DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA 23511-6287

TELEPHONE NO.
444-9670

IN REPLY REFER TO:
11010
08A2131

22 JAN 1987

From: Commander, Atlantic Division, Naval Facilities Engineering Command
To: Commanding General, Marine Corps Base, Camp Lejeune, North Carolina
(Attn: Facilities Officer)

Project in program

Subj: FY 89 MCON BUDGET SUBMITTAL

Encl: (1) Appendix A for Project P-229
(2) Appendix A for Project P-629
(3) Appendix A for Project P-829
(4) Appendix A for Project P-852
(5) Appendix A for Project P-870
(6) Appendix A for Project P-872
(7) Appendix A for Project P-873
(8) Updated DD Form 1391 for Project P-811

1. Attached to enclosures (1) through (7) are the DD Form 1391's, Budget Estimate Summary Sheet, Collateral Equipment List, and Site Plan for each project. These attachments along with enclosure (8) represent what was forwarded to NAVFACENGCOM for the FY 89 MCON budget submittal on 17 November 1986.

— Telcon from MCB advised this was dropped —

2. Projects which were submitted to NAVFACENGCOM but have since dropped from the FY 89 MCON Program are: Project P-679, Electronics/Communications Maintenance Shop; P-810, Mechanics Training Building; P-841, Mess Hall Addition; Project P-845, Oil Spill Control Facility.

3. Request you review the enclosures and provide any comments within 30 days. If no comments are submitted, concurrence will be assumed.

Note: two projects that dropped out of FY-89 have been added to FY 89:
P-810 Mech Trng Bldg
P-841 Mess Hall ADDN, French Ck

Al

D. L. RIDDLE, P. E.
By direction

APPENDIX A 24 Dec 1986

1. In House Design
Construction Contract No.: N62470-87-B-7135

Project Title/Location: FY 89 MCON Project P-829, Fly Ash Control System, Building 1700, Marine Corps Base, Camp Lejeune, North Carolina (MARCORB Camp Lejeune)

Attachments:

(a) DD Form 1391 dated 3 Nov 1986 with Facility Study
(b) Environmental Pollution Control Report dtd 12 Feb 82
(c) LANTDIV Report of Investigation of Ash Collection and Disposal System
(d) Proposed Site Plan

2. Project Budget: $ 570,000 Construction Cost: $ 513,000

Approval from the Project Manager (PM) is required to continue design in excess of programmed funds. You are responsible to design to scope. Approval from the PM is required to continue design in excess of the authorized scope.

3. LANTNAVFACENGCOM PM/Telephone:

Ms. S. M. Gale, P. E., Code 09A2131/804-444-9670

4. Activity Point of Contact/Telephone:

Mr. Larry Brant, Public Works Department /919/451-1833
Mr. G. S. Johnson, Utilities Department/919-451-5161

5. Services Required:

a. The following listed services are required:

Plans
Specifications
Cost Estimate
Asbestos Testing
Shop Drawing Review
As-Built Dwg Prep
Air/Water Permit Prep

b. Bench mark datum shall be obtained from the Activity.

6. Proposed Design Milestones: (Calendar days)

Your assessment of the schedule shall be provided monthly to the Project Manager.

	CUMULATIVE NO. DAYS	GOVT REV
In-house Design Start	0	-
35%:	105	(45)
Prefinal:	270	(60)
Final (100%):	360	
Advertise:	375	-
Award Construction Contract:	465	-

7. Scope Description: The project is to provide an additional fly ash handling and storage system for Electrostatic Precipitation (ESP) fly ash at the Central Heating Plant, Building 1700. Construction modifications to include ash transfer equipment for ESP's, separate fly ash silo and ash unloading facilities to enhance future recycling options, and air pollution controls during handling, run off controls and auxiliary equipment. Provide drain pit for truck wash down and tie into existing water purification system. Provide local controls for new ash silo. See attachments (a), (b), and (c).

8. Site Approval Status: Not received

9. Project Environmental Assessment (PEA): Not completed

10. Intergovernmental Coordination Required by Designer with State or Federal Agencies Outside DOD: The State of North Carolina, Air Pollution Control Board, must be contacted for review of mechanical system of fly ash control to assure final design complies with "Regulations for the Control and Abatement of Air Pollution."

11. Tentative Site Plan Attached: See attachment (b).

12. Special Building Systems:

a. Power Distribution System(s) 277/480 volt. A new transformer will be required.

b. MCON Funded Built-in Equipment - Fly Ash Silo System

c. Compressed Air - Supplied locally from new air compressor

13. Easements, Air and Water Discharge Permits Required: Air and water discharge permits will be submitted by the Activity, Mr. Bob Alexander, Base Environmental Engineer, telephone 451-3034, area code 919.

14. Utilities:

a. Points of Connection Proposed: (Subject to designer verification)

Water - local in Bldg 1700
Sewer - tie into local system
Power - supplied by new transformer
Steam - supplied locally from Building 1700
Telephone - N/A
Fire Alarm - N/A

See attachment (d).

b. Restrictions on Utility Interruptions: Coordinate with MARCORB Camp Lejeune, Utilities Division, Manager, Mr. G. S. Johnson, telephone 919-451-5161.

15. Construction Procurement Strategy:

a. Number of Construction Contracts: One

b. Proposed Construction Period: 10 Months. Project will be packaged for construction with special Project LI 803M, Fly Ash Handling System for Boilers, MARCORB Camp Lejeune. 10 Months

c. Applicability of Standard Liquidated Damages: No deviation

d. Methods of Procurement Proposed: Competitive Bid (Firm-Fixed-Price)

16. Project Submittal Distribution:

	PM (Codes 10/11/05)	ACTIVITY	STATE AIR POL. CONTROL BOARD	ROICC
Preliminary (35%)				
Plans	1	3		
Outline Specification				
Cost Estimate	1	1		
Basis of Design	1	2		
Prefinal				
Plans, Specifications	2	3	1	1
Cost Estimate	1	1		
Calculations, Environmental Permits	1			
Final				
Plans - Tracings	Original			
Prints	2 sets			
Specifications	Bond 2 copies			
Cost Estimate	2 copies			
Calculations	1 copy			
Field Notes, Reports, Studies, Permits	1 copy each			

MAILING ADDRESSES: DIRECT DISTRIBUTION TO EACH ADDRESSEE BY PM IS REQUIRED

LANTNAVFACENGCOM

Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

Attn: Code 09A2131, Ms. S. M. Gale, P. E.

ACTIVITY (MCB CAMP LEJEUNE)

Commanding General
Marine Corps Base
Camp Lejeune, North Carolina 28542-5001

Attn: Mr. Larry Brant, Public Works Office

ROICC

Resident Officer in Charge of Construction
Jacksonville, North Carolina Area
Marine Corps Base
Camp Lejeune, North Carolina 28542-5001

STATE OF NORTH CAROLINA, AIR POLLUTION CONTROL BOARD

Division of Environmental Management
Air Quality Section
Post Office Box 27687
Raleigh, NC 27611

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1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		3 NOV 1986

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
MARINE CORPS BASE CAMP LEJEUNE, N.C.	FLY ASH CONTROL SYSTEM BUILDING 1700

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
	821-09	P-829	570

9. COST ESTIMATES

Escalation 9% ITEM Escalation to 1 April 1989	U/M	QUANTITY	UNIT COST	COST ($000)
Fly Ash Silo System	LS			513
Fly Ash Silo System	LS			(513)
SUBTOTAL				513
CONTINGENCY (5%)				26
TOTAL CONTRACT COST				539
SUPERVISION, INSPECTION AND OVERHEAD (5.5%)				30
TOTAL BUDGET COST				569
TOTAL REQUEST ROUNDED				570
EQUIPMENT PROVIDED FROM OTHER APPROPRIATIONS (Non-Add)				0

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Provide a fly ash handling and storage system for electrostatic precipitation (ESP) fly ash at the Central Heating Plant, Building 1700. Construction/ modifications to include ash transfer equipment for ESP's' separate fly ash silo and ash unloading facilities to enhance future recycling options and air pollution controls during handling; runoff controls; and auxiliary equipment.

