



CITY OF WASILLA

290 E. HERNING AVE.
WASILLA, ALASKA 99687
PHONE: (907) 373-9050
FAX: (907) 373-0788

INFORMATION MEMORANDUM NO. 91-18

TO: Council

FROM: Deputy Administrator

DATE: December 6, 1991

RE: Storm Water Disposal System

During discussions of the City capital improvement projects we became aware that some members of the Council may not be cognizant of past work performed to develop a City storm drain system. In 1984 Tryck, Nyman and Hays Engineering completed a City storm drain master plan and in 1986 nearly completed work on construction plans to build Phase I at an estimated cost of about \$2 million.

The 1986 paving of the streets incorporated a different concept for disposing of storm water which is essentially a series of elaborate dry wells under the streets. It was believed that the new concept may indefinitely defer the need for a conventional storm water system.

However, we continue to experience difficulties similar to those indicated in the May 18, 1988 letter from D.E.C. One instance of a major clean-up action could cost more than a conventional storm drain system. Additionally, there is concern that future developments of roads, buildings, parking lots, etc. will cause more run-off than can be disposed of by dry wells. Therefore, although not our highest priority, work has continued to develop the first phases of a storm drain system. The attached documents provide information on some of the past efforts.

We have boxes of background files available should you wish to examine them.

Robert E. Harris
Deputy Administrator

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

P.O. Box 871064
Wasilla, AK
99687-9998
(907) 376-5038

May 18, 1988

Mr. Bob Harris, Asst. Administrator
City of Wasilla
290 E. Herning Avenue
Wasilla, Alaska 99687

MAY 20 1988

Re: Storm Water Monitoring Program, Spring 1988 Sampling
Event Wasilla City Street Improvements, Phase I

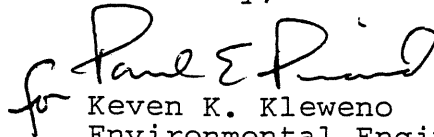
Dear Mr. Harris:

This is in response to Mr. Bob Gilfilian's submittal of the results of analyses of water samples taken from three monitoring wells and one manhole (MH-14) for the storm drain system located in the City of Wasilla. I have completed my review of the submitted results, the Department's file on this project and other pertinent information and have the following comments.

The results of this spring's sampling event shows a decline in the lead concentration in monitoring well number (MW#) 3 located on Yenlow Street to below the maximum contaminant level (MCL) of 0.05 mg/l. However, lead levels in MW#2 has risen to 3.6 mg/l which is approximately 72 times higher than the MCL. Test results for other parameters were also found to be high. The Department is using 0.1 ppm (mg/L) as a cleanup standard for oil and grease contamination in surface or groundwater. Using this figure, it appears that results from all four sampling events have been high enough to require cleanup actions. By looking at only two of the eight parameters being analyzed, I recommend that we schedule a meeting within the next three weeks to discuss this growing problem.

Thank you for your cooperation with this Department. If you have any questions, please do not hesitate to contact me.

Sincerely,


for Keven K. Kleweno
Environmental Engineer

KKK:bkr

cc: Bob Gilfilian, P.E./Gilfilian Engineering
Julie Howe/ADEC/SCRO
Danita L. Maynard/DNR/DG&GS



Alaska Civil Constructors, Inc.

P.O. Box 871868, Wasilla, Alaska 99687
(907) 373-2001

M E M O R A N D U M

To: Mayor Stein and Members of the City Council
From: Bob Gilfilian, City Engineer *BG*
Date: March 10, 1988
Subject: Wasilla Storm Water Disposal Alternatives

In 1984 a Stormwater Drainage Study for the City of Wasilla was completed by Tryck, Nyman & Hayes (TNH). Based on the findings of this study, TNH prepared engineering plans and construction specifications for a stormwater collection and disposal system designed to serve the downtown area of Wasilla including the Southside area of the city.

Subsequent to the completion of the TNH engineering plans, significant drainage related changes have occurred in the project area. Local drainage patterns and road surface elevations have been altered, particularly in the drainage areas where street improvements were made during the Phases I Wasilla Street Improvement Program. In addition, the availability of funds for the construction of stormwater drainage improvements have been limited, and consequently, are not adequate for the development of the TNH plans.

