioxide (SO_2)	6.89 gm/sec.
Particulates (TSP) (Maximum)	0.29 gm/sec.
Mercury Vapor	0.000053 gm/sec.
Lead	0.0089611 gm/sec.
Other emissions	Negligible

Source: CE Maguire, Inc.

Note that these are "worst case" emission rates, and they assume that all the sulfur and mercury and 10% of the lead in the sludge will be emitted into the air. The complex organics in the sludge, the pesticides and the polychlorinated biphenol's (PCB's), are expected to be almost totally destroyed within the incinerator or intercepted by the stack scrubbers and so not to be emitted into the air.

Note also that the particulate emission rate is the minimum performance standard required by EPA regulation based on the dry weight of the materials to be incinerated and that the incinerator will not be accepted from its vendor unless it meets this performance standard.

4.13 AIR EMISSIONS REGULATIONS

Emissions of pollutants into the atmosphere are regulated by a veritable plethora of standards including emission rate limitations from specific new sources for some pollutants, maximum ambient air concentrations that are allowable for various periods of time at various frequencies calculated by various methods for various pollutants, and maximum increments to ambient air concentrations that are allowable for various conditions for various pollutants. Table IV-5 shows the applicable standards.

TABLE IV-5

APPLICABLE AIR EMISSIONS LIMITATIONS

	Sulfur Dioxide	Particulates	Mercury
1. New source emission rates	-	.295g/sec.[1]	.0266g/sec.[2]
2. Maximum ambient air pollutant concentration			
annual average, primary[3]	80ug/m^3[5]	75ug/m^3[6]	-
annual average, secondary[4]	-	60ug/m^3[6]	-
2nd worst day/yr., primary	365ug/m^3[7]	260ug/m^3[7]	-
2nd worst day/yr., secondary	-	150ug/m^3[7]	-
2nd worst 3 hr./yr., secondary	1,300ug/m^3[7]	-	-
3. Maximum degradation in ambient air quality (Increase in pollutant concentration)			
annual average	15ug/m^3[5]	10ug/m^3[6]	-
2nd worst day/hr.	100ug/m^3[7]	30ug/m^3[7]	-
2nd worst 3 hr./yr.	700ug/m^3[7]	-	-

1 @ 1.3 pounds/ton of dry solid waste.

2 equal to 2,300 g/day.

3 primary: standard set to protect the public health.

4 secondary: standard set to otherwise protect the public welfare.

5 arithmetic mean.

6 geometric mean.

7 maximum

g/sec. = grams per second.

ug/m^3 = micrograms per cubic meter.

4.14 AIR ENVIRONMENT

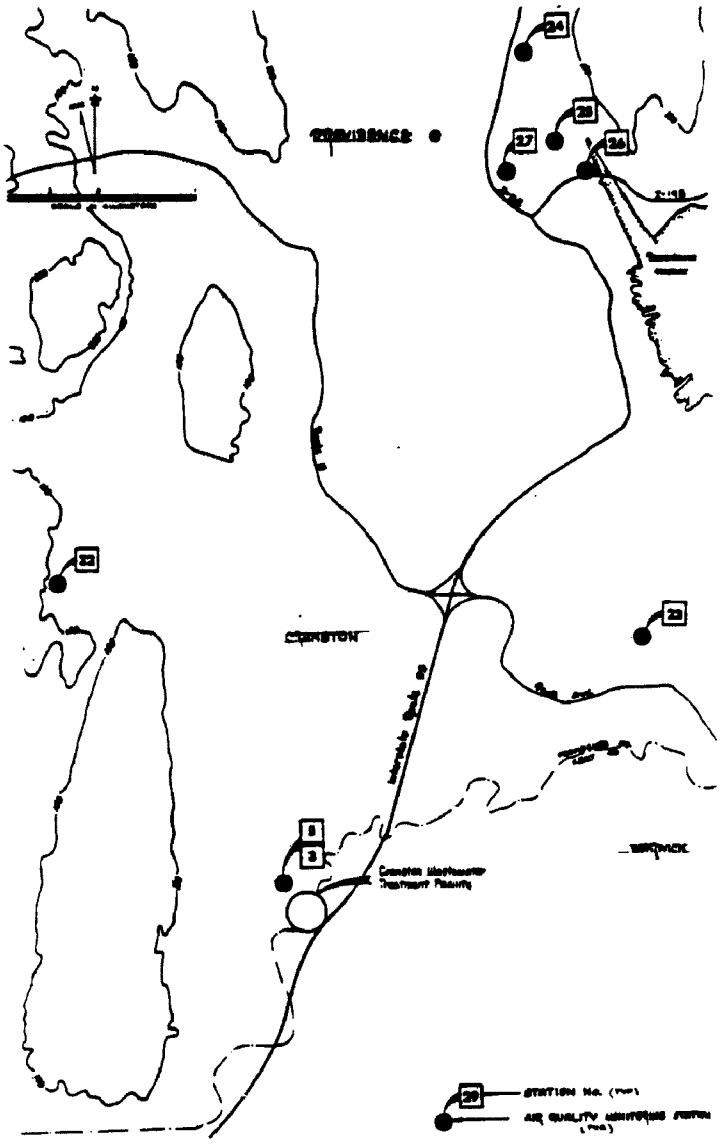
To determine whether the proposed air emissions will exceed the standards for maximum increments in ambient pollutant concentrations it is necessary to calculate the probable dispersion of air pollutant emissions into the surrounding atmosphere, and for similar determination for maximum total ambient pollutant concentration it is further necessary to add the anticipated increments to the existing conditions. The probable dispersion of pollutant emissions is a function of the surrounding meteorology, topography, and of the incinerator stack parameters, while the existing conditions, the product of the interaction of the totality of the surrounding region's natural and economic environments, can only be approximated by statistical analysis of very limited field sampling. The sections below describe the meteorology and topography of the surrounding region, the resulting patterns of dispersion of pollutants in the air, and the available data on ambient air quality, existing and future.

4.141 Meteorology and Topography

Cranston lies within one of the windiest regions of the United States, with calms of less than 1.5 meters per second (3.4 mph) occurring less than 4% of the time and with the most commonly occurring wind speed class centering on 4.47 meters per second (10.1 mph). Figure II-2 shows how the region compares with the windiness for the rest of the contiguous United States.

In general these winds prevail from the west with northwest winds typical of the winter, with southwest typical of the summer with the summer winds added to by strong southerly sea breezes in fair weather, and with northeasterly winds common in storms throughout the year. Figure IV-1, the wind rose for Providence used in air pollutant dispersion calculations in this section is based on the period 1964 to 1973.

The topography of the region is quite limited with the highest hills not over 500 feet above sea level and with no prominences at all in the vicinity of the proposed incinerator or between the incinerator and the bulk of the urban area.



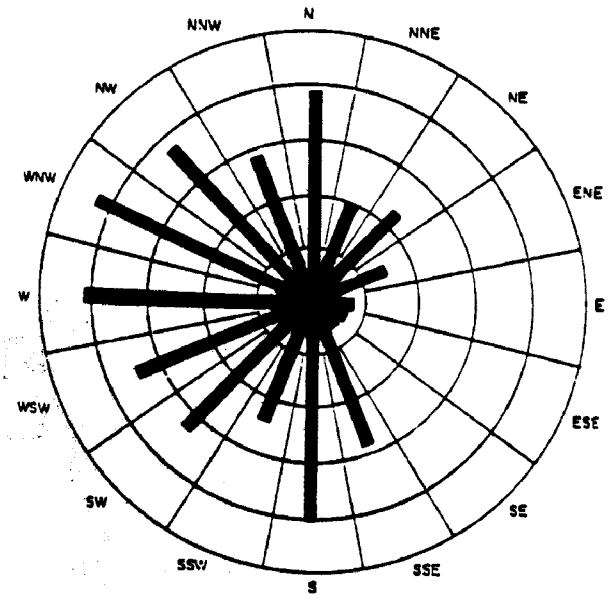
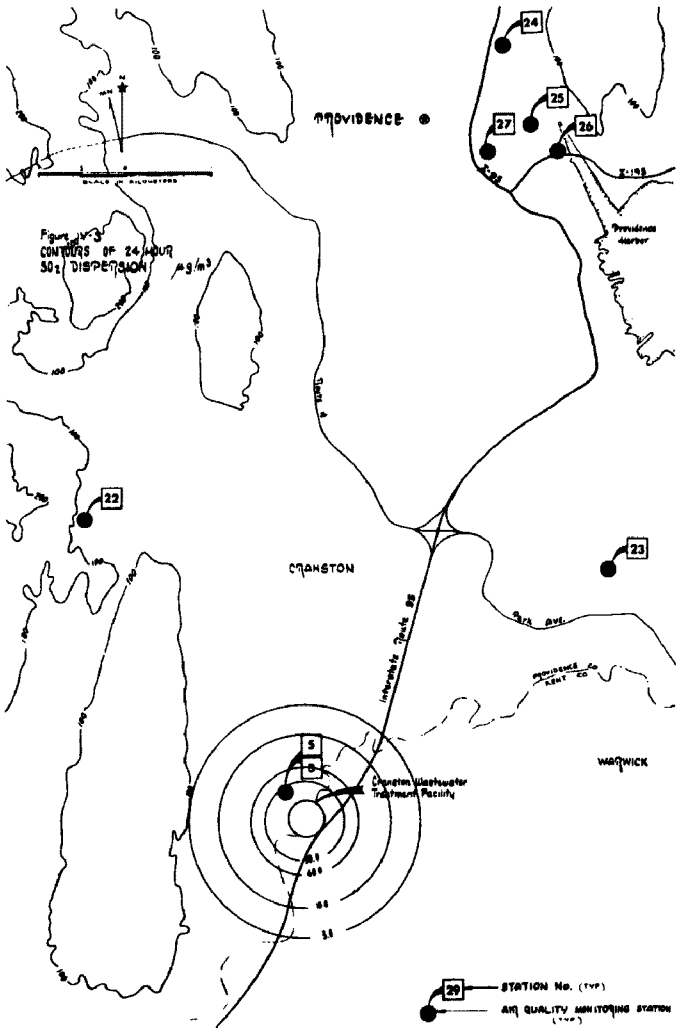


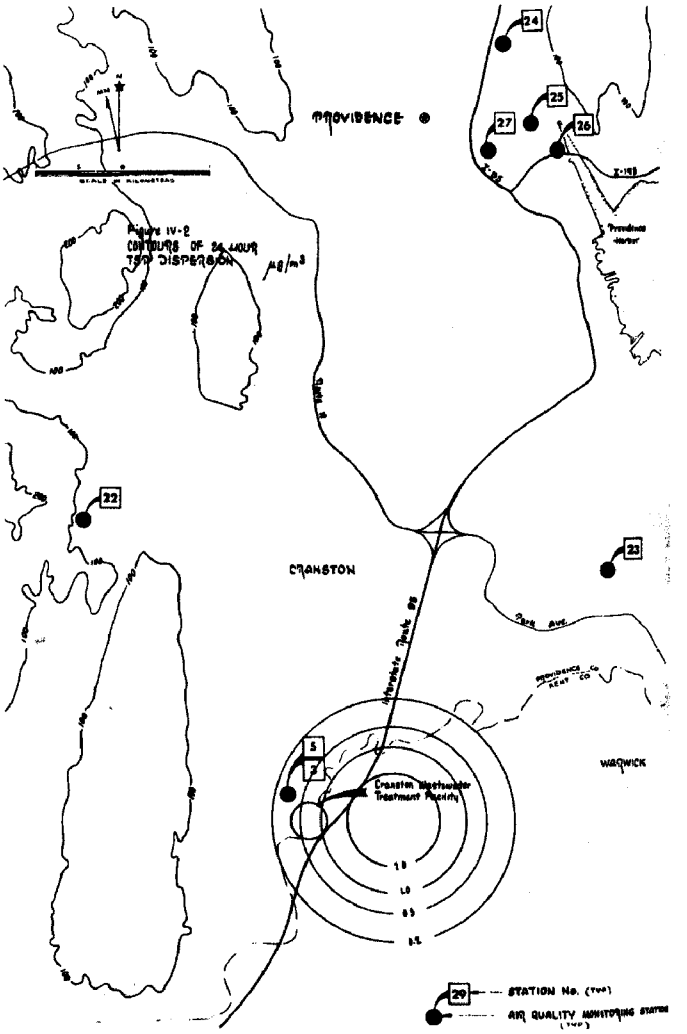
Figure IV-1 TOPOGRAPHY & WIND ROSE FOR PROVIDENCE AREA
TEN YEAR AVERAGE (1964-1973)

SOURCE : NATIONAL CLIMATIC CENTER & U.S. GEOLOGICAL SURVEY

4.142 Dispersion of Pollutants

Short time period ground level concentrations of sulfur dioxide and particulates were calculated by C.E. Maguire, Inc. from the metereological parameters, i.e. wind speed and direction, atmospheric mixing height and ambient air temperature and from proposed incinerator stack parameters, i.e. height and diameter, gas exit speed and temperature, and other factors, using proposed peak emission rates and the PTMAX model (developed by EPA). Those concentrations are the maximum levels likely to occur at the worst meteorological conditions as a result of the proposed action. The results of the calculations are shown in Figures IV-2 through IV-4. Note the rapid decrease in concentrations as the distances from the incinerators increase and note that the symmetry of the pattern reflects the flatness of the terrain.





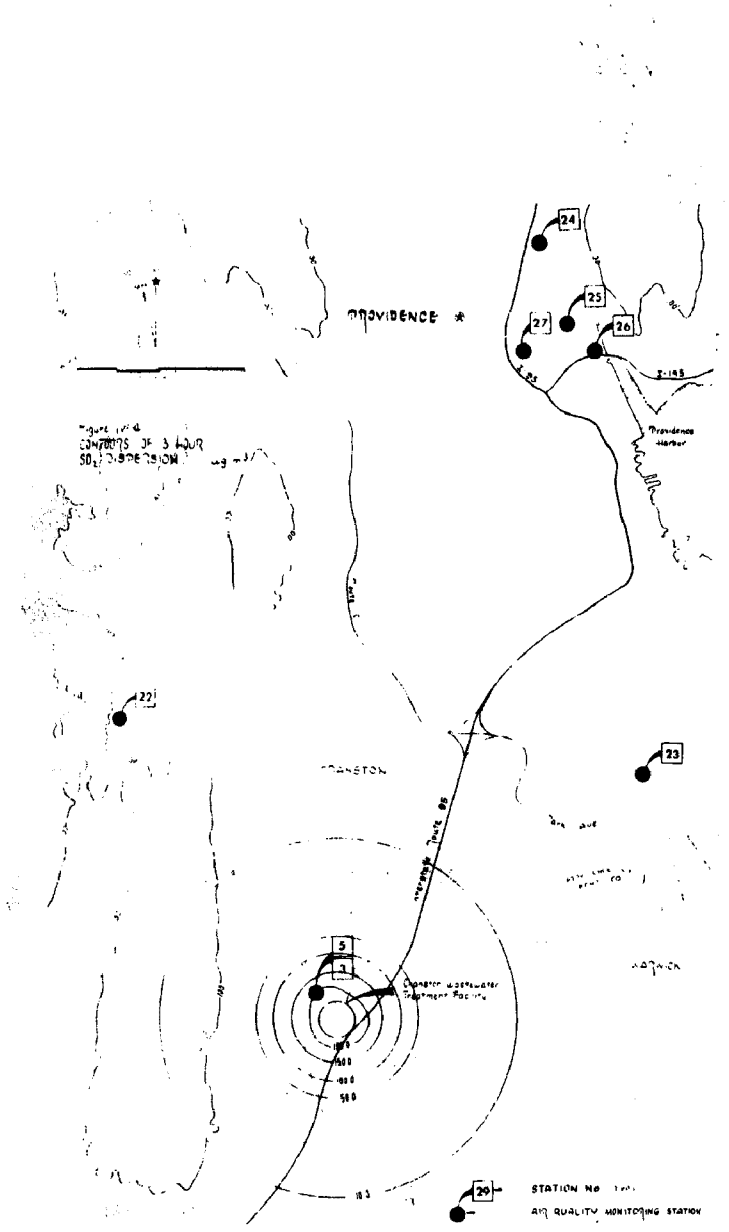


TABLE IV-6

ANTICIPATED MAXIMUM DEGRADATION IN AMBIENT AIR QUALITY IN AND NEAR CRANSTON

ANNUAL AVERAGE INCREASES

MICROGRAMS PER CUBIC METER

AQMA Receptor No.	Location	TSP[1]	SO_2[2]
3	56 Eddy Street	0.	1.
5	46 Eddy Street	0.	1.
22	Cranston Police	0.	0.
23	Cranston Hospital	0.	0.
24	State Office Building	0.	0.
25	Westminster Street	0.	0.
26	Dyer Street	0.	0.
27	Providence Police	0.	0.
29	National Weather Service Warwick	0.	0.

0 = Less than 0.5

1 maximum allowable = 10 micrograms per cubic meter.

2 maximum allowable = 15 micrograms per cubic meter

Source: CE Maguire, Inc.

In addition, annual average concentrations of pollutants were calculated by C.E. Maguire, Inc. using EPA's Climatological Dispersion Model (CDM), general climatic data from Green Airport, upper air temperature from Nantucket, (the nearest National Weather Service station with the capability of making such measurements), and an assumed half for sulfure dioxide of 3 hours. Table IV6, shows the calculated concentrations at existing air monitor receptor stations in and near Cranston.

4.143 Ambient Air Quality

Figures IV-5 through IV-8, reproduced from "Technical Support to the State of Rhode Island on Development of Air Quality Maintenance Plan" by Welden Research Division of Abcor, Inc. for EPA, published September, 1975, (hereinafter called the Walden Report), show the ambient:

1974 annual average SO_2 concentrations for Rhode Island
1974 annual average TSP concentrations for Rhode Island
1985 annual average SO_2 concentrations for Rhode Island
1985 annual average TSP concentrations for Rhode Island

The 1985 TSP levels are based on the assumption that all gasoline will be unleaded by that time while the 1985 sulfur dioxide levels shown assume that power stations will be allowed to use fuels contining 2.2% sulfur rather than the 1.0% sulfur fuels used in 1974, a most probable condition for TSP and a worst assumption for SO_2.

In addition, probable frequencies of 24 hour SO_2 and TSP concentrations were calculated for two of the monitoring stations, the Cranston Police Station and the Cranston Hospital, using the limited available data. Table IV-7 shows the key ambient air parameters using two different statistical techniques currently used in calculation of such parameters. Note that by one of the techniques it could be said that the air quality at the police station is in probable violation of one of the standards, i.e. 2nd highest day, TSP.
Note also that the difference between results of the two methods is greater than the purported amount of violation and that all of these highs and 2nd highs are extrapolations, extensions of mathematical curves beyond actual measurements, i.e. no such violations have actually been measured.

TABLE IV-7

ANTICIPATED MAXIMUM AMBIENT AIR POLLUTANT CONCENTRATION

AT SELECTED[1] RECEPTORS IN CRANSTON

MICROGRAMS PER CUBIC METER

				1. Cranston Police Station				2. Cranston Hospital			
Pollutant	Applicable Parameter	Maximum Allowable	Anticipated Increase	Existing 1975 A	Existing 1975 B	Anticipated Max[2] A	Anticipated Max[2] B	Existing 1975 A	Existing 1975 B	Anticipated Max[2] A	Anticipated Max[2] B
TSP	Annual average	60[3]	0.0	52	52	52	52	45	45	45	45
	2nd worst day/yr.	150[3]	3.1	137	163	140	166	102	124	105	127
SO_2	Annual average	80	1.0	14	17	15	18	30	36	31	37
	2nd worst day/yr.	365	71.4	82	74	154	145	142	182	214	253
	2nd worst 3 hr/yr.	1300[3]	239.7	NA	NA	NA	NA	NA	NA	NA	NA

NA Data not available.

1 Closest air quality monitoring stations to proposed incinerator.

2 Assuming no improvement in ambient air quality through the air quality maintenance plan.

3 Non-health related.

A Larson Analysis

B Least Squares Method

Source: CE Maguire, Inc.

Figure IV-5 shows assumed 1974 annual average TSP. Note that the proposed incinerator is outside the zone of standards violation, the striped zone.

Figure IV-6 shows what is expected to happen by 1985 to this average annual TSP if all gasoline is unleaded. Note that this action alone will result in lower TSP levels even with larger populations, eliminating the area of violation.

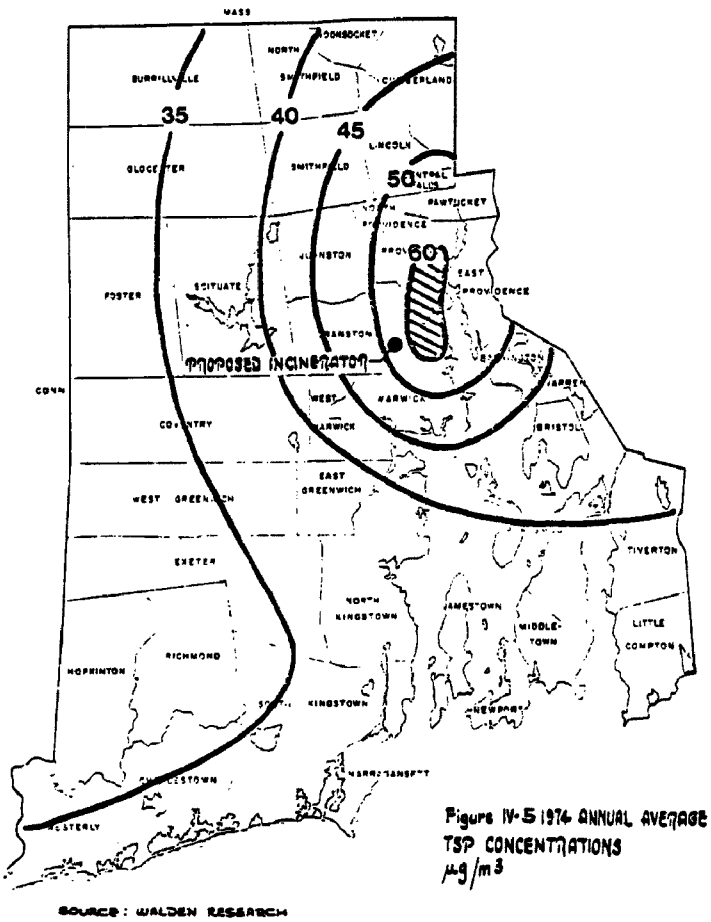


Figure IV-5 1974 ANNUAL AVERAGE TSP CONCENTRATIONS $\mu g/m^3$

SOURCE: WALDEN RESEARCH

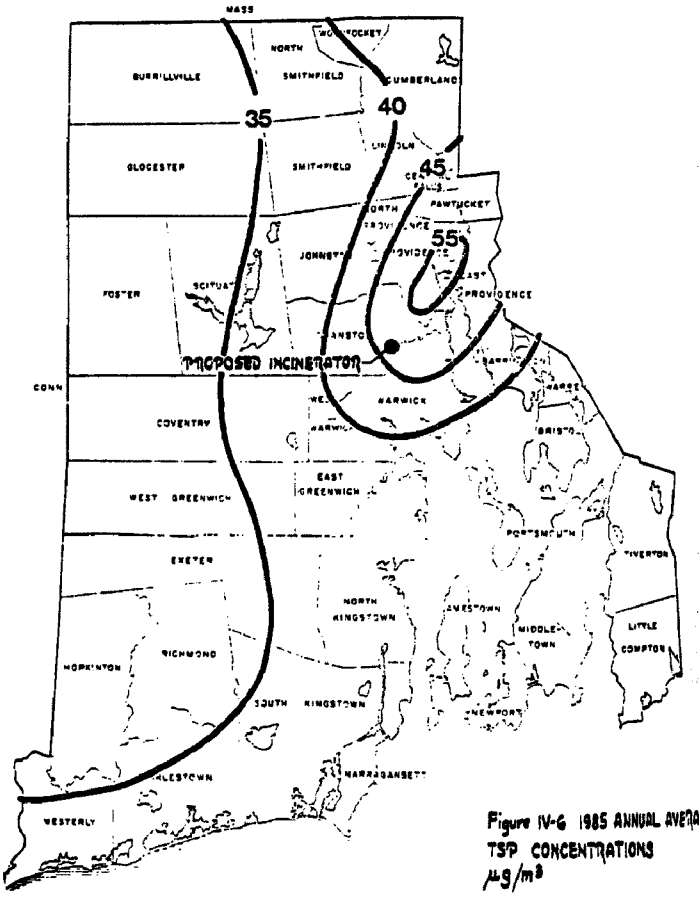


Figure IV-6 1985 ANNUAL AVERAGE TSP CONCENTRATIONS $\mu g/m^3$

SOURCE: WALDEN RESEARCH

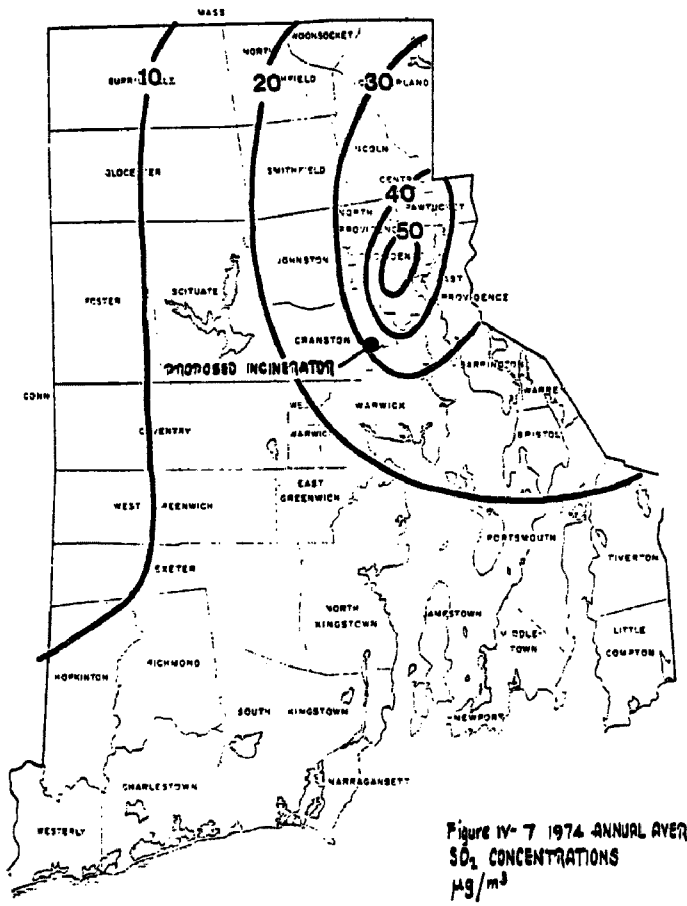


Figure IV-7 1974 ANNUAL AVERAGE SO_2 CONCENTRATIONS $\mu g/m^3$

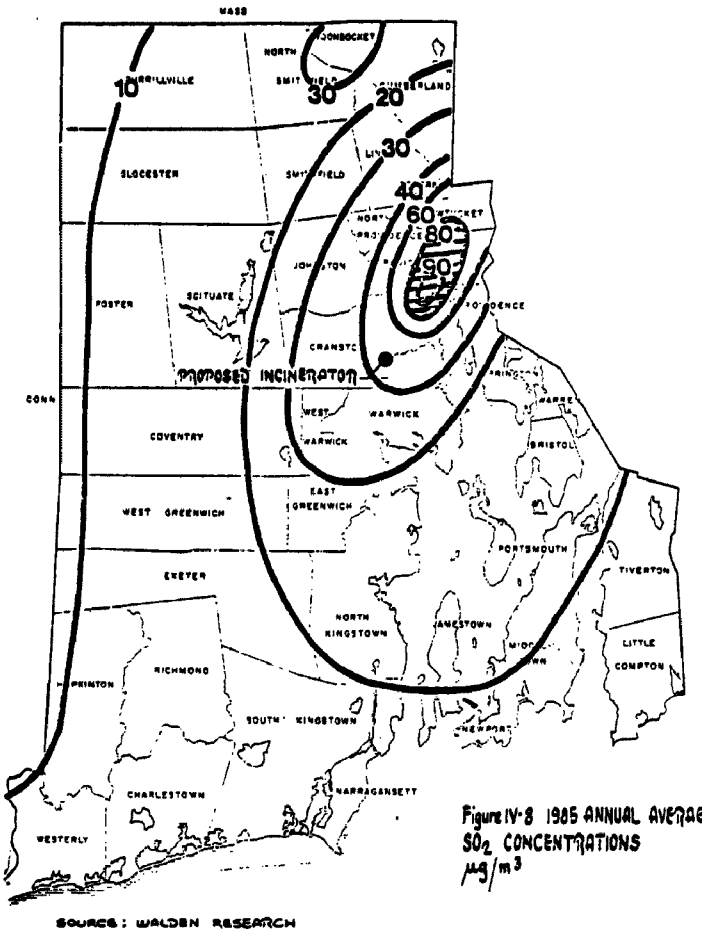


Figure IV-8 1985 ANNUAL AVERAGE SO_2 CONCENTRATIONS $\mu g/m^3$

Figure IV-7 shows assumed 1974 annual average SO_2 concentration distribution. Note that there is no area of standards violation.

Figure IV-8 shows what would happen by 1985 to this annual average if major fuel users were allowed to use 2.2% sulfur fuel. Note that the zone that would violate SO_2 standards is well away from the proposed incinerator.

4.15 RESIDUAL SOLIDS

At the design capacity of the plant, the solid residuals remaining after incineration of the sludge, screenings, grit, etc. are expected to amount to about 5300 tons or 4400 cubic yards per year. This residual will be composed principally of ash containing some nitrate, phosphates and other mineral materials. The ash will be biologically inert but will contain some toxic chemicals. Physically it will be finely divided material with sufficient moisture added to it to control dust and wind erosion.

In addition to this annual increment, physical expansion of the treatment plant will require excavation of about 15,000 cubic yards of old (at least 10 years), digested sludge which was deposited years ago in the areas into which the plant expansion is proposed. Biological pathogens are unlikely to be present within this material but, like the ash that will constitute the balance of the solid waste residuum toxic chemicals may have persisted within the sludge mass protected from leaching and weathering.

4.16 ADJACENT DISPOSAL SITE

Ultimate disposal of solid waste residuals from the Cranston wastewater treatment plant has always been, in now, and is proposed to be in the floodplain just north of the plant. (In the past and at the present time this residual has been in the form of biologically digested sludge while in the future it is to be incinerator ash). Figure IV-9 is a map of the floodplain showing the existing use of the area with Figure IV-10 showing the area proposed to be developed for expansion of the plant itself.

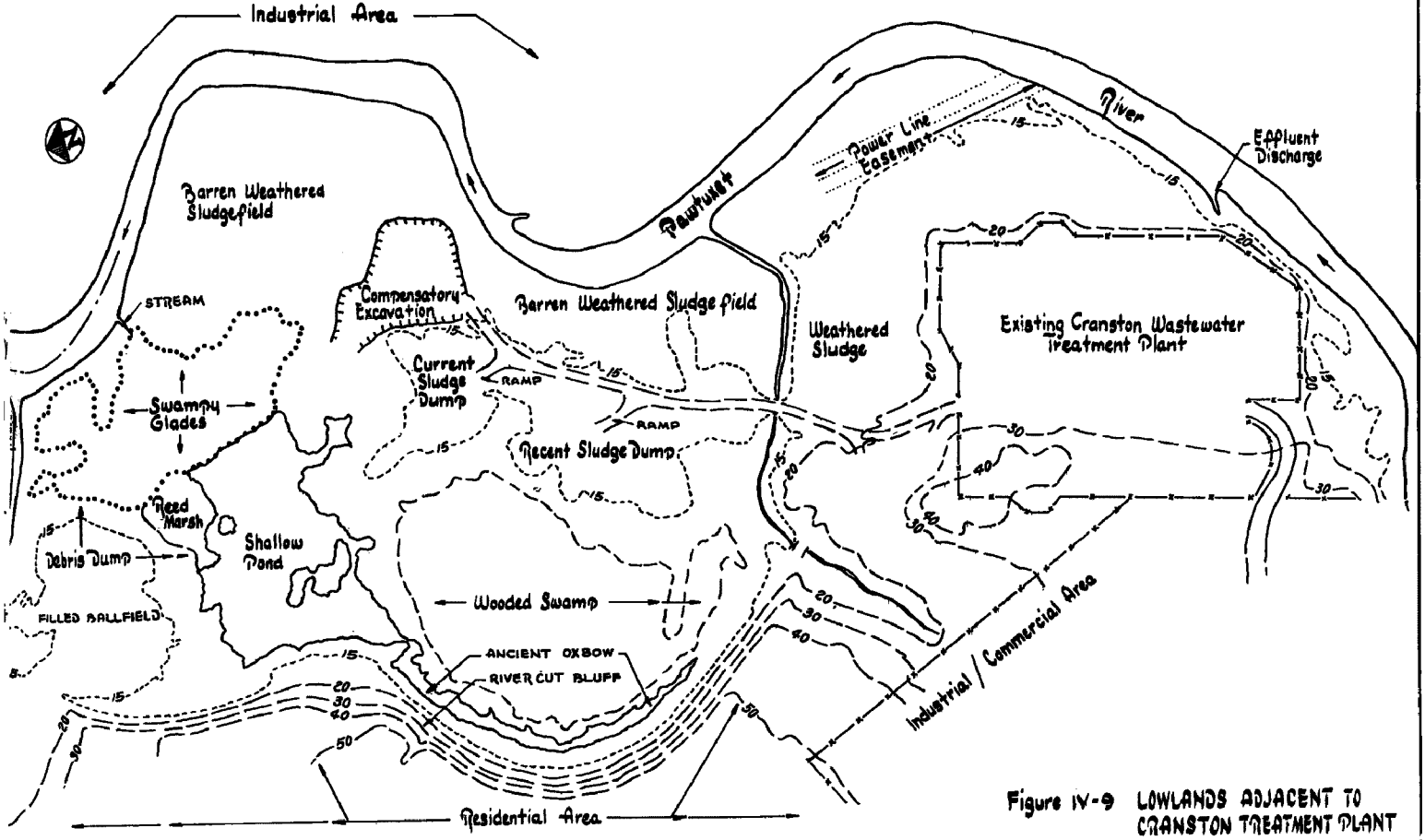


Figure IV-9 LOWLANDS ADJACENT TO CRANSTON TREATMENT PLANT

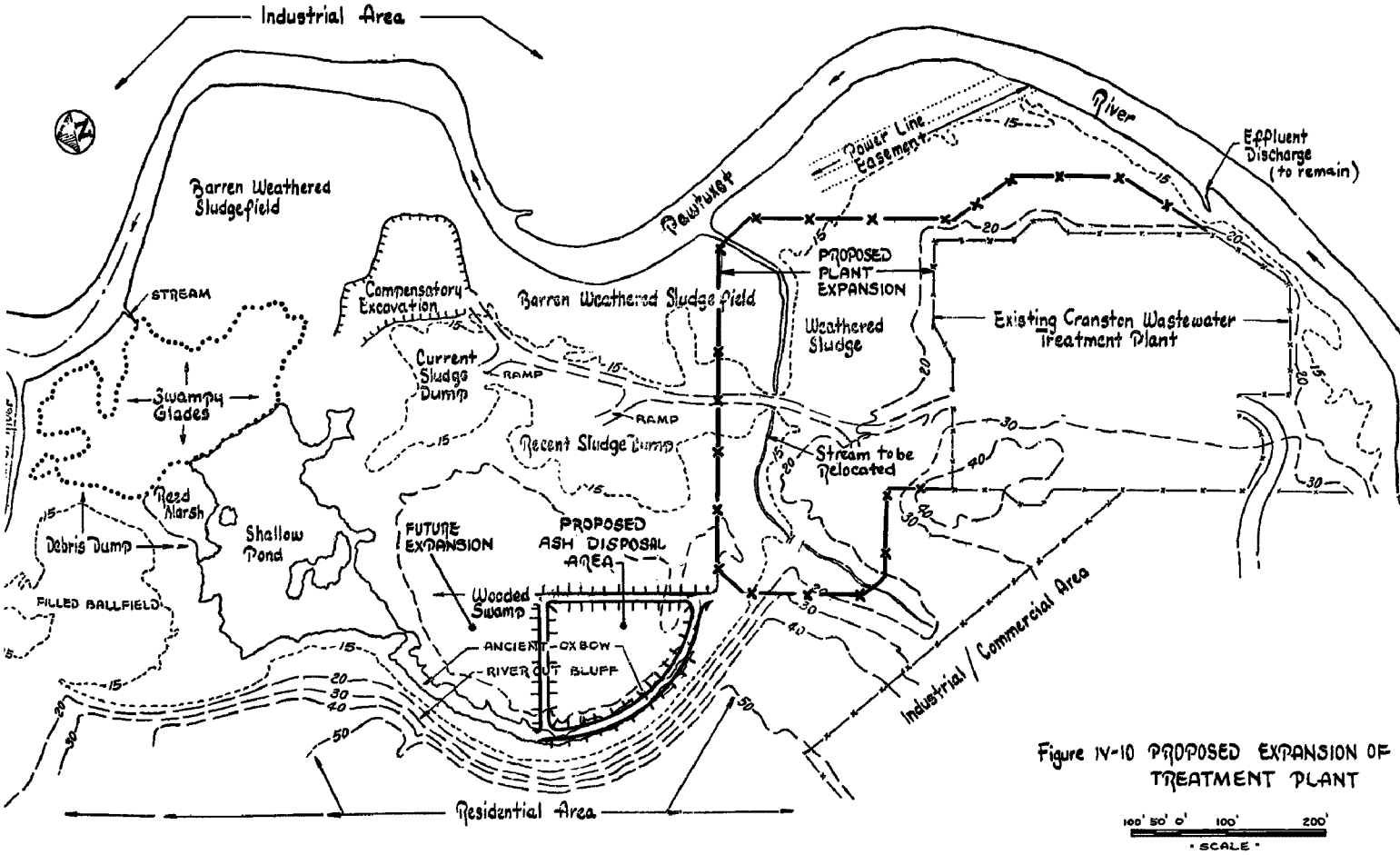


Figure IV-10 PROPOSED EXPANSION OF TREATMENT PLANT

4.17 ALTERNATIVE DISPOSAL SITES

There are a large number of potential alternative solid waste disposal sites within reasonable proximity of the Cranston wastewater treatment plant since the plant lies next to one of the major highway intersections of the State of Rhode Island. Figure IV-11 shows the location of these alternative sites and the type of disposal considered for them.

Two of the sites, the two golf courses, were considered only for surface application of the sludge as a soil conditioner and/or fertilizer; two of the sites, the Briggs Farm recreation area and the grounds of the state institution were considered both for such surface application and for sanitary landfill type disposal of sludge or ash; and the other three, two commercial sanitary landfills and a partially worked out quarry, were considered for burial of sludge or ash.

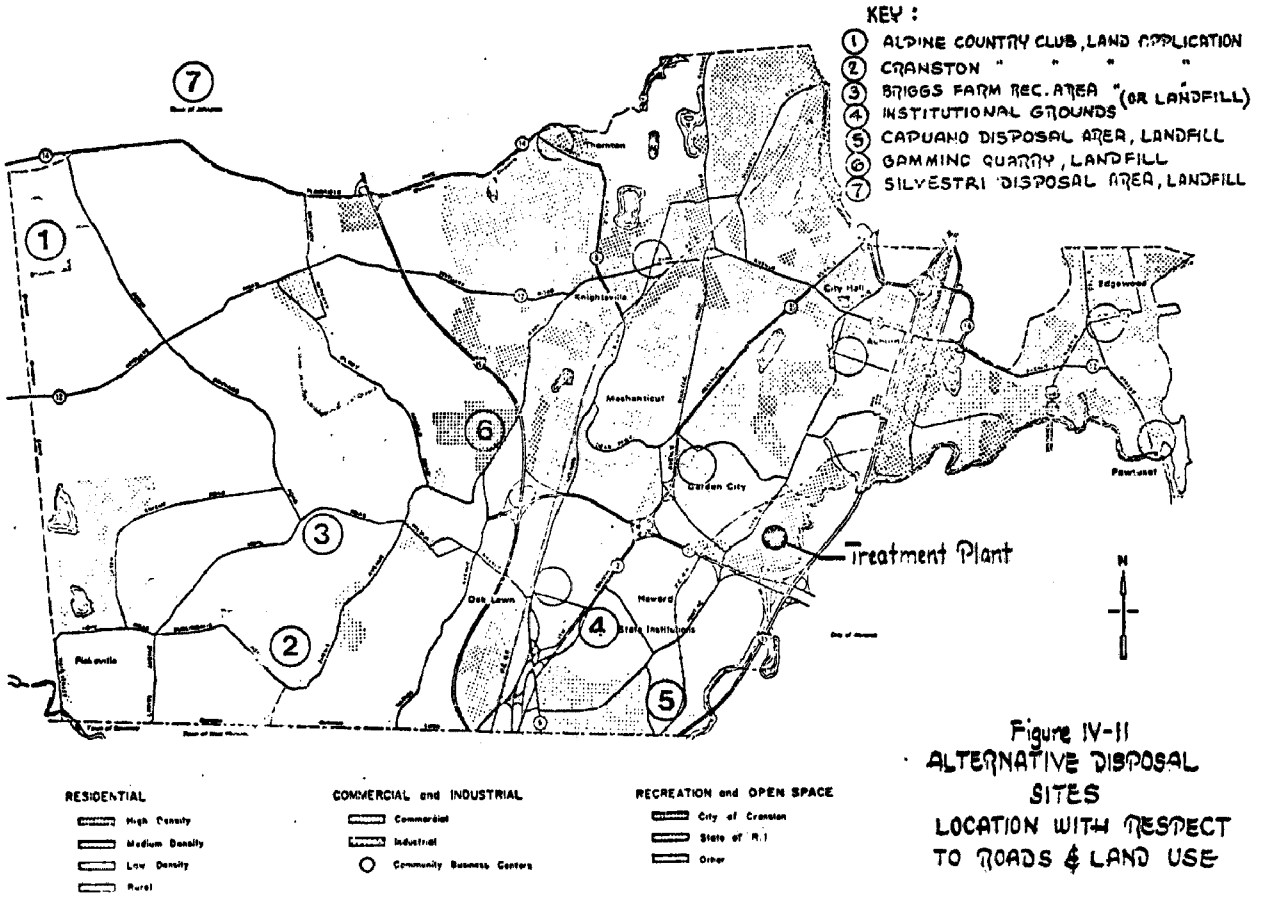


Figure IV-11
ALTERNATIVE DISPOSAL SITES
LOCATION WITH RESPECT TO ROADS & LAND USE

4.2 PROPOSED ACTION FOR SOLID WASTE TREATMENT AND DISPOSAL

4.21 THE PROPOSED ACTION

Proposed residual solids disposal actions include steps to dispose of both the large volumes of fresh sludge that will be generated steadily by the enlarged treatment plant and the old sludge that will have to be removed for construction of the new additions to the plant.