11. REQUIREMENTS:

PROJECT: Provide fly ash control system for the Central Heating Plant, Building 1700.

REQUIREMENT: To correct excessive fly ash dust problem, as recommended by LANTDIV's Investigation of Ash Collection and Disposal System at the Central Heating Plant, Building 1700, MCB, Camp Lejeune, NC dated December 1982.

CURRENT SITUATION: Fly ash dust has become a serious maintenance problem to controls and equipment in the Central Heating Plant, as well as an environmental hazard.

IMPACT IF NOT PROVIDED: Continued frequent maintenance of controls and equipment, and prolonged environmental risk to health and safety of operational personnel.

* U.S. Government Printing Office: 1984—765-012/17914 2-1

Attachment (a)

1. COMPONENT		2. DATE
Marine Corps	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	3 NOV 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System - Building 1700	P-829

SPECIAL CONSIDERATIONS

1. Pollution Prevention, Abatement, and Control: This project will not cause additional air or water pollution.

2. Flood Hazard Evaluation: Requirements of Executive Order No. 11296 (Flood Hazards) are not applicable.

3. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

4. Fallout Shelter Construction: Not applicable.

5. Design for Accessibility of Physically Handicapped Personnel: Provisions for physically handicapped personnel are not required in this facility.

6. Preservation of Historical Sites and Structures: The project facilities do not directly or indirectly affect a district, site, building, structure object, or setting which is listed in the National Register or otherwise possesses a significant quality of American history.

BUILDING BUDGET ESTIMATE SUMMARY SHEET FOR P- 829

Title: Fly Ash Control System Bld 1700 | Costs Escalated to: 1 APRIL 1989

Location: Camp Lejeune, North Carolina | Escalation: 9%

Prepared by: Larry Harrison | Date: 3 Nov 86 | Contingency: 5%

	$/SF	$/SYS	SYS QUAN	TOTAL	BUILDING	BUILT-IN EQUIPMENT
~~Building~~ Facility						
Ash System		LS	LS	340400	340400	
Steam Pipe		74.67/LF	150 LF	11200	11200	
Drain Pipe		LS	LS	21200	21200	
Compressed AIR		39.64/LF	275 LF	10900	10900	
Electrical		3158 LF	2400 LF	75800	75800	
Roadway / Platform		416.67/SY	112 SY	46600	46600	
Water Piping		30.67/LF	225 LF	6900	6900	
Subtotal Building					513000	
Supporting Facilities						
Subtotal Supporting Facilities						

Total Contract Cost w/o Contingency:	$ 513000
Contingency 5 %	$ 26000
Total Contract Cost	$ 539000
SIOH 5.5 %	$ 30000
Total Budget Cost	$ 569000
Rounded	$ 570000

*Asterisk indicates these totals on 1391s.

COLLATERAL EQUIPMENT REQUIREMENTS (Initial Outfitting)
LANTDIV NORVA 4-11010/6 (Rev.11/81)

DATE 3/NOV/86

1. ACTIVITY (Base and Location)
MARINE CORPS BASE CAMP LEJEUNE, NC

2. PROJECT TITLE
Fly Ash Control System, Building 1700

P. NO. 829

COG. SYMBOL AND FED. STOCK NO. OR OTHER SOURCE	ITEM/EQUIPMENT DESCRIPTION	QUAN. TITY	UNIT OF ISSUE	UNIT PRICE	TOTAL COST
1. Built-in Equip to be MCON Funded	NONE				
2. Expense ITEMS	NONE				
3. INVESTment ITems	NONE				
4. APA EQUip	NONE				
5. TRAINING EQUIP.	NONE				
6. OTHER Expenses	NONE				
7. EQUIP. on HAND	NONE				

1. COMPONENT		2. DATE
Marine Corps	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	15 Sept 1986

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System - Building 1700	P-829

SPECIAL CONSIDERATIONS

1. Pollution Prevention, Abatement, and Control: This project will not cause additional air or water pollution.

2. Flood Hazard Evaluation: Requirements of Executive Order No. 11296 (Flood Hazards) are not applicable.

3. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

4. Fallout Shelter Construction: Not applicable.

5. Design for Accessibility of Physically Handicapped Personnel: Provisions for physically handicapped personnel are not required in this facility.

6. Preservation of Historical Sites and Structures: The project facilities do not directly or indirectly affect a district, site, building, structure object, or setting which is listed in the National Register or otherwise possesses a significant quality of American history.

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

FACILITY STUDY

1. Project: This project provides a means of controlling the extisting execessive dust problem at the Central Heating Plant in Hadnot Point.

2. Current and Planned Future Workload with regard to this Project: Over one billion pounds of steam is produced annually at the Central Heating Plant, creating residue of bottom ash and fly ash.

3. Description of Proposed Construction:

   a. Type of Construction: Permanent.

   b. Replacement: Not applicable.

   c. Description of Work to Be Done:

      (1) Primary Facility: This project will consist of construction/modifications of ash transfer equipment for electrostatic precipitators; separate fly ash silo with tie-in to existing silo for backup capability when one silo breaks down; ash loading facilities; air pollution controls; and auxiliary equipment.

      (2) Energy Conservation: Although the proposed project will not directly contribute to savings in energy, it will indirectly contribute to conserving oil yearly by alleviating ash residue build-up which causes equipment breakdown, at which times more expensive oil must be burned instead of coal. Further, a separate silo to handle precipitator ash would create a possibility of selling fly ash to a private concrete company. This would eliminate costs associated with hauling and land-filing of the fly ash.

      (3) Collateral Equipment: Not applicable.

4. Cost Estimate: The Area Construction Index for Camp Lejeune is .95, with a contingency factor of 10 percent. This data is applicable to FY-83. Cost data derived from LANTDIV's Investigation of Ash Collection and Disposal System at the Central Heating Plant dated December 1982, and escalated to FY-89.

★ U.S. Government Printing Office: 1984—705-012/17926 2-1

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		5 Sept 1986

3. INSTALLATION AND LOCATION	
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542	
4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

5. Justification for Project and Scope of Project:

a. Justification for Project.

(1) Project: The proposed project will provide a separate fly ash silo and unloader.

(2) Requirement: A separate silo and unloader to handle precipitator fly ash is required to control the exiting excessive fly ash problem.

(3) Current Situation: Both bottom ash and fly ash are now stored in the same silo, mixing the lighter fly ash with the heavier bottom ash. Upon unloading, excessive dust escapes into the atmosphere. Fly ash dust has become a seriour maintenance problem to controls and equipment in the Central Heating Plant, as well as an environmental hazard to the health and safety of operational personnel.

(4) Impact if Not Provided: Continued frequent maintenance of controls and equipment, and prolonged environmental risk to health and safety of operational personnel.

b. Justification for Scope of Project: The scope of this proposed project is that recommended by the investigative report cited in paragraph 4 above. The report's recommendation will satisfy North Carolina Air Pollution Control Guidelines, 15 NCAC 2D.

6. Equipment Provided from Other Appropriations: None.

7. Common Support Facilities: Ther are no common support facilities available that can satisfy.

8. Effect on Other Resources: This project will not require additional funding for utilities services and operations, nor will additional operating personnel be required.

9. Siting of the Project: See Site Location Map, enclosure (1).

10. Other Graphic Presentations, including Photographs: None.

☆ U.S. Government Printing Office: 1984—705-012/17926 2-1

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION	
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542	
4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

11. Economic Analysis: The proposed project produces no direct economic benefits, but rather it insures compliance with environmental regulations.

12. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

13. Quantitative Data: Not applicable. This project is to correct potential environmental hazards to the local ecology and ecosystems, as well as operational personnel.

