PROPOSED WASTEWATER SUPPLY SYSTEM FOR UMASS WASTEWATER PILOT PLANT FACILITY

INTRODUCTION

Construction of a new Amherst Sewage Treatment Plant (ASTP) has made it necessary to design a new wastewater supply system for the UMASS Wastewater Pilot Plant Facility. A source of raw wastewater, primary effluent and secondary effluent is needed to operate various pilot scale units at the Facility. The type of wastewater required and daily flow requirements for each treatment unit are shown in Table 1. Total flow requirements range between 83,000 to 150,000 gallons per day. None of this wastewater, whether treated by a pilot plant unit or not, is discharged to natural receiving waters from the Pilot Plant Facility. Instead, all wastewaters are collected and return to the ASTP influent.

PROJECT DESCRIPTION

Detailed drawings and specifications for this project can be found on sheets G-4, G-8, PF-M-1, PF-M-2, T-M-1, FF-M-2, FF-M-3, and FF-M-4 of Camp, Dresser and McKee Incorporated (CDM) design plans for the new Amherst plant. A brief description of the salient features of this project is provided below.

Wastewater Supply and Disposal System

The wastewater supply system consists of three underground pipelines running from the new Amherst Sewage Treatment Plant to a pump house located at the UMASS Pilot Plant Facility. The raw wastewater line is approximately 400 ft long and consists of 4 in diameter Schedule 80 PVC. It is connected

Table I. Daily Flow Requirements of UMASS Pilot Plant

Unit	Type of Wastewater Used	Operating Flow Range (gpd)
Activated Sludge (Extended Aeration)	Primary effluent or raw wastewater	7,200-14,400
Activated Sludge (Nitrification-Denitrification)	Primary effluent Secondary effluent Raw wastewater	8,640-14,400
Plastic Media Tower	Primary effluent	23,000-52,600
Trickling Filter	Primary effluent	38,300-57,500
Physical Chemical	Raw wastewater Primary Effluent Secondary Effluent	5,760-8,640
	TOTAL	82,900-152,540

to the ASTP primary pump and pipe gallery which contains degritted and comminuted raw wastewater. The primary effluent line (4 in diam. Sched. 80 PVC) is 300 ft long and is connected to the aeration tank distribution structure. Secondary effluent proceeds from the effluent pumps through a tunnel and then underground to the Pilot Plant via 720 ft of 2 in diam. Sched. 80 PVC. A plan view of the proposed wastewater supply system is shown in Figure 1. The limit of work by ASTP contractors is the boundary of the Pilot Plant Facility. Connecting these pipelines from the boundary to the pump house will be performed by UMASS Physical Plant.

All wastewaters, treated or untreated, will be collected in a single pumping station and returned to the Amherst Plant via 230 ft of 4 in diam. Sched. 80 PVC. This return pipeline will be connected to the UMASS influent line so that flows used at the Pilot Plant Facility will be charged to UMASS. The pumping station is already constructed. It is rated at 115 gpm with 15 ft of head which should be adequate to handle the maximum flows anticipated. The limit of work by ASTP contractors includes all work from the UMASS line tie-in to the pilot plant pumping station. This pipeline route is also shown in Figure 1.

A hydraulic profile of the wastewater supply system is shown in Figure 2. Raw wastewater and primary effluent will flow by gravity while secondary effluent will flow under pressure provided by the effluent pumps. At the Pilot Plant, centrifugal pumps will be used to provide any additional lift needed to supply each unit.

Pilot Plant Distribution System

Wastewater supplied to the Pilot Plant Facility will be distributed by six underground pipelines running from the pump house to each of four pilot

Garage

N

UMASS LINE
SPECIAL MANHOLE

WASTEWATER RETURN LINE
4" SCHED 80 PVC (230')

EXISTING ADMIN. BLDG.

CHLORINATION BUILDING
(Existing Sludge Filter Building)

BLACKTOP

GRASS

PRIMARY PUMP & PIPE GALLERY

R.W.

TUNNEL

2" SCHED. 80 PVC (720')

EFFLUENT PUMPS

S.E.