To dispose of the large volume of fresh solid wastes to be steadily generated by the proposed enlargment of the treatment plant, it is proposed to incinerate the solids and dispose of the residual ash in specially designed cells on the floodplain just north of the treatment plant. Facilities for the incineration are to be provided by reconstruction of the existing incinerator to meet current clean-air standards and by construction of a new incinerator to provide needed additional capacity.

The special cells for the ash will be similar to those currently used for general domestic solid waste, except that they will be lined and drained back into the treatment plant to prevent ground water contamination and surrounded by dikes to protect them from flooding. In addition, it is proposed to surround the cells with monitor wells so that contamination of the ground water can be detected if it should occur despite the proposed precautions.

The old excavated sludge that will have to be removed for construction of the new additions tothe treatment plant will similarly be disposed of in the on-site cells except that it will not be incinerated and it will be similarly monitored for ground water effect.

4.22 ALTERNATIVES

Alternative solid waste disposal strategies other than incineration considered and discarded included:

1. continuation of the present practice of biological digestion and on-site stockpiling on the floodplain.

2. biological digestion of sludge, dewatering and off-site land application with landfill of screenings and grit.

3. thermal conditioning, and off-site landfill of sludge, screenings, grit and grease.

Alternative solid waste disposal strategies, that include incineration, considered and discarded included:

1. incineration of all solids with off-site disposal of ash.

All the alternatives were discarded because they were expected to be excessively costly, or could not be fully explored either for total program cost or total environmental effect or both, within the time allowable under Ciba-Geigy Chemical Company's court ordered clean-up schedule.

Specific reasons for discard of the alternatives included:

1. for continued digestion and stockpiling on the floodplain:

   a. expected sharp increase in sludge generation rate when the Ciba-Geigy wastes are added to the municipal plant

   b. limited knowledge of the environmental effects of the existing stockpiling practice and inadequate time for research

   c. increasing value of floodplain for flood storage as the watershed urbanizes and flood peaking increases.

2. for digestion and disposal off-site for land application (agriculture, lawns, recreation areas) as a fertilizer and/or soil conditioner:

   a. excessive cost if no cash value is assumed for its organic fiber (60% of dry weight) and nitrogen (4.4% of dry weight) content.

   b. limited knowledge of the market for the digested sludge and inadequate time for research.

   c. limited knowledge of the environmental effects of land application and inadequate time for research.

   d. possibility of creating unsafe highway conditions if trucks track sludge and dirt back onto roads after discharging their loads.

3. for thermal conditioning of sludge and disposal in an off-site sanitary landfill:

   a. excessive costs

   b. possibility of creating unsafe highway conditions if trucks track sludge and dirt onto pavements after discharging their loads.

4. for incineration of sludge on-site with off-site disposal of ash in a sanitary landfill:

   a. less control by the City of Cranston of the costs and operation of the sanitary landfill.

4.3 ANTICIPATED ENVIRONMENTAL EFFECTS

The proposed actions are expected to have a variety of effects on the environment including but not necessarily limited to those on air quality, on water quality, on flood storage, on neighborhood liveability, and on wildlife habitat.

The impacts on the neighborhood are likely to be mixed, a trade-off of odor elimination, if the plant performs as expected, and the effects of a larger plant impinging on its surrounding. See Chapter V for a more detailed description.

The impacts on wildlife will be continued elimination of wetlands with the ash disposal cells being proposed for the wetlands not yet spoiled by sludge dumping. Further, it should be noted that the proposed action does not include any steps to restore the loss of wildlife habitat that resulted from the stockpiling of digested sludge on the wetlands in the first place.

The loss of floodplain, although an adverse environmental effect, is not a serious loss and can be made up by compensentory enlargement of flood storage in a number of places, both on and off site.

The water quality impacts may be significant and include passage of chemicals leached out of the ash through the treatment plant and into the river in the plant's effluent stream. The degree of solubility of the ash, and as a result the concentration of solutes in the leachate, are not known. No federal standards for such discharges have as yet been established, but are scheduled to be so established in the near future.

And finally, the emission of pollutants into the atmosphere, while the proposed action will increase the amount of pollutants in an absolute sense, the percentage of change will not be large and the amount of change will not violate clean-air standards, assuming a very small ambient improvement as a result of the state's air quality maintenance plan. Sulfur dioxide emissions, not over 7 grams per second, will increase average annual SO_2 concentrations by up to 1 microgram per cubic meter, an increase of only 2 or 3% over existing conditions, about 7% of the allowable increase in present regulations, and a total ambient well under (less than 65% of) the ambient standards.

The short term impact of this emission rate under stagnant air conditions will amount to maximum day ground level SO_2 concentrations at the treatment plant site about 3/4 of the allowable increment or about 1/5 of the allowable second worst day per year ambient standard. The maximum

three hour SO_2 concentration similarly will amount to about 1/3 of the allowable increment or about 1/5 of the allowable second work 3 hour period per year ambient standard.

Total suspended particulate emissions, not over 0.3 grams per second, will increase average annual TSP concentrations by less than one half of 1 microgram per second, a negligible effect. The short term impact of this emission rate under stagnant air conditions will amount to maximum-day ground level TSP concentrations at the treatment plant site about 1/10 the allowable increment or about 2% of the allowable second worst day per year ambient secondary standard (non-health realted) or about 1% of the allowable second worst day per year ambient primary standard (health related).

Mercury emission rates, about 0.00005 grams per second are about 2/10 of 1% of the allowable emission rates.

Table IV-8 shows this data in tabular form

TABLE IV-8

ANTICIPATED MAXIMUM AIR QUALITY IMPACTS

MICROGRAMS PER CUBIC METER

Pollutant	Applicable Parameter	Maximum Allowable	Anticipated Maximum Impact	
SO_2	degradation			
	worst hour/yr	No Standard	285	
	2nd worst 3 hr/yr	700	240	
	2nd worst day/yr	100	71	
	annual average	15	1	
	ambient concentration			
	2nd worst 3 hr/yr	1300		5.5% increase/ ambient
	2nd worst day/yr	365		20.0% increase/ ambient
TSP	emission rate	1.3 lbs/ton of solids	1.3 lbs/ton of solids	
	degradation			
	worst hour/yr.	No Standard	12	
	2nd worst day/yr.	30	3	
	annual average	10	0	
	ambient concentration			
	2nd worst day/yr[1]	260		1.2% increase/ ambient
	2nd worst day/yr[2]	150		2.1% increase/ ambient
Mercury	emission rate	.0266 grams/sec.	.00005 grams/sec.	

1 Primary Standard, health related.

2 Secondary Standard, non-health related.

Source: CE Maguire, Inc.

4.4 MITIGATION OF IMPACTS

The principal adverse environmental effects of the proposed solid waste disposal about which something could be done include:

1. the possibility that incineration of the solid wastes is waste of a useful natural resource, i.e. a soil conditioner/fertilizer,

2. further loss of virgin wetlands to solid waste disposal, and

3. the neglect to restore or rehabilitate the wetlands that were smothered by the current sludge disposal methods.

On the matter of the possibility that a useful resource may be wasted because there is inadequate time to study the economics and environmental safety of its use as a result of clean-up deadlines within present legislation, it may well be that short-term delay of present environmental goals will produce long-term environmental benefits that transcend present goals.

On the loss of even more naturally vegetated wetlands to solid waste disposal even though there are many acres of wetlands at the site now covered by only a fairly thin mantle of old sludge, it appears further study of the feasibility of reusing the already filled and denuded areas ought to be made.

On the matter of restoration (or lack thereof) of the existing sludge dump, field reconnaisance of the site indicates that the unspoiled remnants of the area are rich in both flora and fauna and are exceedingly beautiful both as small separate landscapes and in the aggregate.

Given that the area is a floodplain, that it is well separated from most residential areas, that it already has a bountiful wildlife and that it could be restored as a productive wild park in its entirety for relatively little cost, it would appear prudent to do so as soon as the alternative solid waste disposal procedure is operable.

The only work that appears necessary to accomplish this includes

1. Picking up of the debris (household rubbish, tires, etc.) which have been thrown down the bluff along the northwestern edge of the site.

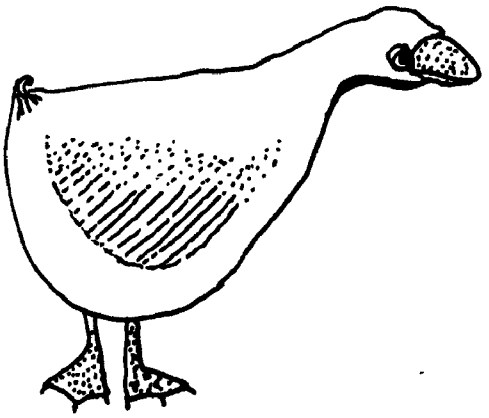
2. Scraping the old sludge up from its blanket like position across the site into piles, exposing the underlying mineral soil wherever possible. Note that while the sludge when fresh contained 85% water and hence could only be placed as a blanket on the ground but that with aging the sludge has dried and become relatively solid.

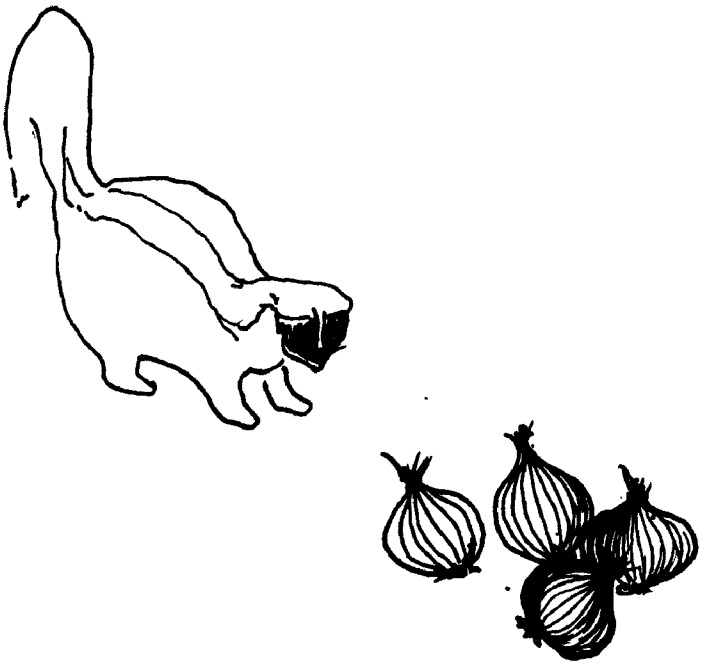
3. Possibly covering the sludge piles with some of the underlying mineral soils.

Beyond this point, nature will take its course, the mineral soils, especially if poorly graded to include puddles and pools, given their lowland location will be covered with volunteer native vegetation within a few years. The mineral cover on the sludge piles will provide a roothold for plants completing the rehabilitation. The wildlife, the bird watchers and the hunters will come back quietly and do their thing.

If a more publicly recognizable park is desired a meandering walkway and patrol road could be incorporated with landscape planting installed prior to the park's "opening", presumably with a restriction on hunting required by the more open access.

Implementation will require a survey to identify landforms, vegetation, and, possibly, archeological sites to be protected. Presumably rearrangement of the old, weathered and washed sludge will not required detailed environmental impact assessments.





Chapter V NEIGHBORHOOD NUISANCE IN THE VICINITY OF WASTEWATER TREATMENT FACILITIES

5.0 INTRODUCTION

The proposed action, described in Chapters III and IV, will impose a set of short-lived nuisances in many parts of the City of Cranston (and adjoining Warwick) during the various construction phases included in or expected to result from the proposed action. Such short-term impact areas will include the vicinity of the treatment plant, the routes of new pipelines and the areas of western Cranston that are expected to urbanize as a result of the proposed action. These short-term impacts are expected to include noise, dust and traffic disruption, including increased risk of traffic accidents, despite the inclusion of all current mitigating procedures within the various construction permits and contracts. However, a fieldreconnaissanceof the sites of all this construction indicated no especially sensitive land use or resource areas immediately adjacent to any of these expected short-lived impacts except as noted in Chapters VI and VII.

Similarly, the proposed action will impose a set of long-term effects on the environment, which effects, simply because they are long-term, must be viewed quite carefully. The principal areas in which these effects are expected are the neighborhoods surrounding the wastewater treatment plants and the river, while the effects that appear to be the most serious are odor and noise. The key elements of the background of this neighborhood nuisance problem include:

1. that while there have been nuisances at both the municipal treatment plant and at the Ciba-Geigy treatment plant, there has been a substantially greater history of public complaint at the Ciba-Geigy plant and;

2. that the proposed action will bring the Ciba-Geigy wastes to the municipal plant for treatment in the future because of:

    a. lack of land for improvement of the Ciba-Geigy treatment plant at its present location,

    b. greater sensitivity of the Ciba-Geigy neighborhood to odor because of its closer location to the treatment plant, and

    c. the likelihood of more efficient, more effective treatment of the combined wastes than of the Ciba-Geigy wastes alone.

The principal questions that arise include:

1. will there be an adverse odor or noise effect on the neighborhood of the Cranston treatment plant as a result of the proposed action?

2. are there alternative actions that could preclude the nuisances?

3. are there any actions that can be taken to mitigate the nuisances? and, perhaps most importantly,

4. if adverse impacts on the neighborhood of the Cranston treatment plant are unavoidable, are these environmental losses justified by the environmental benefits?

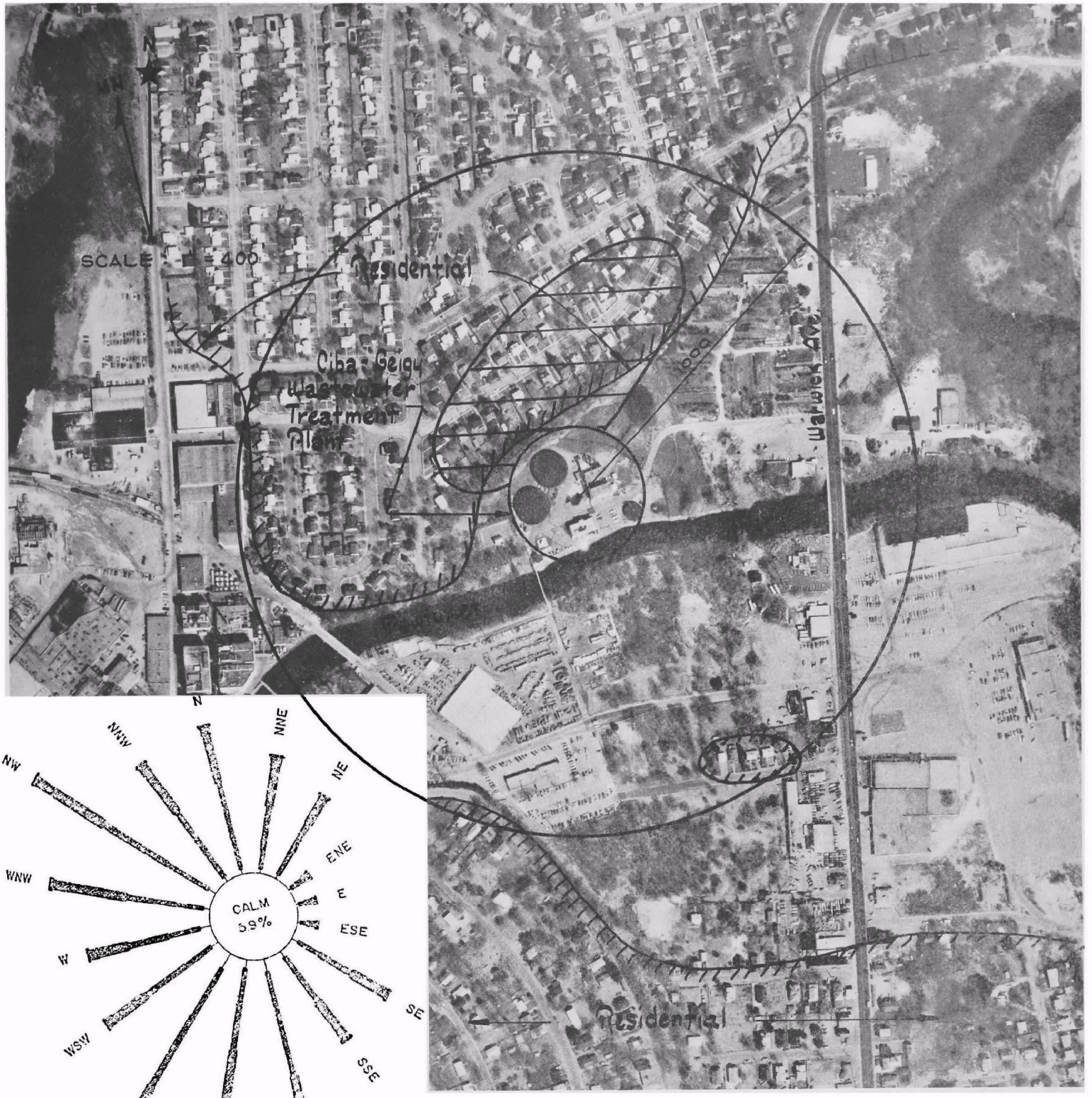
The sections below describe the neighborhoods for which nuisance is a concern, the nature of the nuisances to which they are now subjected, the proposed changes in plant that might change nuisance conditions, and their resulting environmental impacts.

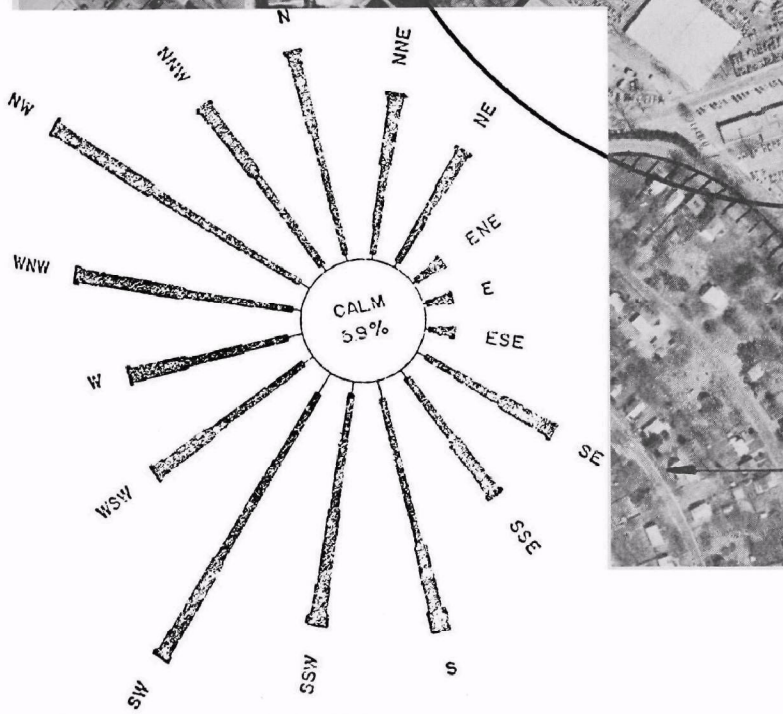
5.1 BACKGROUND

This section includes a description of the neighborhoods around the Ciba-Geigy wastewater treatment plant, the City of Cranston treatment plant and the lower reaches of the Pawtuxet River and of the relevant, ambient odor and noise in each neighborhood.

5.11 CIBA-GEIGY NEIGHBORHOOD

Figure V-1 shows an aerial photograph of the neighborhood around the Ciba-Geigy wastewater treatment plant, the area from which most of the complaints of odor have originated, and a "windrose" which shows the distribution of wind duration in the region. Note the proximity of the treatment plant to the residential area and that the area of complaint lies closely adjacent to the plant. Note also that the windrose shows the annual distribution of the winds, and that, in the summer when windows tend to be open and people tend to be out-of-doors, southerly winds are most common. And finally note the scarcity of undeveloped land in the vicinity of the treatment plant.





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OVERALL AVERAGE WIND SPEED, INCLUDING CALMS, IS 10.7 M.P.H.

SOURCE: CLIMATOGRAPHY OF THE UNITED STATES NO. 82-37, SUMMARY OF HOURLY OBSERVATIONS - T.F. GREEN AIRPORT, 1951-1960

WINDROSE FOR PROVIDENCE, RHODE ISLAND

LEGEND:

(OBSERVED LIMIT OF ODOR RECEPTION (1000' RADIUS)

AREA OF MOST SIGNIFICANT AND CONSTANT RECEPTION

CIBA - GEIGY CORP. W.W.T.P.
SITE AND SURROUNDING AREA
· ODOR SURVEY · Figure V-1

5.12 CRANSTON TREATMENT PLANT NEIGHBORHOOD

Figure V-2 shows an aerial photograph of the neighborhood around the City of Cranston's treatment plant, and the location where the digested sewage sludge (from both the City of Cranston's sewage and Ciba-Geigy's) is dumped. Note:

1. that, in the proposed project, the use of the sludge dump will be discontinued,

2. that there are almost no residence, within 800' of the plant (not including the sludge dump).

3. that the prevailing southerly summer winds will tend to waft odors out over the site of the existing sludge dump,

4. that the balance of the common winds do blow out over route 95 for quite a long distance as measured along the road, and

5. that most of the land near the treatment plant (other than disposal area to be abandoned and highway) is commercial or industrial.

5.13 PAWTUXET VILLAGE

The only other area in which nuisance is believed to be of concern is the lower reaches of the Pawtuxet River, an older residential neighborhood that includes the Pawtuxet Village Historic District, a neighborhood listed on the National Register of Historic Places. Note that this district includes a substantial portion of the river itself within the "place" listing.

Attention is drawn to this place for the following reasons:

1. EPA is compelled by Executive Order 11593 to protect all areas so listed (or eligible for such listing) from environmental degradation resulting from any of its actions (or non-actions) if at all prudent and feasible.

2. Without effective removal of pollutants from the lower reaches of the Pawtuxet River in the relatively near future, it is likely that the river will, again in the relatively near future, become anaerobic during low flows creating a serious and extensive odor problem in the Pawtuxet Village Historic District. The result is that any EPA assisted, or licensed, project on the Pawtuxet River must be adequate to prevent any nuisances that can prudently be prevented.

CRANSTON W.W.T.P. PROCESSING UNITS

LEGEND :

1. GRIT & GREASE REMOVAL UNITS
2. ELUTRIATION TANKS
3. MAIN OFFICE BLDG. & VACUUM FILTER EQUIPMENT
4. SLUDGE DIGESTOR TANKS
5. PRIMARY CLARIFIERS
6. SECONDARY AERATION TANKS
7. FINAL CLARIFIERS
8. BLOWER EQUIPMENT BUILDING
9. CHLORINE CONTACT TANK

CRANSTON WASTEWATER TREATMENT PLANT

SITE AND SURROUNDING AREA

· DESCRIPTION · Figure V-2

5.14 AMBIENT ODORS AT CIBA-GIEGY

The Ciba-Geigy treatment plant (including two one (1) million gallon equalization tanks, trickling filters, and a final clarifier) was built in 1970, and since then residents just north of the treatment facility have complained of odors from that plant. The majority of the odor complaints from those residents started in 1971, immediately following the completion of the facility. The source of the odor emissions seemed to be from the trickling filter systems, so that Ciba-Geigy, responding to the complaints and the presumed cause, installed corrective equipment, a nutrition (ammonia acid) holding tank to feed the trickling filter and eliminate the low pH and anaerobic conditions. Unfortunately the corrections did not work, complaints were still received, and so, in the summer of 1974, an odor counteracting system was installed around the trickling filter. This system masks the unpleasant odor by blowing a sweet-smelling chemical around the circumference of the trickling filter. This still was not satisfactory and in July 1974, in a further experiment to eliminate the odor emissions from the treatment facility, Ciba-Geigy temporarily turned off the forced draft fans under the trickling filter. The effect of this action was to reduce the stripping of volatile solvents from the wastewater. This appears to have worked, as there have been very few odor complaints since. (It should be noted that while this action appears to have been effective in reducing odor, it did not noteably effect the efficiency of pollutant removal from the wastewater.)

Concurrent with this experimentation, and based on the same complaints, public hearings were held in March, 1975, which hearings led to establishment of a formal odor control program. The program consisted of daily surveys of the surrounding neighborhood, as well as actual air monitoring measurements. In the period of May through June 1975, Ciba-Geigy, under the inspection of representatives of the State Department of Health, tested the air to determine if the hydrocarbon emissions associated with the odor were of sufficient quantity to adversely effect the health of the nearby residents. These tests were undertaken with the trickling filter forced draft fans on. The tests were negative, indicating no health hazard in the area at the time of testing.

On July 23, 1975, the forced draft fans were again turned off (reducing solvent removal by air stripping), and remain off to this date. The odor complaints have virtually stopped as a result of this action and no official complaints have been recorded at the Rhode Island Department of Health since discontinuing use of the forced draft fans. Since that time several field visits were conducted during the preparation of this statement to further evaluate the odor climate in the area.

Currently there are no significant odor emissions from the trickling filters at the plant, due most probably to the shut-off of the forced draft fans and to the odor masking system. The wastewater at the Ciba-Geigy plant has, by past record, however, been shown to be odorous when exposed to aeration treatment (trickling filters). The extent of the area impacted by the odors when they were emitted is shown on Figure V-1 based on records of odor complaints.

5.15 AMBIENT ODORS AT CRANSTON TREATMENT PLANT

Odors at the Cranston treatment plant, while plainly evident and objectionable, have not been the object of the sustained and strong complaint experienced at the Ciba-Geigy treatment plant. To help determine whether the proposed action will abate or create odor, a survey was made of existing odor conditions as part of the preparation of this statement. It should be noted of this survey (made through April and May of 1976) that residents and workers in the effected area have indicated that odors on some occasions may have been substantially more severe than those found during the survey period. However, it should also be noted, that the source of these more severe odors are likely to have been the same as the sources of the less severe odors identified in the survey (same sources, worse conditions) and that the odor mitigating actions incorporated in the proposed project will probably be effective for all of them.

In measuring the existing odor emissions within the Cranston project area and evaluating odor conditions, there were a number of established approaches which theoretically could have been utilized, with the varying approaches broadly categorized as either analytical or sensory. The analytical approaches measure concentrations of known odor substances in the air, while the sensory approach evaluates the human response to the odor.

Since this particular area has so many varied and compounded odorous substances and since there is no instrument or means of chemical analysis presently available that can replace the function of the nose in its ability for the detection and intensity rating of complex odors, the sensory approach was selected for this survey.

The measuring instrument used consisted of a judging panel randomly selected to be representative of the general population. Three judges were used, a number identified in the literature as being both convenient and accurate for general ambient odor measurements of the type undertaken. (Comments were also sought from local residents in order to obtain a more complete identification of any odor problem in the area.)

The measuring procedure was by direct exposure of the panelists to various odors in and surrounding the site. The investigative format was to record date, time, location, weather conditions estimated source of odor, strength of odor, acceptability of odor, and any comments. Comparative and quantitative standards were set for strength and acceptability of the odors. The strength measurements were rated 0 to 5, ranging from no odor to strong. The acceptability measurements were also rated 0 to 5, with a range of Very Pleasant to Very Unpleasant.

Site visits were scheduled to obtain a broad range of weather, wind, and treatment plant conditions. The resulting average odor measurements at the station locations are shown in Table V-1. The average of the readings was calculated in order to account for both the changes in the actual conditions as well as variations in the odor-perception characteristics of the several judges and in the same judge from day to day. In spite of the uncontrollable human factor in this sensory testing, the number of measurements and the attention to detail are considered to have yielded reliable and meaningful results.

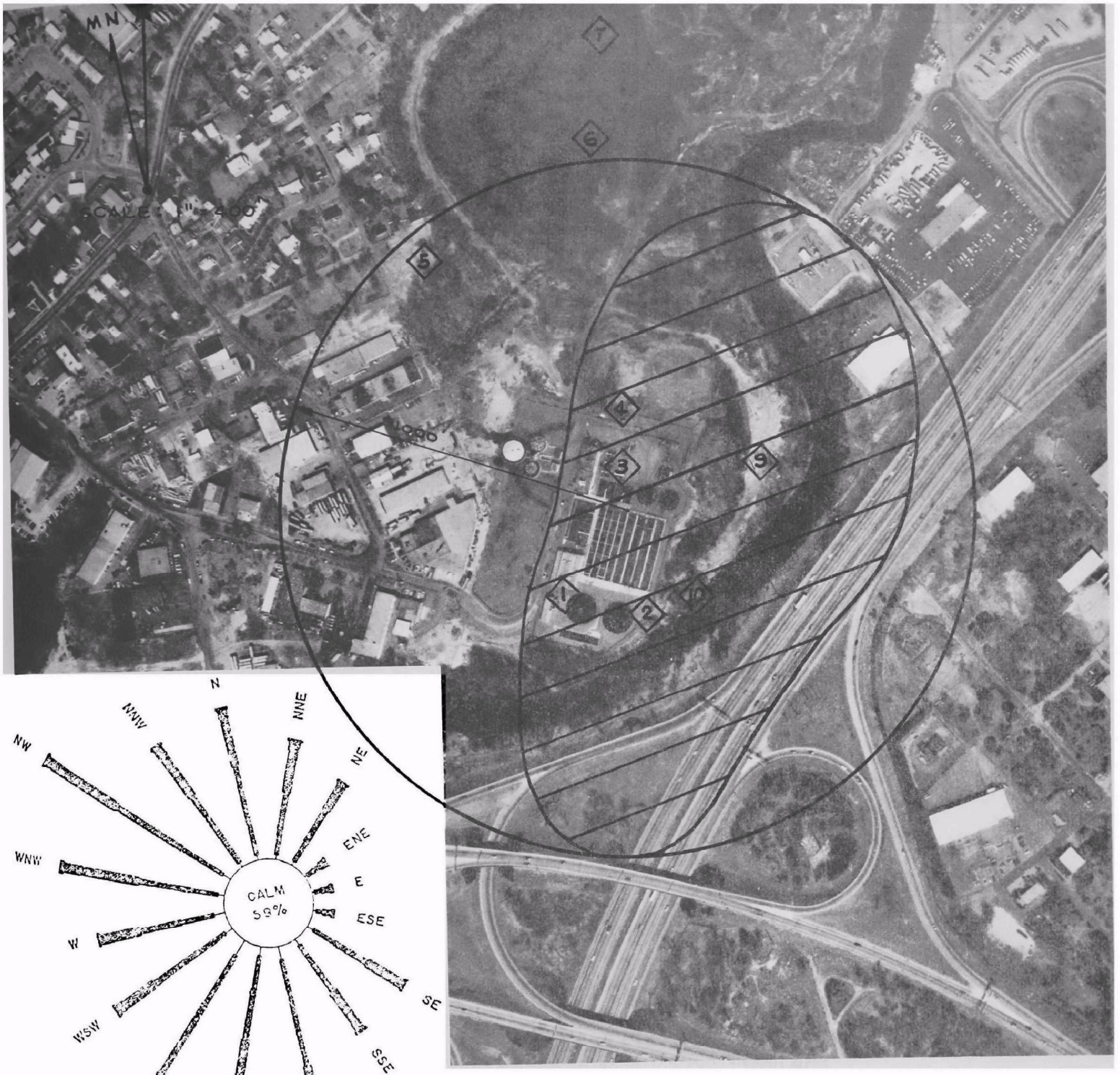
TABLE V-1

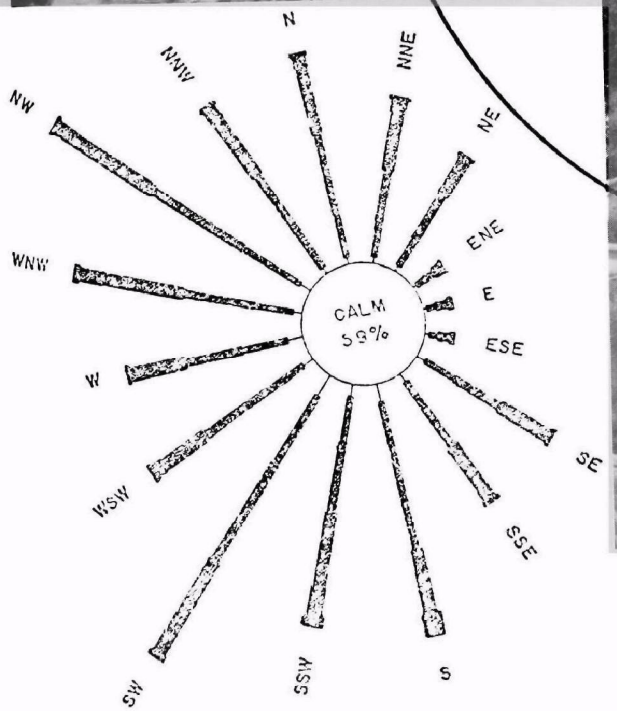
CRANSTON WASTEWATER TREATMENT PLANT
AMBIENT ODOR MEASUREMENTS

Station No.	Location (Estimated Source of Odor)*	Strength** Averages	Acceptability Averages
1	WWTP (final clarifier tanks)	2	3
2	WWTP (secondary aeration tanks)	2	3
3	WWTP (elutriation tanks)	4	4
4	WWTP (sludge disposal area)	3	3
5	Residential Area (swampy area below)	1	2
6	WWTP (sludge disposal area)	3	4
7	WWTP (sludge disposal area)	3	4
8	WWTP (swampy wetland, North)	2	2
9	WWTP (perched water east of fence)	4	5
10	WWTP (secondary aeration tanks)		

*For location of Station, see Figure No. V-3
**Strength ranges from 0 to 5, no odor to very strong; acceptability ranges from 0 to 5, very pleasant to very unpleasant.

Source: CE Maguire, Inc.





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SOURCE: CLIMATOGRAPHY OF THE UNITED STATES NO. 82-37, SUMMARY OF HOURLY OBSERVATIONS - T. F. GREEN AIRPORT, 1951-1960.

WINDROSE FOR PROVIDENCE, RHODE ISLAND

LEGEND:

- (2) ODOR SURVEY STATION NUMBER (SEE MEASUREMENTS IN TABLE 1)
- 1000' RADIUS CIRCLE (OBSERVED LIMIT OF ODOR RECEPTION)
- AREA OF MOST SIGNIFICANT AND CONSTANT ODOR RECEPTION

CRANSTON WASTEWATER TREATMENT PLANT SITE AND SURROUNDING AREA

· ODOR SURVEY · Figure V-3

Site visits and measurements during the survey period showed that both the treatment plant and adjacent sludge landfill appear to be major odor sources in the area. In particular, the elutriation tanks and secondary aeration tanks were observed to be major sewage treatment components emitting generally unpleasant odors. The severity of the odor emissions for these sources varies from day to day. In general, on some warm days, the secondary aeration tanks overload beyond their oxidation capacity, become anaerobic and emit a strong detergent-sewage type odor.

The elutriation tanks, adjacent to the west side of the main office building, emit a constant background and occasionally strong sewage (digested sludge) type odor. These odors are for the most part localized around the elutriation tanks themselves, because of the wind-screen afforded by the main office building.

The sludge disposal area almost contantly emits an easily noticeable "farmy" type odor. Warm days and puddling of rain on the surface of the sludge accent the sharpness of these odors presumeably due to increased microbiologic activity.

Strong odors were also found just east of the fenced-in treatment plant, and were emitted from small ponds of water in the winter disposal area of the primary sewage grit. The algal formation on the surface of the water-grit interface is the probable cause of these odors.

Other less significant sources of odor at the treatment plant are:

1) primary and final clarifiers which are occasionally overloaded and form a surface scum;

2) the septic tank pumpings which are delivered by trucks several times a day to the grit and grease removal area of the plant; and

3) the swamp north of the sludge landfill which on warm days evaporates the stagnant water.

The observed sources of odor at the site, ranked from worst to best according to strength and frequency of odor occurrence include:

1. Secondary aeration tanks
2. Sludge dump
3. Elutriation tanks
4. Primary clarifiers
5. Final clarifiers
6. Septic tank pumpings ("septage")
7. Swamp north of sludge dump

The odors perceived at the receptor stations west and north of the plant, the commercial and residential areas respectively, were found to be minimal at times of observation, although occasionally when the treatment plant was emitting high odors at the source and the wind direction was towards these several receptor stations, odors could be detected. Comments from residents and workers in the commerical and residential areas west and north of the plant revealed that on intermittent occasions, the odors from the treatment plant may be much higher than those detected in the survey. Frequent strong "sewage" type odors are also reported from travelers on Route 95, east of the site. The descriptions and times of occurrence of these odors seems to indicate that they are strongest on warm days, and are more frequent at this location because of the prevailing wind direction from the west.

5.16 AMBIENT NOISE AT CRANSTON TREATMENT PLANT

Noise impacts are evaluated by:

1. comparison of total noise levels resulting from addition of ambient noise levels to anticipated increases with acceptable total noise levels for the proposed land use or activity, and

2. comparison of incremental total noise levels resulting from subtraction of ambient noise levels from anticipated total noise levels with acceptable noise level increments.

TABLE V-2

NOISE IMPACT AND COMMUNITY RESPONSE

Noise Increase	Degree of Impact	Community Reaction
Less than 5 dB (A)	Slight	None
5-15 dB (A)	Moderate	Occasional complaints from individuals
More than 15 dB (A)	Severe	Frequent complaints from individuals and group action likely

Source: Parrock, H.O. "Community Reaction to Noise", Ch. 36, Handbook of Noise Control, Ed. C. M. Harris. McGraw-Hill, 1967.

Table V-2 shows the likely social reaction intensity of various noise increments while Table V-3 shows the more detailed noise standards in the City of Cranston's zoning code. Special note should be made of the desireability of maintaining sleeping noise levels at about 32dB (A) indoors (or 47 dB (A) outdoors allowing for 15 dB shielding of an open-windowed structure).

To establish the existing daytime ambient noise levels at the treatment plant, a survey was made in April, 1976, with a general purpose sound level meter. At each of the measuring stations, the minimum noise level (L min.), the maximum noise level (L max.) median noise level (L 50) and the level of noise exceeded 10 percent of the time (L 10) which provides an average upper limit of the range of noise experience were determined. From these the equivalent sound level (Leq), considered by EPA to be the best descriptor of environmental noise, were calculated. The location of the sampling point locations are shown in Figure V-4 and the results of the survey are shown in Table V-4.

TABLE V-3

CITY OF CRANSTON NOISE CODE

Maximum permissible sound-pressure levels at specified points of measurement for noise radiated continuously from a facility between the hours of 11:00 P. M. and 7:00 A. M.

Frequency Band: Cycles per second	*Sound Pressure Level:* Decibles*
20 - 75	75
75 - 150	70
150 - 300	62
300 - 600	55
600 - 1200	49
1200 - 2400	43
2400 - 4800	37
4800 - 10000	35

*According to the following formula: Sound Pressure Level in Decibels equals 10 log $\frac{P}{0.0002 \text{ dynes/sq. cm.}}$

If the noise is not smooth and continuous or is not radiated between the hours of 11:00 P. M. and 7:00 A. M., one or more of the corrections in Table 2 below shall be added to or subtracted from each of the decibel levels given above in Table 1.

TABLE 2

Type of Operation or Character of Noise	*Correction in Decibels*
Daytime operation 7:00 A. M. to 11:00 P. M.	plus 5
Noise source operates less than 20% of any one-hour period	plus 5*
Noise source operated less than 5% of any one-hour period	plus 10*
Noise source operated less than 1% of any one-hour period	plus 15*
Noise of impulsive character (Hammering, and so forth)	minus 5
Noise of periodic character (Hum, screech, and so forth)	minus 5

*Apply one of these corrections only.

LEGEND :

(1) NOISE MONITORING STATION

CRANSTON WASTEWATER TREATMENT PLANT
SITE & SURROUNDING AREA
• NOISE SURVEY • Figure V-4

TABLE V-4

AMBIENT NOISE MEASUREMENTS
(Weekdays, Working Hours)

Station No.*	Land Use (Location)	Distance from Source of Noise	L (min) dBA	L_{50} dBA	L_{10} dBA	L (max) dBA	Leq.**
1	WWTP (Blower Building)	25'	65	67	67	68	67
2	WWTP (Blower Building)	2'	74	76	76	79	76
3	WWTP (Final Settling)	5'	67.5	67.5	67.5	67.5	67.5
4	WWTP (E. Fence)	150'	58	61	67	70	64*
5	WWTP (E. Fence)	200'	62	63	63	63	63
6	WWTP (Digester)	20'	69	70	71	72	70
7	Commercial (Glen Road)	10'	52	53	53	53	53
8	Residential (Eddy St/Celistia)	10'	53	53	53	54	53
9	WWTP (Sludge Landfill)	400'	45	48	52	57	50
10	Commercial (Pettaconsett Ave)	10'	52	64	75	90	76

*See Figure V-4 for Map Locations of Stations.