LANTDIVINST 11019.2D
12 FEB 1982

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT INFORMATION

MEDIA: AIR EFD: LANT UIC: M62470
PROJECT NO.: P-829

+ PROJECT NAME: FLY ASH CONTROL EQUIPMENT - BUILDING 1700

FACILITY: MARINE CORPS BASE
ADDRESS: AC/S, FACILITIES, CAMP LEJEUNE, NC 28542
AGENCY CONTACT: MR. BOB ALEXANDER, ENVIRONMENTAL ENGINEER, AV 484-3034

FUND CMD: CMC APPN: ~~MCMCP~~
STATUS: PP

INTERNAL PROJECT NUMBER: P-829

+ COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS:

FY	DESIGN	FUNDED	CONSTR	FUNDED
84	?	NO	?	NO
—	—	—	—	—
—	—	—	—	—

TOTAL COST: ?

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START):	—	—
DESIGN (COMPLETION):	—	—
CONSTR (START):	—	—
CONSTR (COMPLETION):	—	—
FINAL COMPLIANCE:	—	—
REG FINAL COMPLIANCE:	—	—

+ CONGRESSIONAL AUTHORITY DATES: MCON +

	(MO / YEAR)	
SCHEDULED:	—	—
REQUESTED:	—	—
RECEIVED:	—	—
35% DESIGN COMPLETION	—	—

+ OTHER PCR DATES

APPROVED:
PREPARED: 1 AUG 83
REVISED: 8 DEC 85

+ INFO FOR NEESA USE

POLLUTANT CATEGORY
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS

PRIORITY
VARIOUS LOCATIONS —
MAJOR REVISION —
LEGAL ACTION CODE —
LEGAL CITATION

LANTDIVINST 11019.2D
12 FEB 1982

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT INFORMATION

MEDIA: AIR EFD: LANT UIC: M62470
PROJECT NO.: P-829

+ PROJECT NAME: FLY ASH CONTROL EQUIPMENT - BUILDING 1700 +

1. PROBLEM STATEMENT

0001 FUGITIVE FLY ASH EMISSIONS ARE GENERATED DURING THE
0002 SILO UNLOADING OF THE ASH HANDLING AND STORAGE SYSTEM.
0003 THE PROBLEM IS COMPOUNDED BY COMBINED USE OF FACILITES
0010 FOR BOTTOM ASH AND FLY ASH HANDLING. VISIBLE EMISSIONS ARE
0020 RECURRENT AS WELL AS THE CREATION OF HEALTH AND SAFETY PROBLEMS
0030 FOR OPERATIONAL PERSONNEL.
0040
0050

2. REMEDIAL ACTION

0001 IN DECEMBER 1982 THE LANTNAVFACENCOM DESIGN DIVISION
0002 RECOMMENDED THE INSTALLATION OF A SEPARATE FLY ASH
0003 HANDLING AND STORAGE SYSTEM FOR THE ELECTROSTATIC
0010 PRECIPITATION (ESP) FLY ASH. FACILITIES TO BE MODIFIED/
0020 CONSTRUCTED INCLUDE ASH TRANSFER EQUIPMENT FOR ESP'S, SEPARATE
0030 FLY ASH SILO, ASH LOADING FACILITIES TO ENHANCE FUTURE RECYCLING
0040 OPTIONS, AIR POLLUTION CONTROLS DURING HANDLING, RUNOFF CONTROLS,
0050 AND AUXILLIARY EQUIPMENT.

3. APPLICABLE STANDARDS

0001 NORTH CAROLINA AIR POLLUTION CONTROL GUIDELINES,
0002 15 NCAC 2D.
0003
0010
0020
0030
0040
0050

4. OTHER PCR INFORMATION

0010
0020
0030
0040

8/16/8
Copy to

ATTACHMENT (6)

INVESTIGATION OF

ASH COLLECTION AND DISPOSAL SYSTEM,

HIGH DUST LOADING IN BREECHING,

AND BYPASS STACK CAPS

AT THE

CENTRAL HEATING PLANT, BUILDING 1700

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

DECEMBER 1982

DESIGN DIVISION
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGNIA 23511

PREPARED BY:

R. W. TISDALE, JR.
MECHANICAL ENGINEER

ATTACHMENT (c)

I. Investigation of Ash Collection and Disposal System

A. Description of System

The ash collection and disposal system at the central heating plant was installed as a part of the original plant construction in the early 1940's. The system is of the dry pneumatic vacuum conveying type with a vertical storage silo and was manufactured by United Conveyor Corporation. A two stage steam ejector produces vacuum on the conveying system. Ash from the silo is loaded into open bed dump trucks by means of a rotary feeder and horizontal screw conveyor with water conditioning.

B. Major Modifications to Original System

Within the past five years, several modifications have been made to the original ash system. A new two stage steam ejector and a new rotary feeder and unloader have been installed to replace the original components. Additional ash collection piping has also been installed for transporting fly ash collected from two new electrostatic precipitators. No other major modifications are known to have been made to the original ash system.

C. System Operation

The original function of the ash system was to remove and temporarily store ash generated from the operation of four 100,000 pound per hour pulverized coal fired steam boilers. Ash was collected from the boiler, air preheater, mechanical collectors and stack hoppers, transported through the vacuum conveying system and stored in the silo (see figure 1). Stored ash was then unloaded into open dump trucks for hauling to the base landfill for disposal. Based on conversations with plant personnel, no undue problems were experienced with the removal and disposal of ash until the electrostatic precipitators were added. The methods of collecting, storing, removing and disposing of the ash have remained basically unchanged, however problems have been encountered since flyash collected by the precipitators have been added to the system.

D. Operational Problems Incurred

Since the flyash has been added to the system, the rate of ash flow from the silo through the rotary feeder and unloader has become very inconsistent. As a result of continuous variations in ash flow, proper water conditioning cannot be maintained. Operating personnel have been manually readjusting water flow in an attempt to provide proper mixing with limited success. During severe changes in ash flow, either a "water rich" or "water lean" mixture passes through the unloader outlet. As ash flow reduces suddenly due to large clinkers being unloaded, excessive water totally saturates the ash previously unloaded. In addition, the excess water drains from the truck creating additional water pollution problems at the silo as well as a nuisance during

transport. When ash flow suddenly surges due to fine precipitator ash being unloaded, unconditioned ash is discharged with the unwetted particles becoming airborne. These dust clouds have been severe at times, creating a nuisance to surrounding facilities. This dust eventually settles and creates additional water pollution problems in the area storm drainage system. Unconditioned ash that does fall into the truck also has a tendency to become airborne during transport and dumping, creating additional nuisances.

E. Probable Cause

The primary cause of the problems experienced in unloading and disposing of the ash stems from the variations in particle size of the ash being unloaded. The variations in flow are caused by the smaller particles being more densely packed when passing through the rotary feeder. In addition, the surface area of the smaller particles per unit volume is greater and requires more water for wetting. One other possible problem is that the charged particles collected by the precipitator may have a greater surface tension reducing the wetting capability.

F. Possible Solutions

Several possible solutions to reduce or eliminate the problems being experienced were investigated. These possible solutions and their probable effects on the system are as follows:

1. Install aeration blocks and diverter core in the ash storage silo to provide better mixing of different size particles.

   This solution may lessen the extreme variations in flow but will not resolve the problem of wetting the fine particles. The ash is segregated in the silo due to the ash being pulled from only one hopper at a time with resulting layers of ash of a particular size in the silo. Mixing at the outlet probably would have only minimum effects on the problems.

2. Install an air operated valve on the water conditioning line in lieu of a manual valve.

   An air operated valve may increase response time but will not resolve the variations in flow and the wetting problem.

3. Utilize a surfactant to provide better wetting of the finer particles.

   Wetting agents have met with limited success and do not totally resolve the problem of variations in flow. Wetting agents may help improve the wetting of the fine ash but variations in ash flow will probably minimize the improvement.

4. Install a rotary unloader designed to handle fine particles.

A rotary unloader such as the Model D-40 manufactured by Allen, Sherman, Hoff (see figure 2) would probably provide better mixing and wetting of fine particles but the variations in flow may continue to cause some minor problems. Initial cost of the unloader would be approximately $40,000.00.