FINAL PUMP & PIPE GALLERY

AERATION TANK
INFLUENT DISTRIBUTION STRUCTURE

4" SCHED. 80 PVC (400')

P.E.

4" SCHED 80 PVC (300')

LIMIT OF WORK
BY ASTP CONTRACTOR

NOTE:

DETAILED DRAWINGS AND SPECS CAN BE FOUND ON SHEETS G-4, G-8, PF-M-1, PF-M-2, T-M-1, FF-M-2 FF-M-3 AND FF-M-4 OF CAMP, DRESSER & McKEE INC. DESIGN PLANS FOR THE AMHERST SEWAGE TREATMENT PLANT

LEGEND:

R.W. = RAW WASTEWATER
P.E. - PRIMARY EFFLUENT
S.E. - SECONDARY EFFLUENT
ASTP - AMHERST SEWAGE TREATMENT PLANT

SCALE:

1" = 40'

FIGURE 1. WASTEWATER SUPPLY AND RETURN PIPING.

C.J.M.

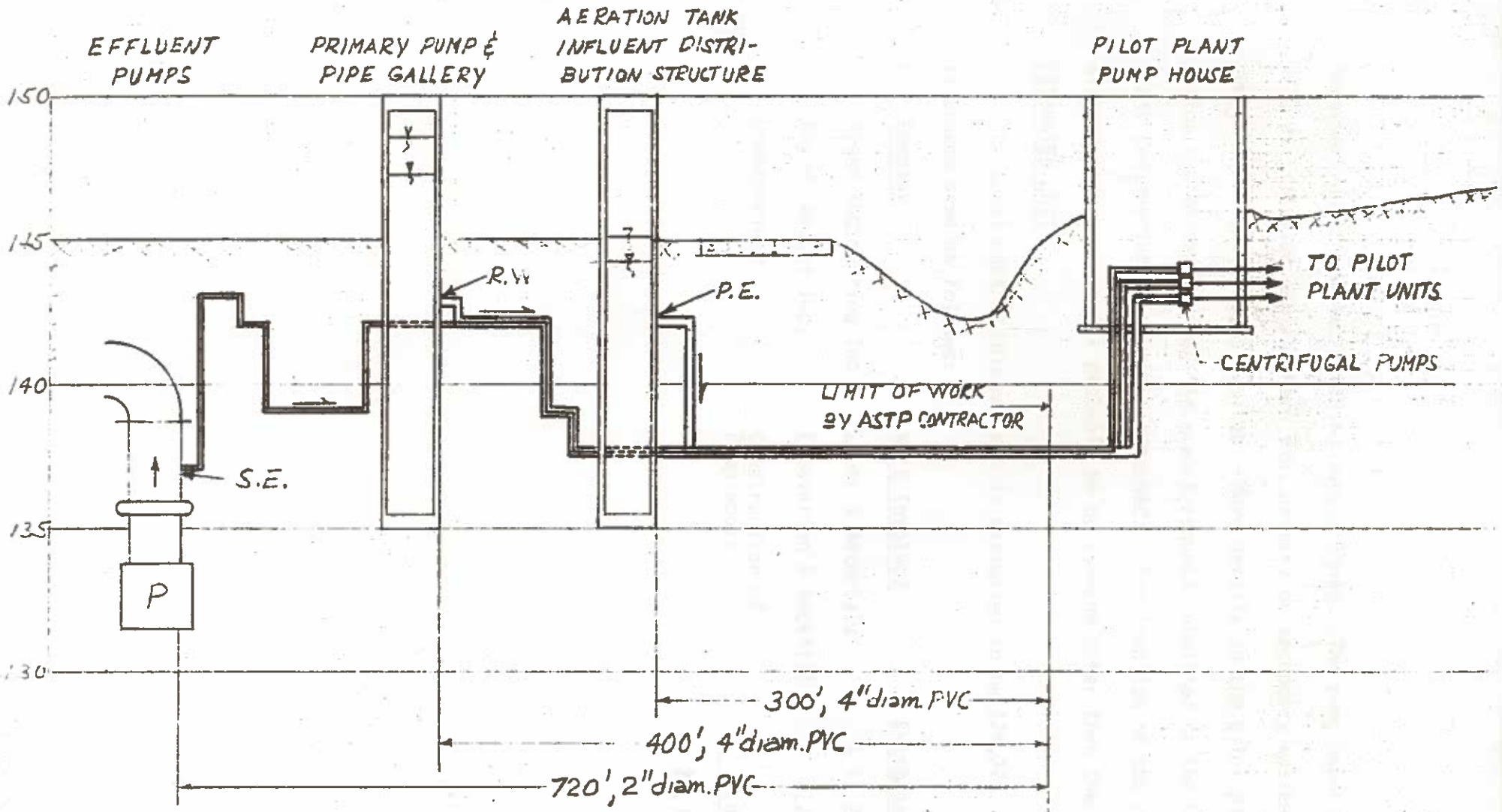


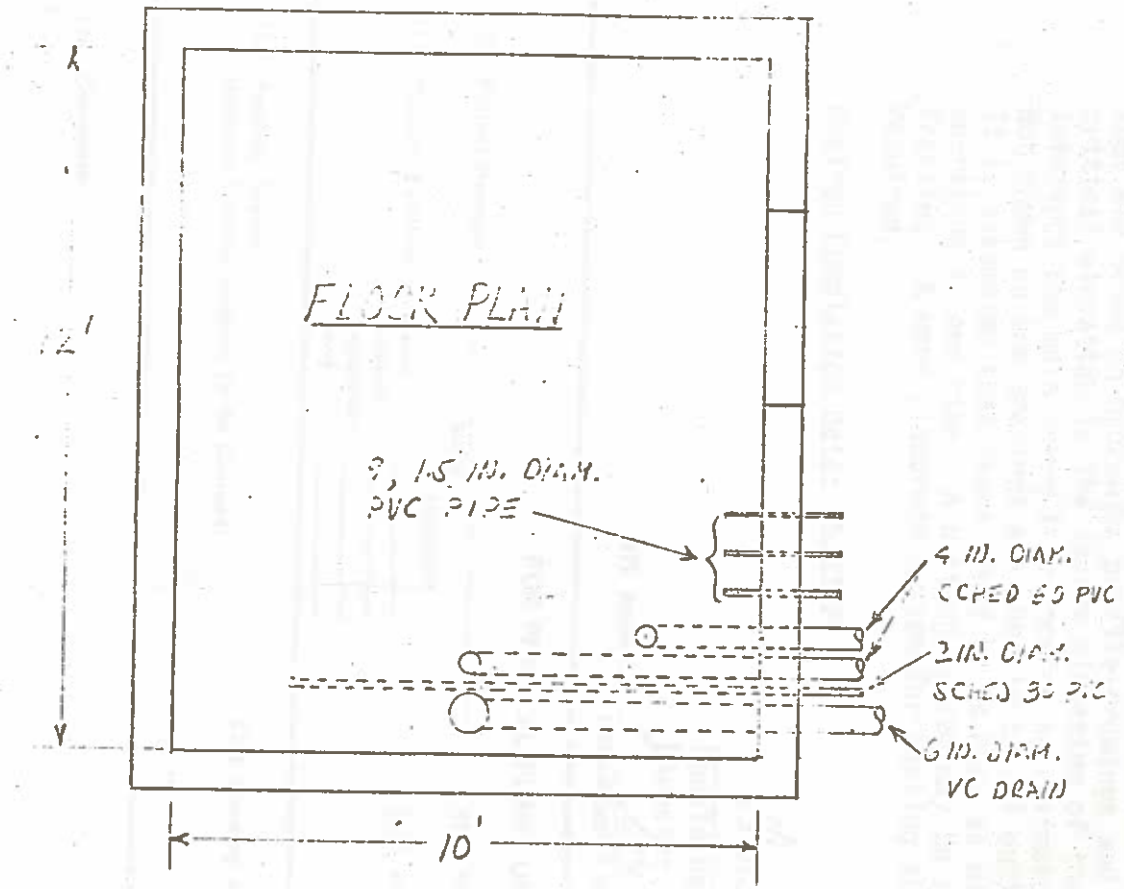
FIGURE 2. HYDRAULIC PROFILE

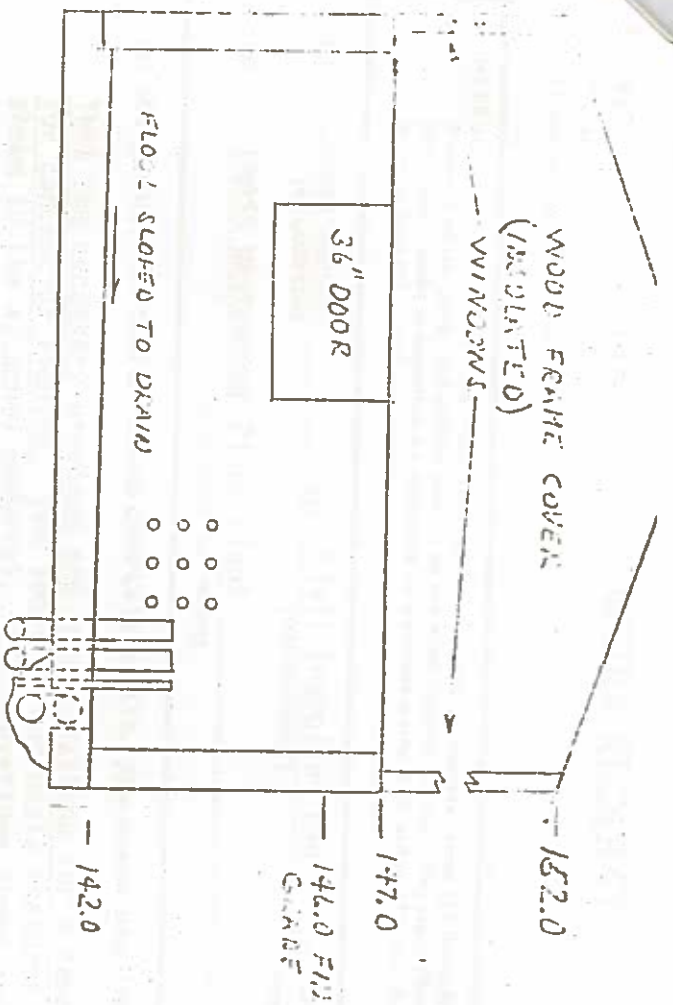
treatment units and two building supply lines. The pump house will serve as a distribution center where raw, primary or secondary wastewater can be pumped to whichever unit desired. More details on the pilot plant distribution system can be found in a work request submitted to the UMASS Physical Plant Engineering Department (attached). Construction of the pilot plant distribution system will probably be by someone other than the ASTP contractor.