**Note: The Leq values are calculated from daytime readings only; values for 24 hour period would most likely be lower.

Source: CE Maguire, Inc.

The readings show a fairly wide spread of sound levels throughout the study area. Within the treatment plant site the highest noise emissions are at the blower building and the digesters, with the blower building emitting a low frequency humming noise, the sound level of which drops off rapidly within a few feet, and with the digester air pump emitting a high pitched hissing sound, which was still detectable over 50 feet distant. The general noise level at the plant was approximately 65 dB(A), ten (10) feet from the water processing tanks (water splash). The key condition to note however is that existing noise levels beyond the site boundary areas were not affected by, nor were noises heard from, the Cranston Wastewater Treatment Facility.

Outside the treatment facility, the commercial area just to the west had a quite high noise level of Leq=76dB(A). This high noise level is mostly a result of truck and commerical traffic which produces peak noises close to 90 dB(A). The ambient noise level in the commercial area, without the traffic influence, as measured at station 7 is Leq= 53dB(A).

Nightime ambient noise levels (except at the plant) are expected to be primarily a function of the traffic on Route 95 and have been calculated from average hourly traffic characteristics on that road. Table V-5 shows these ambient noise levels both at a point 100' from the highway and at the nearest residential area at the end of Eddy Street.

TABLE V-5

NIGHT AMBIENT NOISE LEVELS

db (A)

Time	Typical Traffic Flow[1]	Typical Noise Levels 100' from I-95 L_{50}	100' from I-95 L_{10}[2]	1600' from I-95 L_{50}	1600' from I-95 L_{10}
10-11	3000 vph	71	77	54*	56*
11-12	2400 vph	69	76	52	54*
12-1	1200 vph	66	74	49	52
1-2	1200 vph	66	74	49	52
2-3	900 vph	64	73	47	50
3-4	400 vph	58	NM	41	44
4-5	300 vph	56	NM	39	43
5-6	300 vph	56	NM	39	43
6-7	700 vph	62	NM	45	48
7-8	3300 vph	75	82	58*	61*

1 vehicles per hour.

2 assumes 10% trucks.

* exceeds recommended indoor sleeping noise level by over 5 dB.

NM not statistically meaningful.

Source: CE Maguire, Inc.

5.2 THE PROPOSED ACTIONS TO CONTROL NEIGHBORHOOD NUISANCE

5.21 THE PROPOSED ACTIONS

To preclude the probability that continued growth of pollutant discharges into the Pawtuxet River (without abating actions being taken) will create an odor nuisance, all along the lower reaches of the River but particularly at the Pawtuxet Village Historic District, a neighborhood listed in the National Register of Historic Places, to abate pollutant discharges into the river without creating an odor nuisance at the Ciba Geigy treatment plant neighborood, and to abate odor nuisances in the areas surrounding the Cranston wastewater treatment plant, it is proposed to:

1. substantially increase Cranston's capability of reducing pollutant discharges into the river including adequate capacity for improved treatment of the city's current discharges, of Ciba-Geigy's current discharges and of the future growth of both,

2. close down Ciba Geigy's existing treatment plant and add its discharges to the city wastewater system,

3. improve (as well as enlarge) the city's wastewater treatment plant to eliminate odor formation, and

4. change waste treatment processes to eliminate odor forming processes including specifically:

    a. substitution of solid waste incineration for digestion and dumping eliminating odors stemming from elutriation, from sludge dumping and from grit dumping, and

    b. provision of special facilities for handling septage receipts.

5.22 ALTERNATIVES

Primary alternative overall waste treatment strategies that might alter neighborhood nuisance potentials, that were considered and discarded included:

1. as alternatives to wastewater discharge into the river, to protect the river's quality and the quality of neighborhoods along the lower reaches of the river, direct discharge into the Providence River by effluent pipeline.

2. as alternatives to incineration of solid wastes to protect neighborhood and regional air quality:

    a. burial of sludge in a controlled landfill on- or off-site and

    b. application of treated sludge on land as a soil conditioner or fertilizer.

The alternative of direct discharge of effluent to the Providence River was discarded both because it appeared to offer little or no better quality in the lower reaches of river than the proposed action and because it would be more costly.

The alternatives of non-incineration of solid wastes were discarded primarily because they might create neighborhood odor problems, would not materially improve air quality, and, for the off-site disposal alternatives, create a potentially life-threatening vehicle safety hazard if the off-site materials handling were sloppy enough to allow trucks to track sludge back onto public highways.

5.3 ANTICIPATED ENVIRONMENTAL IMPACTS

The proposed action is expected to:

1. preclude creation of nuisance conditions along the Pawtuxet River,

2. eliminate odors from the vicinity of the Ciba-Geigy treatment plant,

3. eliminate odors from the vicinity of the Cranston treatment plant except for the odors generated by decay of seasonal algae blooms that occur in the old oxbow and adjacent wooded swamp along the bluff at the western edge of the lowlands, and

4. create noise problems of unknown severity in the residential area just to the west of the site near the end of Eddy Street.

The odor elimination effect, other than the algae decay problem, is expected to be designed into the project and hence is dependent on the quality of design, of operation, and of maintenance of the facility. The decaying algae odors however are not expected to be significantly effected by the proposed treatment plant improvements, and a discussion of how this might be eliminated is presented in Section 5.4 below.

Noise, in addition to that inevitably generated during construction, is expected to effect the nearby neighborhood, almost up to Pontiac Avenue, particularly at night. The noise is expected to be caused by the sludge incinerators which must be operated continuously to provide economical and fuel-efficient autogenous combustion, and as a result will be constant and will continue through sleeping hours, even when traffic dies down on the nearby Route 95. Table V-6 shows the probable noise levels through the night hours for existing conditions and for incinerators that would generate 75 and 80 dB(A) measured outside the enclosing structure. Note that the actual noise levels that will be generated will depend on the detailed design of the facility and that the 75 and 80 dB(A) impacts are illustrative.

The key features of the table are:

(1) that ambient conditions probably do not exceed over 5 dB above EPA recommended sleeping levels between 11 PM and 7 AM except for not over 6 minutes of peak between 11 PM and midnight,

(2) that with a 75 dB(A) incinerator, this short duration peaking exceedance period would be extended to 2 AM, the median noise level would not fall to the 5 dB exceedance until midnight, and from 3 AM to 6 AM the median noise level would be increased by about 7dB, and

3. that with an 80 dB(A) incinerator, the peaking exceedance period would be extended to 3 AM, the median noise level would not fall to the 5 dB exceedance until 2 AM, and from 3 AM to 6 AM the median noise level would be increased by 10 or 11 dB.

TABLE V-6

NIGHT NOISE IMPACT OF INCINERATORS AT EAST END OF EDDY STREET FOR VARIOUS INCINERATOR NOISE LEVELS

(dB (A))

Hour	Existing Ambient		If 75 dB at incinerator			If 80 dB at incinerator		
			Increment at Eddy Street	Resulting Ambient		Increment at Eddy Street	Resulting Ambient	
	L_{50}	L_{10}		L_{50}	L_{10}		L_{50}	L_{10}
10-11 P.M.	54	56	46	55	56	50	55	57
11-12	52	54	46	53*	55	50	54*	55
12-1 A.M.	49	52	46	51	53*	50	53*	54*
1-2	49	52	46	51	53*	50	53*	54*
2-3	47	50	46	50	51	50	51	53*
3-4	41	44	46	47**	48	50	51**	51**
4-5	39	43	46	47**	48	50	50***	51**
5-6	39	43	46	47**	48	50	50***	51**
6-7	45	48	46	49	50	50	51**	52
7-8	58	61	46	59	61	50	59	61

Existing exceeds EPA recommended sleeping level of 32 dB indoor plus 15 dB open window shielding by over 5 dB.

*Resulting will exceed EPA recommended sleeping level by over 5 dB.

**More than 5 dB increase over existing.

***More than 10 dB increase over existing.

Source: CE Maguire, Inc.

The significance of these noise increments is hard to evaluate, particularly since there are no firm criteria or standards at this time and since human toleration of noise apparently depends on a large number of factors, not the least of which is quality of sound (soothing hum, shrill whine, clanging cowbell, gurgling brook, etc.), a parameter not included in the foregoing analysis. Further there is the question of whether a small increase in noise level is a negligible change or the straw that breaks the proverbial camel's back. The impacts of the assumed 75 dB(A) incinerator do not seem to be particularly severe, especially when the relatively small geographic area of impact is considered in comparison with the very large scale objectives of the project. This is not to say however that this is no impact and that no mitigating actions are called for.

An 80 dB(A) incinerator would be quite another thing and, according to the literature, can, rather certainly, be expected both to be upsetting to people and to lead to nuisance complaints unless effective mitigating actions are included in the project.

5.4 MITIGATION OF ADVERSE IMPACTS

The only expected long-term adverse impacts of the proposed action specifically effecting the surrounding neighborhoods (not including those impacts discussed in Chapters VI and VII) include an odor problem, probably stemming from rot of algae in the wetlands between the existing sludge disposal area and the nearby residential area, and the night noise problems at houses in the vicinity of Eddy Street. Actions for mitigating these effects are described below.

5.41 Wetlands Odor Control

It is believed that the odor rising from the wetlands is the result of seasonal decay of algae bloom that occurs as a result of nutrient runoff from the sludge dump into almost stagnant, seasonally intermittent water bodies. Elimination of the odor appears to require elimination of the algae bloom, which in turn would require:

1. elimination of the wetlands by draining or filling,

2. elimination of the nutrient supplies by removal of all sludge from the watershed of the wetlands, or

3. dilution and leaching away of the nutrients by diversion of a significant stream through the wetlands.

The first of these alternatives appears to be in contrast with the State of Rhode Island's present wetlands conservation policy but not with the City of Cranston's zoning ordinance. It should be noted however, that either filling or draining would be both expensive and be likely to be resisted by the State which could delay or deny required permission.

Elimination of the nutrient supply by sludge removal would be expensive, pose a problem of alternative disposal of the old sludge, and, possibly not work anyway.

The third route, dilution and leaching by diversion of a significant stream through the wetlands, in this particular case, appears to be both simple and economical, to be a return to a condition which pre-existed the construction of the existing treatment plant, and to almost be necessitated by the proposed plant expansion. Attention is called in Figure IV-10 to a stream which flows between the existing plant and the sludge disposal area and to the plant expansion which requires relocation of the stream. It should be noted:

1. that this is a sizeable stream which drains about 400 acres of Cranston including, fortunately for its flow stability, much land within the undeveloped grounds of various state institutions, and

2. that old maps of Cranston show that the stream originally did discharge into the subject wetlands.

It appears appropriate at this time to more fully explore this particular algae bloom control strategy especially in its relationship with the problems of restoring or rehabitating the existing sludge dumps as described in Chapter IV.

5.42 Noise Control

The strategies that will be appropriate to control noise in the vicinity of the Cranston treatment plant will depend in large measure on the final design of the facility and the resulting noise but it does appear that the following actions might be required:

1. to quiet the noise (and visual blight) of the construction near the residential area near the end of Eddy Street, construction of a landscaped earthen barrier (dike), say 5' to 10' high between the residential area and the construction area.

2. to quiet the incinerator noise at the residences.

   a. if the noise level just outside the incinerator is over 85 dB(A),

      1) offer to relocate the residents in the closest residential areas including acquisition of their property at fair market value plus compensation for the costs and hardships of relocation and for the higher mortgage interest payments their relocation is likely to impose upon them, and

      2) offer to sound-proof the homes next closest to the plant (where this is technically feasible) including double paned windows and central air conditioning plus compensation equal, at the least, to the present worth of future operating and maintenance costs (adjusted for future fuel cost savings).

b. if the noise level just outside the incinerator is less than 85 dB(A) and over, say, 73 dB(A), offer to soundproof the impacted houses as described above.

c. if the noise level outside the incinerator is less than 73 dB(A), it appears that no receptor soundproofing will be required.

Determination of specific actions for the residential soundproofing will require detailed information on the design of the proposed facility improvements, detailed survey of the local environments, and detailed analyses of the effects.

Special note should be made of the fact that silencing the key noise sources, the incinerators, is likely to be both less costly than paying the above itemized costs and also a great deal less disruptive socially. Requirement by EPA that the proposed plant either meet both the above described 73 dBA outside the incinerator and the city's existing code at the residential property lines or that the above described financial compensation and soundproofing program be included in the project, will be a positive incentive for the designers to do everything possible to quiet the noise sources.

Chapter VI GENERAL ENVIRONMENTAL EFFECTS OF SECONDARY URBAN GROWTH RESULTING FROM SEWERING NON URBAN AREAS

6.0 INTRODUCTION

The extension of public sewers into the rural areas of western Cranston, regardless of the specific location of the facilities, can be expected to contribute to a wide ranging set of environmental effects in those areas including:

* those effects related to changing the surface quality of the land, i.e. the effect of paving, loss of farmland, etc.

* those effects related to changes in population, i.e. increased traffic, increased air emissions, etc.

The surface effects can be expected, depending on the design of the urban development and its effects in changing storm-water runoff, to alter the quality, extent, depth and frequency of flood and low flows of the streams draining from the urbanizing area with consequent impacts on land use capabilities, economy, wildlife habitat, cultural resources, and esthetics.

The population changes can be expected, depending on density, to alter traffic flows, air quality, noise, costs of some municipal services, property values, etc.

The sections below set forth a brief description of western Cranston; its future, as proposed in the city's master plan, including the proposed sewering; some alternative futures; the anticipated impacts of the proposed plan; some alternative actions that could be substituted to avoid anticipated adverse impacts; and some mitigating actions that could be substituted to lessen or ameliorate adverse impacts.

6.1 SETTING

6.11 CITY-WIDE FRAMEWORK

Figure VI-1, City of Cranston, Schematic Land Use, from the City of Cranston, City Planning Commission's Land Use Analysis: 1974, shows the sharp division between urbanized eastern Cranston and rural western Cranston. Note that the "low" and "medium" density residential areas include lots as small as 6000 and 8000 square feet. Note also that the sharp demarcation between urban and rural lands that occurs in Cranston is very unusual in southeastern New England where gradual transitions are typical.

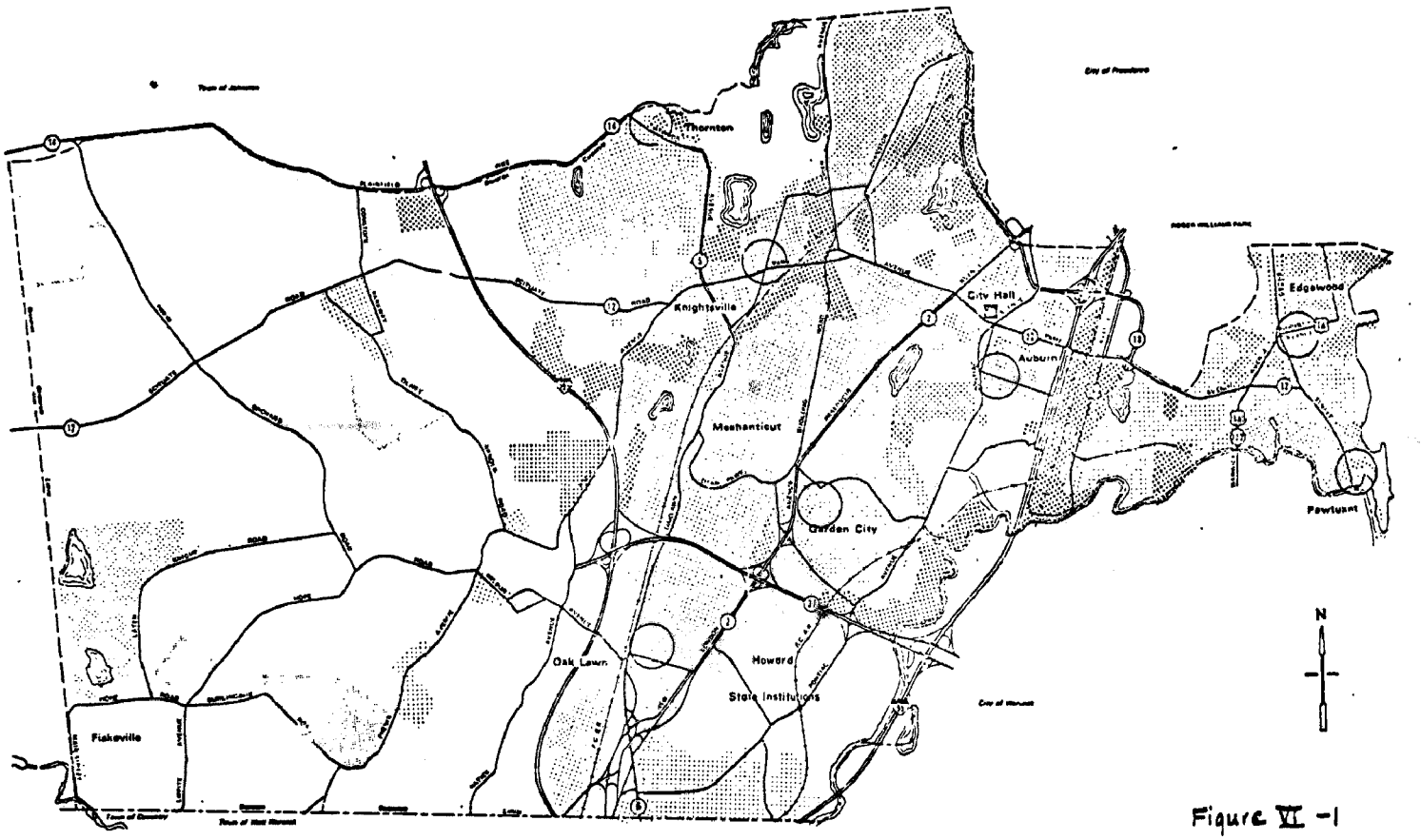

Figure VI-2, Generalized Physiography, City of Cranston, shows the concurrence of a sharp change in bedrock geology, soils and topography along the edge of the urbanized area, a similarly unusual congruence in southeastern New England. Presumeably the sharply defined physiographic edge has had some impact on the location and clarity of definition of the urban edge.

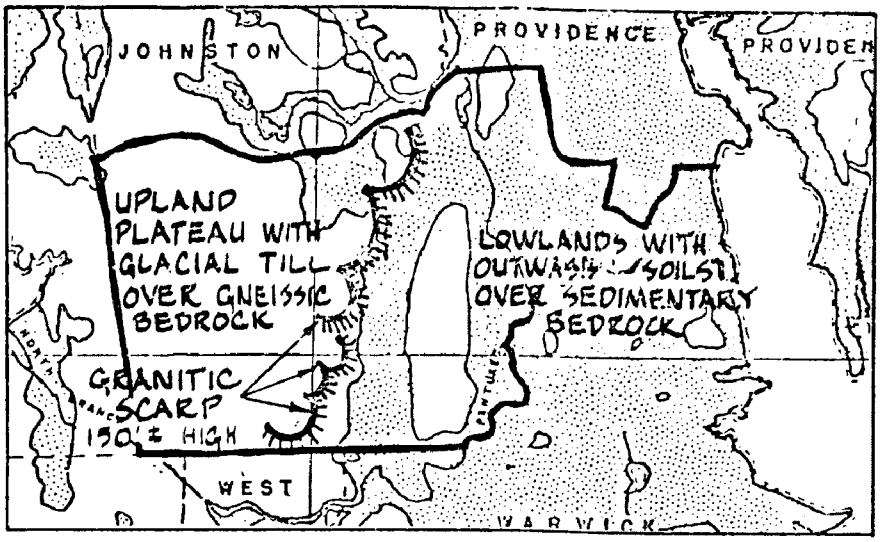

Figure VI-2 GENERALIZED PHYSIOGRAPHY
City of Cranston

source: R.I. Water Resources Coordinating Board, Geological Bulletin #11, 1961.

Further, it should be noted that nearly all of eastern Cranston is served by both public water and public sewer, that there are currently no public sewers in western Cranston, and that new public water services have only recently been installed in portions of western Cranston. All public sewers in Cranston are provided by the City of Cranston while public water in lowland eastern Cranston is provided by a low pressure system operated by the neighboring City of Providence's Water Supply Board, and, in upland western Cranston, by a high pressure system operated by the City of Cranston.

6.12 PHYSIOGRAPHY

6.121 Topography

The principal topographic feature of western Cranston is the scarp running generally North-South through the middle of the City and it is particularly well defined in the southern half of the City where the land rises from an elevation (above mean sea level) of about 50 feet on the east to an elevation of 200 to 250 feet on the west in a relatively short distance. The area east of the scarp is generally quite flat (with the exception of Sockanossett Hill and Rocky Hill), while the area to the west of the scarp is a series of hills, the highest of which, Bald Hill, has an elevation of about 500 feet. The slopes of the land in western Cranston ranges from about 2% to greater than 15%, with the average about 4%. Figure VI - 3 depicts the topographic features of Cranston.

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6.2 PROPOSED ACTION

6.21 THE PROPOSED ACTION

The proposed action, improving and expanding the sewerage system of the City of Cranston, includes the extension of municipal sewers into western Cranston to facilitate urbanization of that area both for industrial and residential growth. This action is consistant in location and density with the City of Cranston's 1975 Master Plan and, in general, in amount of population, with the State Land Use Policies and Plan.

The specific action includes:

1. extension of sewers into the eastern portions of western Cranston, i.e. the lower reaches of the Furnace Hill Brook watershed, areas to the north of that watershed up to and along Scituate Avenue and the Plainfield Pike, and a small urban cluster south of the Furnace Hill Brook water off Phenix Avenue, including two major new industrial are one off Plainfield Pike and the other off Phenix Avenue, botl near I-295 (Figure I-4) and

2. rezoning the residential portions of the sewered area from minimum lots of 80,000 sq. ft. to something on the order of 8,000 sq. ft., possibly with some limited areas zoned for apartments and neighborhood commercial. (Figure VI-9)

It should be noted that while the proposed action corresponds in its geographic extent to the proposed sewered area described in 1. above and in Figure I-4, that the capacity of the pipelines proposed in each watershed basin has been designed for intensive urbanization (i.e. about 3 dwelling units per gross acre) of that entire watershed. This should not be construed as a plan for future zoning changes or for future sewer extensions, nor does it preclude sewer extensions into or zoning changes within other watersheds that are not included within the proposed action. The decision to size the pipes within any watershed as though the entire watershed is to be sewered is a standard and prudent engineering practice which is based on the phenomena that:

1. it is only very little more costly initially to install a larger pipe than a smaller one.

2. that the maintenance costs of larger pipes tend to be less than those of smaller ones,

3. that increasing a pipeline's capacity after installation requires duplication of the entire pipeline at even higher cost than the original installation.

6.22 ALTERNATIVES

By varying the assumptions of whether or not the sewers will be extended, or whether or not the zoning will be changed, it is possible to generate a large number of alternative futures that might result from the proposed action and, from them, to generate alternative environmental impacts.

The alternatives include, at the least:

1. no action including no sewers and no zoning change (Figure VI-8),

1a. a "partial action" alternative, i.e. sewers by no zoning change,

1b. a second "partial action" alternative, i.e. no sewers but with minor zoning change, from 80,000 sq. ft. lots to, say, 40,000 sq. ft., predicated on public water service,

2. the proposed action, i.e. intensive urbanization in the sewered area and rural-residential development in the rest of western Cranston (Figure VI-10), and

3. the proposed action, repeated in the future until all of western Cranston is sewered and intensively urbanized (Figure VI-11) in essence a "worst case".

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6.221 No Action Alternative

The city does have the option of not sewering western Cranston and not changing the zoning to facilitate residential growth. This action, while probably precluding high employment and high tax paying industry, will nonetheless allow continued residential growth in western Cranston, and hence will not lead to no growth.

It must be noted with regard to this residential growth that:

1. Denial of the reasonable use of property, without compensation, is generally unconstitutional.

2. Acquisition, for compensation, of western Cranston (orof its development rights) is certainly beyond the financial means of the City and probably beyond that of the State of Rhode Island.
(8,000 acres @ say $2500/acre = $20,000,000.)

3. Most of the undeveloped (and developable) land in western Cranston (8000 acres) is zoned residential, albeit at 80,000 square foot lots.

4. Recent changes in the Rhode Island expressway system, Route I-295 and 37, have moved western Cranston from being relatively inaccessible to being the most accessible, undeveloped area in the State.

5. Recent extension of public water onto the western Cranston plateau by means of a high-pressure booster system, has changed provision of water supply for housing in that area from being a "crap-shooter's" search for uncontaminated cracks in the underlying bedrock at $2000 per shot to being a routine extension of public water mains.

6. Despite the fact that on-site sewerage in western Cranston is difficult because of soil conditions, it is, none-the-less, possible and is happening in compliance with applicable state and local regulations.

7. Technological changes in solid waste disposal, such as the "clivus multrum" an in-house solid waste composting system, recyclable mineral oil toilet systems as are used on aircraft, or vacuum toilet systems, coupled with irrigation use of wash waters, on individual sites, could overcome soils permeability limitations.

8. As development costs in "good locations" in large portions of large metropolitan areas rise, effectively squeezing out lower-cost development (and lower-income people), development in such areas can be attracted by the increase in snob value.

Putting these all together, the no-action alternative would lead, ultimately, at the least, to the total development of western Cranston, with large lots, ranging from about an acre at the lower end of the scale in the better soil areas to several acres in the poorer soil areas.

This alternative could lead to a total population of up to 16,000 people in about 5000 dwelling units distributed as shown in Figure VI-12. (These figures were calculated by applying the present zoning standards to the land areas in each zone after areas of steep slope, (over 15%), shallow soils or poor drainage as reported by the U.S. Geologic Survey, and public reservations were deleted, see Figure VI-13). The rate of growth would probably be slower than would occur under the other alternatives, but it would, nonetheless, occur.

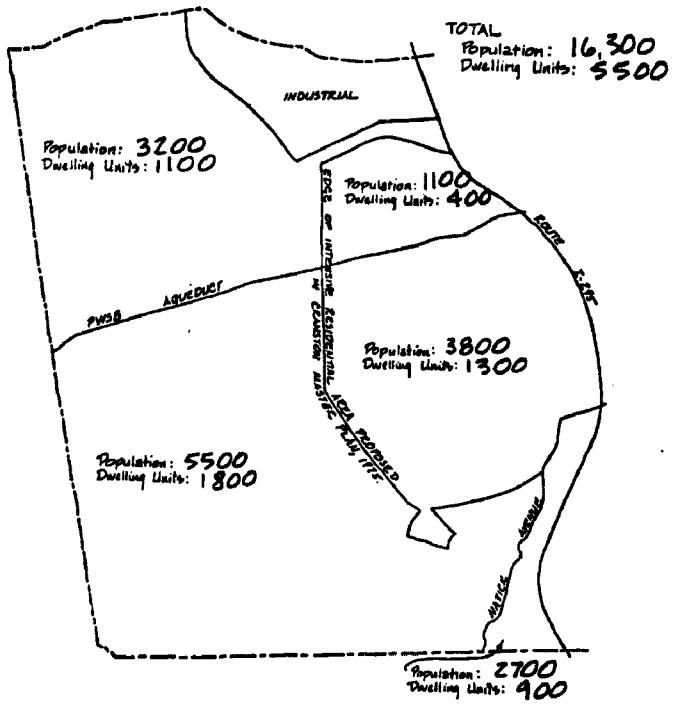

Figure VI-12 FUTURE SATURATION POPULATION DISTRIBUTION
Western Cranston
according to Existing Zoning *
(The No-Action Alternative)

Source: C E Maguire, Inc.

* adjusted to assumed land development constraints

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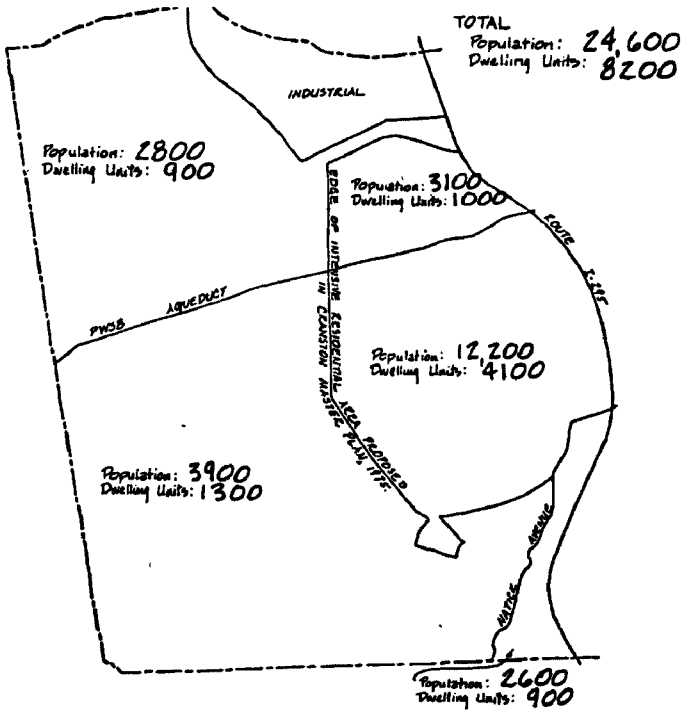


Figure VI -14 FUTURE SATURATION POPULATION DISTRIBUTION
Western Cranston
according to City 1975 Master Plan *
(The Proposed Action)

Source: CE Maguire, Inc. * adjusted to assumed land development constr

6.222 Sewers But No Zoning Change Alternative

Conceivably the city could install sewers in parts of western Cranston to alleviate present sewer problems without changing the zoning, or with only very limited zoning change. Note that this is really only a theoretical alternative with the high sewer cost per resulting dwelling unit tending to preclude its happening.

This alternative would be similar in population, etc. to the no action alternative in most respects except that the eastern areas of the plateau would grow very rapidly.

6.223 Zoning Change But No-Sewer Alternative

Conceivably the city could reduce lot size requirements in western Cranston to about 40,000 sq. ft. on the strength of extension of public water service. Presumeably if a lot is

not sufficiently permeable and well drained to be acceptable for on-site sewerage at 40,000 square feet, it will not be acceptable at 80,000. Further, it is possible such a change could result from court action overturning the existing large lot pattern as discriminatory, arbitrary, or an unwarranted infringement on property rights.. This alternative would be similar in general to the no action alternative except that the ultimate populations would be doubled.

6.224 The Proposed Action Repeated to Fully Intensive Urbanization

Conceivably the city could implement the proposed action leading to intensive urbanization of the proposed sewered area and deterring low-density development beyond that area for, say, a decade, and then the city could make a similar decision again, to extend its sewers and change its zoning. Sufficient repetition would lead to total intensive urbanization of all of western Cranston.

This alternative is not believed to be a likelihood, but rather it is a possibility and it does pose the "worst-case" set of environmental impacts. Figure VI-15 displays the population distributions implicit in this alternative.

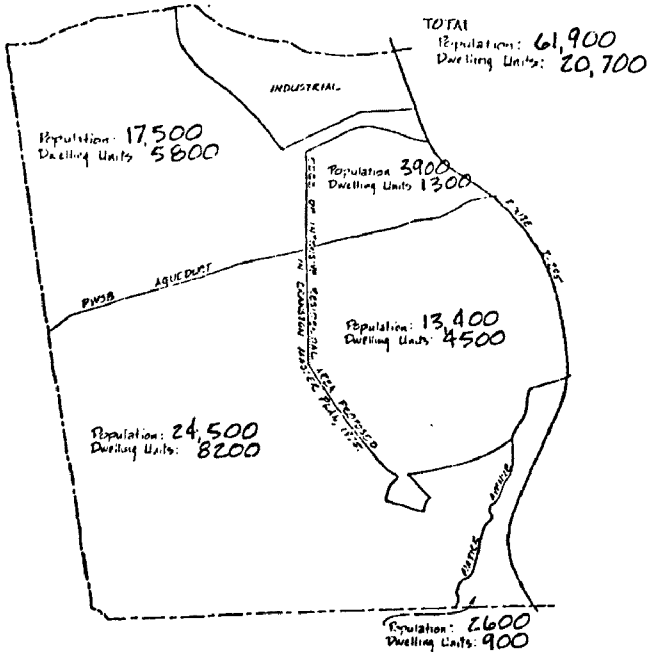


Figure VI-15 FUTURE SATURATION POPULATION DISTRIBUTION
Western Cranston

Fully Urbanized at 8,000 to 12,000 sq.ft. Lots overall *
(The Worst Case Alternative)

Source: C E Maguire, Inc. * adjusted to assumed land development constraints

6.3 ANTICIPATED IMPACTS

Decision to implement the proposed action (extension of sewers into, and zoning change in, western Cranston) or to follow any of the alternative courses of action outlined above, including taking no action at all, will lead to a broad set of significant environmental impacts in western Cranston and to a narrower set in the surrounding region. The mechanisms by which the impacts of the decision will be exerted will be through urbanization of presently rural lands with the urbanization both changing the character of the land surface and the numbers of people. The changes in land surface could lead to:

1. quantitative changes in stream flow (flooding, etc.)
2. qualitative changes in stream flow (pollutants, etc.)
3. esthetic changes
4. wildlife habitat changes

The changes in population could lead to:

1. changes in traffic flows
2. changes in air quality
3. changes in noise
4. changes in municipal operating costs & revenues

6.31 LAND SURFACE CHANGE EFFECTS

All the alternatives will lead to changes in the land surface including substitution of pavement and building roofs for vegetative surfaces, substitution of paved, roofed or vegetative surfaces for plowed surface, substitution of drain pipes for surface runoff, and alteration of the vegetation including mostly clearing of forest for housing but also reforesting (with shade, ornamental, and fruit trees) existing field and farms.

The most serious effect of these changes, with the details depending on the specific alternative, will be changes in stream flow and water quality with impacts on esthetics, microclimate and wildlife habitat being relatively inconsequential.

6.311 Streamflow and Groundwater Depletion

Urbanization under any of the proposed alternatives will lead, to some degree, by virtue of the changes in surface permeability and the increased smoothness of the drainage ways (e.g. pipes substituted for surface runoff), to increased floodflows and to reduced groundwater recharge and low stream flows in western Cranston. The increased floodflows could lead to destruction of downstream streambank properties, the need to replace culverts and bridges, increase erosion, and broadening of downstream floodplains, particularly when the increased floodflow from western Cranston is added to that from other tributary areas of the Pawtuxet River and Meshanticut Brook.

The decreased groundwater and low-flows would result from the stormwater being rapidly shed before it could infiltrate into the ground, the ultimate source of low flow in streams. These two decreases would have adverse effects on wildlife habitat, esthetics and, taken together with similar losses in other tributaties, theoretically lead to reduction in the volume of water available downstream for effluent dilution.

To quantify these impacts and to compare the various alternatives, the peak runoff was calculated for Furnace Hill Brook at Furnace Hill Street for storms of various severities for the various alternatives. Table VI-1 shows

TABLE VI-1

FURNACE HILL BROOK

RUNOFF @ ELEV. 50 IN CUBIC FEET PER SECOND

	LAND USE ALTERNATIVE - WESTERN CRANSTON			
	PRE-URBAN*	1	4	5
RUNOFF EVENT FREQUENCY (YEARS)				
2	190	250	315	485
5	345	460	575	860
10	545	730	795	1,100
25	825	900	1,155	1,555
50	1,050	1,240	1,440	1,915
100	1,300	1,520	1,755	2,305

*Pre-Urban = Condition likely to have existed before any suburban development.

1 - Existing Zoning - fully developed.

4 - Master Plan - fully developed.

5 - All of western Cranston urbanized.

Source: CE Maguire, Inc.

the results of these calculations. The pre-urban column shows the conditions as they would have been prior to any suburbanization, alternative 1 shows the effect of the proposed action and alternative 5 shows the effect of total urbanization. Alternative 2 would be the same as alternative 1 while alternative 3 would be similar to alternative 4.

The method used for the calculation was that described in the U.S. Soil Conservation Service's Technical Release No. 55, Urban Hydrology for Small Watersheds, Chapter 2, a technique which entirely eliminates the need for "engineering judgement" on surface permeability, roughness of surface, etc. but rather relates runoff to precisely determineable watershed characteristics such as soil type, dimensions, percentage paved, etc. The various runoff events, from 2 to 100 year recurrenceperiods reflect the phenomenon that more severe storms are likely to recur less frequently then less severe storms.

Inspecting the resulting changes in flood flows, several kinds of observations could be made including:

1. that the impact of urbanization, the increase in flood flow, is significant and deserving of amelioration, but is hardly an ecological disaster (except for the worst case, i.e. total urbanization),

2. that all the alternatives will have a significant impact including "no-action", and

3. that the proposed action is not much more adverse in this respect than no-action and is considerably less adverse than the worst case.

And finally, it must be noted of these conclusions, for their proper evaluation and subsequent decision making:

1. that the soils and topography of Furnace Hill Brook are such that the impact of urbanization on streamflow is minimized and that similar urbanization in other parts of the Pawtuxet watershed, or in other watersheds may be much more adverse in its effect, and

2. that relatively slight changes in the pattern and design detail of the development could entirely obviate and/or mitigate the adverse impacts.

6.312 Water Quality

In addition to changing the rates and volumes of storm-water runoff, urbanization will change its quality through a number of interrelated processes involved in converting farm and forest to street and lawn, including unpaved land runoff effect construction effects and pavement run-off effects.

As farmland is changed to paving, lawns, etc. there should be a very large reduction in pollution of runoff carrying suspended solids, phosphates and nitrates from cultivated fields, while as woodlands are so changed, an opposite effect should occur. Table VI-2 taken from the Corps of Engineers, Omaha District, "Regional Wastewater Management Study", October, 1974, shows those effects quantitatively for long-term average conditions.

TABLE VI-2

Average Annual Stormwater Runoff Concentrations of Pollutant Parameters*

Land Use	Suspended Solids (mg/l)	BOD_5 (mg/l)	Phosphorus as P (mg/l)	Nitrogen as N (mg/l)
Residential (2-5 ppa)**	300	20	0.70	3.1
Residential (5-8 ppa)	340	22	0.66	2.9
Residential (8-12 ppa)	380	24	0.62	2.7
Residential (12-15 ppa)	420	26	0.58	2.5
Residential (Combined Sewer Overflows)	250	100	4.00	10.0
Commercial and Industrial	500	30	0.50	2.2
Agricultural (Adequate Controls)	3,000	20	.20	5.0
Agricultural (Needing Control)	40,000	25.0	2.80	65.0
Rural (Adequate Controls)	500	0.3	.002	1.0
Rural (Needing Control)	5,000	3.5	.04	8.0

*Corps of Engineers, Omaha District, "Regional Wastewater Management Study", October 1974.

**Persons per acre.

During the urbanization process extensive areas of land will be torn up, reshaped and ultimately resurfaced, creating intensive but short-lived erosion and silt runoff in a checkerboard pattern all over the city. At worst, the erosion could reach and exceed the worst suspended solids runoff loadings of the worst agricultural areas listed in Table VI -2, but it would be limited in any one location to one construction year and, unlike agricultural runoff, not be repeated in the same place year after year.

The worst effects are likely from pavement runoff with severe pollution likely to occur after the urbanization process is completed, as an erratic but endless series of short-lived events, when short duration but intensive storms follow long dry periods (e.g. summer thunderstorms following periods of drought). Such storms would wash the dirt, dust, litter, vehicle drippings and rust, lawn clippings, etc. that accummulate in street gutters into the streams through the storm drain systems, and, in the case of the low stream flows caused by the proceeding drought and low runoffs caused by the short duration of the storm, create high pollutant concentrations for brief periods.

Techniques for the quantification of this effect, in terms of calculation of concentration of pollutants, duration of concentration, and frequency of occurrence, are only now being developed while methods for evaluating the acceptability of various concentrations for various durations at various frequencies are even less advanced. In consequence no quantifications of the effect have been prepared for this statement. It should be noted however that a statewide study of this problem is about to be undertaken by the Rhode Island Statewide Planning Program under the Section 208 planning assistance program of the Water Pollution Control Act Amendments of 1972, and that the Rhode Island Department of Natural Resources appears to have adequate authority to enforce any necessary mitigating action that may evolve from the 208 study under the Rhode Island Wetlands Act.

6.313 Esthetics

Bearing in mind:

1. that beauty is ultimately in the eye of the beholder, and

2. that impacts of the project on specific areas of esthetic speciality are discussed in Chapter VII,

it must be noted that all of the alternatives, including no-action, will lead to significant changes in the appearance of western Cranston.

At the present time western Cranston is a fairly random mixture of fields and forests with scattered houses and agricultural buildings of highly varied qualities. The net impact is judged by most observers to be highly attractive for the most part. All the alternative actions described above will lead, in the long run to the almost total replacement of the pattern of fields and forests with urban land uses, but with some qualitative differences between the alternatives.

The no-action alternative, no sewers and large lots, because of the varied suitability of the soil for on-site sewerage, would lead, at least in the early phases, to scattered, low density growth that would be likely to preserve significant amounts of forest throughout the area, and presumably result in a relatively non-urban landscape.

The proposed action and the other sewered alternatives are likely to lead to a fairly uniform coverage of the land with houses with relatively little forest area preserved undeveloped, and all presumably will result in a quite urban landscape in the sewered areas.

The esthetic quality of resultant development, however, is likely to be more dependent on the quality of design, the zoning standards and the subdivision regulations than on the decision of whether or not to sewer the area. The

key factor in whether the results are likely to be attractive or not probably will depend on whether adequate trees are preserved in the original development phases of the wooded areas and whether adequate space is provided for future growth of trees in the cleared areas. Devices for providing such space include adequate lot sizes, "cluster zoning", and "planned unit development".
(Cluster zoning is a variant of zoning in which a developer is allowed smaller lot sizes than would otherwise be applicable in any zone, but the total number of such lots is usually limited to the number of "normal" size lots otherwise applicable. The resulting undeveloped land is usually placed in some sort of open space trust or is held in common by all the lot-owners in the development. Planned unit development is similar to cluster zoning but development is not necessarily limited to the land uses otherwise applicable in the zone, i.e. dwelling units can be placed in apartment buildings rather than in detached houses and commercial activities are sometimes allowed in residential zones if designed into a large development. The specifics of both devices tend to be highly variable and to be tailored to the character and attitudes of the community that elects to adopt such zoning.)