5. Install a separate ash system for the precipitators.

A separate silo and unloader to handle fine ash from the precipitators separately should resolve the major problems currently being experienced. (See figures 3 and 4) By separating the fine ash from the larger particles, each system would be handling ash of similar size and consistency. Variations in flow due to particle size should be minimized. The rotary feeder and unloader could be selected to handle fine material and could be set up to properly condition fine material only. The major drawback to this solution is initial cost. A separate system would cost approximately $350,000.00.

6. Install a dust collector system to control dust emissions in the unloader outlet.

A dust suppression and collection system could be installed on the unloader outlet to contain any dust emissions. This system would probably effectively contain fugitive dust but would not affect overwetting due to variations in flow. In addition, fine particles would only be recirculated and may only build up within the silo.

G. Additional Considerations

Interest has been expressed by the activity to sell the precipitator ash to local private businesses. If the ash can be easily sold, plant personnel would be required to dispose of approximately two thirds of the ash presently handled. However, the precipitator ash would have to be handled separately and a separate silo required.

H. Recommendations

The only solution investigated that will probably solve all of the current problems would be to install a separate ash system, silo and unloader for the precipitators. The separate system would also allow sale of the flyash if desired. The major drawback to this solution is the initial cost of $350,000.00.

II. Investigation of High Dust Loading in Breeching

A. Description of System

Each of the two new precipitators is connected to two existing coal fired boilers. The arrangement of the new breeching is shown in figure 5. The common breeching was designed for a velocity of 30 feet per second assuming two boilers operating at full load. The transition into the precipitator was designed to provide a maximum velocity of 5 feet per second assuming two boilers at full load. Turning vanes and ladder vanes in the transitions and a perforated plate at the precipitator inlet were installed to provide equal air distribution into the precipitator.

B. Operational Problems Incurred

During normal operation, flue gas to the precipitator varies from one fourth to maximum design velocity. When the velocity reduces , ash falls out in the duct and on the ladder vanes. Some vanes near the top and bottom fill to where the opening becomes almost totally blocked. In addition, ash falls out and accumulates at the base of the inlet transition to the precipitator along the walkways. These ash buildups cause unequal velocity distribution through the precipitator as well as emissions when the velocity suddenly increases. The accumulated ash on the walkway also causes problems when entry into the precipitator is required for maintenance.

C. Recommendations

A team from the Navy Energy and Environmental Support Activity was requested to investigate the ash build up problems and to determine the velocity distribution through the precipitator. Site investigations were made in August 1980 and September 1981. Recommendations contained in the final report of February 1982 include removal of an 8 inch section at the bottom of the inlet perforated plate and the addition of a sonic sootblower to keep the inlet vanes free. Removal of the 8 inch section of the plate and installation of the sonic sootblowers are recommended and should alleviate the ash buildup problems at the precipitator inlet. Ash buildup in the inlet duct is not considered a major problem and should have no serious adverse effects on the system operation.

III. Investigation of Stack Caps

A. Description of System

The original boiler arrangement had flue gas breeching from each boiler passing vertically through the roof and connecting to to individual roof mounted stacks through a 90° transition. Each stack had a hopper at its base that was connected to the flyash collection system piping. No interconnections occurred between boilers.

B. Modifications to Systems

When electrostatic precipitators were added to the boilers, the flue gas breeching from two boilers were connected and a single duct routed to a common precipitator and ground mounted stack. The original breeching and roof mounted stacks were retained for use as a bypass. Two single blade guillotine dampers were installed on each boiler, one at the connecting to the old stack and one in the new breeching prior to connecting with the second boiler. This arrangement allowed isolation from the old stack or the new precipitator as required.

C. Operational Problems

Leakage has occurred past the bypass stack guillotine damper ever since the initial operation. The leakage could be caused by or significantly increased from ash accumulating in the damper seating track. Leakage of flue gas results in flyash accumulating in the bypass stack hopper and emissions occurring from the bypass stack. Whenever rain occurs, the ash in the hopper is wetted and hardens. Plant personnel are then required to manually remove the material to free the hopper outlet.

D. Possible Solutions

The possible solutions investigated are as follows:

1. External stack caps:

   The use of external stack caps which are generally limited to small boilers are not considered an acceptable solution. In order to be effective, the cap must be larger in diameter than the stack by one half and must be located above the stack at the height of one half the stack diameter when located to effectively block out the rain, the stack cap will create a downdraft around the plant. The resulting fumigation problem will not be acceptable. If the rain cap is designed to minimize the fumigation problem, the effectiveness of preventing rain from entering the stack will be greatly reduced.

2. Internal stack damper:

Use of a damper similar to a butterfly damper (see figures 6 & 7) investigated. Due to wind loading, the damper must be located inside the existing stack or within an extension to the stack. This arrangement would require a platform mounted on the existing stack or an extended operator drive from the base of the stack. The addition of a platform to the existing stack was not recommended structurally and extended drive mechanisms would probably not be reliable. From a maintenance standpoint, this solution would be no better than the current situation.

3. Double bladed guillotine damper:

Installation of a double bladed guillotine damper with compressed air pressurizing the space between the blades, should prevent leakage into the bypass stack. This alternative should prevent flyash from entering the stack hopper and therefore eliminate the problem. The initial cost for installing these dampers is estimated to be $150,000.00.

4. Install baffles and drainage trough in stack:

Installation of baffles and collection trough in the stack were investigated and determined to be ineffective. This solution would add additional draft loss and would plug up with flyash.

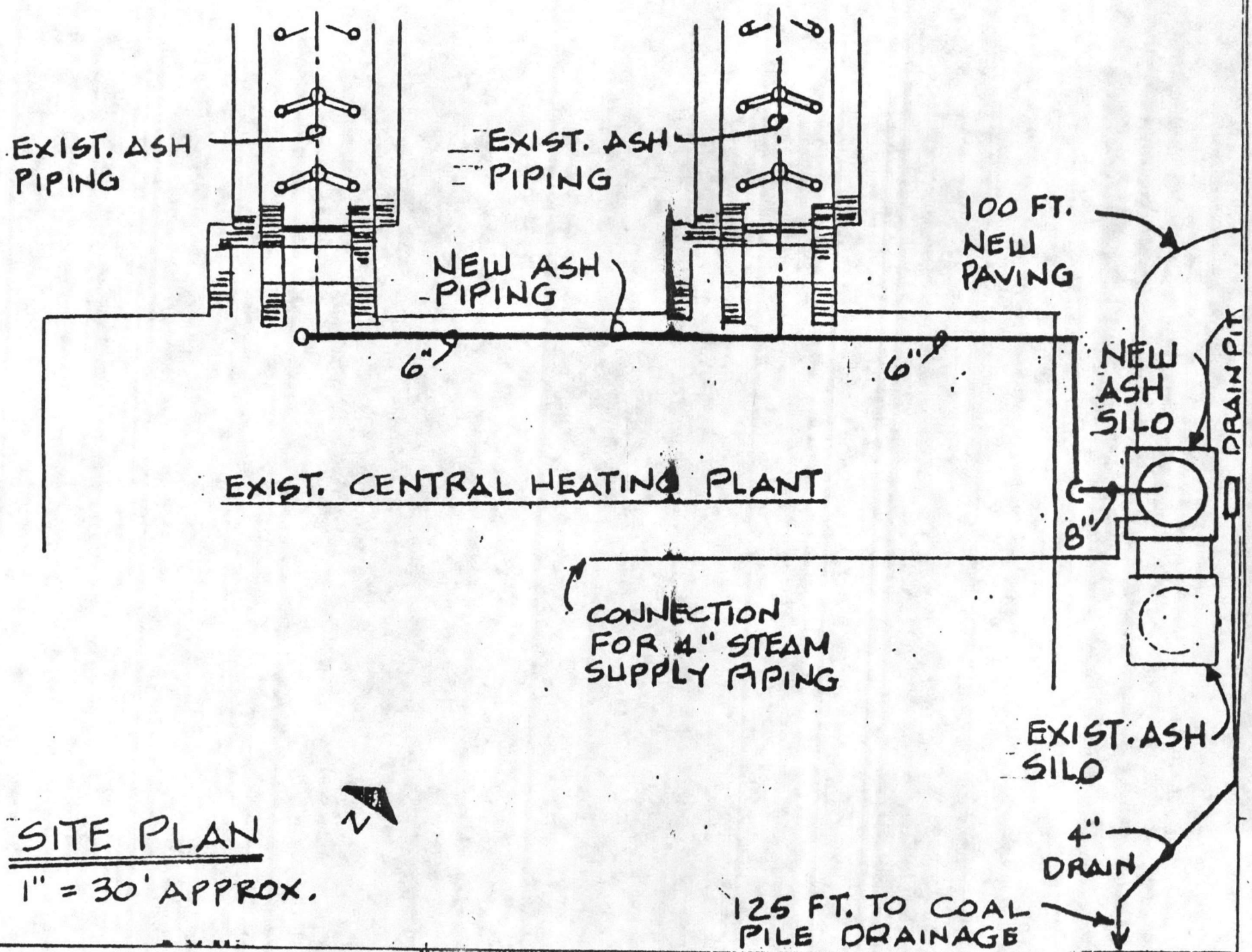
5. Install compressed air on existing dampers:

Installation of a compressed air manifold along the seating track of the damper may keep the dust from allowing the damper to seal properly. Compressed air could be used to blow the track clear prior to closing the damper.

E. Recommendations

Recommend compressed air be installed on the existing damper tracks to reduce the amount of leakage to an acceptable level. If leakage is still excessive, recommend double guillotine dampers be installed.

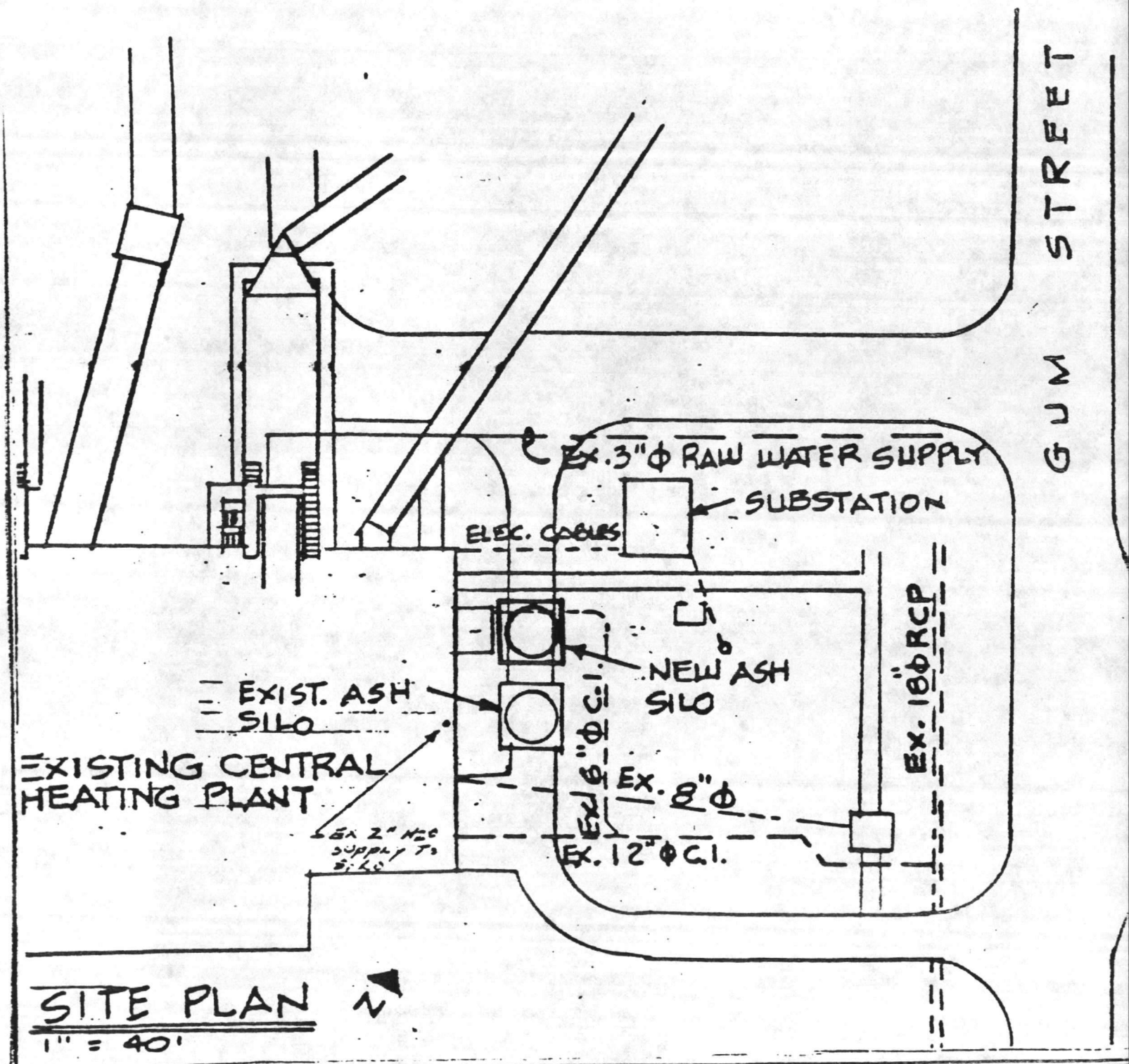
Installation of a double guillotine damper will eliminate the flyash from entering the hopper and prevent any plugging due to rain. No additional adverse effects should be produced such as would be experienced with any of the alternatives investigated to prevent rain from entering the stacks.