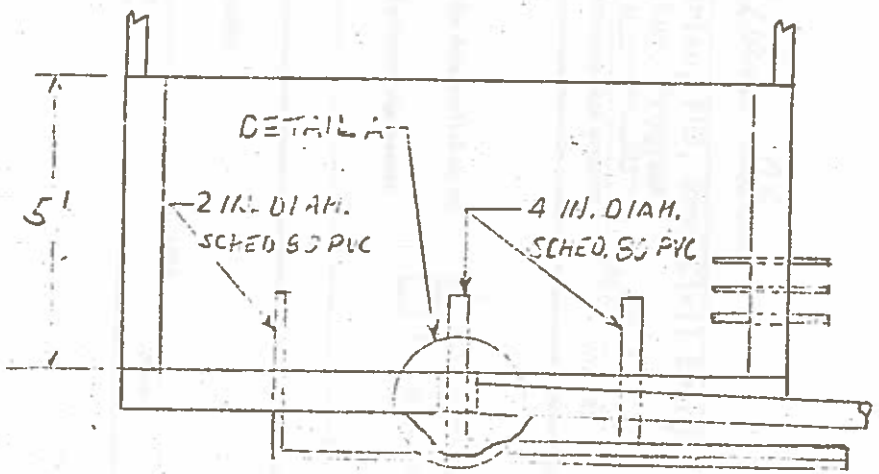
ESTIMATED COST

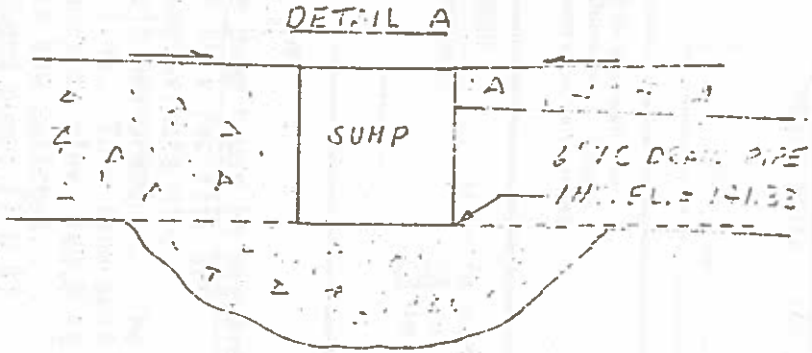
The total cost of this project is estimated to be $24,375. This cost is broken down as follows:

Company	Work Involved	Estimated Cost
Arden Engineering Inc.	Labor & Materials	$ 15,278
Roy M. Wright Inc.	Excavation & Backfill	3,297
Undetermined	Construction of Pump House	5,800
		$ 24,375


FLOOR PLAN
3, 1.5 IN. DIAM. PVC PIPE
4 IN. DIAM. SCHED 80 PVC
2 IN. DIAM. SCHED 80 PVC
6 IN. DIAM. VC DRAIN
10'
12'


WOOD FRAME COVER (INSULATED)
WINDOWS
FLOOR SLOPED TO DRAIN
36" DOOR
142.0
144.0 FIN. GRADE
147.0
152.0


DETAIL A
2 IN. DIAM. SCHED 80 PVC
4 IN. DIAM. SCHED. 80 PVC
5'


DETAIL A
SUMP
6" VC DRAIN PIPE
INV. EL. = 141.33

SCALE: 1" = 40'

To: WORK CONTROL CENTER
Physical Plant Department
University of Massachusetts

WORK REQUEST

DO NOT WRITE IN THIS SPACE

..... Work Order Number

INSTRUCTIONS: Use a separate Work Request for each job. Complete items (1) through (8) in quadruplicate. Forward white, pink, and yellow copies to the Work Control Center, Physical Plant Department. Retain blue copy. make information as complete as possible using both sides of form. Request must be justified fully in item (6). Include sketches and attachments if necessary.

(1) C.James Martel (REQUESTOR) (2) Civil Engrg(Env.Eng.) (DEPARTMENT) (3) 5-0685 (TELEPHONE) (4) ATTACHMENTS: ☒ YES ☐ NO

(5) UMASS Wastewater Pilot Plant (LOCATION OF WORK)

(6) SCOPE, JUSTIFICATION & DESIRED COMPLETION DATE. (Use reverse side, if necessary.)

That the necessary drawings and specifications for a sewage pump house be prepared for contractor bidding. The location and basic features of this facility are shown in the attached material. The elevations shown are approximate since they are based on hydraulic profile drawings and not on field measurements. The critical elevation is the invert elevation of the 6" drain line. This line must intersect the main sewer line located approximately 25 ft away at elev. 140.8 ft. Not shown on the drawings are the electrical outlets, lights and switches. It is estimated that there could be as many as nine centrifuged pumps (110 V) operating at one time. A heating system may be required to prevent pumps from freezing. A more elaborate system for heating the entire building is not required.

Desired Completion Date: 5/23/77

Donald Dean Adrian

Donald Dean Adrian, PhD, Prof.Civil Engrg & Director, Env.Eng. Program

(7) Approved ..... (8) 4 Nov 77
DEPARTMENT HEAD (AUTHORIZED AGENT) (DATE)

FOR PHYSICAL PLANT USE

(9) Project Manager ..... NAME

(10) Work To Be Accomplished by ☐ Outside Contract ☐ In – force Labor

(11) Project Estimate

	AMOUNT
Labor	
Material	
Equipment	
Total	

(12) Project Estimate Approval: .....