As City Engineers we were directed to review the current plans to determine the feasibility of developing these plans. The purpose of our review was to evaluate the TNH plans and consider other possible alternates that are economically feasible to develop and provide the highest possible level of protection for Lake Wasilla and Lucille.

According to TNH cost estimates, the most expensive items of the proposed plans consisted of the discharge main line from the pump station and the stormwater outfall/detention basin located west of the existing City Sewage Drainfield Facility. In this regard, we have focused our evaluation on the discharge/disposal portion of the stormwater system. It is important to note that acquisition of the properties for the pump station facility and outfall site has not been completed, nor has the controversial issue been resolved over the drainage easements through the numerous private properties located downstream of the outfall site.

Based on our review findings we believe it would be in the best interests of the City to reconsider an alternate plan that was originally proposed under the 1984 Stormwater Drainage Study. This alternate plan involves the construction of a force main from the TNH proposed pump station to a natural drainage area located west of Century Park. This plan does not require the construction of a detention pond since the stormwater will be discharged over a large wetland area.

The attached drawing shows the location of the proposed TNH plans and the alternate plan commencing at the Lake Lucille pump station facility. A preliminary cost estimate for the development of these plans and a schedule of major improvement items are described as follows:

ITEM	TNH PLAN	ALTERNATE PLAN
Pump Station	1	1
Force Main	2600 LF	1950 LF
Gravity Main	6800 LF	1000 LF
Manholes	18	3
Outfall Structure	1	1
Detention Berm & Pond	1	NONE
Stream Crossing	500 LF	NONE
Estimated Cost	\$ 1,870,000.00	\$ 950,000.00

This cost estimate is based in part on estimated costs provided by Tryck, Nyman & Hayes in the Wasilla Storm Drainage Fact Sheet. Land acquisition costs are not included in this estimate.

In consideration of the costs savings associated with the new alternate stormwater disposal system, it is recommended the City direct us to further evaluate the Alternate Plan. The next phase of work would involve contacting the property owners who would be effected by this plan. If land acquisition appears favorable, a conceptual plan would be prepared for submittal to the appropriate regulatory agencies for their review and concurrence for permitting purposes.



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M E M O R A N D U M

To: Mayor Stein and Members of the City Council

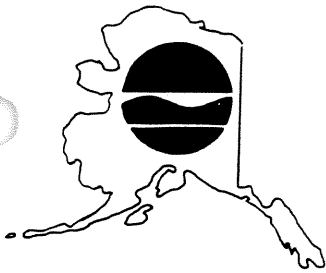
From: Bob Gilfilian, City Engineer

Subject: Storm Water Main Alignment

Date: May 19, 1988

This memo is in response to Council Member Colleen Cottle's request for additional information regarding the proposed location of the force-main on Willow Street. As explained in our previous memo to Council dated April 18, 1988, we changed the alignment from the initial location on Lake Street to Willow Street for the following reasons:

1. Willow Street has fewer underground utilities compared to Lake Street resulting in a reduction of line location conflicts.
2. Willow Street is at a higher elevation compared to Lake Street, resulting in a reduction in the length of line constructed in the groundwater. Burial of main line in shallow groundwater is very costly particularly in trenches that slough excessively due to sandy soil conditions as typically found along lake Street.



Gilfilian Engineering, Inc.

P.O. Box 871868, Wasilla, Alaska 99687 (907) 376-3005

M E M O R A N D U M

TO: Mayor Stein and Members of the City Council

FROM: Bob Gilfilian, City Engineer *BGH*

SUBJECT: Wasilla Storm Water Disposal

DATE: February 9, 1989

The purpose of this memorandum is to provide the City Council background information on the subject project and a summary of the project status.