6.314 Wildlife Habitat

Bearing in mind that the principal habitat value of western Cranston (except for occasional deer which will be driven away by urbanization no matter what alternative is selected) is for small animals and birds, it appears: 1) that the proposed action and other sewered alternatives, at the proposed zoning standards, will lead to a substantial loss of wildlife habitat, 2) that the no-action alternative, because it will result in fragmented development and preservation of varying size wooded areas, will substantially maintain the numbers and variety of wildlife (but with substitution of some species for others), and 3) that relatively slight changes in the pattern and detail of the development, i.e. cluster type zoning, etc. could entirely mitigate the adverse effects of the proposed action.

6.32 POPULATION CHANGE EFFECTS

All the alternatives will lead to changes in population, and the changes in population, in turn, will effect the environment. The most serious of the effects, with the details depending on the specific alternative, will be increases in traffic flow and increases in noise. In addition, the alternatives could contribute to significant changes in the balance of municipal operating costs and revenues and to some change in air emissions.

Table VI-3 and Figures VI-12, 14, & 15 show the amounts and distribution of population in western Cranston for the principal alternatives. Note that these are saturation populations and that it will probably take some time for these amounts to be reached. Various studies done by the city and state planning agencies have forecasted residential population growth on the order of 15,000 new people in twenty years in Cranston, with the city's forecast allocating half of this growth to the eastern half of Cranston.

It must be noted in this regard:

1) that forecasts are, in the final analysis, educated guesses and that while they are usually right, they can be very wrong;

2) that population growth in suburban areas can be explosive, inundating once rural land with buildings at unreasonable densities before adequate planning for open spaces and other public facilites can be accomplished;

3) that western Cranston is at or very near the center of accessibility in the metropolitan area;

4) that Cranston is a socially prestigious location within the metropolitan area, a very important factor considering that in the real estate selling profession every salesman recounts the old saw that "the three most important factors controlling the desireability of real property are location, location, and location;"

5) that the adult population is growing very rapidly (as a result of the maturation of the post war boom-babies, actually 1946-1962) despite the slow growth of the total population;

6) that normal growth of families and housing in recent years has been severely retarded by the recession and historically unprecented, high interest rates, creating a backlog of potential marriable people and potential housing demand.

TABLE VI-3

SUMMARY OF SATURATION POPULATION DISTRIBUTION ALTERNATES

WESTERN CRANSTON

	Existing Zoning	1975 Master Plan	Fully Urbanized
Northwest Quadrant north of aqueduct west of proposed zoning change	3,200	2,800	17,500
Southwest Quadrant south of aqueduct west of proposed zoning change	5,500	3,900	24,000
Lower Furnace Hill Brook Watershed proposed area of zoning change	4,900	15,300	17,300
Natick Avenue Strip between Natick Avenue and I-295	2,700	2,600	2,600
Total	16,300	24,600	61,900

Source: CE Maguire, Inc.

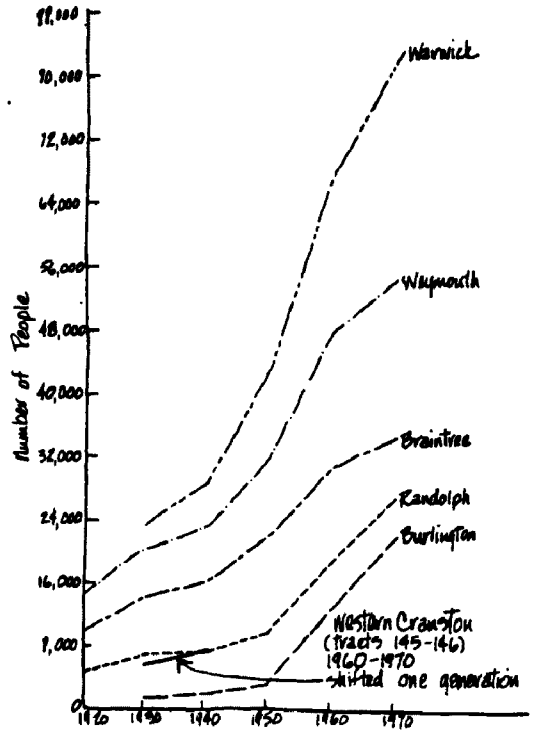


Figure VI-16 Historical Growth of Selected Suburban Communities, 1920-1970

Source: U.S. Census of Population, 1920-1970.

Figure VII-16, Historical Growth of Selected Suburban Communities, 1910 to 1970 shows how quickly areas similar in their location with respect to metropolitan centers have grown in times past. Such growth could occur again in the future and it very well could occur in western Cranston if public sewers are provided.

In the following analyses, therefore, the saturation populations implicit in each alternative are used as a basis for impact estimation. In general, partial development will generate partial impact. Note however that since the development will tend to grow from urban edge out into the countryside, the areas where public spaces should have been reserved or mitigating actions should have been taken are likely to be among the first developed, precluding their ultimate provision. In essence a mitigating action or ultimately needed public faciltiy whose planning is delayed may be an action or facility that is denied.

6.321 Traffic & Traffic Fatalities

Urbanization of western Cranston, under any of the proposed alternatives, will lead to very substantial changes in traffic volume and, as a further consequence, to increased accidents.

In general, in the northern part of western Cranston, the road network appears to be more-or-less readily adaptable to traffic increases, but in the southern part of western Cranston, the increased traffic is likely to lead to a virtually complete breakdown of the transportation system, including the probability of impairment of public safety services (police, fire, ambulance, etc.), reduction in property values, frustration induced auto accidents, including needless fatalities and cripplings, and road-widenings whose design will be more guided by desperation than by concern for environmental quality.

The most critical point of this transportation failure will be between the intersection of Route 37 and Natick Avenue, on the east, and the intersections of Phenix Avenue with Hope and Olney Arnold Roads, on the west, with all the streets in the surrounding areas impacted to variously adverse degrees by the various alternatives.

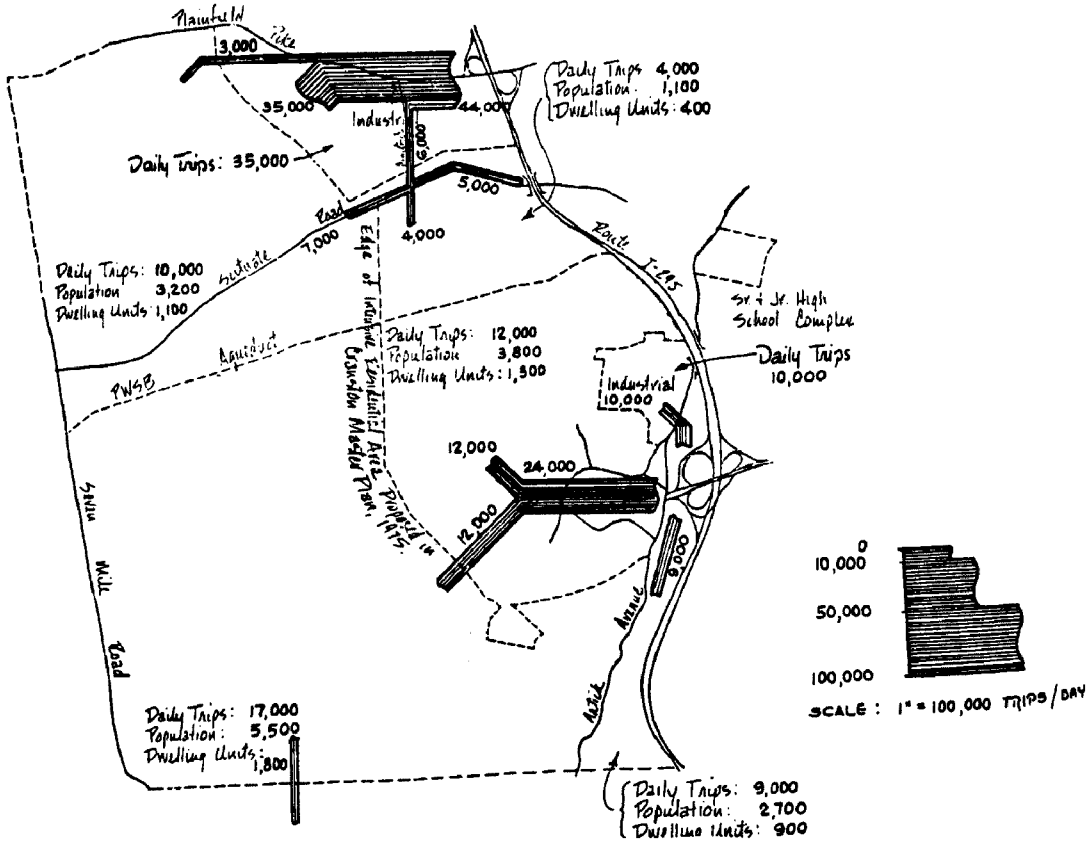


Figure VI - 17 PRINCIPAL TRAFFIC FLOWS EXPECTED TO BE GENERATED BY FUTURE SATURATION DEVELOPMENT * according to Existing Zoning (The No-Action Alternative)

Source : C E Maguire, Inc.

The no-action alternative will ultimately generate some 26,000 trips per day on the two key streets, Wilbur-Conley Streets and Phenix Avenue just west of Natick Ave. The combined capacities of these roads is about 7,000 trips per day, at the densities recommended for safe operation by the USDOT, and 21,000 trips per day, totally congested.

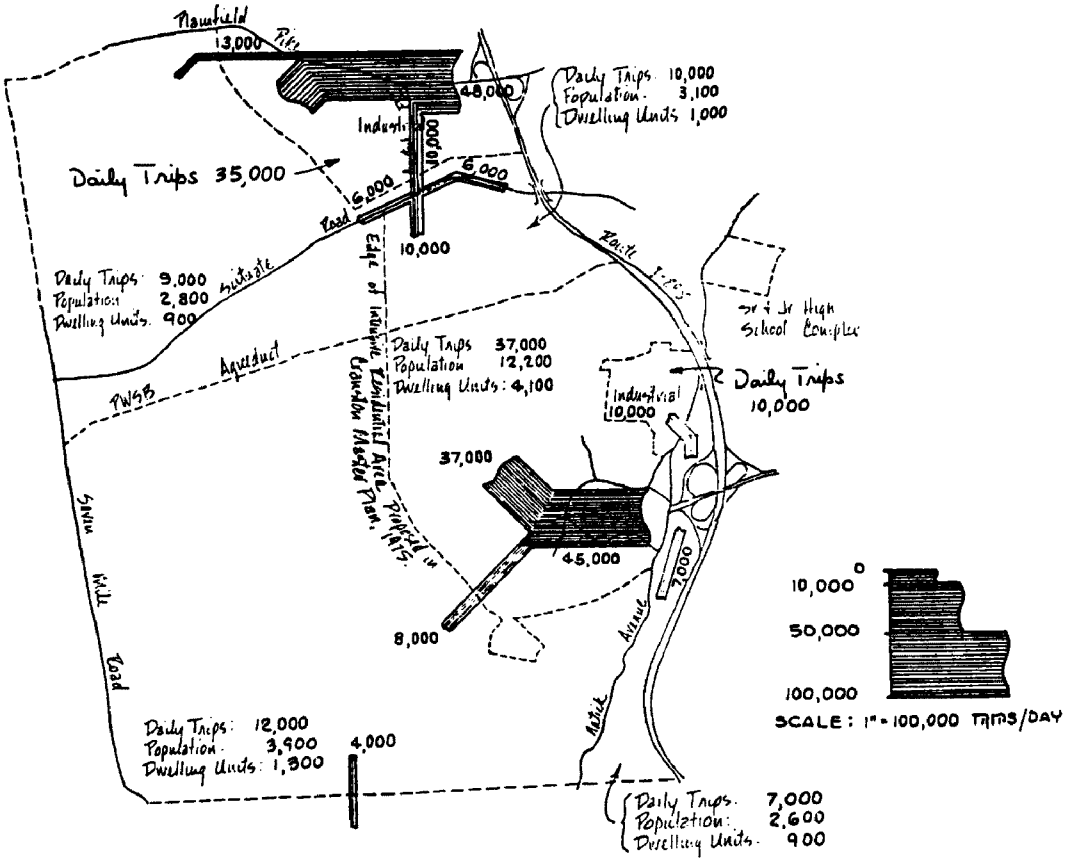


Figure VI - 18 PRINCIPAL TRAFFIC FLOWS EXPECTED TO BE GENERATED BY FUTURE SATURATION DEVELOPMENT *

according to City 1975 Master Plan
(The Proposed Action)

Source: C E Maguire, Inc.

The proposed action would generate some 45,000 trips per day on these two streets and alternative 5, the worst case, with public sewerage and 8,000 to 12,000 square foot lots throughout western Cranston, would generate some 90,000 trips per day.

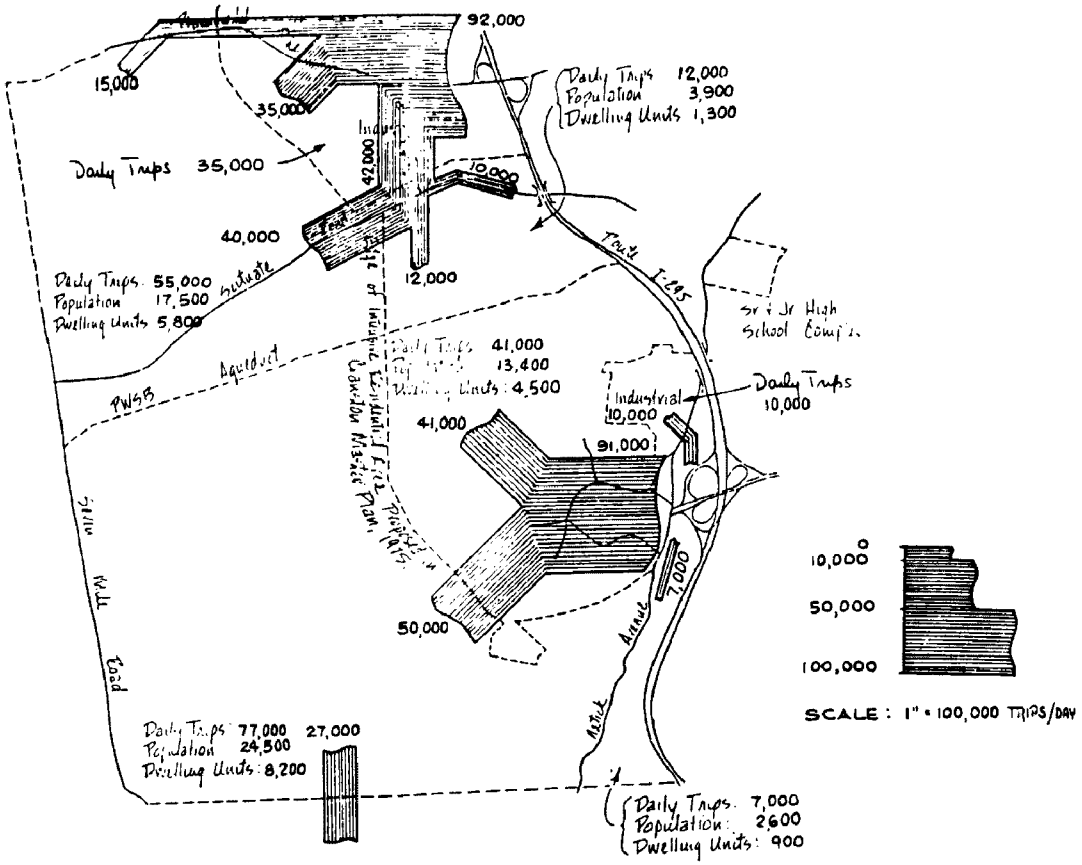


Figure VI - 19 PRINCIPAL TRAFFIC FLOWS EXPECTED TO BE GENERATED BY FUTURE SATURATION DEVELOPMENT *

Fully Urbanized at 8,000 to 12,000 sq. ft. lots overall
(The Worst Case Alternative)

Source: C.E. Maguire, Inc.

Clearly any of these futures ought not to be accepted and cannot be ignored. The no-action alternative, no sewers and 80,000 square foot lots will not avoid the problem, and will ultimately compel the straightening and widening of most of the streets in the area to their esthetic and cultural resource, and microclimatic detriment. The proposed action, limited sewers and 8,000 and 12,000 sq. ft. lots, would have an even greater impact and require not only widespread straightening and widening, but also a new roadway of at least 4 lanes westward from the end of Route 37. The worst case alternative, sewers and 8,000 and 12,000 sq. ft. lots throughout western Cranston would ultimately require extension of Route 37 or something very similar across the area to Hope.

In the northern areas, along the Plainfield Pike, the various alternatives will have similar quantitative impacts but the environmental costs would be substantially less as the areas most affected are industrial.

Figures VI-17, 18, 19 show the principal traffic streams likely to be generated by the various alternatives based on trip generation tables of the Institute of Traffic Engineers, the terrain limitations, and assumed destinations. Figure VI-20 shows the capacity of the roads in the most severely impacted areas based on a parametric analysis of the roads as per the USDOT's Highway Capacity Manual. Table VI-4 shows the existing traffic on these roadways based on counts by CE Maguire, Inc., their existing capacity at safe densities, their existing capacity at worst conditions, and their expected future load for each alternative.

TABLE VI-4

TRAFFIC CHARACTERISTICS

VICINITY OF FURNACE HILL BROOK

	Wilbur/ Conley St.	Furnace Hill Street	Hope St. (West of Phenix)	Phenix Ave.
Safe[1] [3] Capacity	2,600	3,200	3,900	4,550
Maximum[2] [3] Capacity Total Congestion	6,900	6,000	9,200	13,900
Existing Conditions	3,300	1,450	1,800	2,300
Existing Zoning Fully Developed	13,000	9,000	14,000	13,000
Master Plan Fully Developed	23,000	14,000	22,000	25,000
Master Plan 20 Year Development	11,000	7,000	11,000	13,000
Western Cranston Fully Urbanized	45,000	23,000	40,000	45,000

1 U.S. FHWA "Level of Service B".

2 U.S. FHWA "Level of Service F".

3 Peak hour equals 7.7% of average daily flow

Source: CE Maguire, Inc.

In particular, it should be noted that this forecasted transportation failure is more than inconvenience and loss of comfort and time, it is loss of limb and of life itself. Automobile caused fatalities are the fifth leading cause of death in the United States, the third leading cause of years-of-life-lost to people under 65 years of age, and the leading cause of death and disablement

to young people. Adding to this the disablement of otherwise economically productive young people with otherwise long life expectencies, this particular environmental problem could well be considered the nation's and Cranston's primary environmental problem.

The causes of automobile related accidents have been much discussed and attributed to a variety of causes including vehicle failure and irresponsible drivers, but all they do have in common an action of a driver with respect to the roadway, driving faster than the roadway allows, not turning when the roadway turns, and entering an intersection or passing without being able to see oncoming traffic. Presumably if these drivers had not been impatient, if they had not been acting unwisely or had not been easily frustrated, in short, had not been human, they or the persons with whom they collided would not be dead (or maimed). Equally if they were driving in an environment with no sight-distance limitations, no surprise turns, no slow-moving trucks simultaneously blocking lightly used roads and obscuring oncoming traffic (or children playing in the streets ahead), the accidents may well have been averted. However, regardless of presumed cause, statistical analyses of highway accidents have indicated the following:

1) that divided, limited-access, grade separated expressways have far fewer accidents than all other roads,

2) that the number of accidents on any roadway, except on winding two-lane roads, is proportional to the traffic density except for extremely light or extremely heavy traffic,

3) that on two-lane winding roads the number of accidents increases as the square of the traffic density, and

4) that at very low densities, accident rates are very high and that at very high densities, accident rates are very low.

In general, these relationships are easily explainable, with expressways precluding cross-traffic and vehicles backing into the roadway, pedestrians fenced out, etc.; with more traffic on most roads creating greater opportunity for accidents; with very low densities allowing

the reckless to achieve unreasonable speeds; and with very high densities binding all traffic into a slow lock-step. The accidents on two lane winding roads, the type characteristic of western Cranston, is somewhat

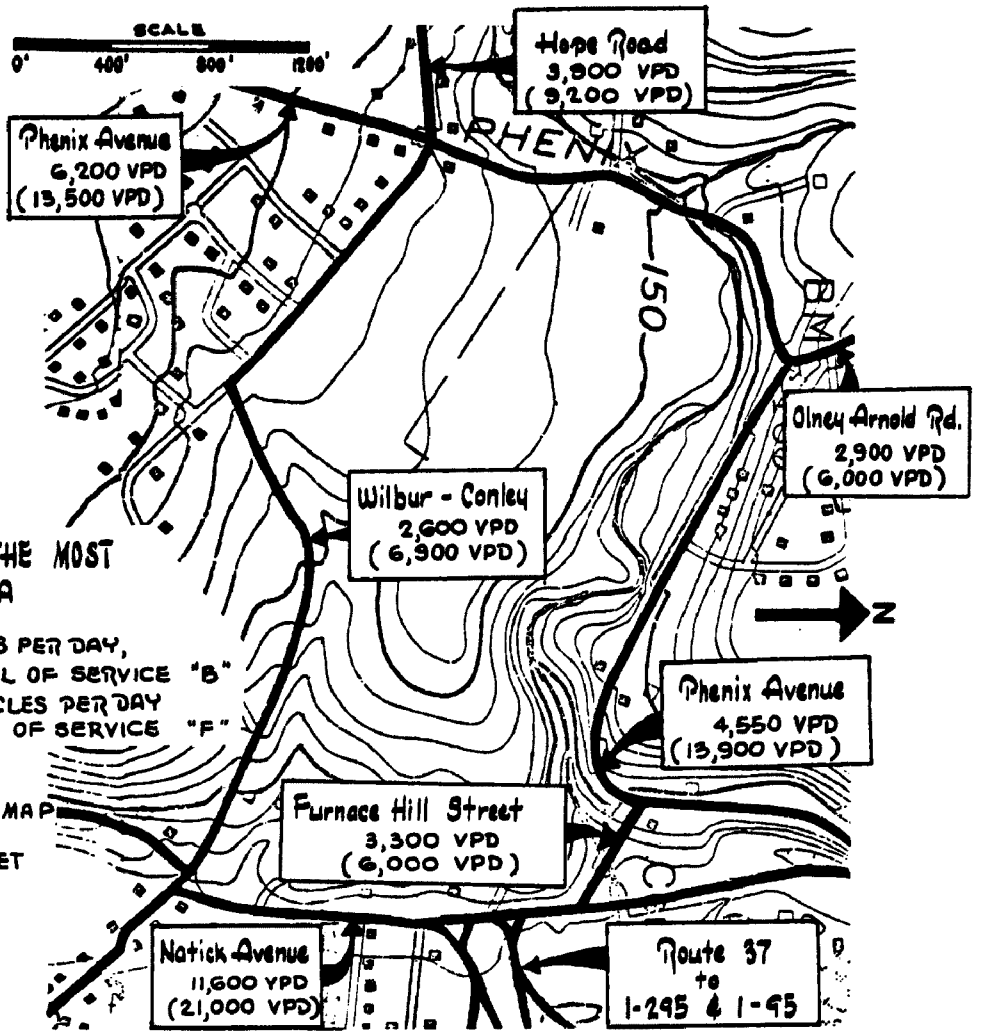


Figure VI - 20 CAPACITY OF THE ROADS IN THE MOST SEVERELY IMPACTED AREA

EGEND: 11,600 VPD - SAFE CAPACITY IN VEHICLES PER DAY, U.S. DEPT. OF TRANSPORTATION LEVEL OF SERVICE "B"
(21,000 VPD) - ABSOLUTE CAPACITY IN VEHICLES PER DAY U.S. DEPT. OF TRANSPORTATION LEVEL OF SERVICE "E"

E: BASE MAP IS ENLARGED U.S.G.S. TOPOGRAPHIC MAP
JRCE: C E MAGUIRE, INC.
CONTOUR INTERVAL 10 FEET

more complicated. On these roads at low densities drivers frequently approach curves and intersections at speeds such that they could not stop if the roadway were occupied by an on-coming vehicle, but since the density is low, the probability that such a vehicle will be approaching at the same time is also low. As the density of traffic increases, the likelihood that a vehicle will be approaching a blind spot too fast increases simultaneously from both directions and as a result the likelihood of a collision increases even faster.

It should be noted that increased traffic density and accidents will be an unavoidable adverse impact of the proposed project, but that the hazards inherent in increasing the use of the existing roadways can and should be mitigated.

6.322 Noise

The principal noise effect expected to be created in the urbanization of western Cranston will be from traffic, generated primarily by local traffic, particularly trucks serving the residential areas.

It should be noted that the principal roads in the southeastern portion of western Cranston are probably already subjecting the residential areas adjoining them to noise levels well in excess of USDOT Federal Highway Administration standards and EPA recommendations, and that all the alternative actions will increase these noise levels significantly over varying time periods. Table VI-5 shows the noise expected to be generated on Wilbur Avenue and Conley Streets for the existing conditions, based on recent traffic counts, and for future conditions likely to be created by the various alternative actions. The calculations were performed according to the National Cooperative Highway Research Program Report #117 and took into account traffic and site conditions. The standards are from the most recent edition of the US FHWA Policy and Program Memorandum 90-2.

The first line indicates the maximum allowable peak hour noise level established by the Federal Highway Administration for outdoor activities where special quietness is not required and includes residential areas, schools, hospitals, recreation areas, etc. (The peak hour L_{10} noise level is the level that will be exceeded 10% of the time at peak hour). In general a peak hour, outdoor L_{10} noise level of 70dBA will insure noise levels indoors, with windows open, that do not interfere with normal functions such as conversation, radio listening, etc. most of the time, and, in areas with no through trucking, do not interfere with sleeping.

The second line is a calculation of existing conditions at a number of locations in western Cranston. Note that these figures are somewhat uncertain because of the relatively low volume of truck traffic now using these streets and the nature of L_{10} as a statistical parameter.

The third, fifth and sixth lines represent the three alternative futures used earlier in this chapter and the fourth line represents the "proposed action," i.e. limited sewering and zoning change.

TABLE VI-5

PEAK HOUR L_{10} TRAFFIC INDUCED NOISE LEVELS FOR SELECTED LOCATIONS

(dBA, 50' feet from edge of road)

	Wilbur/ Conley St.	Furnace Hill St.	Hope St. (west of Phenix)	Phenix Ave.
Maximum Allowable Noise [1]	70			
Existing Condition	(78-85) [2]	(84) [2]	(75-82) [2]	(78-82) [2]
Existing Zoning, fully developed	84-91	90	81-88	84-88
Master Plan, fully developed	84-91	90	81-88	84-88
Master Plan, 20 yr. development	84-91	90	81-88	84-88
Western Cranston, fully urbanized	85-92	91	82-89	85-89

a. Assumes 10% of ADT at peak hour and 5% trucks.

b. Reduction of peak hour to 5% and trucks to 2½% would reduce noise levels about 6 dBA

c. First figure is noise level for the best sections, 2nd figure is for worst sections.

1 Federal Highway Administration

2 ( ) indicates uncertainty because of low truck volumes.

Source: CE Maguire, Inc.

Note that all the noise levels along all the main streets are in excess of the standards. In part, in the worst locations, this is a result of the steep grades and poor alignments of the existing streets and in part, in all areas, is a result of heavy traffic volumes. In a sense, this is a technical confirmation of the common observation that heavily traveled main streets are poor places on which to live.

Note also that these noise levels are quite insensitive to even large changes in traffic volume. Essentially human percep-

tion turns off louder noises so that twice as much energy generates only 3 dB more perceptible sound, an amount so small most observers would not notice it. Table VI-6 shows a similar analysis based on the median conditions likely to exist at peak hour.

TABLE VI-6

PEAK HOUR L_{50} TRAFFIC INDUCED NOISE LEVELS FOR SELECTED LOCATIONS

(dBA, 50' feet from edge of road)

	Wilbur/ Conley St.	Furnace Hill St.	Hope St. (west of Phenix)	Phenix Ave.
Maximum Allowable Noise [1]	60			
Existing Condition	61-64	63	58-61	61
Existing Zoning, fully developed	72-75	74	69-72	72
Master Plan, fully developed	75-78	77	72-75	75
Master Plan, 20 yr. development	72-75	74	69-72	72
Western Cranston, fully urbanized	79-82	81	76-79	79

a. Assumes 10% of ADT at peak hour and 5% trucks.

b. Reduction of peak hour to 5% and trucks to 2½% would reduce noise levels about 6 dBA

c. First figure is noise level for the best sections, 2nd figure is for worst sections.

1 45 dB interior of building plus 15 dB shielding of open window wall.

Source: CE Maguire, Inc.

6.323 Air Quality

Urbanization of western Cranston, in accord with any of the alternatives described, assuming no expecially fuel-intensive industries in the industrial zones, is not expected to exceed either the ambient or the non-degradation air quality standards set by EPA, based on emission rates for various fuels and atmospheric pollutant dispersion models specified by EPA.

In the areas of intensive development there will be some small degradation of air quality, but this will be well within allowable limits for areas not specially protected by law (Class I areas, i.e. national park, etc.). Outside these development areas themselves, e.g. in the already urbanized areas of eastern Cranston and in Providence, the proposed development of western Cranston will have a negligable effect, i.e. equal to, or less than, one microgram of particulates or sulfur dioxide per cubic meter of air at ground level.

6.324 Municipal Costs & Revenues

Additional urban growth, under any of the alternatives, will lead to both additional municipal costs and revenues. The costs will include not only the annual costs of constructing the sewers, and their operations and maintenance, but will also include the costs of schools, street improvement, police and fire protection, social services, etc. The revenues will include not only the benefit charges and user fees assessed on the land to be sewered but also the real estate taxes on the value of the developed land, industrial and commercial, as well as residential.

The larger part of the costs will be for operation of schools, police and fire protection, etc., costs not associated with the sewer program, while the larger part of the revenues will be from real estate taxes.

On the cost side, almost all the increments to the municipal budget will be more-or-less proportional to the number of additional people served and, to a lesser degree, to the miles of roadway added to the community. The area of land developed is unlikely to effect costs significantly. On the revenue side, taxes collectible will be proportional to the value of the developed real estate, not to the number of people served. Hence to get the greatest revenue at the least cost, ignoring the social values and objectives, one would strive to create the greatest real estate value at the least population. Classical city planning strategies to this end include industrial/commercial land use wherever possible and large lot residential for the balance. The industrial/commercial areas in New England are usually sewered while the large lot residential areas may or may not be.

In the case of evaluating the impact of the alternatives for development of western Cranston on municipal costs and revenues, a number of conditions make quantitative analysis of these western Cranstom impacts, very difficult, including that forecasting the future at the level of detail required for firm answers is not really possible, that the social forces creating a market for large - scale population change in western Cranston will simultaneously create a similar one for eastern Cranston, and that the costs of sewering are not necessarily related to population densities.

The only reasonably certain difference among the impacts of the various alternatives is that all the alternatives that include extending sewers to the industrial areas off Plainfield Pike and Phenix Avenue will yield significant gains to the tax base, ultimately over $100,000,000 in industry alone, while without the sewers very little new industrial real estate value is likely to be created. Chapter VIII explores this subject quantitatively in a city-wide context, while the sections below describe some of the variables that must be considered in any such quantitative estimation.

6.3241 Future Projections

Forecasting the future, particularly with any detail, is a manifest impossibility. Beyond the likelihood that the youth of today will grow older, assumptions that they will marry and reproduce at any particular rate are no more than guesses. Political, military, economic and social forces of varying strength and duration could delay, retard, or modify natural tendencies so that effects that should occur over decades might occur in a few years, with the effects of the bunching having more impact than the effects of the total pattern of growth.

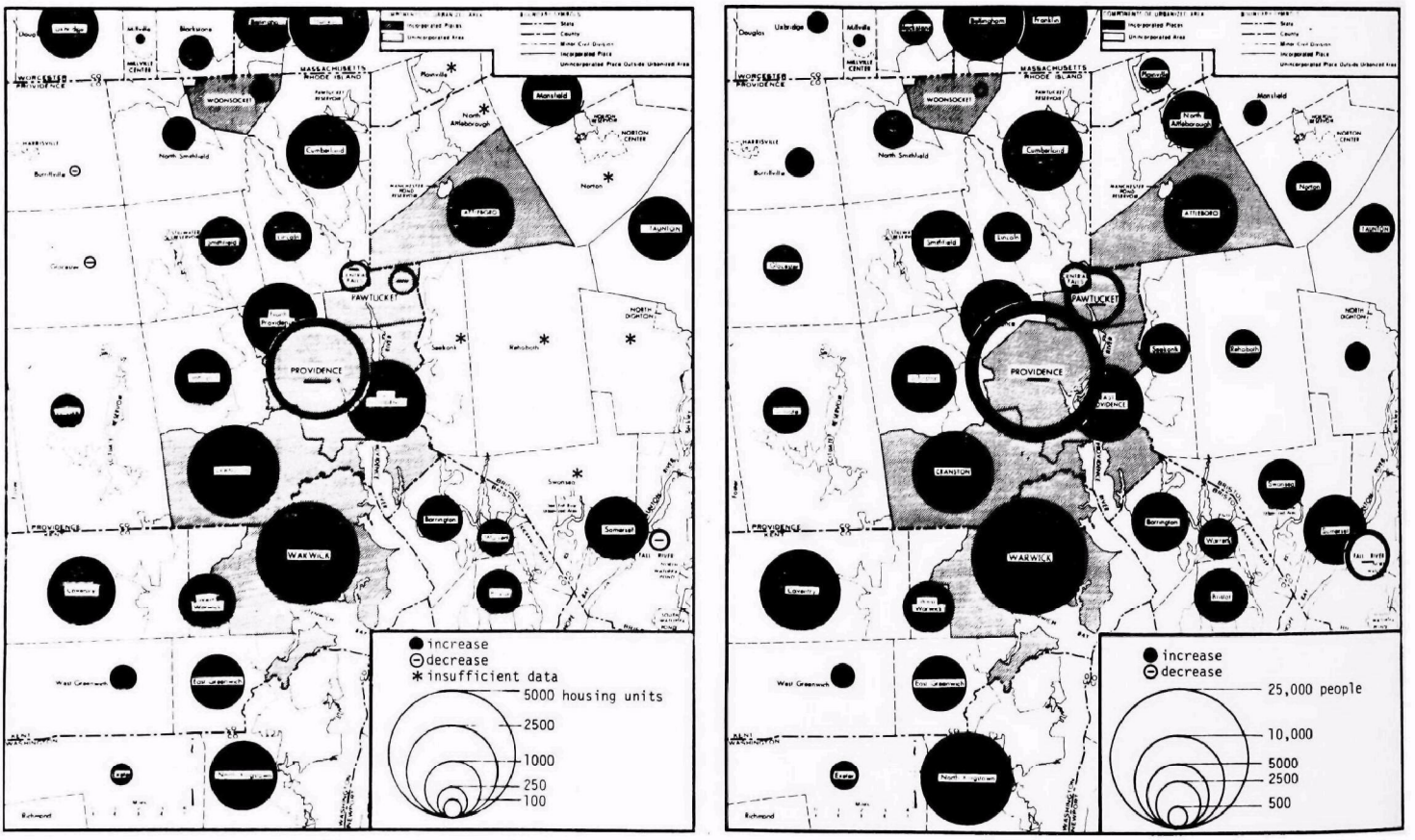
In recent years, in the face of the rising maturity of the post-war baby boom described in Chapter II, in the face of rapid increase of the population between 20 and 30 years of age, the marriage rate, the rate of homebuilding, and the rate of formation of new jobs have all declined precipitously, all without forewarning of the agencies whose functions include such forecasting. For the future will these rates rebound to the forecasted trends, will they continue to lag, will the deficits of the past few years be made up over a long period of time or will they be made up in a short and furious jobs/marriage/housing boom in one or two years?

In terms of impact, this is not an academic concern. If the current jobs/marriage/housing recession continues yet a few more years and then is corrected in a short time period, the impact on municipal services and costs could be severe, requiring design and staffing to a peak of demand with consequent waste after the peak subsides.

6.3242 Concurrent Population Changes

In gauging the impact of future growth in western Cranston, it is important to bear in mind that substantial changes in population size and composition are likely in eastern Cranston over the next two decades whatever happens in western Cranston. The modal age in almost all of Cranston's census tracts' population is about 55 years and the average number of people per dwelling unit, in 1970, was 2.7 or less, for 10 out of 16 census tracts.

Note that these characteristics are not inconsistent with other areas that experienced large growth in the 1950's, that do not contain educational or military institutions, and that have not grown very rapidly in the recent past. Note, also that as the modal group in these housing units ages, as their children mature and leave home, as the current inhabitants move to apartments and institutions, or simply pass away, they will tend to be replaced by young families who will be

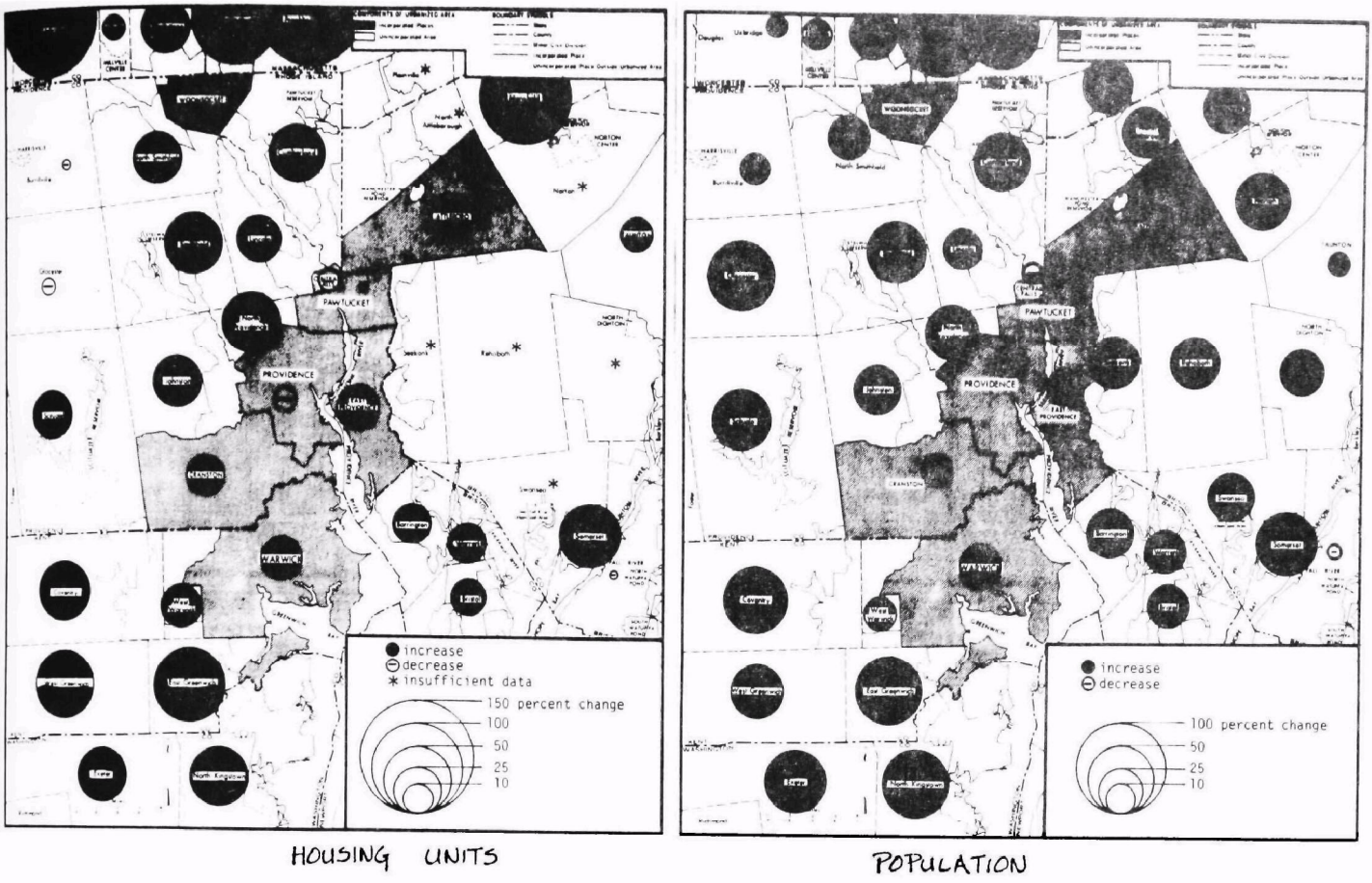


HOUSING UNITS

POPULATION

Figure VI-21 GROWTH IN HOUSING & POPULATION 1960-1970

Source: County & City Data Book, Bureau of the Census, 1972



HOUSING UNITS

POPULATION

Figure VI-22 GROWTH RATES IN HOUSING AND POPULATION 1960-1970

Source: County & City Data Book, Bureau of the Census, 1972.

leaving their current apartments in search of more spacious quarters. This population replacement, without new construction and without adding substantial, new tax base, could increase Cranston's total population by about 15% and it could increase the school population by several times that increase. This particular population change would have a more serious impact on the city's financial condition than any change that might result from the proposed project in western Cranston, in that it will represent increased costs without increased tax base.

Figures VI-21 and VI-22 show the relationship between growth of population and of housing units for the communities of the metropolitan area both in absolute terms and as percentage change. Note that none of these characteristics is rigidly tied to any of the others, that Cranston did add more dwelling units between 1960 and 1970 than any other community in the area except Warwick but that its rate of population growth was among the lowest.