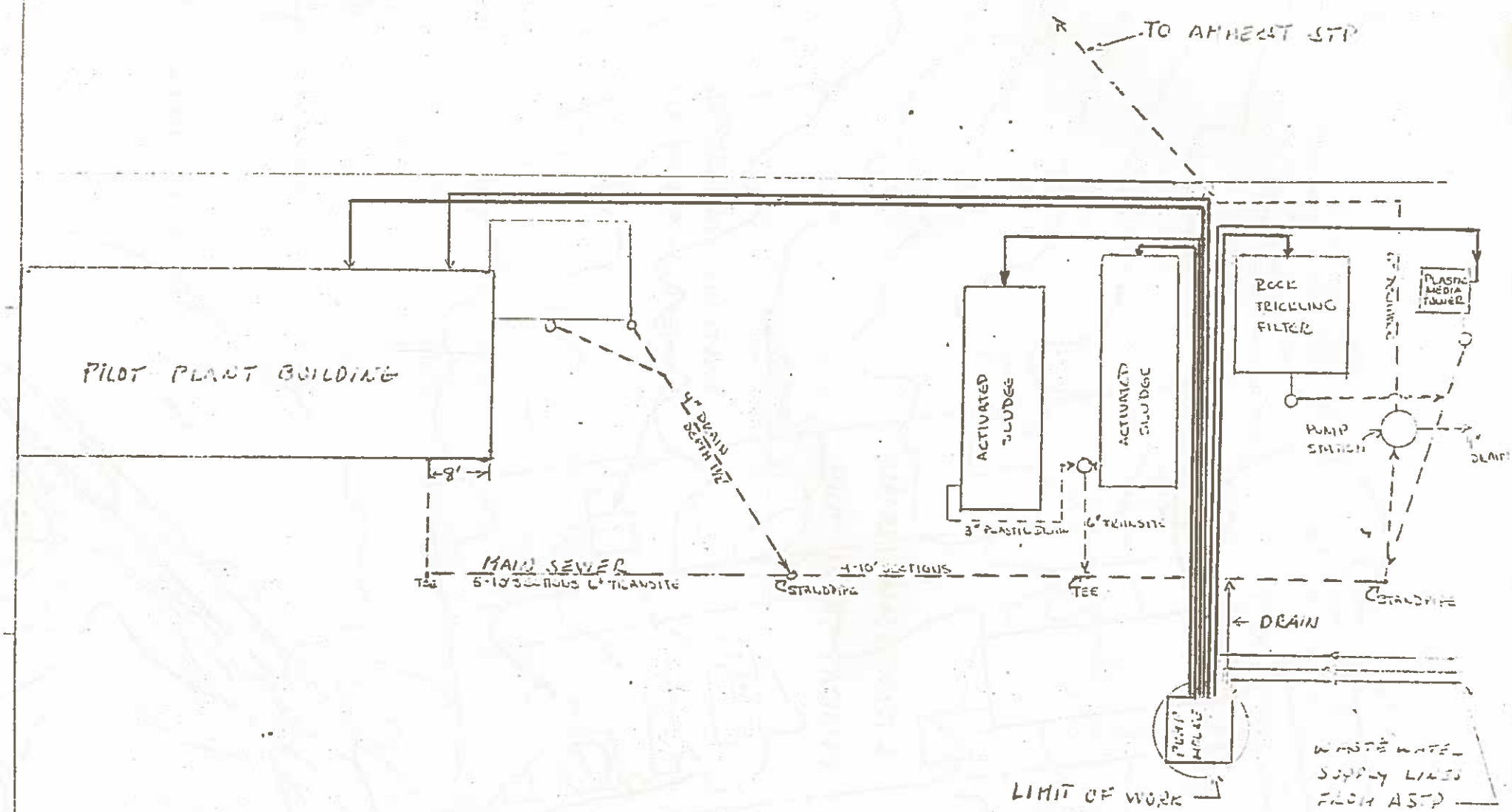
(13) Funding Source (Indicate Specific Account To Be Charged) .....