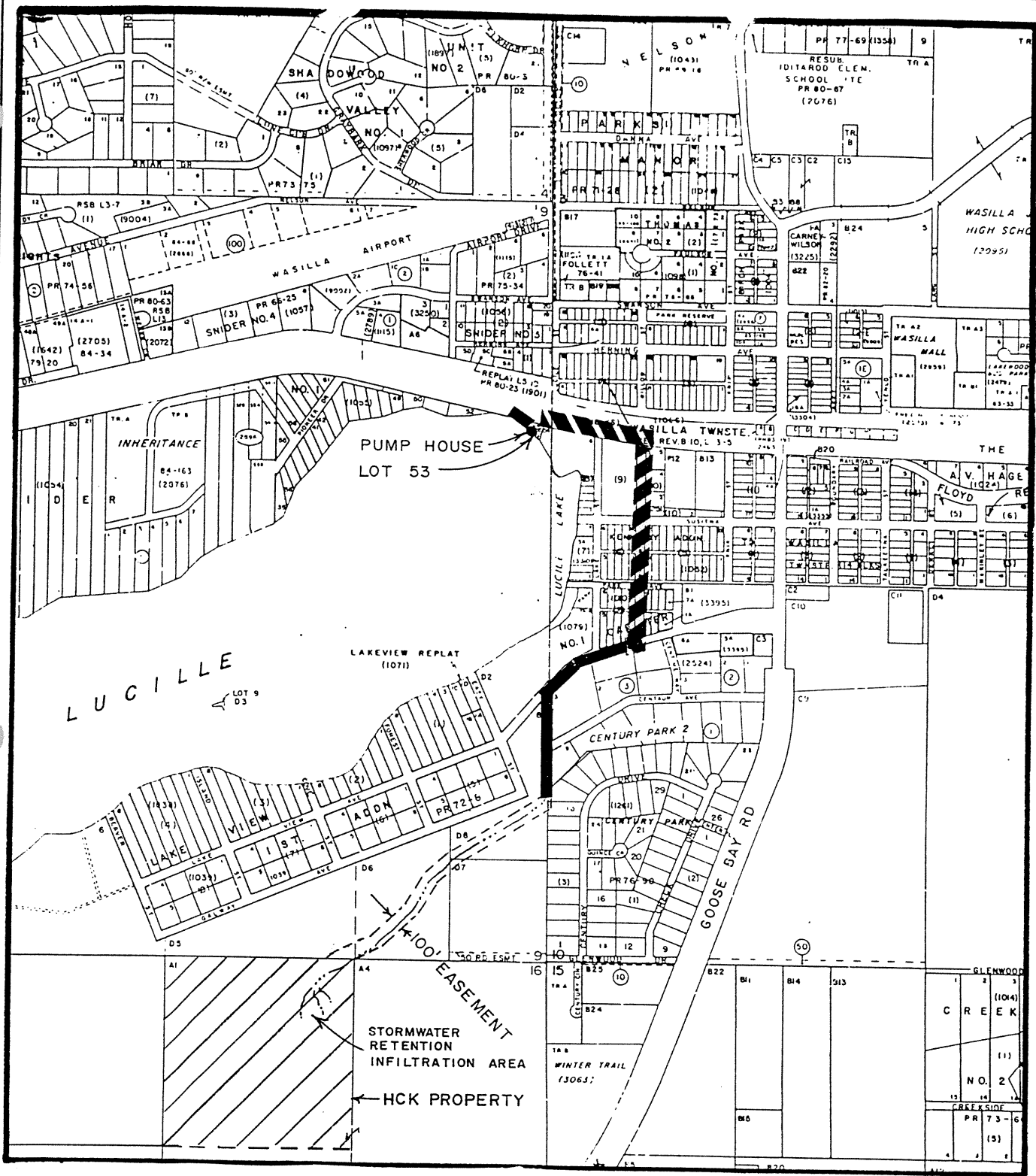
During the winter of 1988 our firm was directed by the city Council to evaluate the City's storm drainage plan to determine if a less costly alternative for storm water disposal could be found. The original storm drainage plans, prepared by Tryck, Nyman & Hayes (TNH), were outdated due to subsequent development within the City of Wasilla and the proposed improvements were prohibitively expensive. After review of existing plans and studys, we determined that a less costly disposal alternative could be developed with a phased approach to storm drainage development. This alternative plan is shown on the attached site location map.