6.3243 Patterns of Development and Cost of Sewering

Patterns of development, i.e. zoning densities, frontage and setback requirements, subdivision regulations, clustering etc. effect both the likely value of development and its cost. In general low density requirements tend to attract development of high value per lot while large frontage and inflexible subdivision regulations, especially in a sewered area, tend to generate high costs per unit. It is possible to mix these in a variety of ways and by selecting the proper mix to generate relatively high values without expecially high development costs.

The key point to note is that development costs are closely tied to frontage requirements rather then to density, since most of the cost of a finished subdivision lot is the cost of street and utilities and not of raw land. To maximize value while minimizing development costs, a combination of low density and limited frontage requirements would be optimum. This could take the form of traditional zoning with large area lots and smallish frontage, of traditional zoning but with minimum lot width measured across the building site rather than at the lot line or minimum setback line, or it could take the form of cluster type zoning or planned unit development.

6.4 MITIGATION OF IMPACTS

The most serious adverse environmental impacts of urbanizing western Cranston, whether as the proposed action, i.e. limited sewering and zoning change, or any of the alternatives, including no-action, will be:

1. Increased traffic including congestion, increased accidents and increased noise, and

2. Increased flood flows on the streams.

Lesser impacts will include reduction of air quality and changes in appearance and wildlife habitat.

Impacts that cannot be clearly identified because they require forecasts of complete social and economic conditions include changes in demand for municipal services and changes in the tax base.

Some of these anticipated impacts can be totally avoided by adequate mitigating actions while others can only be softened; some can be accomplished by changes in regulations (zoning, building codes, subdivision codes) or law while others require major public works improvements; some are merely modifications of current land development practices while others would require fundamental change in the mix of public and private responsibility in land development practice. The sections below describe these mitigating strategies in order of the severity of the impact to be mitigated and/or their difficulty of accomplishment.

6.41 TRAFFIC EFFECTS

The control of congestion, accidents, and noise in areas of urban growth in most places in modern times has been a catastrophic failure, generally unobserved because it ordinarily takes place over so long a time span. (The difference between ordinary urban growth and what is likely in western Cranston is primarily one of likely speed of development.) Usually urbanization takes place slowly with rural roads gradually becoming residential, then with subdivisions filling in on the farmland and forests behind the pioneer houses. As traffic congestion and noise grow, the streets are widened and the pioneer houses are converted to businesses adding further to the traffic. Gradually the businesses in the houses are replaced, here and there, with commercial buildings, and the end result is a commercial strip through a residential neighborhood with the noise, glare, fumes, vibration, and views of the business trip impinging upon the adjoining houses, sowing the seeds of later urban decay.

Some people lay the blame for the end result on planning boards and city councils for "caving in" to the requests to rezone from residential to business, but usually by the time this happens, the lands along the onetime rural roads are already too noisy for residential use.

Some people lay the blame on automobiles and propose that new development be designed along public transit lines despite:

1. that, even in places like eastern Cranston, built up when public transit was a common mode, only 10% of the population now use transit to commute, and even fewer use it for other purposes,

2. that the density of new development is generally less than the density of older development, and that higher rather than lower densities would be required to make transit feasible,

3. that in the pioneer stages of development, when patterns of use are being determined and habits of the residents are being shaped, the densities are very much lower, and

4. that transit agencies are usually interested in eliminating service rather than adding it.

Some people blame the builders and developers, but they are usually totally locked into their patterns of behaviour by zoning and subdivision codes and by the need to stage their developments to minimize the capital investment requirements.

The builders, in their turn will cite the development codes, but the codes were justifiably established to prevent the worst kinds of development abuses by the worst kinds of builders.

And finally, some people will place the blame on growth itself, without recognizing that the young people seeking homes were born a generation before, that they were not party to the decision to be born, and that they only want a decent environment for their own families.

Where then does the problem lie and what can be done about it?

Most likely the answer is in the classical city design literature, in the works of Ebenezer Howard, Frank Lloyd Wright, LeCorbusier, Clarence Stein, etc., i.e. that main streets are inherently unfit for residential use, indeed that they ought not be used other than for transportation, for open space, and, in special areas with special safeguards, for industry and commerce.

Figure VI-23, ,a master plan for Wythenshawe, City of Manchester, (prepared about 1931) shows what a new residential area adjoining an existing city should look like. Note first that Wythenshawe in many ways was just like western Cranston, it adjoined a large metropolitan center, was incorporated within the city limits, and had been precluded from earlier growth by a physiographic boundary (in this case the River Merse); second, that the need for additional housing in the Manchester area had led the city to bridge across the river; and finally, that the two main new roadways were proposed to be buffered by a park strip, 200' wide, on both sides, all along their length.

In a similar response to the same kind of problem, the City of Cranston's 1959 Development Plan for Western Cranston called for extension of Dean Parkway to Hope Road at Briggs Farm along a line just north of the Gammino quarry, and showed the proposed road with a line about 300 feet wide.

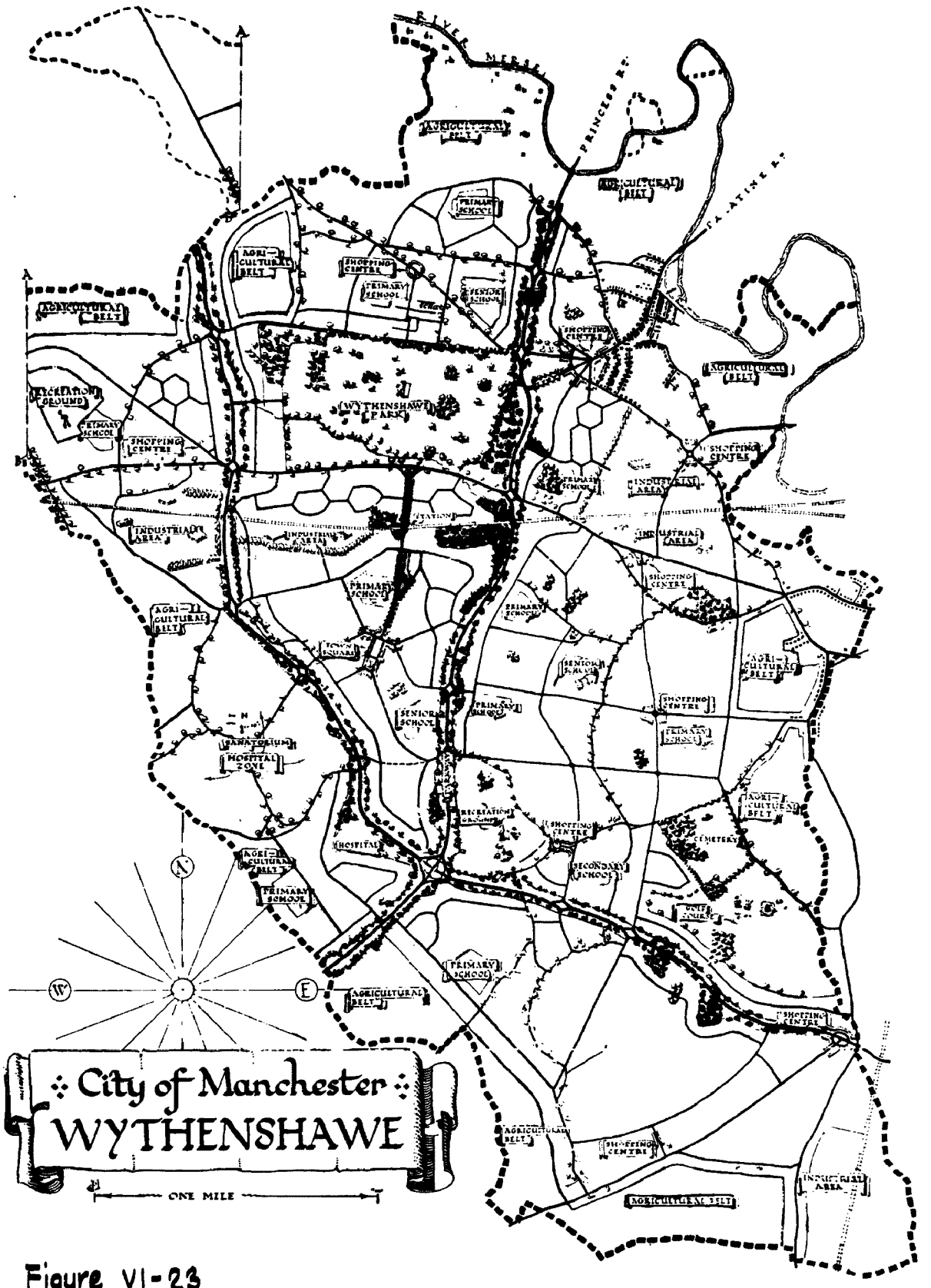


Figure VI-23

WITH ACKNOWLEDGMENTS TO BARRY PARKER, F.R.I.B.A., P.P.T.P.I.

Analysis of the traffic volumes, safety problems, and noise impacts of urbanization of western Cranston, using more recently developed techniques and contemporary noise control standards suggests that the same approaches are still fundamentally valid but that, at the least, the following standards be applied:

1. Noise buffering of 15dB consisting of park lands 225' wide where the roadway is depressed 15' or more below the height of land between the road and residential areas, 250' wide where depressed 10', 300' wide where depressed 5', 500' wide where flush with residential areas and 400' wide where elevated above residential areas.

2. Control of access to eliminate all driveways and uncontrolled street intersections.

3. Consistent curvature limitations, both minimum and maximum, to both limit speeds and avoid blind spots. Note, this recommendation is at some variance with current road design practice which calls for minimum radius standards only. The minimum radius ensures adequate sight distance at the design speed of the road. Unfortunately in areas where the roadway has less curvature than required many drivers will accelerate beyond the posted speeds to that speed physically comfortable, a speed not safe in the areas of minimum curature. Establishment of a maximum curvature and maximum tangent length will tend to keep all traffic bunched within a closer range of speeds, and hence will tend to reduce accidents.
(This principal was applied to the design of the Westchester County parkway system in the 1930's[1])

4. Limited maximum grades to eliminate segregation of trucks and autos by speed on upgrades and to limit truck noise generation.

5. Travel way widths and intersection approaches consistent with the anticipated traffic volumes.

To illustrate the safety improvements that might be achieved, note the relationships between accident rates and traffic volumes for various kinds of roads shown in Figure VI-24.

[1] Personal communication, Prof. Norman T. Newton, Emeritus, Harvard Graduate School of Design.

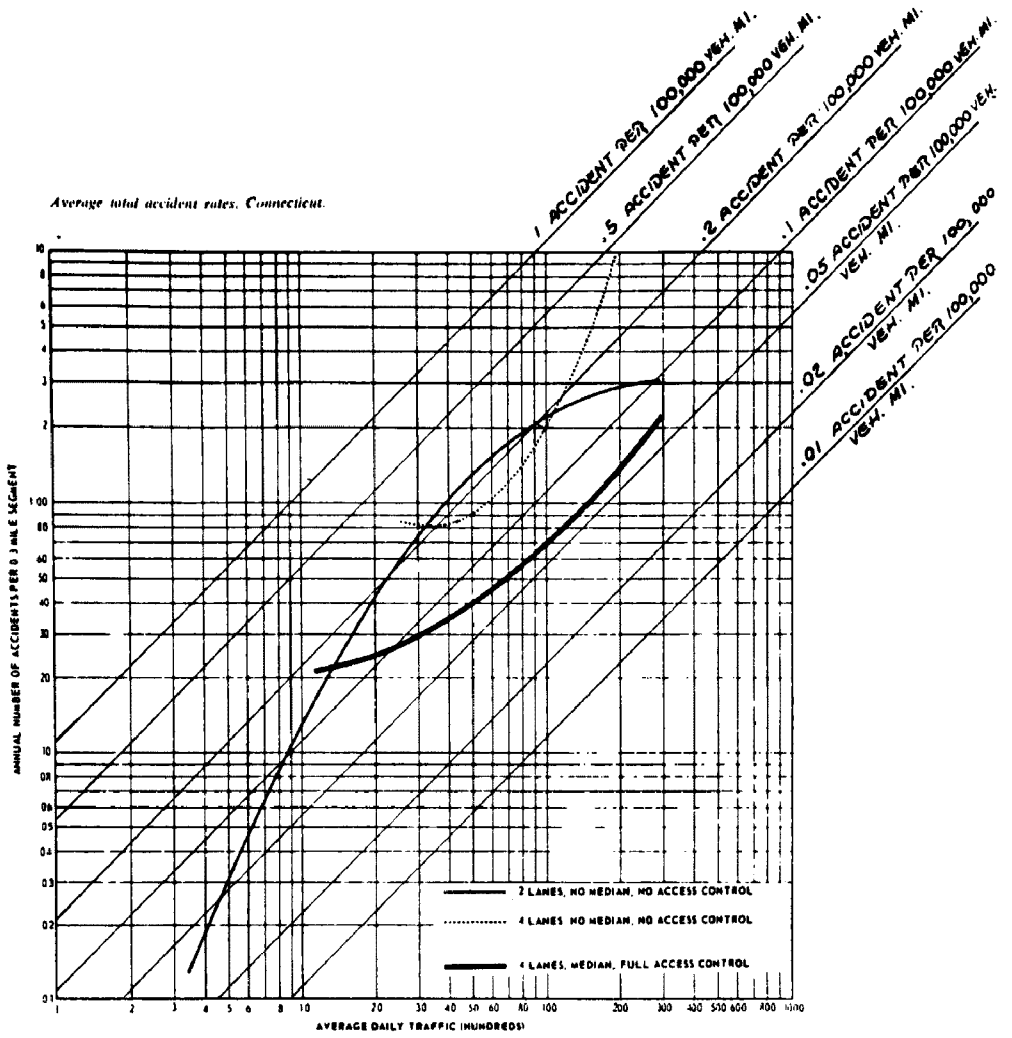


Figure VI -24 RELATIONSHIP BETWEEN TRAFFIC VOLUMES AND ACCIDENT RATES FOR VARIOUS ROAD TYPES IN RURAL NEW ENGLAND

SOURCE : ADAPTED FROM NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 47

This figure is from the National Cooperative Highway Research Program Report 47, Accident Rates As Related to Design Elements of Rural Highways. The particular figure is based on analysis of accidents in Connecticut, the case that most closely reflected conditions in western Cranston. Note:

1. that the accident rates increase on two lane roads to the point where traffic congestion restrains speed at about 5000 vehicles per day and then as congestion increases further, over about 10,000 vehicles per day, the rate declines,

2. that for four lane undivided, uncontrolled-access roadways the accident rate increases sharply at the traffic volumes for which it declines in two lane roads, and

3. that fully controlled roads are, except for very low volumes of traffic, consistently far safer.

Figure VI-25 shows the future accident rates likely on the major streets of western Cranston both with and without this proposed mitigation program. Note, that at the levels of traffic expected as a result of the proposed actions, mitigation programs can be expected to eliminate 85% of all automobile accidents on the major road network in the mile just west of the end of Rt. 37. Put another way, in the design life of the treatment plant, 20 years, it is likely that there will be about 1500 accidents including 2 or 3 deaths and 60 personal injuries as a result of the proposed action in the critical mile described above without the suggested mitigation, while with the proposed mitigation only about 200 accidents would be likely with no deaths and only about 10 injuries.

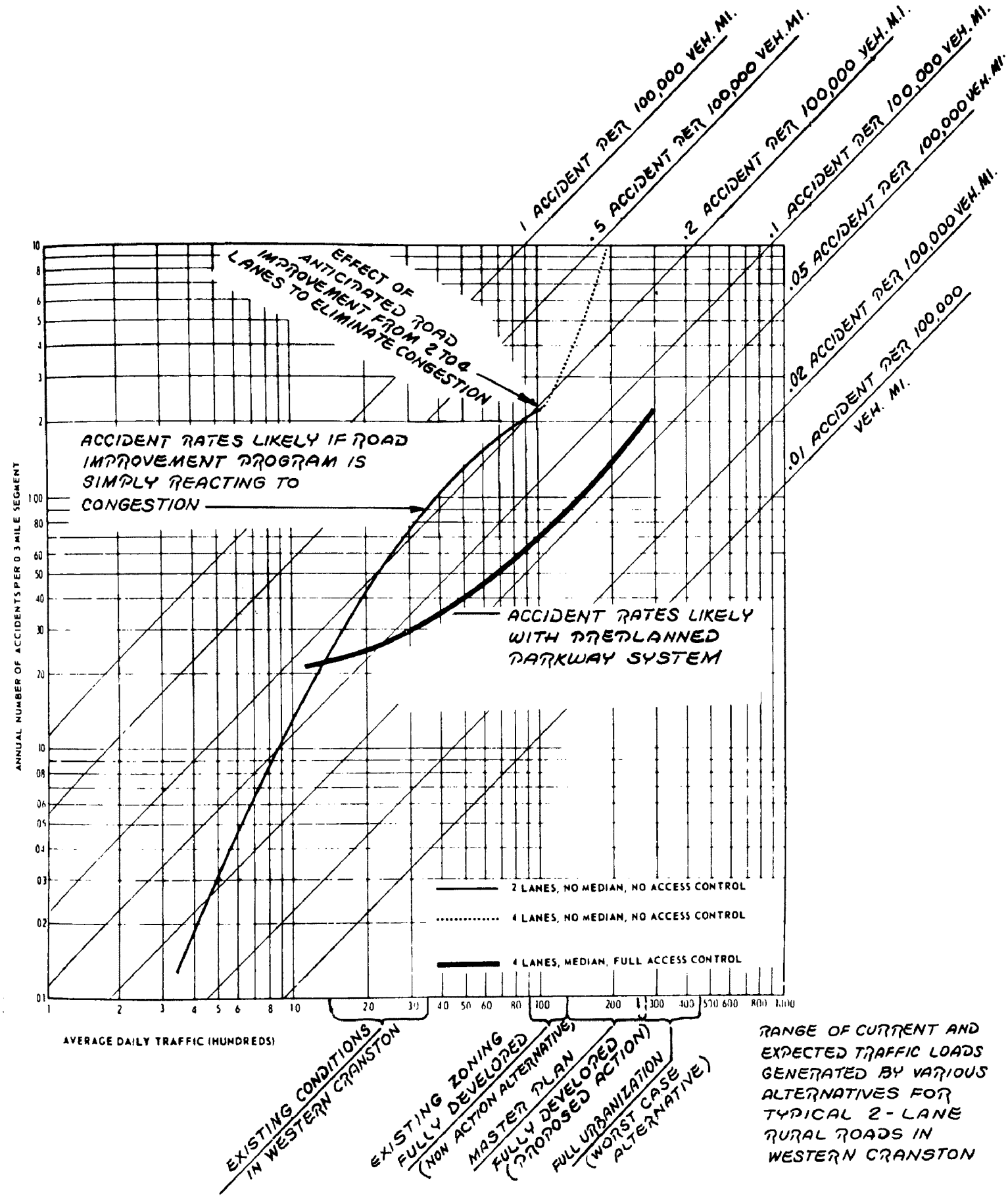


Figure VI -25 ACCIDENT RATES LIKELY TO BE EXPERIENCED AS A RESULT OF URBANIZATION WITH & WITHOUT PROPOSED MITIGATION

SOURCE : ADAPTED FROM NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 47

Figure VI-26 shows in a conceptual way, how these might be applied to the impacts of the No-Action Alternative and of the Proposed Action. Note that the lands along the main roads are either park or commercial (with controlled access).

Note also, and note it particularly, that this is a concept only, not a proposal or a recommendation for immediate action but for thorough study of the concept and all its safety and environmental ramifications.

6.411 The Institutional Problem

Implementation of the above suggested mitigating action appears to be constrained both by lack of any governmental agency clearly responsible for such actions and by lack of general awareness of the problem by the general public. Generally the federal and state transportation agencies focus their activities on intercommunity transportation and city planning agencies focus on intra-development transportation (subdivision plans) with no agency focusing specifically, with meaningful resources, on intracommunity or interdevelopment transportation.

Looking to the past, some tentative efforts were made by the state in this area, notable locally in the Dean Parkway in Cranston, but in recent years state attention in this area has tended to apply interstate solutions to local problems, e.g. extension of Rt. 37 into western Cranston. The end result of present policy often consists of winding, twentytwo foot wide streets serving as the link between thirty foot subdivision streets and seventy mile per hour expressways.

The cause of this gap, does not appear to be in the agencies, state or local, but rather in public attitudes with the business community limiting its demand for transportation, understandably, to intercommunity needs and to access to industrial and commercial zones; with most inhabitants of individual residential areas primarily interested, again understandably, in preserving their own microcosms; and with significant segments of the more outspoken intellectual leadership of the society tending to condemn the system rather than attempting to find workable solutions.

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2. That on-site control of runoff from land development and/or building projects is consistent both with the state wetland act which treats the dumping of increased runoff into streams and wetlands in the identical manner with which it treats dumping of fill into such areas and also with the power of municipalities to regulate drainage design as part of subdivision control and building codes.

3. That the methods of runoff calculation and control described in the newly published Soil Conservation Service's Urban Hydrology For Small Watersheds (technical release No. 55), Chapters 2 and 7, allow simple, effective, and impartial analysis and design without reliance on "engineering judgement", a pitfall of earlier attempts at such regulation.

4. That onsite runoff control appears feasible with use of as little as 10% and not more than 25% of any site or tract of land for runoff storage.

5. That on-site runoff controll transfers the costs to the developers at the time of development and hence neither places any burden on the taxpayers nor does it require any investment in expensive physical improvements prior to actual use.

6. That on-site runoff controll will require the City to establish a proceedures and standards manual, based on the SCS method, to insure consistent application to all subdivision, all buildings, and all other land developments as part of its subdivision and building codes.

7. That while runoff control will be generally effective, it is not the whole answer, that some areas have already been developed, that there will be special cases for which it is not applicable, and that there are some special needs unrelated to the general problem, i.e. protection of the antique industrial area in the Furnace Hill Brook ravine and compensatory flood storage for loss of floodplain elsewhere in Cranston along the Pawtuxet River System.

8. That two of the old mill pond sites south of Phenix Avenue on Furnace Hill Brook could be used very effectively and very efficiently as a multiple-use flood control, recreation, habitat protection, archeological site protection, noise buffer, scenic area, etc. project, IF PROPERLY DESIGNED. These

two sites alone would not nearly resolve the increased runoff problem without an on-site control program, but they could quite adequately supplement such a program.

In consequence of the above, both an on-site runoff control program and exploration of restoration of the two mill ponds as appropriate mitigating actions appear desirable ,although both these actions in turn will have adverse impacts.

In the on-site runoff control program, it should be noted that the mitigating action will impose a new layer of constraints on land developers and, under the existing zoning format in Cranston, reduce the number of units allowable on any tract of land in contravention of the number clearly authorized inthe City's zoning ordinance. To offset these adverse effects, the City could alter its zoning approach, reducing its dimensional requirements, i.e. setbacks, lot size, dwelling units per building, etc. and substituting density and spatial distribution (in terms of ratio of setback distance to number of dwelling units per development cluster, etc.) Note that this is not a recommendation for "cluster" zoning or "planned unit development" as they are ordinarily conceived, but rather a recommendation for zoning based on environmental performance, i.e. amount of traffic likely to be generated, noise (generated by screaming kids) and kids likely to impinge upon neighbors, protection and enhancement of the microclimate, etc. Further, it should be noted that such an approach oriented toward environmental performance criteria, IF PROPERLY DESIGNED, could simultaneous protect the economic interests of developers and the quality of life of the community (both the developers, their neighbors,and the city as a whole), that it would tend not only to control runoff but it would enhance the community's appearance, microclimate, habitat value for songbirds and small mammals, recreational opportunities, etc.

Similarly, in the restoration of the two mill ponds, extreme care and careful coordination will be required to protect the archeological and esthetic values of the sites, conceivably requiring structural forms not ordinarily used in small flood control structures, perhaps restoration of the old stonework or perhaps thin reinforced concrete walls carefully set just upstream of the remnants of the old dams. In any case this work ought to be done under the direct control of the Rhode Island Historical Preservation Commission.

6.43 STREAMFLOW EFFECTS - RUNOFF QUALITY

Control of the quality of urban stormwater runoff, like control of its quar has only recently been recognized as a necessary environmental protection objective.

Methods for such quality control include frequent sweeping of streets to pick up pollutants before they enter the stream system, trapping the settlable materials in catch basin sumps as the runoff enters the drainage system, collection and conventional sewage treatment plant type treatment along with sanitary sewage (or in a parallel system) as the runoff leaves the drainage system, settlement of the runoff waters in sedimentation basins between the storms drain outfalls and the natural streams, and filtration of the street runoff waters by overland flows through grassy or weedy open swales between the pipe outfalls and the natural streams.

Selection among these alternatives will depend in any particular case on the interplay of costs among operations, initial construction, and land. In this case, given the recommendation made previously for mitigating the quantitative changes in streamflow (retarding runoff waters on-site in all urbanizing areas) and given the almost complete likelihood that the methods that will be used to retard runoff (broad and shallow water storage reservoirs and substitution of open drainage swales for drainage pipelines) will almost certainly include sedimentation basins and overland flow filters, the choice of runoff quality control methods appears to be quite simple.

Implementation of this particular environmental quality protection objective, in this case, will required the City to include in its runoff control program described in Section 6.42 provisions:

1. for construction erosion protection: - construction of peak/ flow/sedimentation basins and drainage ways to them as a first stage of all projects that require extensive grading, and

2. for post construction, street drainage pollution control: - design of drainage systems to provide the maximum feasible surface swale drainage (rather than piping) and sedimentation basins between all street drain outfalls and all wetlands and streams.

The effects of these actions will be similar to those described in Section 6.42; they will add no substantial further burdens to developers; they will required no further secondary mitigating actions, and finally they will, similarly, not burden the City's taxpayers.

6.44 APPEARANCE & WILDLIFE HABITAT

The rural beauty and the wildlife habitat value of western Cranston in large measure stem from the variety of sizes of spaces and blocks of woodlands characteristic of most New England rural areas. With urbanization, the larger spaces and forests are broken up into a uniform pattern of small lots and buildings which when applied over miles of landscape without adquate parks, open spaces, topographic features, etc. can become visually and ecologically dull, sterile,and monotonous.

Classical remedies to this esthetic monotony and ecological sterility of urbanization have included the parks, parkways, and wilderness reservations proposed by Frederick Law Olmsted and Charles Elliott, (reflected in Roger Williams Park in Providence and the extensive metropolitan park system in nearby Boston) and the agriculture belts of Sir Ebenezer Howard (reflected in the design of Greenbelt, Maryland). More recent attempts to cope with this problem have included "cluster zoning" and "planned unit development."

All these remedies have had their difficulties. The parks, reservations, and agricultural zones all pose major economic problems, basically that their costs must be borne years, decades, even generations, before their benefits are experienced, while the cluster zoning and planned unit development approaches have the drawbacks of newness, lack of widespread public confidence and acceptence,and, to some degree, lack of critical testing of environmental impacts on the general physical environment, on the community as whole, and on the adjoining residents and property holders.

It is believed that the remedies suggested hereinbefore, under traffic impact control and streamflow impact control are consistent with the general line of these traditions and that these same remedies will probably do much to mitigate both the esthetic and wildlife habitat impacts of the coming urbanization. We have noted in those remedies, that they must be properly designed to have the desired effects. It is not a matter of "good" land uses vs. "bad", (houses vs. sewage treatment plants), of "good " public facilities and services vs. "bad" (parks vs roads),but rather a recognition that our culture is extremely complex requiring many kinds of land use and many kinds of services,and that all of these have impacts that must be weighed and properly handled, essentially that planning, in the words of the National Environmental Policy Act, "...

utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts..." Note that this is not a call for adversary relationship among the disciplines, it is not a call for a sequential approach, it does not set one discipline above any others, but that it does call for cooperation with, and sensitivity to, the needs and viewpoints of others in developing programs for the future. It appears that in developing western Cranston, with better management of the environment than has been done heretofore, Cranston will be pioneering new ground and that it will need to develop new forms, new procedures and new types of regulation. Whether the result will obviate all the environmental problems is not known, but it appears that the National Environment Policy Act does point the way.

Chapter VII SITE SPECIFIC PROBLEMS OF SEWERING WESTERN CRANSTON

7.0 INTRODUCTION

The extension of public sewers into western Cranston, in the manner implicit in the proposed project, could have serious adverse impact on areas of significant cultural, historical, geological, esthetic and ecological value.

Western Cranston is rich in such resources, particularly in the area through which the proposed sewer truck lines must pass and upon which the secondary effects of urbanization, i.e. increased flooding, traffic congestion, noise, etc. will probably be focused.

This coinciding of areas of probable impact and resource location is a consequence of the unusual physiographic constraints of western Cranston. This chapter describes:

1) constraints that lead to the problem.

2) the resources that appear to be threatened,

3) whether there are prudent and feasible alternatives that preclude any potential adverse impacts, and

4) whether there are prudent and feasible actions that can be taken to mitigate any potential adverse impacts.

Of special importance are:

1) the requirements of the Advisory Council On Historical Preservation, established in pursuance to Sections 1(3) and 2(b) of Executive Order 11593, which order insures that no Federal action may adversely impact any property eligible for inclusion in the National Register of Historic Places if there is any prudent and feasible alternative,

2) that there is reason to believe that the proposed action would impact areas so eligible, and

3) that there do appear to be prudent and feasible alternatives which would avoid and/or reduce the adverse impacts.

7.1 SETTING

Western Cranston contains a great number of areas with special interest culturally (in an anthropological sense), historically, geologically, esthetically and ecologically. In general, these areas vary in their specialness from being commonplace to being probably unique or nearly unique within the State of Rhode Island and within the United States as a whole, and they also vary in their size, quality of setting, and degree of preservation, from being unremarkable to being extraordinary.

A reconnaissance survey and preliminary literature search by a C.E. Maguire, Inc. team, including people skilled in urban planning, landscape architecture, civil engineering, geology, geography and photography, supplemented by the State of Rhode Island's Archeologist, Mr. John Senulis, and the Curator of the Slater Museum and Supervising Historian for the Historic American Engineering Record, Mr. Gary B. Kulik, (all starting with data provided by State and City historical preservation agencies and by the Audubon Society) identified an area of western Cranston, primarily along Furnace Hill Brook as:

1) having special values in all five senses, i.e. culturally, historically, geologically, esthetically, and ecologically,

2) having settings that are sizeable, well preserved, and appropriate to the original cultural or historical land use,

3) probably being eligible for inclusion in the National Register of Historic Places.

4) being threatened by the proposed action, both by the action directly and by the effects of urbanization.

The key point to bear in mind is that all of these come together in one fairly small area, the area through or near which not only the sewer main but also the impacts of urbanization, i.e. traffic and stormwater runoff, must pass. The sections below describe this special area along the Furnace Hill Brook in some detail, including the physiographic conditions which in great measure lead to the locational conflicts, a description of the site including its history, and a summary of applicable portions of the historic preservation regulations.

Other areas of western Cranston, not described below, were believed <u>not</u> to be <u>both</u> likely to be adversely impacted by the proposed project <u>and</u> either eligible for inclusion in the National Register of Historic Places or otherwise of exceptional environmental value.

7.11 PHYSIOGRAPHY

Physiographically, Cranston is mostly a flat outwash plain in the east and a rolling glaciated upland in the west. Between the two is a granitic scarp which forms a distinct north-south topographic division. At about the midpoint in the scarp is a zone, somewhat lower in elevation, that is somewhat softer, being composed of sedimentary materials. This central soft spot is physiographically both the ultimate source of a variety of natural and cultural resources and the cause of a set of resource impacts resulting from the proposed sewer extension by restricting possible sewer and road locations.
Furnace Hill Brook, the largest stream in western Cranston, runs through this central zone in a deep ravine,

1) exposing interesting geology and topography,

2) creating a special microclimate,

3) providing an unusual habitat containing, at one time, anadromous fish, and

4) acting as the stage of a long history of human use.

The proposed extension of sanitary sewers into western Cranston would not only place the main interceptor pipeline directly in the ravine, but it would also induce lateral sanitary sewers, storm drains and additional roadway improvements, necessary to accommodate the resultant urbanization, in the vicinity.

Figure VI-2, in the proceeding chapter, shows the generalized physiography of Cranston; Figure VI-3 shows the topography of western Cranston; Figure VI-4, the watershed structure, and Figure VI-6,the road system. Note,on Figure VI-4,that Furnace Hill Brook is the only major stream that crosses from western Cranston to eastern Cranston across the central scarp, and,on Figure VI-6, that there are only four streets that cross the scarp and that two of these lie close to Furnace Hill Brook.

Figure VII-1, Physiography of Western Cranston, shows the bedrock geology of western Cranston superimposed on its topography. The plutonic materials are the basis of the western Cranston upland, being composed of hard, erosion resistant materials, while the softer sedimentary rocks of the Rhode Island Formation underlie the lowlands. The Blackstone Formation which occurs in a few small spots along their boundary zone contains a considerable variety of metamorphic materials including some with little resistance to erosion and/or chemical weathering such as steatite and marble so that this formation tends to underly the major streams and valleys leading out of the uplands, and as result, the major, older roadways.

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In the vicinity of the Furnace Hill Brook, the strike of the bedrock strata is generally east-west and their dip is quite steep so that, where the river runs east-west, steep ravines and gorges have formed, notably south of Phenix Avenue between Furnace Hill Street and Olney Arnold Road and north of Hope Street between Phenix Avenue and Pippin Orchard Road. Where the stream runs across the strata, small falls and rapids have developed below the more sistant materials, with a number of these falls having been used as power sources in times past. Figure VII-2, shows the topography of the vicinity of Furnace Hill Brook in an enlargement of the United States Geological Survey topography maps including the river and ravines.

And finally, it ought to be noted of the geology that the Blackstone Formation includes significant deposits of hematite and closely related minerals, which have been of economic value both, with certainty, as a major bedrock mine and, probably, as an ultimate source of iron for bog iron deposits in the Meshanticut Valley just to the east.

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7.12 ESTHETICS AND HABITAT

The distinctive and unusual topography of the Furnace Hill Brook ravine and gorge stand in quite striking contrast visually and ecologically from the surrounding areas. The general comment of members of C.E. Maguire's reconnaissance team and of various state and federal officials who surveyed the area was that they found it hard to believe that areas so scenic could exist, first, in Rhode Island, and second, so close to the city.

Ecologically, the contrast is most evident in the vegetation which differs from that of the surrounding area. On the north facing slopes, i.e. the microclimatically colder ones, the vegetation includes Mountain Laurel (Kalmia latifolia), Canada Hemlock (Tsuga canadensis), American Beech (Fagus grandifolia) and Yellow Birch (Betula lutea)

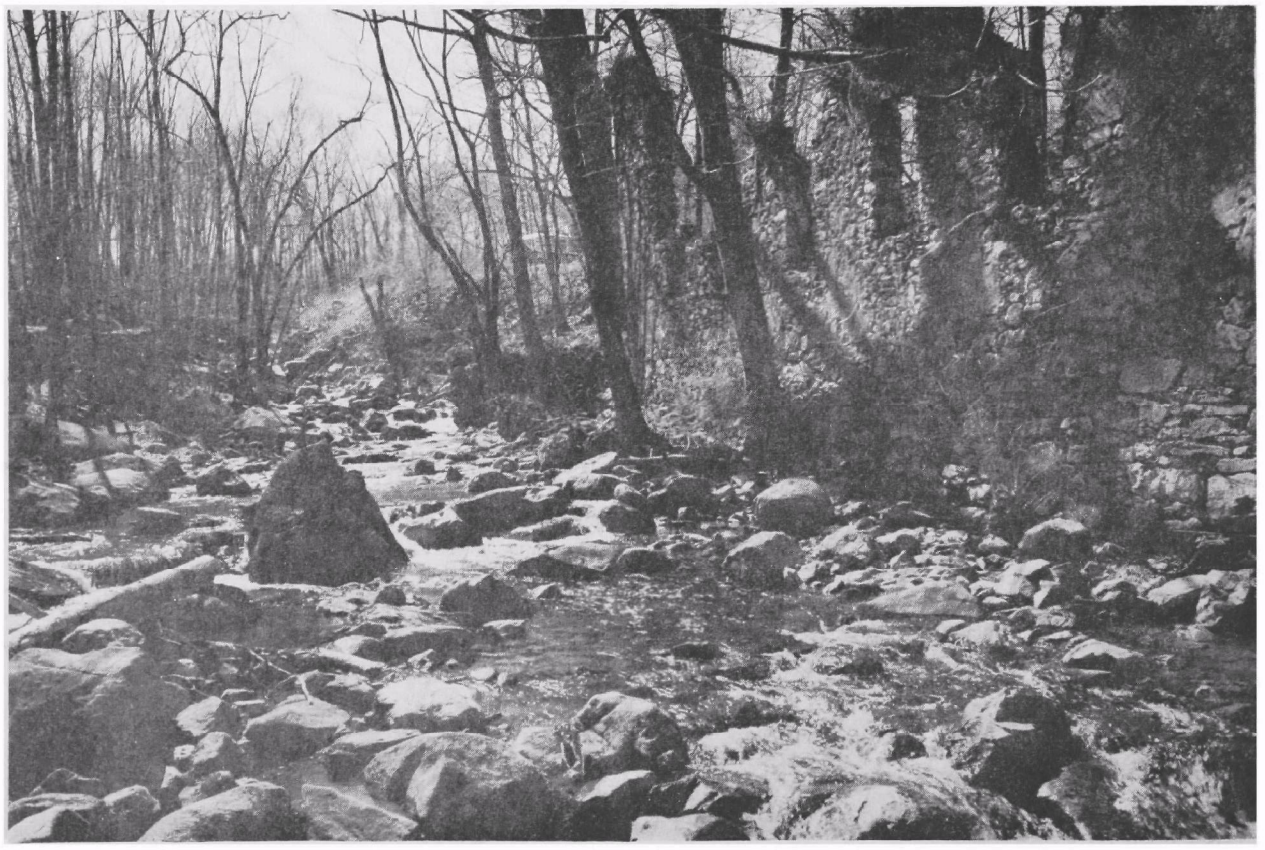

Figure VII-3a Furnace Hill Brook just above Furnace Hill Street, note ruins in upper right half of picture with mortared, uncoursed fieldstone walls on unmortared, uncoursed, squared fieldstone foundations.

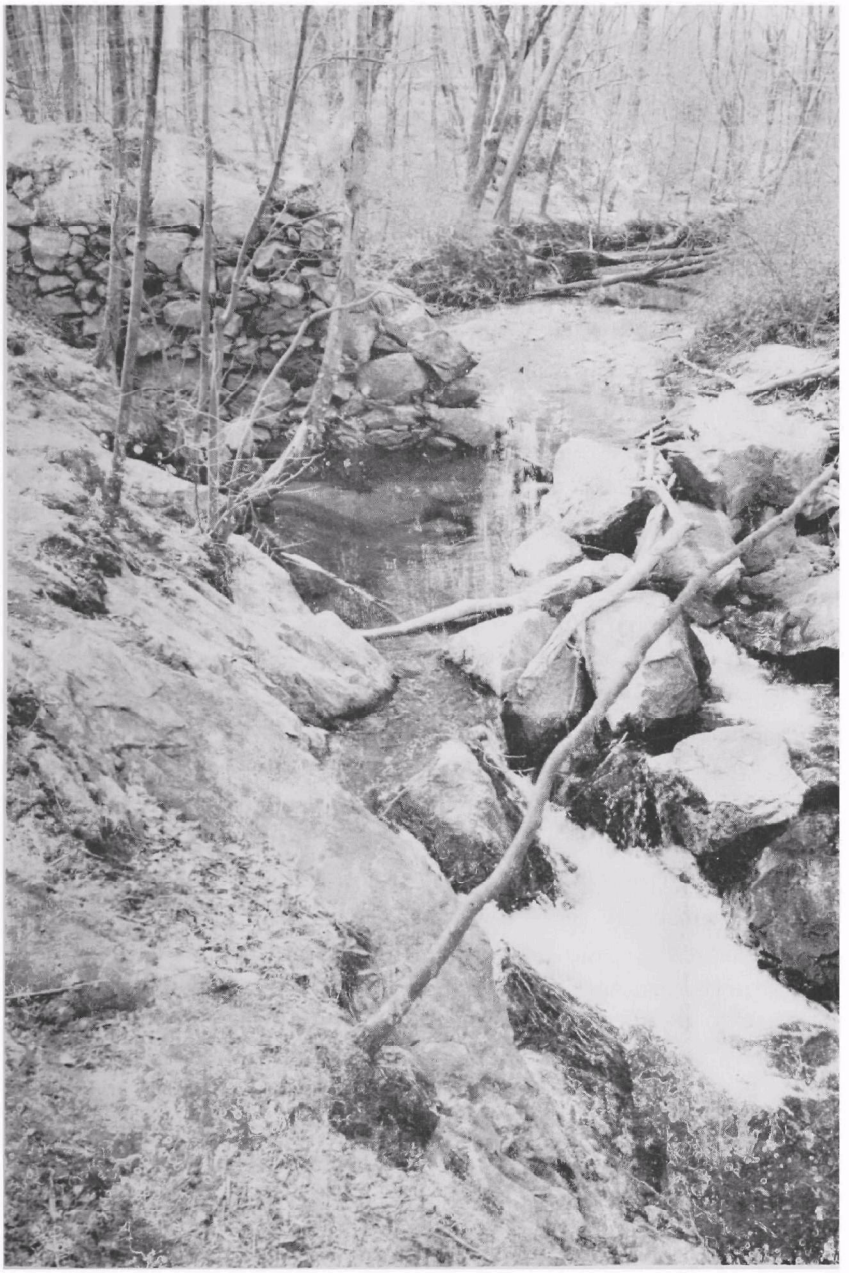

Figure VII-3b. Ruins of uncoursed rubble dam facing just upstream from mill ruins.

all which do not normally occur in the surrounding region's oak-hickory forest but are typical of the forests of central New England. Undoubtedly this change in forest composition is both indicative of other microclimatic effects such as lowered water temperatures in the brook and also contributive to the variety of birds and small animals that are likely to inhabit the area. The water-temperature-lowering-effects of the gorge and ravine, combined with the rapid aeration of the falls and rapids, do create a substantially different (even though small scale) stream habitat from those typical of the rather flat surrounding region, and the greater vegetation range of the ravine is likely, to some degree, to increase, diversify, and extend the season of, food and shelter availability of that region.