(14) Funding Authorization: ..... (15) ..... Signature Date

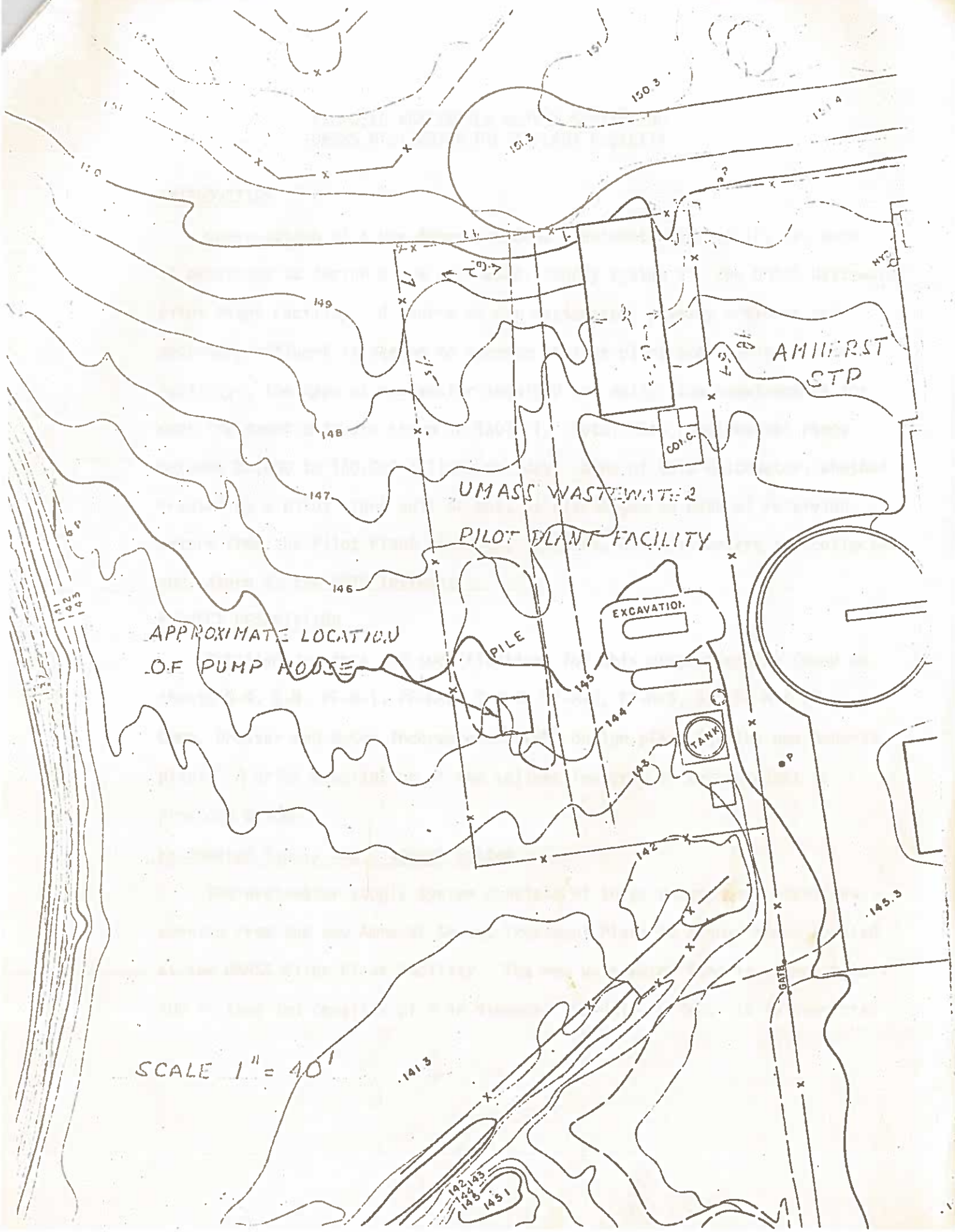
(16) Comments:

Copy

(17) ..... (Signature) (18) ..... (Date)



SCHEMATIC OF WASTEWATER SUPPLY AND COLLECTION SYSTEM


AMHERST STP
UMASS WASTEWATER PILOT PLANT FACILITY
APPROXIMATE LOCATION OF PUMP HOUSE
PILE
EXCAVATION
TANK
GATE
SCALE 1" = 40'