After presenting the alternatives to the City Council in March of 1988, we were directed to prepare conceptual plans for the proposed storm water disposal system. The conceptual plans were used to identify property and easements which should be acquired by the City. The plans were also used for presentation to ADEC to discuss permitting requirements. Based on the conceptual plans, we updated the cost estimate for construction of the proposed storm water disposal system. An itemized cost estimate is attached as part of this memorandum.



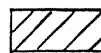
As part of the conceptual planning effort, we evaluated the design and function of the pump station as proposed by TNH. It appeared that their design is readily adaptable to the new disposal system alternative. The system hydraulics are such that the original pumping system, as specified by TNH, could be used as designed.

**WASILLA STORM DRAIN
PUMP STATION AND OUTFALL TO HCK PROPERTY
COST ESTIMATE**

ITEM	UNIT	COST/UNIT	NO. UNITS	TOTAL
State Outfall				
Interceptor Manhole	EA	8,000.00	1	8,000.00
36-inch dia. D.I.P	LF	60.00	214	12,840.00
Pump Station	EA	500,000.00	1	500,000.00
24-inch dia. Force Mains	LF	100.00	2153	215,300.00
Transition Manhole	LS	7,000.00	1	7,000.00
48-inch dia. CMP	LF	75.00	1380	103,500.00
Type III S.D. Manhole	EA	4,000.00	3	12,000.00
Outfall Structure	LS	10,000.00	1	10,000.00
ESTIMATED TOTAL CONSTRUCTION COST				\$868,640.00
ESTIMATED COST FOR PROJECT APPRAISALS				10,000.00
ESTIMATED COST FOR LAND PURCHASE/EASEMENTS (Based on Borough Assessed Values)				220,000.00
ESTIMATED COST FOR DESIGN & PROJECT COORDINATION (Engineering and Surveying Services to prepare plans, specifications and bid documents and obtain the approvals)				44,500.00
TOTAL ESTIMATED PROJECT COST				\$1,143,140.00



LEGEND

-  (2) 24" FORCE MAIN
-  48" CMP STORM DRAIN
-  AREAS TO BE ACQUIRED (PARCEL A1 AND LOT 53)



Gilfilian Engineering, Inc.
 P.O. Box 871868
 Wasilla, Alaska 99687

**WASILLA STORM DRAIN PUMP STATION & OUTFALL
 LOCATION MAP**

Project No.: WO 88 -10	Scale: 1"=1000'	Sheet 1 of 1
Drawn By: CL	Date: 2/9/89	

*This document is part of
a university student's graduate research
project to test the use of peat
as a means to filter hydrocarbons.
Provides some background info.*

I Introduction

This paper examines the performance of the Wasilla stormwater drainage system and its perceived inadequacies. An initial investigation into the potential use of peat filters for remediation has been conducted through review of pertinent literature and filtration experiments using Wasilla peat. Conceptual designs of add-on filters to the existing drainage system are offered, along with suggestions for research and development required to confidently investigate this remediation option.

Wasilla, Alaska, is a suburban business hub located about 40 miles north of Anchorage. The town experienced very rapid growth during the early 1980's, which resulted in municipal water and sewer systems, the paving and upgrading of many streets, and the installation of stormwater drainage systems serving the business core, completed in 1987.¹

The main hydrologic features are Wasilla Lake to the east of town and Lake Lucille to the southwest, separated by 3/4 mile and most of the commercial district. The Alaska Railroad and the Parks Highway run east-west through town, south of most of the development (see map, Figure 1).²²

Wasilla Lake is deeper and better flushed, being drained by Cottonwood Cr. which flows southwest to Knik Arm. Lake Lucille is shallower and more prone to eutrophication, drained by the smaller Lucille Cr. which flows west to Meadow Cr. through Big Lake and Fish Cr. to Knik Arm. Most of the near surface aquifer under the business district flows toward Lake Lucille.²²

II Existing Stormwater Drainage System

The Parks Highway storm system has three outfalls; one at Wasilla Lake at a public swimming beach, and two that are routed under the railroad into Lake Lucille. These drains have leachfields and oil and grease separators, allowing only the overflow to reach the lakes. The leachfields are apparently located adjacent to the highway.