7.13 ARCHEOLOGICAL VALUE (ABORIGINAL)

The valley of the Furnace Hill Brook is believed to have been of special value to the pre-colonial inhabitants of Rhode Island, in part because of its value as an anadromous fishery and in part because of part of its mineral composition, most specifically, its steatite.

As a fishery, the ravine does offer an excellent location for netting, smoking, and drying the spring run of anadromous fish (fish that breed in fresh water and mature at sea), presumably shad, and for establishing a corn crop in the surrounding fields using fish wastes as fertilizer while the fish were smoking and drying.

The steatite, a not too common, soft, easily carved mineral, quarried not far from the ravine, would have been used by the Indians for mortars in which to grind corn, and as such would have been an essential raw material for the Indian economy.
Placing the two resources, food and minerals, together in close proximity would have created a component of human habitat of very special value to a food-gathering society of stone-working technology, and the vicinity of the Furnace Hill Brook probably was a major seasonal encampment of such a people for countless centuries. As such it would have been a center, not only of the aboriginies' economic activities but also of their social, educational, artistic, political and religious activities, and hence the site probably has quite special archeological value.

The preliminary reconnaissance of the site by the state archeologist, undertaken as part of this statement, did uncover, along the southern lip of the ravine, stone chips so formed that they were, very probably, deliberately fashioned as tools, presumeably for splitting and cleaning fish, and thereconnaissancedid confirm the existence and location of the steatite quarry.

Unfortunately, from an archeological point of view, the most likely sites of the camps and cornfields in the uplands immediately adjoining the ravine have since been plowed and have even, in places, had their topsoil stripped, while the most likely sites of the fish traps, the rapids

Figure VII-3c. Ruins of coursed, roughly squared and ranged stone dam with concrete top, course further upstream just below meander in ravine.

in the bottom of the ravine became the site of a series of mills and dams in colonial days. Both of these actions probably have spoiled those specifically effected areas in a aboriginal archeological sense (but not its historical archeology).

Fortunately, from the same point of view, there are still substantial areas in (what at one time were) the mill ponds that would have been well protected from "development" by their impounded waters and in slopes that were not plowed, and so do constitute a possibly significant cultural resource and hence are probably eligible for protection from federal action as an historic site.

7.14 HISTORICAL VALUE

The valley of the Furnace Hill Brook in western Cranston contains the remains of a chain of industrial activities that began in the middle of the 17th century, reached its heyday in the late 18th century, faded through the 19th century, and has remained substantially unchanged through the 20th century, so far.

The principal features of those remains include:

1) that the remains have been relatively undisturbed for a long period of time (about a century).

2) that the remains are relatively well isolated from adjoining land, and adjoining human activities, existing and probable in the future, by the rough topography of the area.

3) that the surrounding lands have changed little in the last century (although this is likely to change rapidly in the near future).

4) that the remains appear to show the historical evolution of industry in New England up to the mid 19th century, all in one nearly contiguous setting.

5) that at least part of the remains can be related to historically important persons, technological developments, and political events.

6) that the remains might, through archeological exploration and historical research, contribute to resolving a major historical debate, i.e. the cause of the American Revolution, economic vs. ideologic, through its relationship with persons intimately involved historically in both the economic and ideologic events that led to the revolt.

Figure VII-4 shows the principal remains superimposed on an aerial photograph of the area.

The history of the area is synopsized below.

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7.141 Seventeenth Century

Industry came to the colonies quite early in their development and included milling of grain, sawing of lumber, various steps in the manufacture of textiles, and the smelting and fabrication of metals, particularly of iron. The iron industry dates back as far as the 1620's in Virginia and the 1640's across Narragansett Bay from Cranston in what, at that time, was the Plymouth Colony.

The resources on which the industry was based were widespread through southern New England, i.e. bog iron ore (a post-glacial sedimentery deposit that occured in most ponds, swamps, and marshes of the region as a result of seasonal chemical reactions within such water bodies that change the soluble iron salts that leach out of the mineral matter of the adjoining uplands to insoluble salts which precipitate out of the water onto the wetland bottoms), charcoal (readily manufactured from the extensive hardwood forests —oak-hickory— of the region), and power for forcing air through the furnaces (also readily developable from the many rapidly falling streams of the region).

At Furnace Hill Brook, the brook would have been adequate (by 17th century standards) for power, charcoal would also have been easily obtained, and iron should have been even more readily available in the Meshanticut Valley than elsewhere in the region, given the rich iron deposits of the Furnace Hill Brook Valley upstream.

Indeed, comparison of the Furnace Hill site with other areas of the Narragansett Basin can easily show that the Furnace Hill site is one of the better <u>small</u> waterpower sites in the region that, simultaneously, is close to extensive wetlands, i.e. eastern Cranston, hence a good 17th century site.

Inspection of the site does indicate an old dam and mill foundation just west of what is now called Furnace Hill Street, and a sluiceway between the two, now filled, is recalled by several people to have only recently been filled. Whether these are 17th century is not known but an old photograph of the area from an unknown source mailed to CE Maguire, Inc. is captioned "Est. 1662."

Est. 1662 Courtesy Clarence L. Holmes

Figure VII-5 View of FURNACE HILL STREET
Early 20th Century
(REPRODUCED FROM AN UNCREDITED COPY)

Figure VII-5 is a copy of the photograph. It was taken along the brook, from east of Furnace Hill Street and south of the brook looking westward. Note:

1) the sparse forest indicating the photograph was taken some time ago.

2) the proximity of the main building to the street, or rather that the street was part of the industrial complex.

The photo, shows the ruins somewhat more intact than today but still only a ruins but with a large wood building to the right of the ruins, now demolished. The whole complex, connected to the house now standing at the corner of Phenix Avenue, has the appearance, from its simple and direct architectural lines, of a colonial period structure. It is locally recalled that the wood second story of the building now gone was entered from the uphill grade through a wide doorway. Chimneys, separate from the main structure, were on the lower grade and on the upstream side of the building. In the period prior to its removal this building is said to have been used as a foundry with shipping/receiving/storage in the wooden second story, casting and forging at the chimneys and shaping and finishing in the basement.

7.142 Eighteenth Century

In the eighteenth century, the western Cranston iron industry moved from being one of many similar local industries of no special note to what may have been a central role in bringing on the American Revolution. Whether it actually was, is near the focus of a major historical debate on the causes of that revolution and that debate in turn is part of a wider intellectual debate on the causes of history itself.

Ignoring the wider debate and looking to the debate on the causes of the revolution, the issue is well defined in John C. Walke's THE CAUSES OF THE AMERICAN REVOLUTION (D.C. Heath & Co., 1973) which puts it thus:

> Not so very long ago Americans were taught that the American Revolution came about solely and simply because all colonists hated tyranny and loved freedom; because all colonists resented a foreign government's denying their right to share in governing themselves; and because all colonists, therefore, rising in heroic resistance to the government which oppressed them, determined to make America an independent nation founded on the principles of political liberty and equality. The persistence of such a simple, black-and-white picture of the revolutionary struggle is reflected in the widely held belief that the chief point at issue between colonies and mother country was the rightness or wrongness of the principle that "taxation without representation is tyranny.
>
> Historical research and analyses by scholars of the past two generations, however, have made it impossible to believe quite so surely that the Revolution was no more, and no less, than a conflict produced by verbal disagreements between a people united in the cause of freedom and a regime which refused to accept freedom as the necessary basis of all governments. The reappraisal of the colonial and revolutionary era, begun by such scholars as Charles M. Andrews, George Louis Beer, Herbert Levi Osgood, and others has made it clear that to see selfless devotion of the patriots to political ideals as the sole cause of the Revolution might well be a national tradition, but it is hardly sound history. Significant facts which today

seem obvious - for example, the extreme tardiness of the patriot leaders in formulating the demand for independence, or the apparent lack of unity among the colonists concerning what they wanted, why they wanted it, and how they proposed to get it - were long overlooked by the traditional explanations of why the revolutionists fought. Beginning in the 1890's, historians directed their attention more closely to the revolutionary use of the political ideals of freedom and equality, independence and self-government; they carefully considered the influence of economic interests, the accidental conjunctures of men and events, and the personal ambitions and prejudices of revolutionary leaders or members of Parliament; they looked more closely into the everyday attitudes and activities of working men, poor farmers, and other hitherto neglected 'lesser folk,' as well as the historic actions and pronouncements of historically preeminent figures; and they sought to establish more precisely the actual, as well as the abstract, logical connections between each step in the conflict. As a result, it is generally recognized today that to understand why the Revolution was fought, one must do more than cite at face the familiar political slogans and catchwords. The historian must consider the actions and the motives of diverse individuals, groups, sections, and classes; and he must be aware of the relationship of the British-American conflict to British imperial problems in general and to larger problems of world affairs. There is no longer any doubt that the causes of the American Revolution were complex and deep-seated.

Despite general agreement that the question, 'What caused the American Revolution?' has no simple and easy answer, historians are still far from agreeing about the relative merits of different answers. Now, more than ever, their works present an array of diverse often contradictory and conflicting interpretations, ...

Historians' disagreement about the causes of the American Revolution involve much more, than a difference in historical philosophy between 'materialists' and 'idealists.' <u>There are crucial disagreements about matters of fact</u> as well as about the interpretations to be put upon the facts; and there are disagreements about the values and standards by which historians should choose and evaluate facts and about the meaning of such terms as 'explanation' and 'understanding.'

The first group of historians propose the so-called 'economic interpretation.' a general name given to a number of related but by no means identical explanations, all sharing one common, central conclusion: that it was the conflicts between colonial and British economic interests - mercantile, industrial, and landed - which led to the Revolutionary War, and that the economic motivations generating those conflicts were the basic driving forces underlying other, more superficial conflicts of political ideas and ideals. Louis M. Hacker offers the clearest possible statement of the viewpoint:

> 'The stuggle was not over high-sounding political and constitutional concepts; over the power of taxation or even, in the final analysis, over natural rights. It was over <u>colonial manufacturing</u>, wild lands and furs, sugar, wine, tea, and currency, all of which meant, simply, the survival or collapse of English mercantile capitalism within the imperial-colonial framework of the mercantilist system.'

Other historians around the turn of the century, not persuaded that economic interpretations satisfactorily explained why the Revolution came about, but equally concerned to push beyond stereotypical generalizations were also moved to inspect more closely the details of pre-Revolutionary history. To a number of these writers it seemed that, whatever the facts about economic and related conflict earlier in the colonial period, the decade or two immediately preceding the outbreak of open hostilities was crucial. They contended that the course of events leading from that point to the war itself was not preordained or deterministically dictated by some economic or other underlying force. It was, in fact, shaped by the specific political decisions taken during this period by governments and politicians on both sides of the Atlantic. Some writers placed particular emphasis on what they saw as stupidity, folly, and irresponsibility on the part of George III and his court, who were seen as surmounting the principled opposition of Parliamentary Whigs and forcing decisions which violated rights and interests dear not just to American colonists but to British liberals as well.

Relating this debate to western Cranston and its potential historical and archeological significance it should be noted:

1) That Stephen Hopkins, signer of the Declaration of Independence, nine times governor of Rhode Island, member of the Continental Congress, Chief Justice of the Rhode Island Superior Court, advocate of colonial union as early as 1752 (two years after passage of the Iron Act of 1750, which prohibited a number of iron finishing operations in the colonies), publisher, pamphleteer, agitator, industrialist, merchant, rum runner, entrepreneur, smuggler, college president (Brown), slave trader, brother of the first Commander-in-Chief of the U. S. Navy, wearer of the hat on the back of the two dollar bill, etc. owned, operated, and got a state subsidy for an iron mine in western Cranston in the Furnace Hill Brook Valley.

2) That Stephen Hopkins was much concerned about the colonies' economy, particularly their balance of trade, or as Hopkins himself put it (from Walke; op. cit.):

> By the best computation I have seen, the quantity of flour made in these colonies yearly is such, that after all the English inhabitants, as well of the continent as of the islands, are fully supplied, with as much as they can consume with the year, there remains a surplusage of at least one hundred thousand barrels. The quantity of beef and pork remaining after the English are in like manner supplied is very large. The fish, not fit for the European market, and the lumber produced in the northern colonies, so much exceed the market found for them in the English West Indies, that a vast surplusage remains that cannot be used.... From the money and goods produced by the sale of the surplusages, with many others of less consequence, sold by one means or other to the Spaniards, French, and Dutch in America, the merchants of those northern colonies are principally enabled to make their remittances to the mother country for the British manufactures consumed in them....
>
> Supposing this intercourse of the colonies with the Spanish, French, and Dutch entirely stopped, the persons concerned in producing the surplusages will of course change the manner of their industry, and improvement and, compelled by necessity, must set about making those things they cannot live without, and now rendered unable to purchase from their mother country (i.e., manufactures).

3) That there appears to be a noteworthy coincidence of interest in the iron industry among the otherwise diverse signers of the Declaration of Independence. John W. W. Sullivan of the American Iron and Steel Institute (Encyclopedia Americana) raises the possibility that the widespread distribution of the iron industry through the colonies (probably the world's

major iron producer of the time of the revolution) and the ironmongers' common grievance with the Iron Act of 1750 may have done much to unify the group of quite separate colonies with little else in common. Sullivan lists as signers with interests in the iron industry:

John Carroll of Carrollton, Maryland
Stephen Hopkins, Rhode Island
Philip Livingston, New York
George Ross, Pennsylvania
James Smith, Pennsylvania
George Taylor, Pennsylvania

In addition, he notes as revolutionary officers with iron interests, Ethan Allen, Nathanial Greene of Potowomut and Coventry, Rhode Island, Daniel Morgan, and one George Washington.

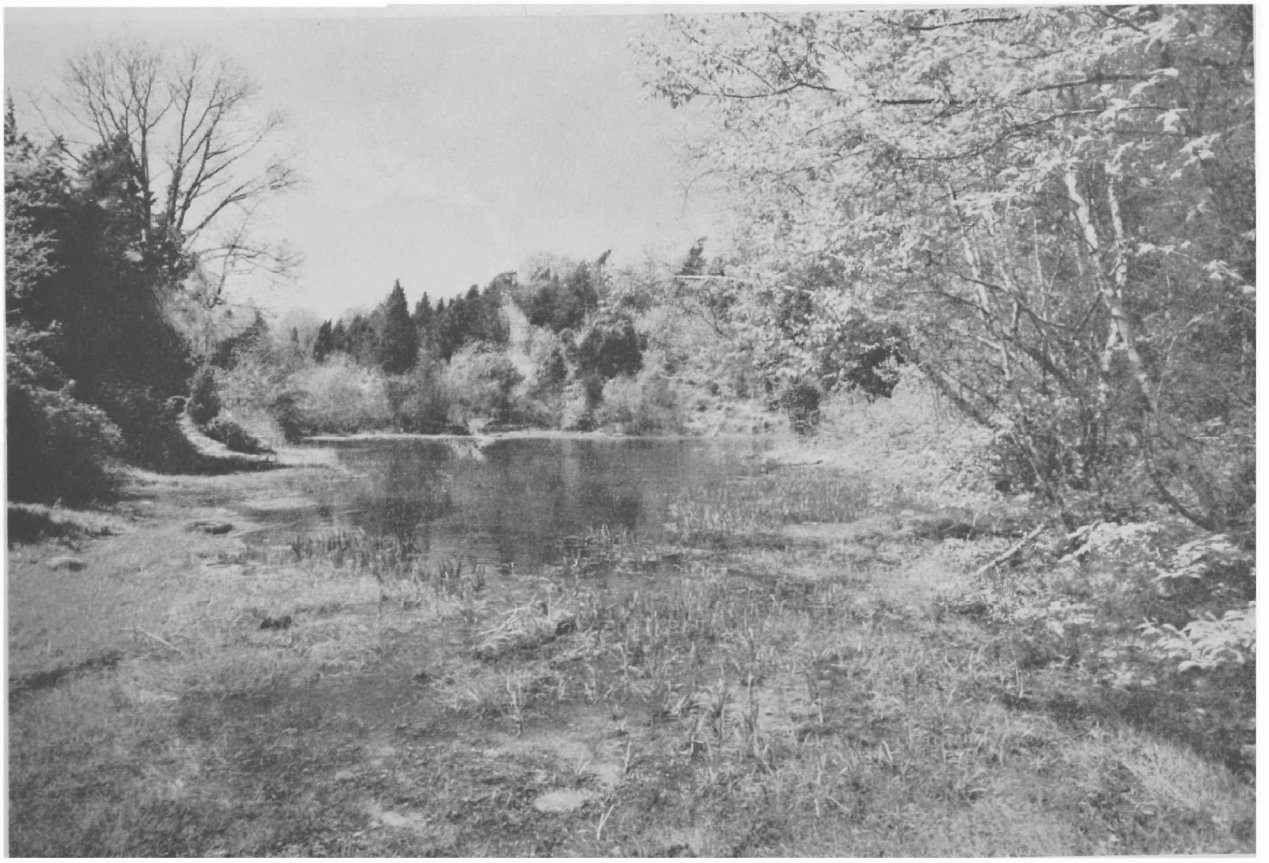

Figure VII-3d. Site of old Hopkins mine just west of Phenix Avenue

Figure VII-3e. Remains of former stream diversion channel used to dewater Hopkins mine site. Note the bowed tree characteristic of streambank vegetation.

4) That Sullivan (op. cit.) also notes that while the Iron Act of 1750 specifically prohibited construction of new steel furnaces (among other processes) and while the consequent British census of the colonial iron and steel industries listed no steel furnaces in Rhode Island in 1750, that there was one in operation by 1776 in that state, location not noted.

Physically, the mine area that was owned by Governor Hopkins is in good condition having been little changed since the 19th century, although some land surveyors' clearings in the pit have been made just this year. The remains of this operation include:

1) stream relocation works to dewater the excavation including a 12 foot high, 100 foot long, earth backed, stone diversion dam angled across the valley at about 45°, at least two man-made stream channels, one now dry but clearly discernible, and with part of the diversion channel blasted out of solid bedrock,

2) an earthen plateau with vegetation strikingly atypical of the surrounding woods, apparently a spoil bank for mine wastes ,

3) several ponds that may have been part of an early strip mine or water supply reservoirs for the mine operation, and

4) several minor stone constructions, including small dams, foundations, etc.

Figure VII-3f. Part of stream diversion dam upstream of Hopkins mine. Note wetlands vegetation in foreground.

Figure VII-3g. View of Hopkins stream diversion dam from uplands.

Locationally, the Hopkins mine is quite close to the presumed 17th century furnace just to the east and is also at the end of "Hope Road," a road that runs directly to Hope Furnace, a major supplier of Revolutionary War armaments, also owned in part by Governor Hopkins, in southeastern Scituate on a fall of the Pawtuxet River, 3 1/2 miles away.

Preliminary literature searches by CE Maguire, Inc. and by Mr. Kulik, revealed the following interesting points about the site:

1) An old map published by John Reed of New York (otherwise not identified) entitled "The State of Rhode Island. From the Latest Surveys, 1796," which shows what appears to be all the major industries of the state, notes the ore beds of western Cranston (along the Furnace Hill Brook) but no others.

2) Mr. Kulik's researches led him to conclude that the site "...saw the first use of steam power in Rhode Island. A Newcomen engine, built by James Brown, was constructed here in 1780. It pumped water from a well (shaft) 80 feet deep and 13 feet wide. According to one description, the engine had a cylinder two feet in diameter and a beam four feet in diameter and 20 feet long ... This was probably one of the first two successful Newcomens (steam pumps) built in the United States. Elijah Ormsbee, who later went on to develop a steamboat with David Wilkinson, worked here and received his first introduction to steam power. The ore was dug by black slaves...."

Figure VII-3h. Ancient Oak at Hopkins mine. Note the broad shape indicates this tree once grew in an open field.

3) Other references indicated that Governor Hopkins was intimately involved with both weapons and technology and was chairman of the Continental Congress committee which supervised the construction and use of David Bushnell's "Turtle," the first submarine. Hopkins' reputation as a reliable and competent technical man is attested to in the matter of the "Turtle" in a letter written by John Hancock to George Washington on October 20, 1775 which stated "Captain John Macpherson having informed the Congress that he had invented a method by which with their leave he would take or destroy every ministerial armed vessel in North America, they (the Continental Congress) appointed Governor Hopkins, Mr. Randolph, and Mr. J. Rutledge to confer with him on the subject, for he would not consent to communicate the secret to any but a committee and you. These Gentlemen (Hopkin's committee) reported that the scheme in theory appeared practicable and that, though its success could not be relied on without experience, they thought it well worth attempting..."

7.143 Nineteenth Century

The ore bed ceased operation as a mine sometime in the early 19th century and the subsequent use of its area is not known. At the lower Furnace Hill Brook site there is record in 1831 of a "Union Dye House," located at the ruins area on Furnace Hill Street, and presumably the stream was then used for both power and washing. By 1855 a "Cranston Furnace" appears to have supplanted the dyehouse and the water power could have been applied to operate furnace bellows. A "Cranston Foundry" appears in the records around 1862. Whether the furnace and foundry were the same business, whether they coexisted with the dyehouse, whether the dyehouse was preceded by an earlier forge, etc. are not known.

7.15 PROTECTION REQUIREMENTS

Cultural and historic resources of national significance are protected by law (Executive Order 11593) from adverse effects of any federal action unless there is no prudent and feasible alternative to the proposed action, and, where there is no prudent and feasible alternative, that every prudent and feasible action be taken to mitigate the adverse effects of the proposed action.

Such mandated protection is limited to properties eligible for listing in the National Register of Historic Places. The criteria for such listing are that the properties both:

A. possess integrity of location, design, setting, materials, workmanship, feeling and association, and

B. that one of the following apply:

1. be associated with events that have made significant contributions to the broad patterns of history, or

2. be associated with persons significant in our past, or

3a. embody the distinctive characteristics of a type of construction, or

3b. represent the work of an artist, or

3c. possess high artistic value, or

3d. represent (as a group) a significant and distinguishable entity whose several components may lack distinction individually, or have yielded or may yield information to/in prehistory or history

Adverse effect includes, but is not limited to:

1. destruction or alteration of all or part of a property.

2. isolation from or alteration of its surrounding environment,

3. Introduction of visual, audible, or atmospheric elements that are out of character or alter the setting, and

4. creation of conditions which would lead to neglect of the property.

7.2 PROPOSED ACTION

The proposed action, so far as impacts on areas of special value and a result of extension of sewers into western Cranston is concerned, includes:

1. extension of interceptor sewers as a federally aided project

2. construction of a system of lateral sewers (not federally assisted), and

3. intensification (and probably acceleration) or urbanization in a portion of western Cranston pursuant to the city's 1976 Master Plan.

The alternatives that have been advanced for the interceptors are major pipelines 18" to 30" in diameter, run both in streets and open country, and, for the vicinity of Furnace Hill Brook are shown in Figure VII-6.

The laterals are smaller pipelines generally laid in existing streets.

The urbanization generally will be private home development on all field and forest lands in western Cranston except for public reservations, which some of the wetlands.

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7.3 ANTICIPATED IMPACTS

The proposed action, extension of sewerage into western Cranston via the Furnace Hill Brook Valley and change in land use as shown on the city's 1976 Master Plan, with or without the proposed apartments, is expected to cause, or lead to, the following impacts.

1. direct destruction and alteration of areas of great value culturally, historically, geologically, esthetically and ecologically, by physical construction, i.e. gaining access to, storing material for, excavating for, and stockpiling earth from, the proposed interceptor sewer in the valley,

2. increase in flood volumes and frequencies through the archeological and historic areas by increase in land development and paving in the watershed upstream from the areas of special environmental resource value causing increased and accelerated erosion of the sites,

3. increase in traffic and traffic noise within the areas of special resource values,

4. possible widening and reconstruction of roadways within the resource areas in response to growing traffic and traffic congestion, and

5. changes in the settings as a result of land use changes.

The no-action alternative, i.e. no sewer and no zoning change, would avoid the first of the effects and to some degree lessen the others.

The worst case alternative, i.e. total sewering and zoning change to 8,000 and 12,000 square foot lots throughout western Cranston would create all the effects of the proposed action but to a substantially more severe degree for most of the adverse effects.

The mechanism by which the last four of these effects would come about is described in Chapter VI, GENERAL EFFECTS OF SEWERING NON-URBAN AREAS.

The mechanism and magnitude of the first impact, disturbance of the land surface, can best be gauged by considering that sewer construction will require, at the least, clearing of an access road along the pipelines, storing pipes (up to 30" diameter), manhole materials, and pipe bedding (crushed gravel, etc.) along the access roadway, excavating a trench at least 5' wide along the trench, and then pushing (or scooping up) the backfill materials back into the trench. In all, a swath at least 25' wide will be severely disturbed on flatter lands, with even greater widths required on hillsides. Figure VII-7 shows such a hillside situation.

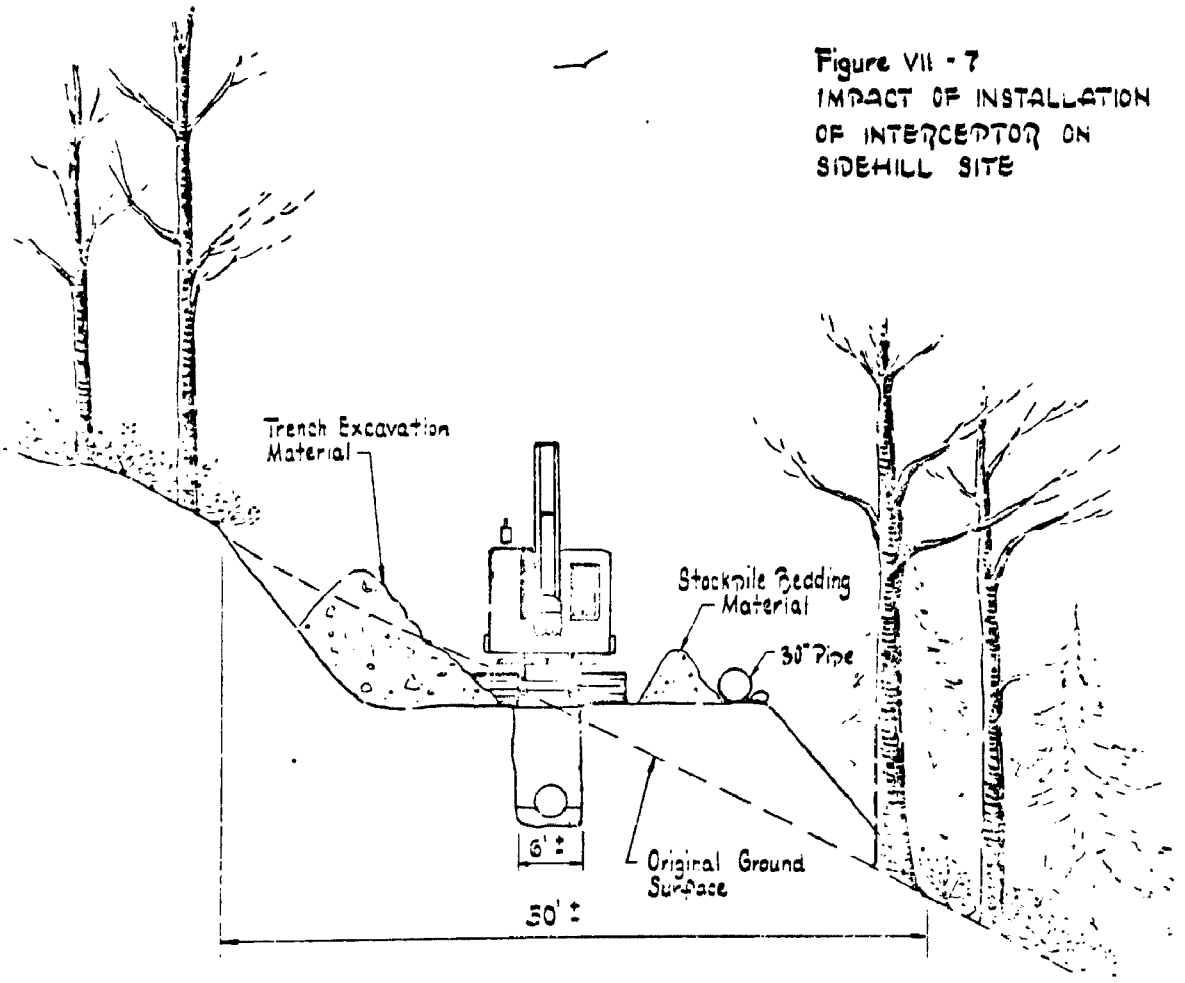

Figure VII - 7
IMPACT OF INSTALLATION OF INTERCEPTOR ON SIDEHILL SITE

Specific areas threatened include the ravine between Phenix Avenue and Natick Avenue by the proposed action and the old iron mine west of Phenix Avenue by future extensions along the brook.

Elsewhere in western Cranston no major adverse impacts are expected in areas with special resource value.

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Chapter VIII OVERALL IMPACTS ON THE CITY AS A WHOLE

8.0 INTRODUCTION

The set of proposed actions, enlargement of the municipal wastewater treatment plant, consolidation of other existing wastewater treatment facilities into the municipal plant, rezoning western Cranston, and extension of municipal sewers into western Cranston, particularly to the areas zoned for industry, in addition to having the specific environmental impacts in the specific localities described herein before, can be expected to effect the City of Cranston and its residents and taxpayers, all taken together, in a manner that can be called significant, originally only financially, but since this financial impact will ultimately affect all other environmental aspects, it can be concluded that the proposed action will ultimately affect the City's total being.

The proposed actions will require a substantial investment of city funds, of state funds (to which the people of the city are major contributors) and of federal funds (to which the people of the city also contribute) for its construction and financing and it will require an on-going commitment to maintain and operate. In addition the proposed actions will lead to increased populations and increased municipal services to those increased populations.

Counterbalancing these costs will be increased revenues, in small part, from sewer use charges but predominatly from increased property taxes from the newly developed areas, while, overriding both the costs and revenues attributable to the proposed actions, will be changes in municipal costs for services to, and revenues from taxes levied upon, existing properties as a result of changes in the city's socioeconomic milieu.

The financial impacts of the growth of western Cranston and its relationship to the City's socioeconomic milieu are described in Chapter VII, Section 7.324 "Municipal Cost and Revenues".

The sections below attempt to set forth the significance of the financial impacts of the proposed actions by comparing them both with the overall city budget and with historic trends in costs and revenues.

8.1 SETTING

The proposed action will result in a direct increase in the municipal budget to cover the financing of the local share of the treatment plant construction and, more important, its operation and maintenance. These direct costs are expected to be on the order of well over a million dollars per year, a not inconsiderable sum. Figure VIII-1 shows how this new sewer debt service and operation and maintenance cost compares with the City's overall operating costs and revenues. Note that the sewer maintenance budget does not include any existing sewer debt service. Note also the far greater importance of school, police, fire and public works costs and of property taxes to the city as a whole, than the sewer costs and revenues.

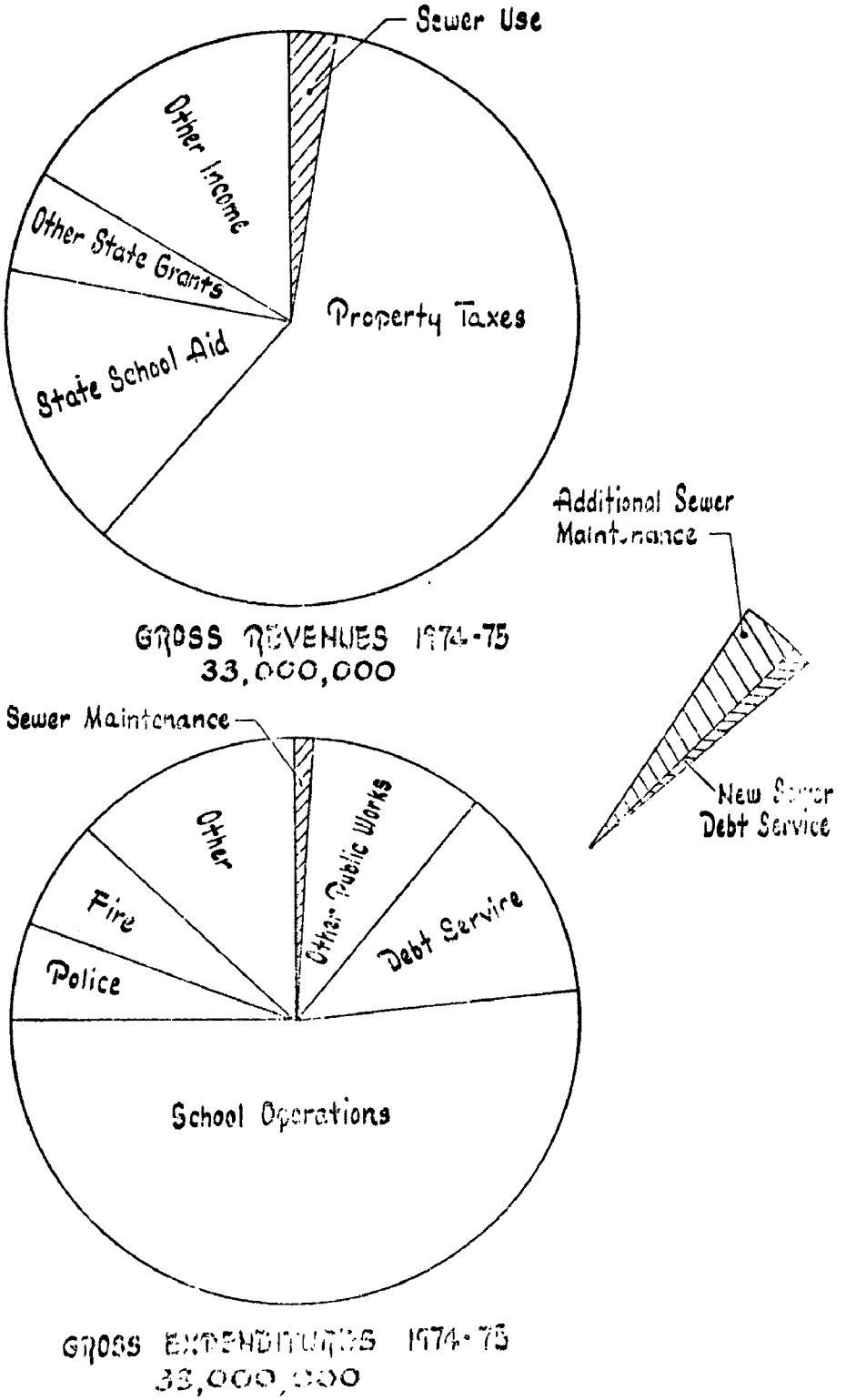
TABLE VIII-1

ANNUAL DIRECT COSTS AND REVENUES OF SYSTEM EXPANSION

	1980	1990	1992
A. COSTS			
1. Debt Service by City (7% 20 yr.)	$1,191,000	$ 843,000	$ 531,000
2. Operation and Maintenance	1,720,000	2,780,000	4,400,000
Sub-Total	$2,911,000	$3,623,000	$4,931,000
B. REVENUES			
1. Ciba-Geigy Estimated	$ 403,000	$ 643,000	$1,023,000
2. Other User Charges	1,295,000	1,657,000	2,019,000
Sub-Total	$1,698,000	$2,300,000	$3,042,000
C. NET ANNUAL DIRECT COST	$1,212,000	$1,323,000	$1,888,000

Source: Universal Engineering Corporation

Figure VIII-1 COMPARISON OF NEW SEWER COSTS TO EXISTING CITY BUDGET



8.2 ALTERNATIVES

Each of the alternatives described herein before, the no action alternative (no sewers and no zoning changes), the proposed action (enlargement, upgrading and extension of the sewer system, and a limited zoning change) and a worst case alternative (intensive sewering and urbanization of all of western Cranston), will have a likely specific impact on Cranston's school enrollments and tax base and on its relative financial condition as a result, within a rather broad range of magnitude and time.

Figure VIII-2 shows the trends in property tax base for the city as a whole including its assessed values, its supposed full value based on estimates of the Rhode Island State Reports on Tax Equalization, and the constant dollar values for the assessed and full values based on the United States Department of Commerce's Implicit Price Deflator. (The dip in full values about 1965, not based on a decline in assessed value, is believed to be an inconsistency in tax equalization estimation techniques, and hence is ignored in the analyses below.)

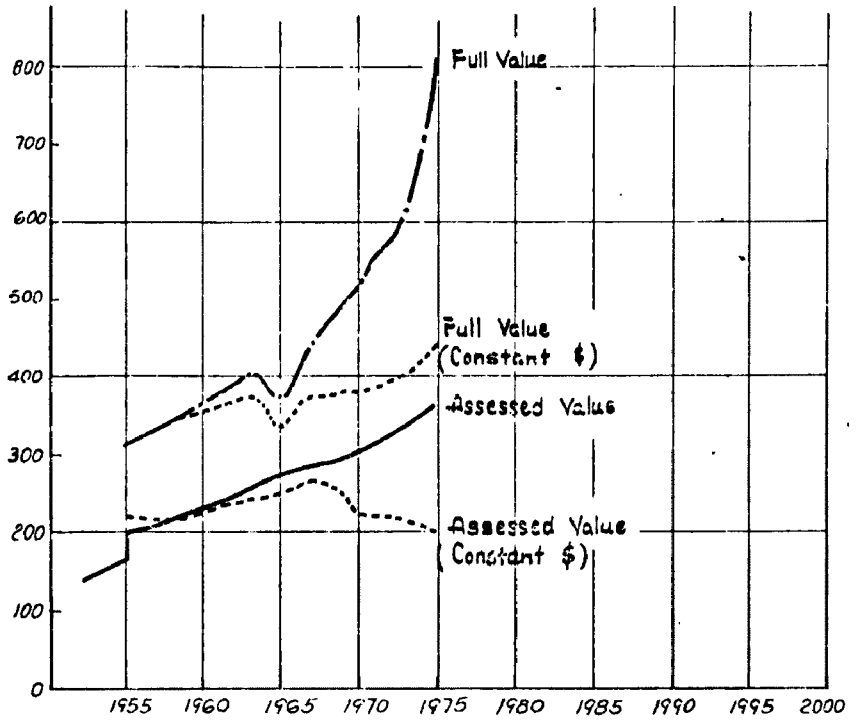


Figure VIII - 2
PROPERTY VALUES
CITY OF CRANSTON

Figure VIII-3 shows the trends in full, constant dollar property values of Cranston, its total population, school population, value per capita and value per pupil on a semi-logarithmic graph. Note that it is the characteristic of this distorted scale that:

(1) anything growing at a uniform rate (the same % change per year) will form a straight line (not necessarily a horizontal line which would be 0%),

(2) any two lines that are parallel are growing at the same rate no matter where they appear on the graph,

(3) the ratio between any two lines at any point may be established by direct measurement (vertically) between the two lines (the method used for establishing values per capita and per pupil).

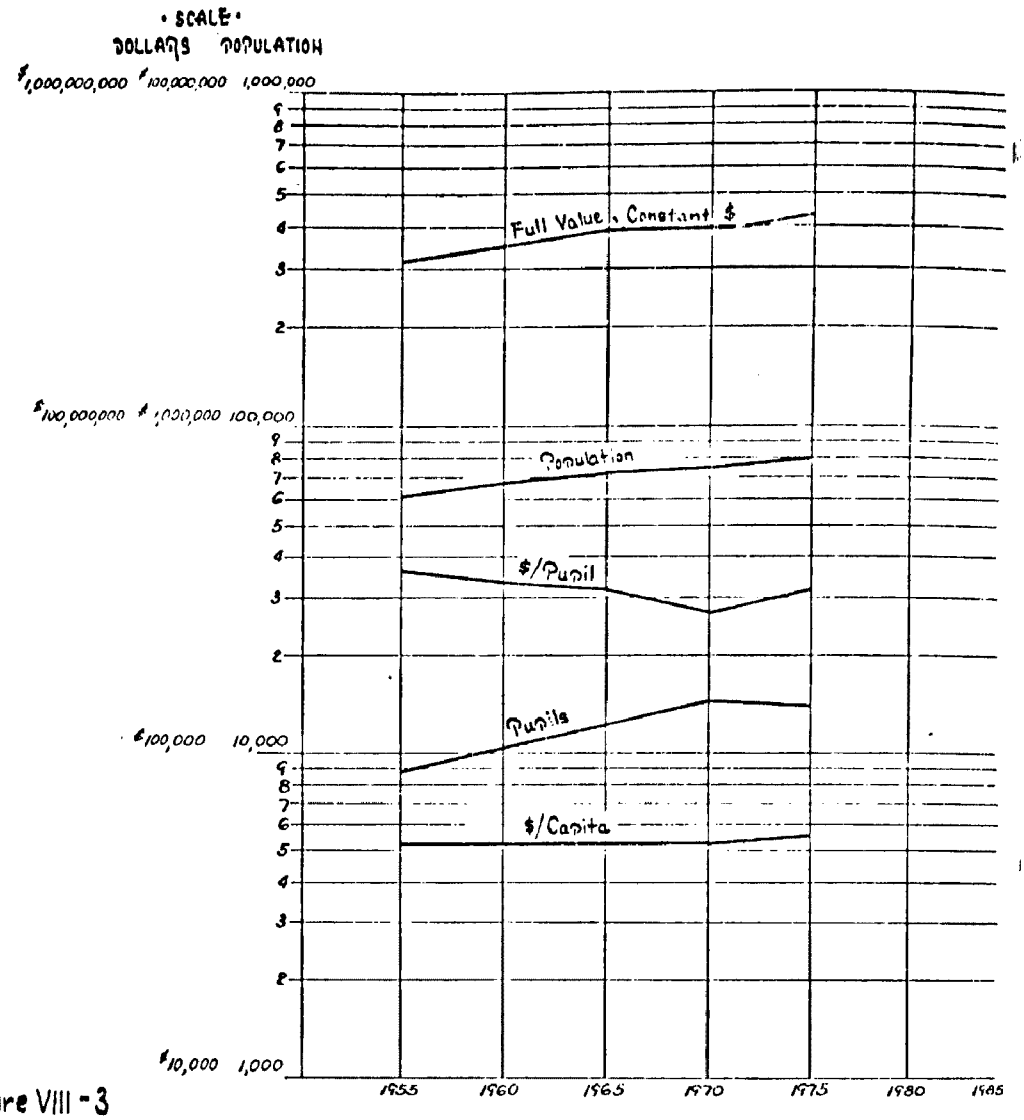


Figure VIII-3
RATIOS OF PROPERTY VALUES TO POPULATION AND SCHOOL ENROLLMENTS, 1955 - 1975

It might be noted on this graph that, in general, the growth rates of full, constant dollar value and population have been proportional to each other, except for the last five years, and that school enrollments have grown faster than both value and population, again except for the last five years. The most striking phenomenon is the reversal of long-term shrinkage of tax base value per pupil since 1970.