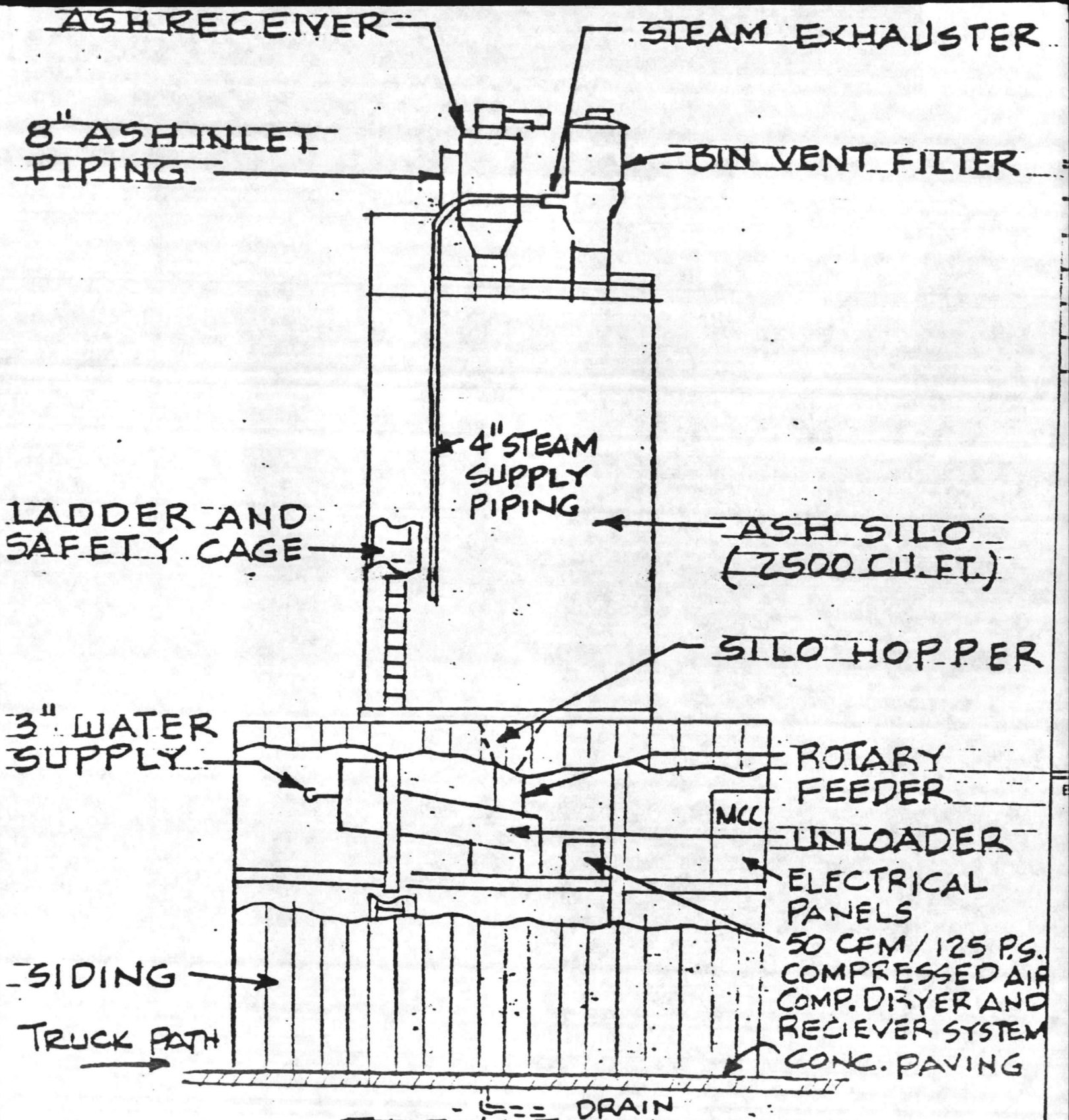
SITE PLAN

1" = 30' APPROX.

Attachment (d)



3. EXISTING FACILITY INFORMATION ON ALTERATION, REHAB, EXPANSION PROJECTS AND DEMOLITION



ELEVATION
NEW ASH SILO

'STING FACILITY INFORMATION ON ALTERATION, REHAB, EXPANSION PROJECTS AND DEMOLITION

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		3 NOV 1986

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
MARINE CORPS BASE CAMP LEJEUNE, N.C.	FLY ASH CONTROL SYSTEM BUILDING 1700

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
	821-09	P-829	570

9. COST ESTIMATES

Escalation 9% ITEM Escalation to 1 April 1989	U/M	QUANTITY	UNIT COST	COST ($000)
Fly Ash Silo System	LS			513
Fly Ash Silo System	LS			(513)
SUBTOTAL				513
CONTINGENCY (5%)				26
TOTAL CONTRACT COST				539
SUPERVISION, INSPECTION AND OVERHEAD (5.5%)				30
TOTAL BUDGET COST				569
TOTAL REQUEST ROUNDED				570
EQUIPMENT PROVIDED FROM OTHER APPROPRIATIONS (Non-Add)				0

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Provide a fly ash handling and storage system for electrostatic precipitation (ESP) fly ash at the Central Heating Plant, Building 1700. Construction/ modifications to include ash transfer equipment for ESP's' separate fly ash silo and ash unloading facilities to enhance future recycling options and air pollution controls during handling; runoff controls; and auxiliary equipment.

11. REQUIREMENTS:

PROJECT: Provide fly ash control system for the Central Heating Plant, Building 11700.

REQUIREMENT: To correct excessive fly ash dust problem, as recommended by LANTDIV's Investigation of Ash Collection and Disposal System at the Central Heating Plant, Building 1700, MCB, Camp Lejeune, NC dated December 1982.

CURRENT SITUATION: Fly ash dust has become a serious maintenance problem to controls and equipment in the Central Heating Plant, as well as an environmental hazard.

IMPACT IF NOT PROVIDED: Continued frequent maintenance of controls and equipment, and prolonged environmental risk to health and safety of operational personnel.

☆ U.S. Government Printing Office: 1984—705-012/17914 2-1

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		3 NOV 1986

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System - Building 1700	P-829

SPECIAL CONSIDERATIONS

1. Pollution Prevention, Abatement, and Control: This project will not cause additional air or water pollution.

2. Flood Hazard Evaluation: Requirements of Executive Order No. 11296 (Flood Hazards) are not applicable.

3. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

4. Fallout Shelter Construction: Not applicable.

5. Design for Accessibility of Physically Handicapped Personnel: Provisions for physically handicapped personnel are not required in this facility.

6. Preservation of Historical Sites and Structures: The project facilities do not directly or indirectly affect a district, site, building, structure object, or setting which is listed in the National Register or otherwise possesses a significant quality of American history.

BUILDING BUDGET ESTIMATE SUMMARY SHEET FOR P- 829

Title: Fly Ash Control System Bld 1700 Costs Escalated to: 1 APRIL 1989

Location: Camp Lejeune, North Carolina Escalation: 9%

Prepared by: Larry Harrison Date: 3 Nov 86 Contingency: 5%

~~Building~~ Facility	$/SF	$/SYS	SYS QUAN	TOTAL	BUILDING	BUILT-IN EQUIPMENT
Ash System		LS	LS	340400	340400	
Steam Pipe		74.67/LF	150 LF	11200	11200	
Drain Pipe		LS	LS	21200	21200	
Compressed AIR		39.64/LF	275 LF	10900	10900	
Electrical		3158 LF	2400 LF	75800	75800	
Roadway / Platform		416.07/SY	112 SY	46600	46600	
Water Piping		30.67/LF	225 LF	6900	6900	
Subtotal Building					513000	
Supporting Facilities						
Subtotal Supporting Facilities						

Total Contract Cost w/o Contingency:	$ 513000
Contingency 5 %	$ 26000
Total Contract Cost	$ 539000
SIOH 5.5 %	$ 30000
Total Budget Cost	$ 569000
Rounded	$ 570000

*Asterisk indicates these totals on 1391s.

COLLATERAL EQUIPMENT REQUIREMENTS (Initial Outfitting)
LANTDIV NORVA 4-11010/6 (Rev.11/81)

DATE: 3/NOV/86

1. ACTIVITY (Name and Location)
MARINE CORPS BASE CAMP LEJEUNE, NC

2. PROJECT TITLE
Fly Ash Control System, Building 1700

P. NO. 829

COG. SYMBOL AND FED. STOCK NO. OR OTHER SOURCE	ITEM/EQUIPMENT DESCRIPTION	QUANTITY	UNIT OF ISSUE	UNIT PRICE	TOTAL COST
1. Built-in Equip to be MCON Funded	NONE				
2. Expense ITEMS	NONE				
3. INVESTment ITems	NONE				
4. APA EQUip	NONE				
5. TRAINING EQUIP.	NONE				
6. OTHER Expenses	NONE				
7. EQUIP. on HAND	NONE				

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System - Building 1700	P-829

SPECIAL CONSIDERATIONS

1. Pollution Prevention, Abatement, and Control: This project will not cause additional air or water pollution.

2. Flood Hazard Evaluation: Requirements of Executive Order No. 11296 (Flood Hazards) are not applicable.

3. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

4. Fallout Shelter Construction: Not applicable.

5. Design for Accessibility of Physically Handicapped Personnel: Provisions for physically handicapped personnel are not required in this facility.

6. Preservation of Historical Sites and Structures: The project facilities do not directly or indirectly affect a district, site, building, structure object, or setting which is listed in the National Register or otherwise possesses a significant quality of American history.

S/N 0102-LF-001-3915 ☆ U.S. Government Printing Office: 1983—705-012/7189 2-1

1. COMPONENT	FY 19_89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

FACILITY STUDY

1. Project: This project provides a means of controlling the extisting execessive dust problem at the Central Heating Plant in Hadnot Point.

2. Current and Planned Future Workload with regard to this Project: Over one billion pounds of steam is produced annually at the Central Heating Plant, creating residue of bottom ash and fly ash.

3. Description of Proposed Construction:

   a. Type of Construction: Permanent.

   b. Replacement: Not applicable.

   c. Description of Work to Be Done:

      (1) Primary Facility: This project will consist of construction/modifications of ash transfer equipment for electrostatic precipitators; separate fly ash silo with tie-in to existing silo for backup capability when one silo breaks down; ash loading facilities; air pollution controls; and auxiliary equipment.