The rest of the business core is served by individual storm drain systems. These typically include gutters draining through grates to a central dry sump manhole. The bottom of the manhole is covered with a replaceable sand filter. Some height above the sand, a pipe invert leads to an adjacent leachfield, where high volume runoff is disposed (see Figure 2). There are about 19 of these drainfields, usually located under paved streets.^{1,22}

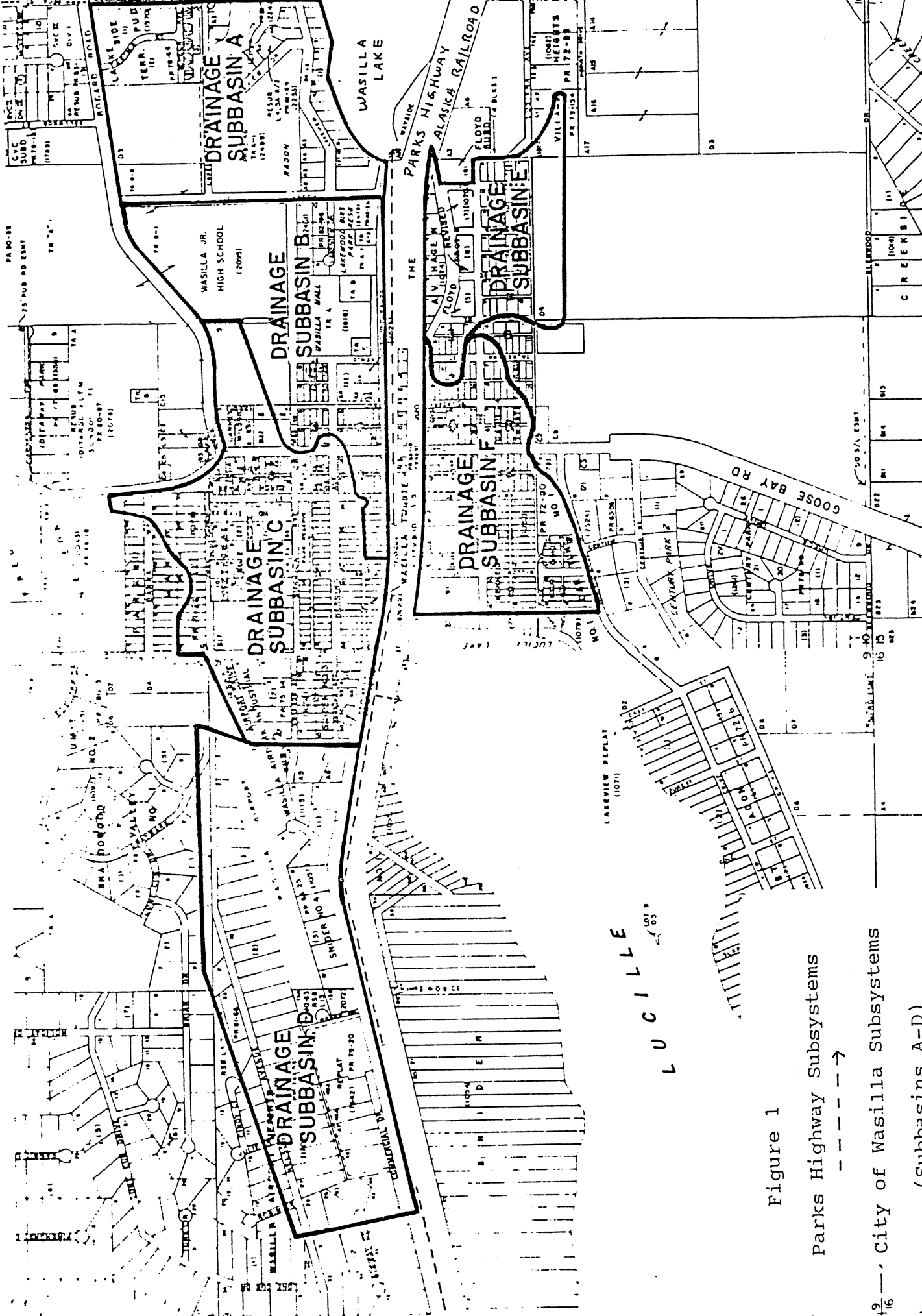
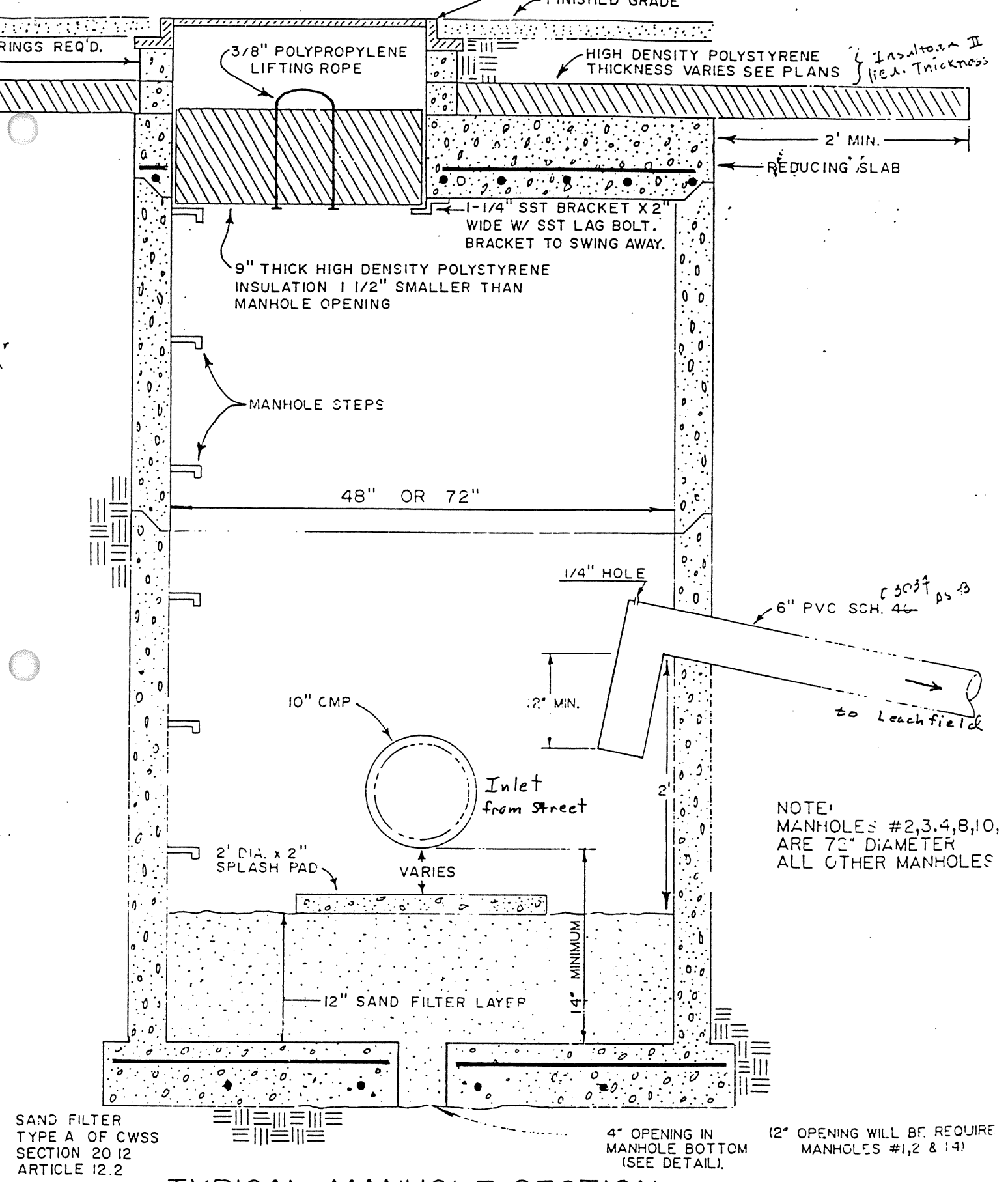