Looking toward the future, it would be comforting to be able to believe that such a relationship could be anticipated to last forever. However, the main body of professional demographic thinking as expressed in reports of the Commission on Population and the American Future, in contrast to what appears in the popular press, is that this is almost certainly a relatively short term aberration. Just how this is likely to effect Cranston depends upon the school enrollment and tax base changes implicit in the various alternatives considered herein.

8.3 IMPACTS

Figure VIII-4 displays Cranston's probable population and full, constant dollar property values for the various alternatives. These extrapolations should be taken as descriptive rather than as forecasts and they are based upon ultimately reaching saturation population after the turn of the century and upon experiencing the most rapid growth rate (the steepest slope on the semi-logarithmic graph) about 1990 as a result of a roll-over of old dwelling units from elderly couples to young families. This roll-over would occur as the elderly couples, now between 50 and 60 years old, reach 65 to 75 years, and as the large number of young people born in the 1950's and 1960's marry and have children. The lowest line in each set shows what would happen if there were no new growth at all, the population will increase anyway because of the roll-over and the property values will decline because of wear and obsolescence.

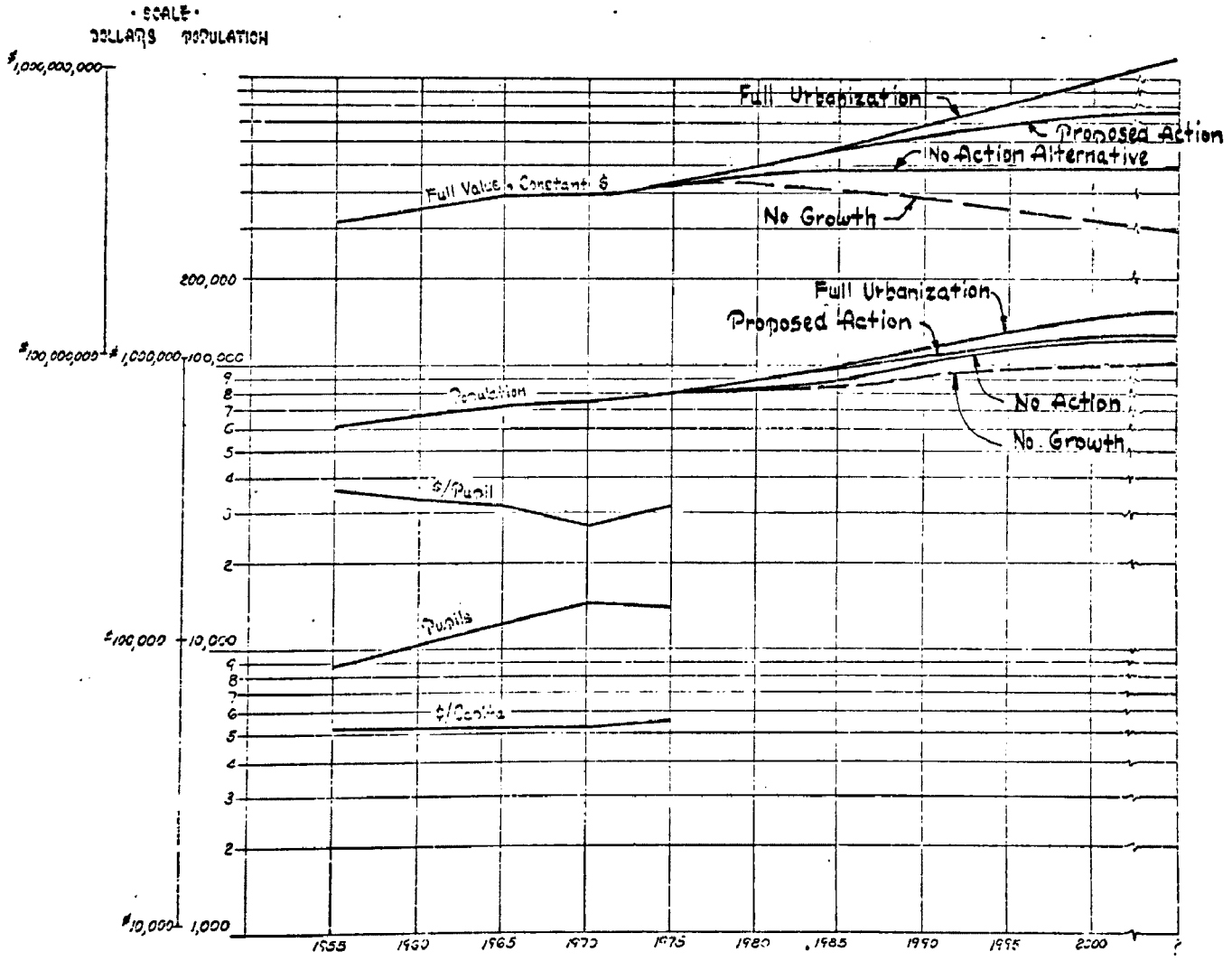


Figure VIII-4 PROJECTIONS OF PROPERTY VALUES AND POPULATION

Figure VIII-5 displays the number of students for each alternative and the ratio of students to total population. The decline in total school enrollments which only recently has become apparent is the result of the decline in births since 1961 and it should continue for some time. Looking to the future however, it is unlikely that the birth rate will not increase as the post-war boom-babies in turn reproduce, say after 1980 and create a new peak in enrollments about 2000.

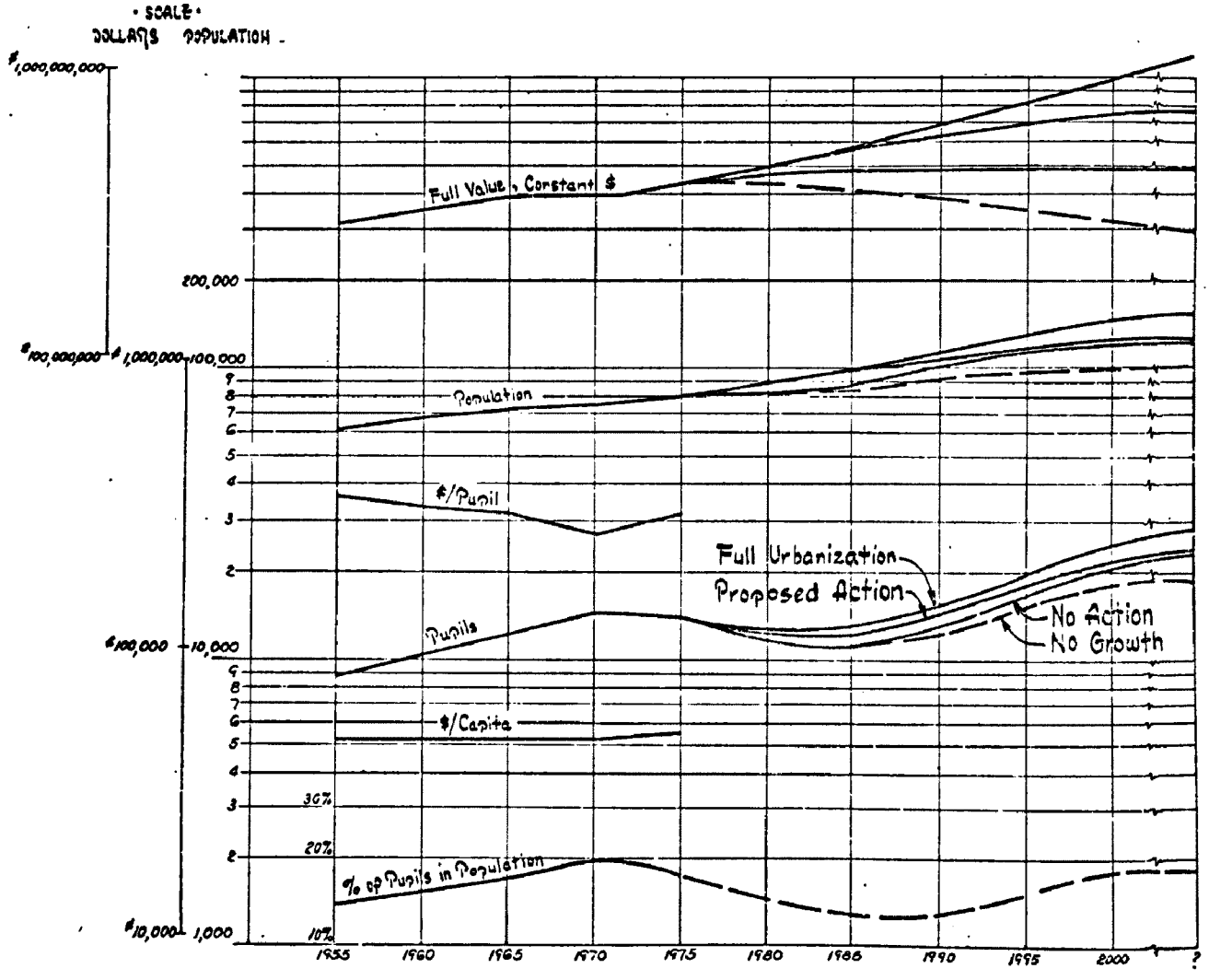


Figure VIII-5 PROJECTIONS OF SCHOOL ENROLLMENTS

Figure VII-6 shows the ratios of property value to school enrollments for each alternative and for the effect of no growth at all. The result is striking and it appears that the following conclusions can be drawn:

(1) that, without growth, in about a generation Cranston will begin to experience the kind of shrinkage of tax base and increased demand for services that has severely injured older cities,

(2) that the impact of the differences in school enrollments among the alternatives is quite small compared both to that of the differences in tax bases of the various alternatives and also to that of changes in age-composition-of-the-population on all of them,

(3) that so long as schools are primarily paid for by local property tax, so long as new buildings are worth more than old buildings, and so long as old buildings decline in value with age, that cities that eschew growth will ultimately be required to accept substantially higher tax rates.

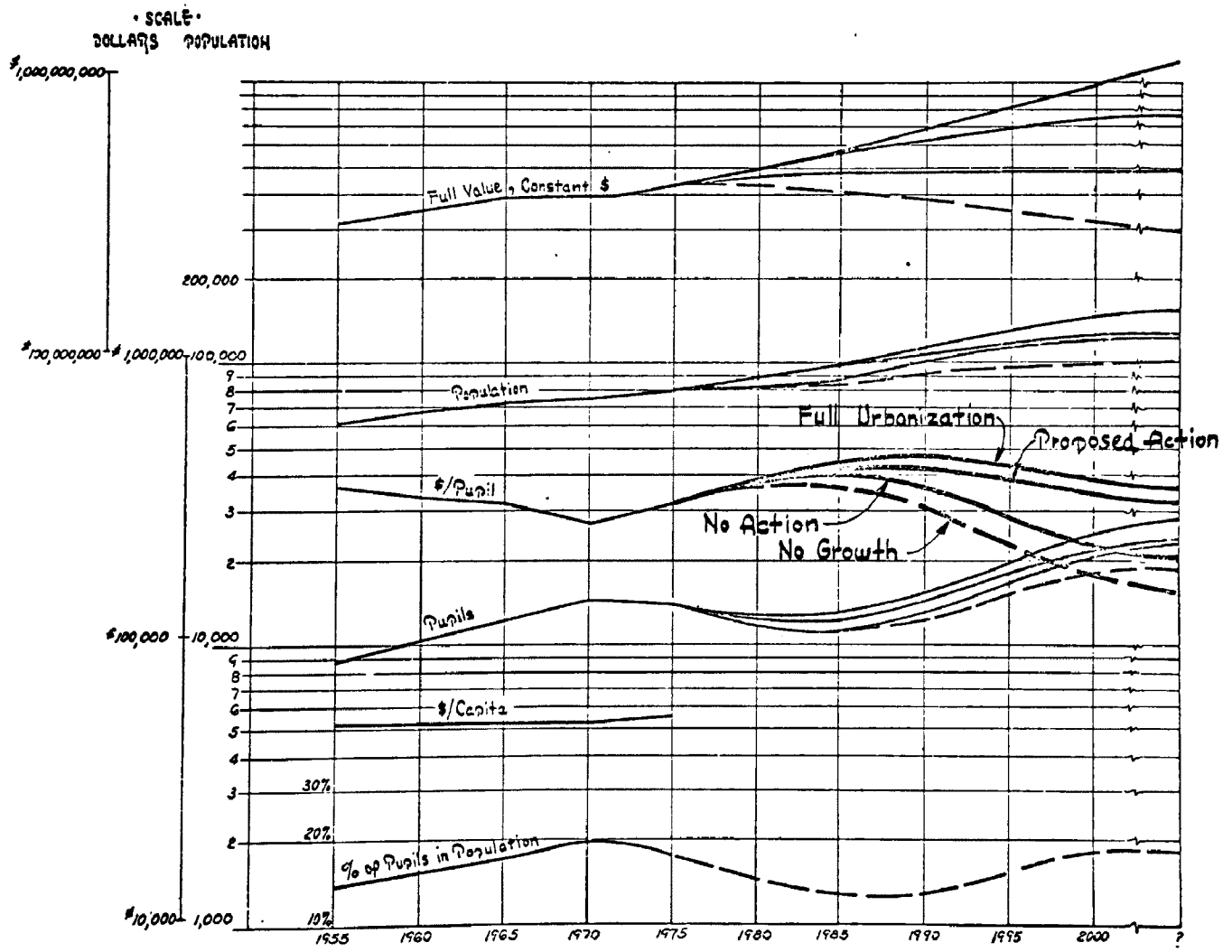


Figure VIII - 6 RATIO OF FUTURE PROPERTY VALUES TO FUTURE SCHOOL ENROLLMENTS

Implicit in these conclusions are that no matter what Cranston does, it will eventually exhaust its capacity for adding new growth when it exhausts its land resources, and that ultimately, as Cranston becomes old and obsolescent, it will decline in value and become increasingly dependent, as have now older cities, on federal and state aid. Presumably if Cranston develops its remaining resources wisely, with proper attention to preventing the causes of obsolescence (congestion, offenses to the eye, nose, and ear, loss of its natural assets, etc.) as suggested in Chapters VI and VII, it will forestall and hopefully obviate, its ultimate decline.

EXHIBIT E

PUBLIC HEARING SUMMARY

A public hearing on the proposed action was held on November 18, 1976, at 7:00 p.m. in the auditorium of the Hugh B. Bain School, 135 Gansett Avenue, Cranston, Rhode Island, before Mr. Wallace Stickney, EPA Region I.

At the outset of the meeting the Mayor of the City of Cranston, the Honorable James L. Taft, Jr., addressed the hearing, endorsing the proposed project; he cited the benefits to the city and its industries, clarified some of the annual cost figures, and pointed out that some of the detailed land uses shown in the Draft EIS, taken from the previous year's city Master Plan, were no longer city policy and should be corrected in the Final EIS.

Presentations of the proposed action, of its anticipated impacts, and of the importance of studying actions that might mitigate expected adverse impacts, were made by Mr. Domenic V. Tutela and Dr. John J. Cochran of Universal Engineering Corporation, the project's planners, and by Mr. Daniel Bubly of CE Maguire, Inc., the project's environmental impact assessment consultants.

On opening the meeting to public comments, a questions was raised on the availability and distribution of the Draft EIS. Mr. Stickney announced in response that additional copies would be mailed out immediately on request and that EPA would extend the deadline for public comments to December 17, 1976.

Questions on the content of the Draft EIS, on the proposed action and on its environmental impacts included:

1. Is industrial development in fact beneficial to local tax bases?

2. Could the wastes from the treatment plant be used as a fertilizer?

3. Could the waste heat from the incinerator of the treatment plant be used in the neighboring state institutions?

4. Is the roadway shown in the Draft EIS as a possible mitigating action for congestion that would stem from population growth supported by the proposed action an adequate solution?

5. Is there a need for additional land for industrial development?

6. Is the agricultural productivity of western Cranston underplayed in the Draft EIS?

7. Are the statements in the Draft EIS about agricultural productivity true?

8. What would be the effects of the project on water quality?

9. What environmental problems would arise from the sludge? from the ash? and finally ...

10. Should an EIS address the morality and social equity of government actions?

Speakers at the hearing included:

The Honorable James L. Taft, Jr., Mayor of the City of Cranston

Domenic V. Tutela, Universal Engineering Corporation

John J. Cochran, " " "

Daniel Bubly, CE Maguire, Inc.

Anthony DeLuca, Cranston City Coundil

Joseph Martelli, Concerned Citizens for Cranston's Future

Senator Raymond Durfee

Edward Lannon

Dan Bolton

Robert Flynn

Alena Calderone, Cranston Conservation Commission

Steve DiMaio

Mr. Gray, Cranston

Joan Giampietro, League of Women Voters

James Shaw

Fred Vincent, Cranston City Planning Staff

Robert Riley

EXHIBIT F

LETTERS OF COMMENT ON THE DRAFT EIS

1. EPA - OFFICE OF WATER PROGRAM OPERATIONS
2. US DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
3. US DEPARTMENT OF INTERIOR
4. US DEPARTMENT OF AGRICULTURE
5. US DEPARTMENT OF TRANSPORTATION
6. US DEPARTMENT OF COMMERCE
7. RHODE ISLAND STATEWIDE PLANNING PROGRAM
8. RHODE ISLAND HISTORICAL PRESERVATION COMMISSION
9. CITY OF CRANSTON, CONSERVATION COMMISSION
10. LEAGUE OF WOMEN VOTERS OF CRANSTON
11. ECOLOGY ACTION FOR RHODE ISLAND, CLEAN WATER COMMITTEE
12. CONCERNED CITIZENS FOR CRANSTON'S FUTURE
13. ROBERT A. FLYNN, SR.
14. CIBA-GEIGY CORPORATION
15. COMMENTS OF UNIVERSAL ENGINEERING CORPORATION TO THE LETTERS OF COMMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: DEC 2 1976

SUBJECT: Cranston, R.I.; Wastewater Collection and Treatment Facilities, Draft EIS

FROM: Kenneth E. Biglane, Director
Division of Oil and Special Materials Control (WH-548)

TO: Regional Administrator
Region I

Attn: Robert Mendoza

The comments from the Office of Water Program Operations concerning subject document are enclosed. If any of the issues raised in these comments require clarification, please contact John M. Hill, Chief, Environmental Evaluation Branch on 245-3054.

Enclosure

Office of Water Program Operations
Comments on
Cranston, Rhode Island
Wastewater Collection and Treatment Facilities

Draft EIS

November 1976

1. It is noted that the consultant (C.E. Maguire, Inc.), in preparing this EIS on behalf of the Region, has complied with the recommendations of the CEQ memorandum to the Heads of Agencies dated February 10, 1976 and the recent CEQ annual report by preparing an "Issue Oriented" EIS. Both the Region and the consultant are commended for this action.

2. An EIS should be "... an essentially self contained instrument, capable of being understood by the reader without the need for undue cross reference." [40 CFR 1500.8(b)] Particular care should be exercised when referencing material in other documents which are not readily available to the public. In the case of this EIS, reference is made to the applicant's Facilities Plan which is available only in the Regional Office or Cranston City Hall. Frequently public participation arises outside of the immediate area of the project and the burden should not be placed upon the reader to locate information necessary for the basic understanding of the EIS. Therefore, pertinent data should be extracted from the Facility Plan as necessary to support statements in the EIS.

3. It is stated, pg. 44, that "... urbanization of western Cranston can be viewed as the 'least sprawl' alternative of the feasible growth choices available..." This statement was not substantiated by the preceding discussion. Further discussion should be provided on this subject.

4. On page 54, it is stated that urban encroachment along the lower reaches of the Pawtuxet River, including the existing treatment plant, has created economic justification for a Corps of Engineers project for further flood control. Further discussion of this issue should be provided, particularly concerning any relationship of the proposed treatment facilities to the requirements of the Flood Disaster Protection Act (P.L. 93-234). On page 87, it is indicated that the cells for storing the ash from the sludge

will be surrounded by dikes to prevent them from flooding. The discussion should also address the protection provided for the treatment plant and the level of such protection in relation to the 100 year flood. (See page 8 of EPA Technical Bulletin, EPA-430-99-74-001, Design Criteria for Mechanical, Electric and Fluid System and Component Reliability). Additional information concerning the flood protection requirements may be found in Program Requirement Memo 76-5 dated August 16, 1976.

5. The discussion of alternatives should be detailed enough to show EPA's comparative evaluation of the impacts [40 CFR 6.304(b)]. The statements indicating the reasons for rejection (page 63) do not indicate a weighing of beneficial and adverse impacts to arrive at the conclusion to accept or reject an alternative. Some of the statements are not substantiated. Thus, the reader cannot make an independent evaluation and appraisal. (Example: One of the reasons for rejection of the alternative for secondary treatment and effluent discharge to the Providence River estuary was "excessive costs". No cost estimates of the alternatives, including the proposed action, were given for comparison.) It is suggested that these alternative evaluations could be made in tabular form to reduce volume.

6. The EIS indicates, page 131, that the capacity of the interceptor from the western Cranston area was based upon intensive urbanization at the rate of 3 dwellings per gross acre. This method provides for development so as to saturate the available space. It is noted, however, that development into this area has been slow because of the natural barrier formed by the granitic scarp, pages 118-120. Experience also indicates that as population density increases, there is a tendency to seek relief from crowding by spreading to other undeveloped areas. Therefore, the saturated condition for pipeline capacity may not be achieved for many years. In accordance with the Cost Effectiveness Guidelines contained in Appendix A of the Construction Grant Regulations (40 CFR 35) the planning period is limited to 20 years and the service life for pipelines is 30 to 50 years. The EIS should provide population projections and capacities for these periods. Where feasible, phased construction should be considered.

7. Figure VI-1 shown on page 118 shows the same symbols for residential, commercial and industrial, and recreation and open space. Since the discussion of land use relies upon interpretation of this map, it is difficult to distinguish any pattern of land use.

REGION I
Room 800
John F. Kennedy Federal Building
Boston, Massachusetts 02203

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
BOSTON AREA OFFICE
BULFINCH BUILDING, 15 NEW CHARDON STREET
BOSTON, MASSACHUSETTS 02114

December 3, 1976

IN REPLY REFER TO:
1.1SE

Mr. John A.S. McGlennon, Regional Administrator
U.S. Environmental Protection Agency
Region I, J.F.K. Federal Building
Boston, Massachusetts 02203

Dear Mr. McGlennon:

Subject: Draft Environmental Impact Statement
Wastewater Collection and Treatment Facilities
Cranston, Rhode Island

The Draft EIS submitted to the HUD Regional Office was sent to the Boston Area Office for review and comment. The following comments are offered for your consideration in the preparation of the Final EIS:

1. As noted in the DEIS, Federal Highway Administration standards were used in the statement to determine existing ambient noise levels as well as the projection of future levels of noise. The median sound level, L50-the sound level which is exceeded 50% of the time, indicates that noise is a problem now and will be a problem in the future. It is important to note that noise levels in excess of those established in HUD standards (1390.2) for residential areas could present a problem if financial assistance by HUD is sought. Where HUD assistance is planned or used in the development of residential areas, those areas with unacceptable noise exposure will generally be discouraged for approval. Therefore, it is important that studies for the control and abatement of noise be considered in the design of the treatment plan. Ameliorative measures should also be pursued for the control of noise in future development of the western area of Cranston.

2. This office concurs that predictions of a future activity in any detail "is a manifest impossibility." However, expansion of a waste water facility will increase the undeveloped land into lands that can be developed, thus urban growth. Urban growth, the shifting of social priorities without redressing the lack of open spaces and recreational development, has led to the erosion of open space. There is no discussion on the present outdoor recreational resources and the future planning of outdoor recreational plans and open space.

Recreation and open space are a part of our society. The public today and in years to come will have more leisure time to enjoy and yet

in densely populated areas or in areas that could be densely populated, the problem of providing recreation opportunities, especially in urban areas, is not addressed. Conservation and land use management should be identified, discussed and give consideration.

We hope that these comments are helpful. Thank you for giving this office the opportunity to review and comment on the DEIS.

Sincerely,

Acting Area Office Director

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTHEAST REGION
JOHN F. KENNEDY FEDERAL BUILDING
ROOM 2003 M & N
BOSTON, MASSACHUSETTS 02203

ER 76/1018

December 17, 1976

Mr. John A. S. McGlennon
Regional Administrator
Environmental Protection Agency
JFK Federal Building, Rm. 2203
Boston, MA 02203

Dear Mr. McGlennon:

We have reviewed the draft environmental statement for wastewater collection and treatment facilities proposed for Cranston, Rhode Island, and offer the following comments.

General Comments

The draft statement is an admirable attempt at covering a very broad topic, but its organization and layout makes comprehension difficult. Analyzing the impacts is difficult because the statement lacks a complete description of the project and area. We suggest reorganizing the final statement to a more standard format, beginning with a complete description of the project area, followed by the proposed project, the project's impact, etc.

Generally, the statement does a good job of enumerating the various impacts which the proposal will probably cause. While it comments on the variations of these impacts and the rapidity with which they could occur, it says little about what will probably occur given the distinctive socio-economic and environmental setting of Cranston. Considering EPA's experience with such projects, a prediction of the probable progression of secondary impacts, i.e., development, public service costs, etc., in terms of kind and time should be possible. Properly qualified such a prediction of the most probable scenario of events would be an appropriate addition to the environmental statement.

The final statement should more fully describe and map the recreational areas which may provide public access to the watercourse. Public access planning becomes increasingly important as the Pawtuxet River quality continues to improve.

We recommend that the Pawtuxet River Authority be consulted in regard to current and proposed recreational activity along the river. The final statement should contain evidence of consultation with that Authority, including their views of river recreational use and access.

In general, the impacts of the proposed project on water resources have been adequately discussed. The statement would be improved, however, by including more specific data on frequency and magnitude of flooding at the project site and by evaluating infiltration and exfiltration effects for both the proposed collector system and the existing sewers.

The environmental statement lists many suggestions and recommendations as to how adverse effects of the proposal can be mitigated or eliminated. However, most of these are beyond EPA's scope of authority and/or responsibility to act upon. While EPA cannot deal with all of these positive measures it is not stated by whom or how they ever could be implemented. Lacking such clarification, the credibility of the recommendations is markedly diminished. To remedy this deficiency would improve the statement's adequacy.

Section 6.411, The Institutional Problem, is an unusually well raised point and one not often seen. Unfortunately, this valid point of consideration is found to occur only in that part of the statement dealing with transportation impacts. It seems to follow from the concerns expressed in the preceding paragraph that a section on Institutional Problems should accompany the discussion of all major elements and impacts associated with this proposal.

Specific Comments

Page 7: This section should include all impacts, not just positive ones or those that cannot be avoided. A concise description of the wildlife resources (a biological inventory) in the project area is needed in order to understand exactly what is being affected. If there are no fish and/or wildlife resources within the area, the statement should say so. The project impact section should cover the effects on aquatic life, including fish and invertebrates, and wildlife, including wetland and terrestrial habitat.

Chapter II: This section attempts to develop a rationale for development in western Cranston which is based largely on availability of water and a fairly high level of air quality. Whatever the merits of such an approach may be, it cannot be said to be complete or comprehensive. Other factors

of equal relevance would be the area's suitability in terms of geological and soil considerations. In the case of the area soils suitability for building foundations, Figure VI-5 shows that most of the area has "Severe Limitations" in this respect. This suggests that all development will be at inflated costs to the public as well as the private investor. Considerations such as this are believed to have a legitimate place in determining an area's development potential. It is suggested that Chapter II be revised to reflect such points.

Page 66: We read with interest the discussion on the chlorinated discharge resulting from the project. The Pawtuxet River may well contain Class D water. Still, the purpose for sewage treatment is to help improve water quality, enabling fish life to return to rivers that have become lifeless. We recommend that either the chlorine be eliminated from the discharge or an alternative to the chlorine treatment be adopted.

Page 90: This section contains the first mention of wetlands. More information is needed, such as how many acres, the type of wetlands, and wildlife usage, if any.

It also notes that floodplain losses can be mitigated ". . . by compensatory enlargement of flood storage in a number of places, both on and off site." This comment establishes that the proposal will create the necessity for a second round of structures, costs to the public and environmental impacts. While an adequate degree of specificity may not be achievable at this time, these points should be addressed in as great a degree of detail as is possible.

Page 114: Not only would draining the wetlands be expensive, but disastrous to any wetlands-related wildlife utilizing the area.

Page 128: Figure VI-7 should denote wetland areas also.

Page 149: How much wildlife will be lost?

Page 192: Throughout the statement, one receives the impression that the project area is rather desolate in terms of wildlife and habitat. As mentioned earlier, this subject should be clarified. This section could also contain the information on wetlands. Another point is that the loss of any of the remaining "undisturbed" habitat might be a negative aesthetic and educational impact for Cranston's people.

Page 194-216: Chapter VII makes clear that certain cultural resource values will be seriously affected by the proposal. Figure VII-8 (page 215) indicates that a number of areas eligible for inclusion in the

National Register of Historic Places are subject to adverse effect. Such effect is also indicated in section 7.3 (page 212). Eligibility status should be cited in the environmental statement as being confirmed by consultation with the Director, Office of Archeology and Historic Preservation, National Park Service, Washington, D. C.

Section 7.15 indicates awareness of protective procedures, yet section 7.4 states that certain requirements "might be considered." The Environmental Protection Agency should be advised that upon a determination of eligibility of historic sites or areas for inclusion in the National Register of Historic Places further requirements of 36 CFR Part 800 will be applicable. We note this draft statement is being provided to the State Historic Preservation Officer and the Advisory Council on Historic Preservation for their respective reviews and commentaries. We would expect to find their responses displayed and discussed in the final statement.

In regard to specific concern given to the protection of archeological values, we note discussion of a reconnaissance by the State Archeologist (page 194), which suggests that further evaluation should be given to such values. Because of the anticipated impacts (sec. 7.3.1 and 7.3.2), we suggest that further evaluation be accomplished soon so as to provide sufficient material for a complete and adequate discussion of impacts and presentation of mitigating measures in the final environmental statement.

Thank you for the opportunity to review the draft statement.

Sincerely yours,

Roger Sumner Babb

Roger Sumner Babb
Special Assistant to
the Secretary

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
222 Quaker Lane, West Warwick, Rhode Island 02893

January 14, 1977

Mr. John McGlennon
Regional Director
U.S. Environmental Agency
JFK Federal Building
Boston, Mass. 02203

ATTENTION: Robert Mendoza

Dear Mr. McGlennon:

This is a late comment on the Environmental Impact Study for Western Cranston which we have reviewed.

One question was alluded to but not really addressed is that of prime agricultural land.

We believe the time will come within the lifetime of most of the people living today when food will be very critical. In fact, if we consider world needs right now, we barely have enough.

Therefore, it behooves us to identify those lands which are and can be readily available or retrieved for food production and work toward its preservation for that purpose. This includes lands currently forested.

The Environmental Impact Study mentions that if the land is used for residential purposes, it can still be gardened. That is true, but there are few individuals who are both capable and willing to produce all their lot can. Then too, a good percentage of the space is lost due to the houses, roads, and esthetic effects.

We, therefore, suggest development be encouraged on other than prime agricultural land.

Sincerely,

Austin L. Patrick, Jr.
State Conservationist

cc's:
C. Rath (C.E. McGuire)
W. Bascombe
A. DelSesto

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE
Suite 250, Federal Bldg & USPO
Exchange Terrace
Providence, Rhode Island 02903

IN REPLY REFER TO:
November 18, 1976

Mr. John A. S. McGlennon
Regional Administrator
U.S. Environmental Protection Agency
J.F.K. Federal Building
Boston, Massachusetts 02203

Dear Mr. McGlennon:

Subject: Draft EIS - Wastewater Collection and Treatment Facilities - Cranston, Rhode Island

Our Regional Federal Highway Administrator has furnished the subject report to our office for our review and action.

We have no significant comments on the factual data relating to Federal-aid highways that is contained in the report.

Sincerely yours,

Gordon G. Hoxie
Division Administrator

By: Mario H. Tocci, Assistant
Division Administrator

cc:
Mr. Kirby, 01-00.4, FHWA

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

December 17, 1976

Mr. John A. S. McGlennon
Regional Administrator
Environmental Protection Agency
Region 1
J. F. Kennedy Federal Building
Boston, Massachusetts 02203

Dear Mr. McGlennon:

This is in reference to your draft environmental impact statement entitled "Proposed Treatment and Collection System for the City of Cranston, Rhode Island." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure Memo from Mr. William G. Gordon
Regional Director, FNE

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Region
Federal Building, 14 Elm Street
Gloucester, Massachusetts 01930

DATE : November 17, 1976

TO : Director, Office of Ecology and Environmental Conservation, EE

THRU : for Robert L. Schuler DEC 02 1976
Acting Asst. Director for Scientific and Technical Services, F5

FROM : William G. Gordon Marvin L. Bowen
Regional Director, FNE

SUBJECT: Draft Environmental Impact Statement--Wastewater Collection and Treatment Facilities, Cranston, R.I.--EPA--DEIS #7610.40

The draft environnental impact statement for Wastewater Collection and Treatment Facilities, Cranston, Rhode Island that accompanied your memorandum of October 29, 1976, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments

The proposed action described in the subject DEIS does not suggest which alternative, if any, of those listed will be implemented to reduce or eliminate chlorine from the discharge effluent. Presently, there are no anadromous species in the Pawtuxet River because of river obstruction and poor water quality. It is our understanding that the State of Rhode Island is investigating the possibility of restoring anadromous species to the Pawtuxet River. The wastewater treatment facility, once in operation, will improve water quality; however, the introduction of chlorine to the effluent discharge will reduce restoration possibilities. Unless measures are taken to greatly reduce or eliminate chlorine from the discharge effluent, the effort to restore anadromous species will be jeopardized.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Administration
STATEWIDE PLANNING PROGRAM
265 Melrose Street
Providence, Rhode Island 02907

December 16, 1976

Mr. John A.S. McGlennon
Regional Administrator
U.S. Environmental Protection Agency
John F. Kennedy Federal Building
Government Center
Boston, Massachusetts 02203

Dear Mr. McGlennon:

We have completed our review of the "Draft Environmental Impact Statement on the Proposed Treatment and Collection System for the City of Cranston, Rhode Island" (October 18, 1976). It addresses all of the important aspects of this project in a clear and thorough manner. The well illustrated format is a refreshing change from conventional engineering reports and environmental impact statements, and is easily readable.

We do have a few comments on the draft EIS which we feel should be addressed before the final report is completed.

1) Our first comment concerns the extent of the proposed expansion of the wastewater collection system as shown on Figure 1-4 (p.5). We question if it is necessary at this time to construct laterals as far west on Scituate Road, and as far north and west on Pippin Orchard Road and Hope Road, as is shown on this figure. Presently, there is little development in these areas and any use other than open space such as agriculture, woodland, or open land would be inconsistent with the recommended land use patterns in the State Land Use Policies and Plan. In addition, the 1975 Master Plan for the City of Cranston proposed that Scituate Road west of Wildflower Drive be zoned rural density residential, which would not require sewer service. While we agree that western

Cranston is an attractive location for future urban growth we do have some reservations about the extent and speed with which this development will take place. It is our feeling that the laterals should not be extended to these two particular areas until the need for them has been definitely established.

In conjunction with this, we do not totally agree with your analysis of the future growth and development of Rhode Island, extrapolated from national trends. Rather, we feel that growth within the state will stabilize in the years ahead, and that intrastate shifts of population will account for most of the development pressures in western Cranston.

2) p.10, Par. 1, last sentence: I do not understand why a discharge into Narragansett Bay at this time would preclude reuse of the water or deepwater discharge in the future.

3) p.8, Par. ii: Another adverse impact which cannot be avoided appears to be the noise from incinerators, and it should be listed here.

4) p.52, Par. 1, 1.5: The preliminary draft of the Pawtuxet River basin water quality management plan will be revised to indicate that the Class E reach at the east end of the Pawtuxet is to be upgraded to Class C. Based on results achieved with the mathematical water quality simulation model, it is felt that this classification can be attained with advanced treatment at municipal plants along the Pawtuxet. However, this classification will not be the legal classification of these waters until a formal public hearing is held on the reclassification. The Department of Health will hold this hearing in late spring or early summer.

5) p. 54, Par. 1, 1.3: This agency does not agree that economic justification for the entire Natick diversion project exists. In fact, the margin of benefits over costs of this project as estimated by the Corps of Engineers is too small to justify its construction.

6) p. 87: Will the leachate collected from the ash disposal cells be pretreated before being drained back into the treatment plant? If not, won't this increase the level of metals discharged to the river? If pretreatment is required, how will the pretreatment sludge be disposed of?

7) Some of the suggestions for mitigating impacts of the project are good, particularly the recommended re-routing of the interceptor near the historic area and the suggested traffic improvements for western Cranston. Who is responsible for deciding if these mitigating actions will be adopted?

Thank you for the opportunity to comment on the EIS. If you have any questions on our comments please contact Mr. Thomas Brueckner at the letterhead address or at 277-2656.

Very truly yours,

Daniel W. Varin, Chief
Statewide Planning

DWV/abg
cc: Carleton Maine
Daniel Bubly, C.E.Maguire

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

HISTORICAL PRESERVATION COMMISSION
Old State House
150 Benefit Street
Providence, R. I. 02903
(401) 277-2678

December 6, 1976

Mr. John A. S. McGlennon, Administrator
U. S. Environmental Protection Agency - Region I
J. F. K. Federal Building
Government Center
Boston, Mass. 02203

Dear Mr. McGlennon:

This office has reviewed the draft Environmental Impact Statement of the Proposed Treatment and Collection System for the City of Cranston, R. I., and offers the following comments.

In general, the consultant has prepared an excellent statement with regard to historic and cultural resources. The level of historical research conducted and the extent of consultation with specialists of various disciplines is far above that found in other comparable impact statements. A preliminary historical and cultural survey was conducted as a part of the impact study; we note, however, that further field investigation will be necessary when final plans are made and prior to construction in order to avoid adverse impact on cultural resources.

Regarding primary impact on cultural resources, we concur with the impact statement's recommendation for relocating the interceptor originally planned for placement within the Furnace Hill Brook ravine. The ravine area is being recommended for nomination to the National Register of Historic Places as an archaeological district, since it possesses a valuable and unusual blend of historic and prehistoric sites. The ravine also has great natural and scenic value, as noted in the report.

With regard to the possible use of two mill ponds on Furnace Hill Brook for the control of increased storm-water run-off caused by expanded road surfacing, we concur with the recommendation of the impact statement that any such action be undertaken only under the supervision of the Historical Preservation Commission. We

urge the city to rely on on-site run-off controls; these have the advantage of avoiding impact on sites eligible for the National Register.

It is the implication of the impact statement that without the proposed wastewater treatment improvements the Pawtuxet River may become anaerobic during low floods, creating a serious odor problem in the Pawtuxet Village Historic District. The report also notes that the village could be affected by the loss of floodplain further up-river. Because a portion of the river itself is within the National Register district, and is important to the district, we urge concern for the flow level of the Pawtuxet.

The increased volume of traffic in Western Cranston will have a significant effect on the environment. The alternatives of over-congested existing streets or the extension of a four-lane Route 37 are not attractive. Either will mean a degradation of the visual and audible environment of the Furnace Hill Brook historic site. The extension of Route 37 will dramatically extend the frontier of urban sprawl and thereby impact Oaklawn Village and possibly Hope Road, both of which are areas eligible for National Register nomination.

The general problem of secondary impacts resulting from new sewers in Western Cranston has been thoroughly addressed in the impact statement. It should be recognized that providing new services will not only satisfy projected growth requirements but will permit and accelerate growth, thus altering existing historical and natural landscapes. Our concern is that, as a part of the general growth process, the cultural resources of the city will be adequately considered in community planning and protected during construction projects.