      (2) Energy Conservation: Although the proposed project will not directly contribute to savings in energy, it will indirectly contribute to conserving oil yearly by alleviating ash residue build-up which causes equipment breakdown, at which times more expensive oil must be burned instead of coal. Further, a separate silo to handle precipitator ash would create a possibility of selling fly ash to a private concrete company. This would eliminate costs associated with hauling and land-filing of the fly ash.

      (3) Collateral Equipment: Not applicable.

4. Cost Estimate: The Area Construction Index for Camp Lejeune is .95, with a contingency factor of 10 percent. This data is applicable to FY-83. Cost data derived from LANTDIV's Investigation of Ash Collection and Disposal System at the Central Heating Plant dated December 1982, and escalated to FY-89.

1. COMPONENT	FY 19 89 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

5. Justification for Project and Scope of Project:

a. Justification for Project.

(1) Project: The proposed project will provide a separate fly ash silo and unloader.

(2) Requirement: A separate silo and unloader to handle precipitator fly ash is required to control the exiting excessive fly ash problem.

(3) Current Situation: Both bottom ash and fly ash are now stored in the same silo, mixing the lighter fly ash with the heavier bottom ash. Upon unloading, excessive dust escapes into the atmosphere. Fly ash dust has become a seriour maintenance problem to controls and equipment in the Central Heating Plant, as well as an environmental hazard to the health and safety of operational personnel.

(4) Impact if Not Provided: Continued frequent maintenance of controls and equipment, and prolonged environmental risk to health and safety of operational personnel.

b. Justification for Scope of Project: The scope of this proposed project is that recommended by the investigative report cited in paragraph 4 above. The report's recommendation will satisfy North Carolina Air Pollution Control Guidelines, 15 NCAC 2D.

6. Equipment Provided from Other Appropriations: None.

7. Common Support Facilities: Ther are no common support facilities available that can satisfy.

8. Effect on Other Resources: This project will not require additional funding for utilities services and operations, nor will additional operating personnel be required.

9. Siting of the Project: See Site Location Map, enclosure (1).

10. Other Graphic Presentations, including Photographs: None.

1. COMPONENT	FY 1989 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
Marine Corps		15 Sept 1986

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
Fly Ash Control System, Building 1700	P-829

11. Economic Analysis: The proposed project produces no direct economic benefits, but rather it insures compliance with environmental regulations.

12. Environmental Impact: A Preliminary Environmental Assessment (PEA) will be written and forwarded under separate correspondence. This proposed project will actually enhance the environment, as it will curtail air pollution.

13. Quantitative Data: Not applicable. This project is to correct potential environmental hazards to the local ecology and ecosystems, as well as operational personnel.

LANTDIVINST 11019.2D
12 FEB 1982

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT INFORMATION

MEDIA: AIR EFD: LANT UIC: M62470
PROJECT NO.: P-829

+ PROJECT NAME: FLY ASH CONTROL EQUIPMENT - BUILDING 1700

FACILITY: MARINE CORPS BASE
ADDRESS: AC/S, FACILITIES, CAMP LEJEUNE, NC 28542
AGENCY CONTACT: MR. BOB ALEXANDER, ENVIRONMENTAL ENGINEER, AV 484-3034

FUND CMD: CMC APPN: ~~MCMCP~~
STATUS: PP

INTERNAL PROJECT NUMBER: P-829

+ COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS:

FY	DESIGN	FUNDED	CONSTR	FUNDED
84	?	NO	?	NO

TOTAL COST: ?

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START):		
DESIGN (COMPLETION):		
CONSTR (START):		
CONSTR (COMPLETION):		
FINAL COMPLIANCE:		
REG FINAL COMPLIANCE:		

+ CONGRESSIONAL AUTHORITY DATES: MCON +

	(MO / YEAR)
SCHEDULED:	
REQUESTED:	
RECEIVED:	
35% DESIGN COMPLETION	

+ OTHER PCR DATES +

APPROVED:
PREPARED: 1AUG 83
REVISED: 8 DEC 85

+ INFO FOR NEESA USE +

POLLUTANT CATEGORY
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS

PRIORITY
VARIOUS LOCATIONS
MAJOR REVISION
LEGAL ACTION CODE
LEGAL CITATION

LANTDIVINST 11019.2D
12 FEB 1982

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT INFORMATION

MEDIA: AIR EFD: LANT UIC: M62470
PROJECT NO.: P-829

+ PROJECT NAME: FLY ASH CONTROL EQUIPMENT - BUILDING 1700 +

1. PROBLEM STATEMENT

0001 FUGITIVE FLY ASH EMISSIONS ARE GENERATED DURING THE
0002 SILO UNLOADING OF THE ASH HANDLING AND STORAGE SYSTEM.
0003 THE PROBLEM IS COMPOUNDED BY COMBINED USE OF FACILITES
0010 FOR BOTTOM ASH AND FLY ASH HANDLING. VISIBLE EMISSIONS ARE
0020 RECURRENT AS WELL AS THE CREATION OF HEALTH AND SAFETY PROBLEMS
0030 FOR OPERATIONAL PERSONNEL.
0040
0050

2. REMEDIAL ACTION

0001 IN DECEMBER 1982 THE LANTNAVFACENCOM DESIGN DIVISION
0002 RECOMMENDED THE INSTALLATION OF A SEPARATE FLY ASH
0003 HANDLING AND STORAGE SYSTEM FOR THE ELECTROSTATIC
0010 PRECIPITATION (ESP) FLY ASH. FACILITIES TO BE MODIFIED/
0020 CONSTRUCTED INCLUDE ASH TRANSFER EQUIPMENT FOR ESP'S, SEPAFATE
0030 FLY ASH SILO, ASH LOADING FACILITIES TO ENHANCE FUTURE RECYCLING
0040 OPTIONS, AIR POLLUTION CONTROLS DURING HANDLING, RUNOFF CONTROLS,
0050 AND AUXILLIARY EQUIPMENT.

3. APPLICABLE STANDARDS

0001 NORTH CAROLINA AIR POLLUTION CONTROL GUIDELINES,
0002 15 NCAC 2D.
0003
0010
0020
0030
0040
0050

4. OTHER PCR INFORMATION

0010
0020
0030
0040

8/16/8
Copy to
LAC

INVESTIGATION OF

ASH COLLECTION AND DISPOSAL SYSTEM,

HIGH DUST LOADING IN BREECHING,

AND BYPASS STACK CAPS

AT THE

CENTRAL HEATING PLANT, BUILDING 1700

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

DECEMBER 1982

DESIGN DIVISION
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGNIA 23511

PREPARED BY:

R. W. TISDALE, JR.
MECHANICAL ENGINEER

I. Investigation of Ash Collection and Disposal System

A. Description of System

The ash collection and disposal system at the central heating plant was installed as a part of the original plant construction in the early 1940's. The system is of the dry pneumatic vacuum conveying type with a vertical storage silo and was manufactured by United Conveyor Corporation. A two stage steam ejector produces vacuum on the conveying system. Ash from the silo is loaded into open bed dump trucks by means of a rotary feeder and horizontal screw conveyor with water conditioning.

B. Major Modifications to Original System

Within the past five years, several modifications have been made to the original ash system. A new two stage steam ejector and a new rotary feeder and unloader have been installed to replace the original components. Additional ash collection piping has also been installed for transporting fly ash collected from two new electrostatic precipitators. No other major modifications are known to have been made to the original ash system.

C. System Operation

The original function of the ash system was to remove and temporarily store ash generated from the operation of four 100,000 pound per hour pulverized coal fired steam boilers. Ash was collected from the boiler, air preheater, mechanical collectors and stack hoppers, transported through the vacuum conveying system and stored in the silo (see figure 1). Stored ash was then unloaded into open dump trucks for hauling to the base landfill for disposal. Based on conversations with plant personnel, no undue problems were experienced with the removal and disposal of ash until the electrostatic precipitators were added. The methods of collecting, storing, removing and disposing of the ash have remained basically unchanged, however problems have been encountered since flyash collected by the precipitators have been added to the system.