Figure 1
 Parks Highway Subsystems

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City of Wasilla Subsystems

(Subsystems A-D)



SAND FILTER
TYPE A OF CWSS
SECTION 20 12
ARTICLE 12.2

TYPICAL MANHOLE SECTION

nts

Figure 2
Typical Manhole in City
of Wasilla Stormdrain
Subsystems

III Problems with the Existing System

The Alaska Department of Environmental Conservation (ADEC) recently completed an investigation into the performance of these systems.¹ They were concerned that pollutants may be contaminating the lakes or groundwater. During fall of 1988 and spring of 1989, ADEC took numerous samples at 22 stations and analyzed them for pollutants of interest, including total petroleum hydrocarbons, metals, chloride, and BTX, as well as dissolved oxygen, conductivity, pH, and alkalinity.

ADEC concluded that pollutants were reaching Wasilla Lake or the near surface aquifer via the storm drain along the Parks Highway. Major pollutants included total petroleum hydrocarbon, lead, and chromium, which were found to exceed applicable regulatory limits in some of the samples. Maximum Contaminant Levels were taken from Quality Criteria for Water (the EPA "Gold Book"), or Alaska Water Quality Criteria, 18 AAC 70.020 (a) (1) (C), Growth and Propagation of Shellfish, other Aquatic Life, and Wildlife.

Recommended action included closing the swimming area until the source of oil contamination was located and remedied, better maintenance of the oil and grease separators, and investigating alternatives to discharging directly into the lakes or near surface aquifer.

IV Response Options

The options for responding to the problems with the Wasilla stormdrain system include:

1. Assign a lower priority: This response category includes postponing action or accepting lower water quality standards. Public pressure and legal/regulatory restraints limit this option.
2. Export the problem: In this case, pumping the stormwater to a distant less visible and supposedly less sensitive surface drainage is exporting the problem to a different location to be dealt with in the future.
3. Treat the source: Regular street sweeping, limiting road salt use, and reducing erosion are simple methods of reducing stormwater pollution.
4. Treat the runoff: Currently this involves the use of sediment basins, oil/grease separators, and passing the bulk of the runoff through leachfields where other pollutants were hoped to be adsorbed before the runoff contacts the aquifer or lakes. The present level of treatment is believed to be inadequate.

Jurisdiction and financial capability are basic to the first option; the City of Wasilla, Alaska Department of Transportation, and ADEC are the major players. Funding restraints that limit other options enhance this option by default.