Yours truly,

Frederick C. Williamson

Frederick C. Williamson
State Historic Preservation Officer

FCW/mm

JAMES L. TAFT, JR
MAYOR

MRS. ELENA CALDARONE, CHRMN
ANTHONY J. RODI, VICE CHRMN
ANTHONY VENTETUOLO
FREDERICK J. VINCENT
RAYMOND F. HORBERT
J. ROBERT WAHLBERG
JAMES A. SHAW

CONSERVATION COMMISSION
EXECUTIVE OFFICE
CITY HALL
CRANSTON, RHODE ISLAND 02910
PHONE 461-1000

December 14, 1976

Mr. John S. McGlennon
Regional Administrator
U. S. Environmental Protection Agency
Region 1, Room 2203
John F. Kennedy Federal Building
Boston, Massachusetts 02203

SUBJECT: Comments on the Draft Environmental Impact Statement Wastewater Collection and Treatment Facilities for the City of Cranston, Rhode Island

Dear Mr. McGlennon:

This Commission is in favor of improvement and enlargement of the sewerage treatment plant to prevent overloading of the existing plant and to improve the water quality of the Pawtuxet River.

If western Cranston is more intensively urbanized, we have a great concern with the runoff-related effects in this area; and we are very much in favor of the mitigating actions, as presented under "Runoff Related Effects-Western Cranston" pg. 12, section 1.12 of the Draft. However, the important Table VI-I on page 144 needs some refinement. If alternative 1 "shows the effect of the proposed action" (intensive urbanization in the sewer area) it could not be in the same column with the existing zoning, where most of the area is zoned A-80 (80,000 s.f.)

The Conservation Commission also endorses the mitigating actions included under "Traffic related effects-western Cranston" pg. 13. It notes especially the concept of a control access parkway. This concept merits further study.

Those mitigating actions listed under "Impacts on special resource-values" sections #3 and #4, pg. 14 and section #5 under "Impacts on vicinity on Cranston waste water treatment plant" pg. 15, are also endorsed by the Commission.

Questionable judgment was expressed about paragraph II of the Summary of Significant Impacts. Under "The unavoidable adverse effects of urban growth," the report, point 2, includes the "Permanent loss of rural land, mostly forest with some farms, to urbanization but not necessarily resulting in permanent loss of the agriculture productivity of the rural lands."

This Commission suggests including the loss of prime agricultural land not in paragraph IV, but in paragraph V, "Irreversible and Irretrievable Commitments of Resources."

Pages 41 and 42 deal with agriculture in a superficial manner. There are only two viewpoints pursued:

1. Whether Rhode Island's total agricultural land or output is meaningful when compared to its food needs, and

2. Whether residential development really precludes food production.

The statistics quoted in the first point, from the 1972 U. S. Census Bureau's County and City Data Book show the small percentage of the nation's farmland that survived in Rhode Island. However, it produced double this percentage in Rhode Island's total retail food purchases. The 1960's statistics are meaningless in this decade of accelerating energy costs which are reflected in the high costs of food brought in from out of state. We can only assert the growing popularity and success of vegetable and fruit producers in western Cranston in the last few years. Both the residents and non-residents of this area benefit by the purchase of the fresh produce grown here. It is very meaningful in this metropolitan area.

We cannot find any substantiation of the Draft's second point that the residential development wouldn't preclude food production. Intensive urbanization certainly prevents agricultural use of the same land.

There was no thought given in this Draft to the enhancement of the present agricultural production in western Cranston and no exploration of the agricultural belts of Sir Ebenezer Howard (reflected in the design of Greenbelt, Maryland) mentioned only in passing on page 183.

We have to consider seriously the impact on farmlands. The Council on Environmental Quality recently asked heads of Federal Agencies to include in the Environmental Impact Statements they prepare an analysis of the effects of proposed actions on prime and unique farmlands. Environmental Impact Statements should evaluate the irreversible effects not only from direct construction activities, but also from urbanization or other changes in land use that might

be induced by the federal action. The Department of Agriculture plans a major new emphasis on reviewing and evaluating all federal draft environmental impact statements with respect to impact on prime and unique farmlands.

Should the proposed action suggested in this Draft be adopted i.e. intensive urbanization in the sewered area, the Conservation Commission does not feel that enough attention is given to the restoration of the land.

The rephrasing of the sentences using the word "mitigate" is suggested. For example, the statement (pg. 149) " . . . zoning, etc. could entirely mitigate the adverse effects of the proposed action" does not make sense when mitigate means to make less severe, to moderate. The same reasoning should be applied to the last column, page 167: "Some of these anticipated impacts can be totally avoided by adequate mitigating actions while others can only be softened. . ."

The Cranston Conservation Commission is listed on the Summary Sheet as an Agency which has contributed to the Formation of this Statement. We did not help in any way to prepare this Draft and, therefore, ask to have the Conservation Commission deleted from the Summary Sheet.

Sincerely yours,

Alena Caldarone

(Mrs.) Alena Caldarone
Chairperson

AC:sl

LEAGUE OF WOMEN VOTERS

OF CRANSTON, RHODE ISLAND

Affiliated with the
LEAGUE OF WOMEN VOTERS OF THE
UNITED STATES

December 17, 1976

US Environmental Protection Agency
Region 1, Room 2203
John F. Kennedy Federal Building
Boston, MA 02203

Re: Draft - EIS Waste Water Collection & Treatment Facility, Cranston, RI

Dear Sir:

Basically we agree that the Cranston Waste Water Treatment Plant should be improved and enlarged to serve the present and future needs of the City, The EIS does make a good case for Cranston as especially suitable for urban growth. However, development should only be allowed after the installation of sewers, a public water supply and solid waste disposal are provided.

One of the unique characteristics of the Western Cranston area is the large amount of prime farm land, according to the January 1975 State Land Use Policies Plan. The EPA regulations on preparation of EIS Statements do say (Fed Reg, Volume #40,#72, page 16814) "Protection of prime agricultural land...has become an important concern as a result of the need to further increase food production from domestic sources...and the continuing need to preserve the diversity of natural resources for future generations." Did you seriously consider this in your study or did you ignore the EPA's regulations?

Cranston's forest land is valuable because it provides many benefits including water shed protection, recreational values, esthetics, wild life habitat and forest products. The rural character of this section must be preserved. Somehow we must reach a balance in the development of this section. Land should be set aside for future recreational areas excluding land already owned by the state.

Development cannot progress with the current "Cow Path Roads," we support your idea of a limited access parkway with the widest possible buffer zones.

At all cost the areas of special resource value must be protected and preserved.

Sincerely,

Margaret Ansty

Margaret Ansty, President
43 Franconia Dr., Cranston, RI 02920

Joan M. Giampietro

Joan Giampietro, Land Use Chairman
20 Hibiscus Dr., Cranston, RI 02920

12/22/76

To: Environmental Impact Office, EPA - Region I, JFK Federal Building, Boston, Mass. 02203 (att'n: Bob Mendoza)

From: Clean Water Committee, Ecology Action for Rhode Island, 286 Thayer Street, Providence, R.I. 02906 (401-274-9429) (prepared by Linda Silversmith, chairperson)

Re: Cranston, R.I., Environmental Impact Statement, Wastewater Collection and Treatment Facilities -- Draft (Comments due Dec.17, 1976; 10 day extension requested)

Copies to: C.E.Maguire, Universal Engineering, Cranston Conservation Commission, Mayor Taft's office

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The commentary of the Clean Water Committee will be divided into two parts: a section with general comments and a section with page by page notations.

A. General Comments:

1. Water quality goals: it is not entirely clear in this document that the water quality goals for the Pawtuxet River will be at least C classification; it is reasonable to assume that the D goal will be changed to C in an early revision by the state and with strong public support.

2. Land use plans: Nowhere is there a discussion of the discrepancies between Cranston's proposals for western Cranston and the proposals (mostly open space) of the State Guide Plan for land use. Since federal monies are not supposed to be granted for projects conflicting with the state guide plan, some discussion of the differences here and methods for mediating these should be included.

3. Public participation: Was there sufficient public participation according to guidelines for P.L.92-500 in the preparation of this EIS draft? Note (1) the low number of citizens' comments contributed to the draft, and (2) the short notice of only 1 week for the April 20 meeting. What was the attendance at that meeting?

4. Coordination with other plans: It is obvious that this EIS draft was prepared on a constrained timetable. For instance, a revision should include expansion on the topics of related studies and how Cranston's plans fit with these: in particular, more attention could be paid to (a) the 208 studies projected for the Pawtuxet basin, (b) the Pawtuxet River Basin's Water Quality Management Plan, and (c) the Corps of Engineers' most recent proposals for flood control in the basin. Areas where plans agree or disagree should be stressed.

5. Sewer ordinance, pre-treatment, pass-throughs, etc: It appears to this committee that these topics are relevant for consideration in an EIS since the way in which each is handled can affect the environmental impact of the overall project.

6. Farm lands: The committee assessment is that the discussion of loss of agricultural lands ignores completely the cumulative effect of small changes. Each local change in environmental quality should not be treated as an isolated impact, but as part of an

see next page

A. General comments, continued, #6...

overall picture: thus, the loss of a supposedly small percentage of R.I. and national farm land should be treated in terms of overall trends, not just as a small incident. Additionally, no mention is made in this EIS of other studies existent in R.I. concerning the national trend (problem?) towards loss of agricultural lands and recommendations for ways (e.g., via tax structure) to encourage maintenance of R.I. farm land.

7. Flood plain disposal of ash: While the recommended disposal method for incinerator ash suggests a design to protect ash from contact with ground water, it is not clear by what means the ash will be protected from contact with flood waters.

8. Soil surveys: It would be useful to have superimposed on one map all the information on topography, slopes, water tables, drainage, etc. with the Soil Conservation Service's interpretations also summarized in the one place for what is buildable, usable for septic disposal, etc.

9. Commendations: the committee appreciates the thorough handling of the Furnace Brook area and the points stressed concerning matching transportation (and surrounding open space corridors) to population growth in western Cranston.

10. Coordination with other federal agencies: Regarding the proposal for open space corridors adjacent to transportation networks (and to sewer networks?), what kinds of consultation have taken place or will take place with the federal Department of Transportation and the Bureau of Outdoor Recreation concerning coordination with EPA water quality programs? (Reminder: BOR and Region I EPA have a memorandum of understanding concerning coordinating recreational and water quality programs).

B. Page-by-page notations: commentary begins on next page--page 3.

B. Page-by-page notations:

1. page backing list of tables: While an occasional small sketch enlivens this report, it does not seem right that the U.S. taxpayers should have to pay for full-page sketches like this one.
2. p.1 - These maps are so poorly legible as to be a ridiculous waste of paper. (also true on page 2)
3. p.3, line 1: doesn't some overload already occur at peak flows?
4. p.3, Fig.I-3: (a) the state institutions are already tied in; (b) Ciba-Geigy should not be listed as "to be abandoned" since some pretreatment will be necessary.
5. p.4, Table 1-1: Proposed water quality condition downstream should be changed to class C.
6. p.4, + later section on incineration: how will incineration by Cranston fit in with regional 208 planning?
7. p.5, Fig.1-4: How does this compare with (1) Cranston zoning; (2) State Guide Plan; a map with superpositions for comparison would be useful.
8. p.7: (item 3 re Pawtuxet Village) Doesn't the Pawtuxet Village have some septic or nonpoint discharge problems?
9. p.7, item 2 at bottom: again, what is the consistency of growth plans with state and local planning?
10. p.9: why doesn't this listing include mention of regional alternatives (as does p.20).
11. p.10, paragraph 2, bottom: is this really realistic to consider home crops as a hobby as significant?
12. p.12, item 1: will this include requirements for long term maintenance of these storage sites? Where are these reservoirs to be?
13. p.12, item 1, 2nd stage mitigating actions: what is meant by item a? What requirements does the author have in mind? why does there have to be any "compensatory relaxation"?
14. p.12, bottom: is there evidence that impoundments, reservoirs, etc. do make possible good sites for open space and wildlife habitats?
15. p.13, bottom: Will Cranston also consider such recreational facilities as bikeways along sewer line extensions (cfr.general commentary, re BOR above). Concerning item c. : is this really true for the buffer zones proposed around roadways -- especially after construction?
16. p.14, bottom, re park: this is an appropriate topic for investigating the intent of the BOR-Region I EPA memorandum of understanding.

more on page 4

B. 17. p.17, Table 1-3: sludge and ash disposal could have more than local impact, depending on regionalization, use of flood plain, etc.

18. p.29: should the quality of R.I. air be reconsidered as being worse than presented, given that (a) visible pollution is almost a daily event as one drives towards Providence, and (b) EPA has stated that R.I.'s current air quality would not permit establishment of any refineries in R.I.

19. p.30: One should, however, take note here of the predicted need for the Big River Reservoir by the R.I.Water Resources Board

20. p.30: is Ridker the best resource as a water reference? What about other predictions of water shortages in the eastern US, e.g, New Jersey.

21. p.32: Reading through section 2.2 begins to seem like a waste of space on generalizations of dubious accuracy.

22. p.33, bottom: but there was a net emigration in the last decade by U.S. census figures.

23. p.37: bringing these remarks closer to home in Cranston - will the anticipated alternatives plan for "anticipated growth" or "allow it to spread at will"?

24. p.38: how suitable is this area of expected urbanization when one looks at soils and water (emphasis here should be that good planning uses environmental and social criteria together).

25. p.39: what is the definition of "hard to develop soils": is this only in terms of the water table and sewering or are there problems with slope, terrain, etc. too?

26. p.42: how can there be good farmland and soils' problems coexisting?

27. p.44: how does this relate to studies of farmland in R.I. and conservation thereof? (item 4). Also - bottom comment could include a reference as to what part of report discusses this further.

28. p.52: parag.1 - planning should be for class C as a minimum. parag.2 - could check the Pawtuxet River Basin plan re its evaluation of Pawtuxet Village's problems

29. p.58: this page was MISSING in our copy

30. p.60, item 2, bottom: is there room on site for this conversion?

31. p.61: does conversion for out-of-basin discharge really eliminate requirement for tertiary treatment? how much more would it cost to maintain advanced treatment?

32. p.63, item 4: do these suggestions represent a realistic approach (vs. the proposals to save agriculture in this state)?

33. p.67: item 2, top: will the Cranston effluent be of high enough quality for ultraviolet irradiation?
item 1, bottom: what is/are the products, using sulfur dioxide? (to react with chlorine)
item 3, top: how much less stable are bromamines than chloramines? What effects do they have on fish and at what concentrations compared to chlorine products?

more on page 5

B.

34. p.69: what is the projected lifetime for the landfill for the ash

35. p.71, Table IV-2: what happens when the heavy metals are incinerated--what products do they form?

36. p.72, parag.2: won't flooding renew moisture content in this sludge?

37. p.74, Table IV-4: is there no way to decrease these emissions further?

38. p.75, Table IV-5: footnoes 3 and 4 need clarification to draw a distinction for the reader between primary and secondary standards.

39. p.76, part 4.141: "windiest region" is based on what standards? Also how consistent are these wind figures with the air pollution data presented earlier for R.I.?

40. p.82, parag.2: this assumption of all unleaded gas by 1985 does not seem valid, given the lifetime of some of the older models of automobile in ownership by poorer families.

41. p.84: continuing a policy of using the floodplain seems crazy unless there is 100% guarantee of floodproofing.

42. p.86: what is the cost of these alternatives vs. using the floodplain?

43. p.87: parag.2 - please clarify what these specially designed cells are. Parag.3 - what will be the lining of the cells? To what flood level will the dikes protect? What will the monitoring be for?(be more specific).

44. p.88: re incineration and off-site disposal: can the time element be considered a valid excuse in an EIS?
re bottom item 1-c: good point

45. p.89: item 4-a., bottom: this may be inconvenient but is it a valid reason for discarding an alternative?

46. p.90, parag.4: is there a more specific proposal on this "compensatory enlargement of flood storage"?

47. p.92: item 3, top - why is this being neglected? Also - lower parag. re park: could BOR help in establishing this park?

48. p.95: please note that the Ciba-Geigy treatability study still did not deal with company wastes untreated by the test procedure, i.e., what is passing through untreated? How might this affect Pawtuxet water quality?

49. p.100: since the July 1975 studies did show that turning off the fans did decrease efficiency of pollutant removal from wastewater, it is entirely unlikely that the last sentence in paragraph 1 can be true for July 1974. Solvent not removed by air stripping must be retained in the water.

50. p.110, item 4-b: good idea; should be standardly included in design of sewage treatment facilities in areas also having septage.

more on page 6

B. 51. p.112, middle parag.on noise: it would be useful to refer here to future discussion (p.115) of ways to alleviate noise

52. p.118: is there a reference for the statement that "gradual transitions are typical" in southeastern New England?

53. p.119: how is the drainage in western Cranston without sewers?

54. p.120: Fig.VI-3 and description of topography would be more useful in conjunction with parallel work indicating slopes and SCS interpretation key re utility at various slopes for land use.

55. p.122: given the conditions of parag.3, is it logical to worsen these runoff conditions by more pavement and urbanization?

56. p.124: here is where superposition of the various limitations of soils to give a total picture (septage,slope, runoff,etc.) would be useful.

57. p.124, bottom line: who should be answering this question-- is that a job for the city of Cranston?

58. p.128: even if the forest area has limited direct value for wildlife, it would be useful to see forests indicated on a map.

59. p.131: bottom of paragraph - is this engineering practice for sizing of pipes also a standard and prudent practice for control of urbanization?

60. p.137: Figures V-8 through V-11 should be compared with the State Guide Plan for Land Use.

61. p.137: item 6: are there any data concerning the effects of on-site sewerage in western Cranston -- e.g., wet basements, backed up septic tanks, etc.?

62. p.137: item 7: are these alternatives seriously evaluated here? (or is the fact that R.I. does not allow some of these preventing serious consideration as to whether they are viable solutions?)

63. p.141: last parag. - an explanation should be offered why this alternative is "not believed to be a likelihood".

64. p.143, top: is there any correlation in studying these effects with the "208" study in this area?

65. p.145, bottom: should calculations be extended to the other watersheds where effects might be more adverse (item 1)? In item 2 - "relatively slight changes" - such as? where are these discussed further? - should be referenced here.

66. p.146: earlier the consultants on this report implied that farmland as such is a minor usage; it is inconsistent for this to be a minor usage in one place and contribute to runoff significantly in another (as parag.2 here) -- which is more accurate?

67. p.147: what kind of authority is being referred to in the bottom paragraph? whose legal opinion is it that this authority exists? Is this jumping the gun on the legal-institutional study of the 208 program and its future recommendations?

more on page 7

B. 68. p.159, Table VI-5: should the lines for the master plan, fully developed and 20 yr.development be identical as in the table?

69. p.168: bottom - item 1: but where does the transit go vs. where people want to go? item 2: is this relevant when you are recommending cluster zoning? item 4: this is very opinionated - perhaps who wrote this should be stated here.

70. p.176: 6.411 section: is this an area where an agreement is needed between DOT and EPA?

71. p.178, parag.1 - not recognizing a problem does not mean it did not exist earlier, although admittedly severity has increase

72. p.178, parag.2 - we agree that channelization is not a good approach.

73. p.178, parag.3 - in general isn't the small reservoir approach better than the large one? Can the pro's and con's of large vs. small impoundments be spelled out here?

74. p.181, middle parag.: to whom are these "adverse effects" supposed to be adverse? to developers? to tax rate? this should be spelled out. Also - concerning the recommendation to base zoning on environmental performance - shouldn't this ideally always be a basis for zoning?

75. p.194: parag.2 is the first place in which anadromous fish are defined; yet, they are mentioned several times earlier in this report.

76. p.210, bottom: some words or phrases are missing here.

218 Oaklawn Avenue
Cranston, R.I. 02920
November 19, 1976

U.S. Environmental Protection Agency
Attention: Mr. Stickney
Environmental Policy Coordination Office
Room 2203
John F. Kennedy Federal Building
Boston, Ma. 02203

Dear Mr. Stickney,

The E.P.A. Hearing which was conducted last night in Cranston was most informative. Our worst fears were realized relative to the adverse environmental effect that would ensue should the industrialization of western Cranston become a reality.

The first draft did specify the many disadvantages i.e. overcrowding, traffic congestion, complete change in the character of the area, noise pollution, visual pollution - to mention just some. These are exactly the environmental destructions that good planning and good zoning are required to not allow to happen.

The people retained to prepare this report admit the detrimental impact of urbanization of this area but argue that this is the price the citizens of Cranston should be willing to pay because "You are your brother's keeper."

Those of us who have great concern about the continual destruction of our environment have an opposite view. We feel that we have a duty to future generations to start reversing this process of destruction of the planet Earth. Western Cranston has the potential like some adjacent areas, to develop into one of the best residential areas in the New England area. The City of Cranston can be proud that many residents are genuinely interested in preserving the good characteristics of our city and by sensible planning extend these advantages to the undeveloped areas.

We would at this time, request an extension of time to file detailed comments. Especially due to the proximity of the holidays this additional time would be most helpful.

Do not construe our objections to some portions of this plan as an objection to a new water treatment plant for Cranston. This seems necessary even if there were a zero growth situation, which seems unlikely.

I would assume that your agency was established by the government to protect the environment. I would strongly urge the E.P.A. to examine the information already compiled. The only conclusion that can be arrived at as a result of such a study would be a conclusion that the urbanization of our rural areas would have a most adverse effect on our environment.

I would appreciate your reply regarding an extension of time to file written comments.

Sincerely yours,

Joseph F. Martell

Vice President
Concerned Citizens for
Cranston's Future

JFM/mja

C.C.:

Mayor James Taft
Planner - Anthony DelSesto
Providence Journal-Bulletin
Cranston Herald Today
Cranston Mirror

28 November, 1976

U.S. Environmental Protection Agency
Region I, Room 2203
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Subject: Comment on Draft EIS
on the
Proposed Treatment and Collection System
for the
City of Cranston, R.I. dated October 18,1976

Gentlemen:

The following comment is offered for your consideration prior to issuance of the Final EIS.

I. GENERAL: The considerations on which the DRAFT EIS are based appear to be identical to those upon which the City of Cranston Comprehensive Land Use Plan was predicated - i.e. a projected growth in the population of the City of Cranston and maintenance of current population at the R.I. State Institutions which are both unsubstantiated and contrary to current trends.

The writer has, over the past year, called the matter of the need for more substantiated population projections to the attention of both the Cranston School Committee and the Cranston City Council. Since the projected population figures are the basis for City, State, Federal and Ciba-Geigy participation in up to 52 million dollars in expenditures, it is felt that resolution of the basic question - "Is expansion of Cranston's Treatment and Collection System required to accommodate or create a population growth to extent projected in the comprehensive land use plan and the Draft EIS?"

At the 18 November, 1976 Public Hearing, the EPA representative admitted the "97,000 by 2000" population projection differed from the State Planning Commission projection of 93,400 by 2000" but dismissed it as unimportant. The writer suggests a difference of over 20% in population increase is significant enough to warrant review prior to committment of 52 million dollars of taxpayers or stockholders funds. (Current trends and basic time-series analysis suggest more conservative projections.)

II. SPECIFIC: Table 1-1 P.4 and Table 111-4 P. 59 comparison

	1975	2000
Pop. Served	68,000	93,000
Plt. Capacity	11.4 MED	23,0 MGD
Waste Water Flows		
Cranston	10.04 MGD	20.1 MGD
Ciba-Geigy	1.25 MGD	1.8 MGD
R.I.S. Inst.	1.13 MGD	1.1 MGD
BOD_5 Content	1,630	1,840 13% inc.

Why a 46% increase in per capita wastewater discharge? (Based on 68^K at 10.04 and 93^K at 20.1 MGD, or from 14.7G GPP to 216 GPD. Reference is also made to the R.I. Development Council, Fenton Keyes Associates, pp. 25-27 estimate of 155 GPP/day).

P.5 map: - has adequate consideration been given to servicing the Phenix Ave-Natick Ave. Brookfield Hills areas of Cranston by the new expanded West Warwick Pollution Control Facility? Where pollution control facilities have been heavily federally-funded should not geographical rather than municipal boundaries be given prime consideration?

P.7, P.43-44 "The expansion of economic base.... significantly increases the supply of fully serviced industrial land.... substantially persistant unemployment. The writer submits that the Providence area has experienced substantial and persistant unemployment not because of a lack of fully serviced industrial land but in spite of the same. The Howard Industrial Park is notably unsuccessful following considerable investment of R. I. taxpayers dollars. Should we spend more dollars to compete with ourselves?

Testimony before the Cranston City Council within the last month has given specific reasons why more preferred industrial locations lie beyond the city limits. (Leesona, Brown & Sharpe, and BIF did not opt for available sites in Cranston.

The current efforts of the State of R. I. to develop surplus government facilities appear to offer best results at minimum investment of taxpayer monies. The relocation of minor industries within the state to Western Cranston would not represent a net economic gain. The need for more fully serviced industrial land should be substantiated - not assumed - in the Final EIS.

P.8 (ii) Adverse effects can be avoided if their causes are not created unnecessarily.

P.10 (iv.) The last sentence of the second paragraph "If and when....for high yeilds" is cited as an example of non-essential and non-contributory comment which will hopefully be eliminated from the Final EIS.

P.28-34 The general tenor of the "Suitability for Urbanization" section is expressed in the last paragraph of P.33 and first paragraph of P.34. The optimistic statements in these sections ignore such realities as:

1. The 1970 Census ranks R.I. 46th of 50 states in % population growth since 1920. (only W.Va., Penn., Ala. & Me. fared worse).

2. Conference Board projections through 1985 drop R.I. to 38th based on a 12.3% growth rate from 1970 on - however -

3. The U.S. Bureau of the Census now reveals R.I. as one of 2 states which have lost population since 1970.

4. R. I. has a chronic, but carefully calculated, unemployment problem. It will not be solved by creating industrial sites at taxpayer expense in rural areas which hold little hope of occupancy.

5. R. I.. is limited by remoteness from markets, natural industrial resources, fuel prices and rail and highway systems in the types of industry it could attract.

6. The only strong point made is one of ample water supply which might attract industries requiring high water usage (e.g. textile, paper or chemical such as Ciba-Geigy). We note the expansion capacity

of the proposed facility would be hard pressed to accommodate a high water usage type industry.

P.43-44

Again the EIS conclusions defy published projections of the U.S. Bureau of the Census, the R. I. Statewide Planning Commission, the Conference Board and actual history.

The writer suggests the Cranston has not been viewed as a "least sprawl alternative" by industry or population.

It has been noted that between the last two U.S. Census periods, when 5 of R.I.'s older cities lost population, Cranston ranked 32nd of 34 remaining communities in % growth (out ranking only Burrilville and New Shoreham (Block Island).

Current porjections (cited at the 18 Nov., 1976 hearing) indicate the R.I. State Planning Commission does not share the EIS optimism.

P. 50-53

(Maps) - we note

1. The towns of Coventry and West Warwick meet water quality standards downstream of the outflows of the American Hoechst Corp. chemical plant and the West Warwick Pollution Control Facility. Why is this quality lost in Cranston? (Note: American Hoechst maintains and paid for a separate facility).

P. 59
Table III-4

1. To amplify earlier comments (above) we feel no substantiation is given for a 100% increase in cranston Wastewater flows.

2. The total present population of census tracts 145 and 146 (which are to be not 100% sewered in the expansion) is only slighly in excess of 10% of the city's population. Even your most optimistic projections of forced or created growth would make (or hope to make) the total population of these two tracts 11,856

by the year 2000. A less than 20% addition to the present load. Granting this improbability and expanding it into your unsubstantiated projection of service to 36.7% more people, we seek clarification of the 100% projected wastewater flow increase.

3. The R.I. State Institution projection is inconsistant with its population trends and projections.

Current thinking and policies of involved social agencies seek alternatives to institutionalization. A R. I. State Institution Population Projection should be included in the FINAL EIS.

P. 86 — Alternative Disposal Sites - it would appear that the use of the Gammino Quarry as a landfill site could restore the city's major eyesore to an area of foliage similar to reclamation of southern strip-mined areas.

Chap. VI — The recent history of "progress" in Western Cranston has been one of disregard for environment - e.g. - the soil-stripping of acreage between Natick Avenue and Interstate 295 to transform recent farmland to a motorcycle and mini-bike pit - the land filling of the brook bounding Cranston and West Warwick (which was purported to be a Green Acres protected area with area tree cutting prohibited).

The present creation of a plat between Natick-Wilbur and Rte. 295 in an area purported as not suitable for homes which an attempt was made earlier this year to re-zone as an apartment site.

P.150-6.32 to quote 6.32 — 1)"....they can be very wrong". Table VI-3 proves the statement.

SUMMARY:

1. Rejuvenation of the present facility is necessary and desirable.

2. Retention of the Ciba-Geigy plant is essential and should be accommodated on an equitable basis.

3. Absorption of the T.I. State Institution facility should be state funded based on realistic projections of institutional population.

4. It should be the purpose of the EIS FINAL REPORT to suggest a facility to cope with an expected requirement; it should not be the purpose of the report to create a situation which would justify the expanded facility.

5. It is requested that the FINAL EIS be witheld pending new and more realistic projections of city and institutional populations. These projections would form the basis for both the expansion of Wastewater Collection and Treatment Facilities and a new Comprehensive Land Use Plan.

It is hoped the above comment will receive consideration and action prior to issuance of the FINAL EIS. Thank you for the opportunity to offer comment.

Very truly yours,

/s/ Robert A. Flynn, Sr.

Robert A. Flynn, Sr.
605 Natick Avenue
Cranston, Rhode Island 02920

Cranston Plant

CIBA-GEIGY Corporation
P.O. Box 2055
Providence, R.I. 02905
Telephone: 401 941 3000

Shipping Address:
180 Mill Street
Cranston, R.I.

CIBA—GEIGY

December 16, 1976.

Mr. John A. S. McGlennon
Regional Administrator
Environmental Protection Agency
Region I, J. F. Kennedy Building
Boston, Massachusetts. 02203

RE: Cranston, R. I. Wastewater Collection & Treatment Facility Plan, and Environmental Impact Statement.

Dear Mr. McGlennon:

The draft Environmental Impact Statement (EIS) prepared by C. E. Maguire, Inc. and the draft Wastewater Facility Plan for the City of Cranston prepared by Universal Engineering, Inc. have been reviewed by CIBA-GEIGY Corporation. We wish to compliment each group for the quality and timeliness of its efforts in completing this phase of the project on schedule.

The recommended treatment alternative in the facility plan based on the two-stage activated sludge nitrification process with effluent filtration has been piloted by CIBA-GEIGY in a six month study costing nearly four hundred thousand dollars. The results of the pilot demonstration show that effluent from this system will meet all anticipated discharge requirements. We, therefore, concur with the conclusion of Universal Engineering and recommend that the two-stage activated sludge nitrification process with effluent filtration be approved.

Approval of this project is in the best interest of the people of Rhode Island, the City of Cranston and local business and industry. First, the water quality of the Pawtuxet River will be protected by a new, highly efficient effluent system. Secondly, the City of Cranston will have the new system it requires at the lowest possible cost since

industries like CIBA-GEIGY will pay their share of the expansion and the operation of the plant. In addition, local jobs will be protected and expanded as business and industries find the cost-effective wastewater treatment alternatives they require.

Thank you for the opportunity to comment on these draft reports. We welcome any comments you have concerning our responses and we will be happy to answer any questions you may have regarding them.

Sincerely yours,

John Simas
Plant Manager

js/jcv

cc: C. E. Maine, Assistant Director
Environmental Health
R. I. Department of Health

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
BOSTON, MASS. 02116

MEMORANDUM

To: Files Job: 7516

From: D.E. Date: 12/28/76

Subject: EIS Comments from EPA office of Water Program Operations

The below responds to the comments of the EPA Office of Water Program Operations dated 12/3/76 on the EIS to the Cranston Facility Plan but only as these comments relate to the Facility Plan itself.

1-3. No comment necessary

4. The relationship of the existing treatment plant and the expansion proposed in the Facility Plan to the 100 year flood area are discussed in the Facility Plan on pI-45. Briefly, the plant is protected from the 100 year flood.

5. Part V of the Facility Plan discusses the weighing and selection of the most beneficial alternative. Part III discusses costs of the various alternatives including the discharge to the Providence River estuary.

6. City growth management policy for western Cranston has outlined that development be confined as much as possible to contiguous urban areas. The configuration of interceptors shown in EIS Fig. I-4 is based on this policy. Population projections developed preliminary to the Facility Plan indicates that the basins immediately west of I-295, those to be sewered, will be saturated or nearly so well within the 30-50 year horizon for interceptor pipelines.

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
BOSTON, MASS. 02116

MEMORANDUM

To: Files Job: 7516

From: D.E. Date: 12/28/76

Subject: EIS Comments from HUD

The below responds to the comments of the U.S. Dept. of Housing and Urban Development (HUD) dated 12/3/76 on the EIS to the Cranston Facility Plan but only as these comments relate to the Facility Plan itself.

1. Noise abatement measures will be incorporated in the design of the treatment plant.

2. As mentioned in the Facility Plan (p.IV-18) the City is aware of the potential need for recreation and open space land in western Cranston.

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
BOSTON, MASS. 02116

MEMORANDUM

To: Files Job: 7516

From: D.E. Date: 12/28/76

Subject: EIS Comments from RI Historical Preservation Commission

The below responds to the comments of the R I Historical Preservation Commission dated 12/6/76 on the EIS to the Cranston Facility Plan but only as the comments relate to the Facility Plan itself.

The City is in the process of conducting a drainage, erosion and sedimentation control study. One of the purposes of this study is to propose methods to minimize off-site impacts of storm runoff. The protection of the Furnace Hill Brook ravine is a concern in this study. The interceptor shown in the Facility Plan as placed within the ravine will be relocated outside it to minimize harm to this scenic and historic area.

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
BOSTON, MASS. 02116

MEMORANDUM

To: Files Job: 7516

From: D.E. Date: 12/28/76

Subject: EIS Comments by the Cranston Conservation Commission

The below responds to the comments of the Cranston Conservation Commission dated 12/14/76 on the EIS to the Cranston Facility Plan but only as these comments relate to the Facility Plan itself.

The City is in the process of conducting a drainage, erosion and sedimentation control study. One of the purposes of the study is to propose regulations to minimize off-site storm runoff. Another is to recommend structural methods to attentuate storm runoffs to downstream areas.

Regarding the concern for urban development vs agricultural uses, it is a matter which transcends local boundaries and involves forces existent without the proposed project. It is also not an either/or situation. Land use control mechanisms are being developed whereby agricultural land can be conserved and urban development can still take place. Sewering a portion of western Cranston does not necessarily mean the death-knell of agriculture throughout western Cranston. By sewering a portion of western Cranston, urban sprawl otherwise more consumptive of rural land is concentrated closer to existing City services, tending to relieve growth pressures on outlying areas. About half of western Cranston will not be served by sewerage until after the year 2000. Certainly long before that, mechanisms can be implemented to conserve agricultural land worthy of such protection.

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
BOSTON, MASS. 02116

MEMORANDUM

To: Files Job: 7516

From: D.E. Date: 12/28/76

Subject: EIS Comments from Ecology Action

The below responds to the comments of Ecology Action for Rhode Island, Clean Water Committee, dated 12/22/76 on the EIS to the Cranston Facility Plan, but only as these comments relate to the Facility Plan itself.

A. General Comments

1. No comment
2. The Facility Plan treats these points in Part II Section B, Land Use.
3. No comment
4. No comment
5. The City's sewer use ordinance is currently under study and a new ordinance is being prepared. Pre-treatment will be required of certain industries. (Pass throughs ?)
6. The striking of a balance between urban development and agricultural land transcends local boundaries and until of late, was not generally thought of as a serious problem. Several mechanisms are possible for use today, others are still evolving, but many are not possible in Rhode Island due to lack of enabling legislation. The State itself does not strongly address this issue in the State Guide Plan.
7. Fig V-7 of the Facility Plan shows protection of the incinerator ash disposal cells from flooding. Disposal will be done inside of embankments, the tops of which are above 100 year storm flood levels.

8-10. No comment

B. Page-By-Page Notations

1-2. No comment
3. Some overloading particularly during high groundwater does occur.
4-5. No comment
6. 208 has not begun its sludge management planning studies.
7. It is not clear that comparisons with existing zoning would show any meaningful relationship since the basins adjacent to I-295 are to be rezoned for uses consistent with the City's Comprehensive Plan. A comparison with the Comprehensive Plan shows coterminous urbanized and sewered areas contiguous to existing urban development. The State Guide Plan is not fine grained enough at the intra-community level to provide for a meaningful comparison for the area to receive sewerage in Cranston.
8. Dwellings on Pawtuxet Neck do not receive City sewerage service.

9. See A2 previous.
10. Regionalization as an alternative is implied.
11. No comment
12. If the City of Cranston were to construct such impoundments, it would of course assume maintenance for same. No locations have been proposed by the Facility Plan.

13-14. No comment.
15. Multiple use of interceptor right-of-ways will be considered. Undisturbed right-of-way between the mowed safety zone and right-of-way fence does act as a habitat for many wildlife species.
16. No comment
17. Sludge or ash disposal would not have more than a local impact by any parameter. Direct environmental impacts such as leaching, odors etc. could be effectively dealt with. Indirect impacts such as trucking to a particular site could be minimized but might in certain cases be an adverse traffic or noise impact of a local nature centered on the disposal site itself.

18-21. No comment
22. In 1975, it had been reported that the State of Rhode Island had actually lost population since 1970. It is quite likely that this was due to the one-time "shock" withdrawal of military and support personnel and their dependents which left the State with a net-emigration for the 1970-75 period.

23-29. No comment.
30. Yes.
31. Out-of-basin discharge to the Providence River estuary eliminates the need for tertiary treatment. Maintaining advanced treatment serves no purpose for discharge to the Providence River.
32. In view of the project's time frame and need for a committed effluent discharge (not one based on proposals), the use of treatment plant effluent as agricultural irrigation in Cranston or anywhere in Rhode Island is not realistic.
33. No Comment
34. The ash landfill will be sufficient to the year 2000.
35. Incinerated heavy metals become oxidized.
36. No Comment
37. The emissions given in Table IV-4 meet EPA regulations. It would be a questionable use of scarce resources to further attempt to reduce emissions.

38-41. No comment
42. The Facility Plan analyzed costs of solids handling and disposal and the data is contained in Tables III-30 to 33.
43. Part V of the Facility Plan p. V-47 and 48 contain the information desired.
44. The entire project is geared to a particular time schedule. Alternatives which most cost effectively achieve the desired standards within the time schedule with minimum adverse environmental effects shall be selected.
45. Selection of an off-site sanitary landfill may subject the City to uncontrolled cost escalations , and uncertainties if the landfill violates the conditions of its license.
46. No comment. This is a proposal of the EIS.
47. No Comment
In reference to the proposed park, this is a matter for the City to pursue.
48. No Comment

49-58. No comment
59. Decisions to provide utilities and the placement thereof are "standard and prudent" tools to manage urban development.
60. No comment.

61. See Facility Plan Part I Section A9 Water Resources, specifically p. I-50, the second paragraph.
62. See Facility Plan Part III Section C Alternative Waste Treatment Systems.
63-76. No comment.

UNIVERSAL ENGINEERING CORPORATION
100 BOYLSTON STREET
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MEMORANDUM

To: DVT Job: 7516

From: DE & WJS Date: December 20, 1976

Subject: Robert Flynn Comments on EIS

The following responses reply to the comments of Robert Flynn on the EIS.

I General

Mr. Flynn overemphasizes the difference between the Facility Plan (EIS) population projection for the year 2000 and the R I Statewide Planning Program (RISPP) projection by saying that there is a "difference of over 20% in population increase." What also must accompany that statement is that the "20% difference" equals only 3000 people. Considering that the base by that year is almost 100,000 people (93,400 vs 96,757), this is quite acceptable. Thus the discrepancy is actually 3%.

II Specific

The calculated increase in per capita wastewater discharge is incorrect. A correct version of the table would be:

	1975	2000
Pop Served	68,000	93,000
Plt. Capacity	11.4 MGD	23.0 MGD
Waste Water Flows		
Cranston	11.5*MGD	18.7 MGD
Ciba-Geigy	0 "	1.8 "
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1975 per capita wastewater = 11.4 MGD/68,000 = 169 gpd
2000 per capita wastewater = 18.7 MGD/93,000 = 201 gpd

This is a 19% increase.
*Note that the plant design capacity is exceeded by the flow generated by the 1975 population.

Tables II-7 and II-8 in the Facility Plan contain the wastewater flow projections upon which the above figures are based.

Mr. Flynn must be aware that the per capita wastewater discharge figure includes development of the Howard Industrial Park, other industrial growth and domestic flow increase, all on a design flow basis. It is not known whether the comparison figure he quotes is a design flow figure or an average flow figure.

West Warwick was consulted and expressed an interest only in sludge disposal.

The Howard Industrial Park has lacked sewerage service until recently.

It is not known why Leesona, Brown and Sharp and BIF did not locate in Cranston.

Cranston had a low rank in percent increase in population because of its large base, (second only to Warwick of the communities that gained population between 1960 and 1970). While five of RI's other cities may have lost population according to Mr. Flynn, Cranston continues to grow faster than the State since 1900 and faster than the Providence SMSA since 1950 and will soon become RI's third largest city behind Providence and Warwick. Only Middletown, Warwick, and North Kingstown gained substantially more than Cranston in absolute terms between 1960 and 1970. Cumberland gained slightly more. In other words, of the large communities in R I with a large population increase, only Warwick surpassed Cranston.

(Re: page 4 of letter) The expansion of the wastewater treatment plant increases the capacity for industrial wastewater from 2.2 MGD to 7.7 MGD (design flow.) This capacity could service some high water-usage type industry.

The Gammino Quarry can be re-used in a more suitable manner than as a landfill, with its visibility from and access to an Interstate highway.

The instances cited in "disregard for the environment" cited by Mr. Flynn in Western Cranston are regulated by the City's Zoning Ordinance, R I Freshwater Wetlands Act and the City's Subdivision Regulations respectively.

Routing		Initial	Copies
D.E.N.	⌐		
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R.I.G.			
DFN	⌐		
L.J.M.			
J.A.Z.			
DVT	⌐		3 ✓

61. See Facility Plan Part I Section A9 Water Resources, specifically p. I-50, the second paragraph.
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