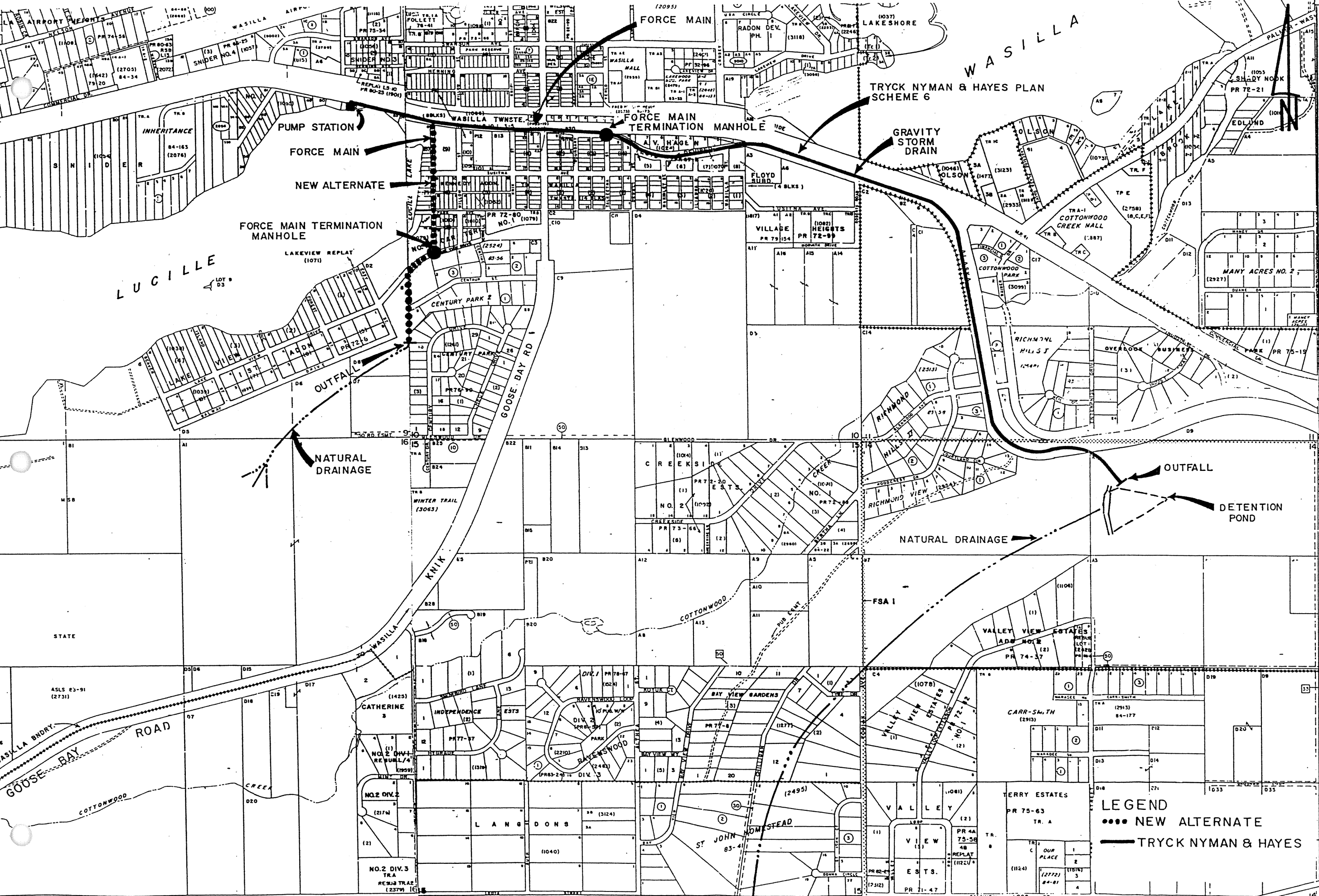
The second option has received some consideration. Initial drainage plans considered the option of outfalls quite distant from the lakes. These would have required pumps, force mains, and long extensions. A current consideration is to install a lift station at the east outfall into Lake Lucille and pump the stormwater to an overland drainage south of the lake. This modification would cost an estimated \$1 million and serve only a small portion of the total system, and not the most noticeable problems at the Wasilla Lake outfall. Serving the entire core area may cost in the order of \$10 million since streets would have to be dug up; levelized annual costs could be about \$2 million including maintenance.

A further constraint to remote discharge might be the fluctuating hydrology of the region. Flow through Lake Lucille comes from the near surface aquifer; reducing this flow would reduce flushing and may have adverse effects despite reduction in pollutant loading. The storm drains, especially the leachfields, were supposed to have been constructed above the groundwater. However, this spring it was observed that a healthy flow was exiting the drains into the lakes two weeks after the road surfaces had dried, with no intervening rainfall. Exfiltration from the water table may be the cause, perhaps caused by a temporary high near surface aquifer level.

The effect of increasing efforts in pollution source reduction, Option 3, have not been estimated. While heavy metals reported in the groundwater are thought to originate with surface pollution, possibly automobiles, some leaching from gravels by surface waters containing salt has been suggested. Routine street maintenance is likely very cost effective.

Option 4 has a high potential for long term cost effectiveness because the pollution is actually treated. While the source of oil pollution reported by ADEC was probably transitory, better separator maintenance can certainly help reduce petroleum pollution in the lakes; even separator modifications may be warranted. However, oil separators do not significantly reduce heavy metal contamination of receiving waters. To solve the problems with heavy metals or other pollutants not addressed in the ADEC report, a more effective treatment system is required.

Subsequent sections address the use of peat for a filtration medium to be used with the existing stormdrain systems.



PROPOSED WASILLA STORM WATER DISPOSAL SYSTEM

LEGEND
 ●●● NEW ALTERNATE
 — TRYCK NYMAN & HAYES

PROJECT NO. W.O. 88-07 SCALE: 1"=1000 DATE: 3/14/88
 DESIGNED BY: SRR DRAWN BY: CL SHEET 1 OF 1

Alaska Civil Constructors, Inc.
 P.O. Box 871 868, Wasilla, Alaska 99687