D. Operational Problems Incurred

Since the flyash has been added to the system, the rate of ash flow from the silo through the rotary feeder and unloader has become very inconsistent. As a result of continuous variations in ash flow, proper water conditioning cannot be maintained. Operating personnel have been manually readjusting water flow in an attempt to provide proper mixing with limited success. During severe changes in ash flow, either a "water rich" or "water lean" mixture passes through the unloader outlet. As ash flow reduces suddenly due to large clinkers being unloaded, excessive water totally saturates the ash previously unloaded. In addition, the excess water drains from the truck creating additional water pollution problems at the silo as well as a nuisance during

transport. When ash flow suddenly surges due to fine precipitator ash being unloaded, unconditioned ash is discharged with the unwetted particles becoming airborne. These dust clouds have been severe at times, creating a nuisance to surrounding facilities. This dust eventually settles and creates additional water pollution problems in the area storm drainage system. Unconditioned ash that does fall into the truck also has a tendency to become airborne during transport and dumping, creating additional nuisances.

E. Probable Cause

The primary cause of the problems experienced in unloading and disposing of the ash stems from the variations in particle size of the ash being unloaded. The variations in flow are caused by the smaller particles being more densely packed when passing through the rotary feeder. In addition, the surface area of the smaller particles per unit volume is greater and requires more water for wetting. One other possible problem is that the charged particles collected by the precipitator may have a greater surface tension reducing the wetting capability.

F. Possible Solutions

Several possible solutions to reduce or eliminate the problems being experienced were investigated. These possible solutions and their probable effects on the system are as follows:

1. Install aeration blocks and diverter core in the ash storage silo to provide better mixing of different size particles.

   This solution may lessen the extreme variations in flow but will not resolve the problem of wetting the fine particles. The ash is segregated in the silo due to the ash being pulled from only one hopper at a time with resulting layers of ash of a particular size in the silo. Mixing at the outlet probably would have only minimum effects on the problems.

2. Install an air operated valve on the water conditioning line in lieu of a manual valve.

   An air operated valve may increase response time but will not resolve the variations in flow and the wetting problem.

3. Utilize a surfactant to provide better wetting of the finer particles.

   Wetting agents have met with limited success and do not totally resolve the problem of variations in flow. Wetting agents may help improve the wetting of the fine ash but variations in ash flow will probably minimize the improvement.

4. Install a rotary unloader designed to handle fine particles.

A rotary unloader such as the Model D-40 manufactured by Allen, Sherman, Hoff (see figure 2) would probably provide better mixing and wetting of fine particles but the variations in flow may continue to cause some minor problems. Initial cost of the unloader would be approximately $40,000.00.

5. Install a separate ash system for the precipitators.

A separate silo and unloader to handle fine ash from the precipitators separately should resolve the major problems currently being experienced. (See figures 3 and 4) By separating the fine ash from the larger particles, each system would be handling ash of similar size and consistency. Variations in flow due to particle size should be minimized. The rotary feeder and unloader could be selected to handle fine material and could be set up to properly condition fine material only. The major drawback to this solution is initial cost. A separate system would cost approximately $350,000.00.

6. Install a dust collector system to control dust emissions in the unloader outlet.

A dust suppression and collection system could be installed on the unloader outlet to contain any dust emissions. This system would probably effectively contain fugitive dust but would not affect overwetting due to variations in flow. In addition, fine particles would only be recirculated and may only build up within the silo.

G. Additional Considerations

Interest has been expressed by the activity to sell the precipitator ash to local private businesses. If the ash can be easily sold, plant personnel would be required to dispose of approximately two thirds of the ash presently handled. However, the precipitator ash would have to be handled separately and a separate silo required.

H. Recommendations

The only solution investigated that will probably solve all of the current problems would be to install a separate ash system, silo and unloader for the precipitators. The separate system would also allow sale of the flyash if desired. The major drawback to this solution is the initial cost of $350,000.00.

II. Investigation of High Dust Loading in Breeching

A. Description of System

Each of the two new precipitators is connected to two existing coal fired boilers. The arrangement of the new breeching is shown in figure 5. The common breeching was designed for a velocity of 30 feet per second assuming two boilers operating at full load. The transition into the precipitator was designed to provide a maximum velocity of 5 feet per second assuming two boilers at full load. Turning vanes and ladder vanes in the transitions and a perforated plate at the precipitator inlet were installed to provide equal air distribution into the precipitator.

B. Operational Problems Incurred

During normal operation, flue gas to the precipitator varies from one fourth to maximum design velocity. When the velocity reduces , ash falls out in the duct and on the ladder vanes. Some vanes near the top and bottom fill to where the opening becomes almost totally blocked. In addition, ash falls out and accumulates at the base of the inlet transition to the precipitator along the walkways. These ash buildups cause unequal velocity distribution through the precipitator as well as emissions when the velocity suddenly increases. The accumulated ash on the walkway also causes problems when entry into the precipitator is required for maintenance.

C. Recommendations

A team from the Navy Energy and Environmental Support Activity was requested to investigate the ash build up problems and to determine the velocity distribution through the precipitator. Site investigations were made in August 1980 and September 1981. Recommendations contained in the final report of February 1982 include removal of an 8 inch section at the bottom of the inlet perforated plate and the addition of a sonic sootblower to keep the inlet vanes free. Removal of the 8 inch section of the plate and installation of the sonic sootblowers are recommended and should alleviate the ash buildup problems at the precipitator inlet. Ash buildup in the inlet duct is not considered a major problem and should have no serious adverse effects on the system operation.

III. Investigation of Stack Caps

A. Description of System

The original boiler arrangement had flue gas breeching from each boiler passing vertically through the roof and connecting to to individual roof mounted stacks through a 90° transition. Each stack had a hopper at its base that was connected to the flyash collection system piping. No interconnections occurred between boilers.

B. Modifications to Systems

When electrostatic precipitators were added to the boilers, the flue gas breeching from two boilers were connected and a single duct routed to a common precipitator and ground mounted stack. The original breeching and roof mounted stacks were retained for use as a bypass. Two single blade guillotine dampers were installed on each boiler, one at the connecting to the old stack and one in the new breeching prior to connecting with the second boiler. This arrangement allowed isolation from the old stack or the new precipitator as required.

C. Operational Problems

Leakage has occurred past the bypass stack guillotine damper ever since the initial operation. The leakage could be caused by or significantly increased from ash accumulating in the damper seating track. Leakage of flue gas results in flyash accumulating in the bypass stack hopper and emissions occurring from the bypass stack. Whenever rain occurs, the ash in the hopper is wetted and hardens. Plant personnel are then required to manually remove the material to free the hopper outlet.

D. Possible Solutions

The possible solutions investigated are as follows:

1. External stack caps:

   The use of external stack caps which are generally limited to small boilers are not considered an acceptable solution. In order to be effective, the cap must be larger in diameter than the stack by one half and must be located above the stack at the height of one half the stack diameter when located to effectively block out the rain, the stack cap will create a downdraft around the plant. The resulting fumigation problem will not be acceptable. If the rain cap is designed to minimize the fumigation problem, the effectiveness of preventing rain from entering the stack will be greatly reduced.

2. Internal stack damper:

Use of a damper similar to a butterfly damper (see figures 6 & 7) investigated. Due to wind loading, the damper must be located inside the existing stack or within an extension to the stack. This arrangement would require a platform mounted on the existing stack or an extended operator drive from the base of the stack. The addition of a platform to the existing stack was not recommended structurally and extended drive mechanisms would probably not be reliable. From a maintenance standpoint, this solution would be no better than the current situation.

3. Double bladed guillotine damper:

Installation of a double bladed guillotine damper with compressed air pressurizing the space between the blades, should prevent leakage into the bypass stack. This alternative should prevent flyash from entering the stack hopper and therefore eliminate the problem. The initial cost for installing these dampers is estimated to be $150,000.00.

4. Install baffles and drainage trough in stack:

Installation of baffles and collection trough in the stack were investigated and determined to be ineffective. This solution would add additional draft loss and would plug up with flyash.

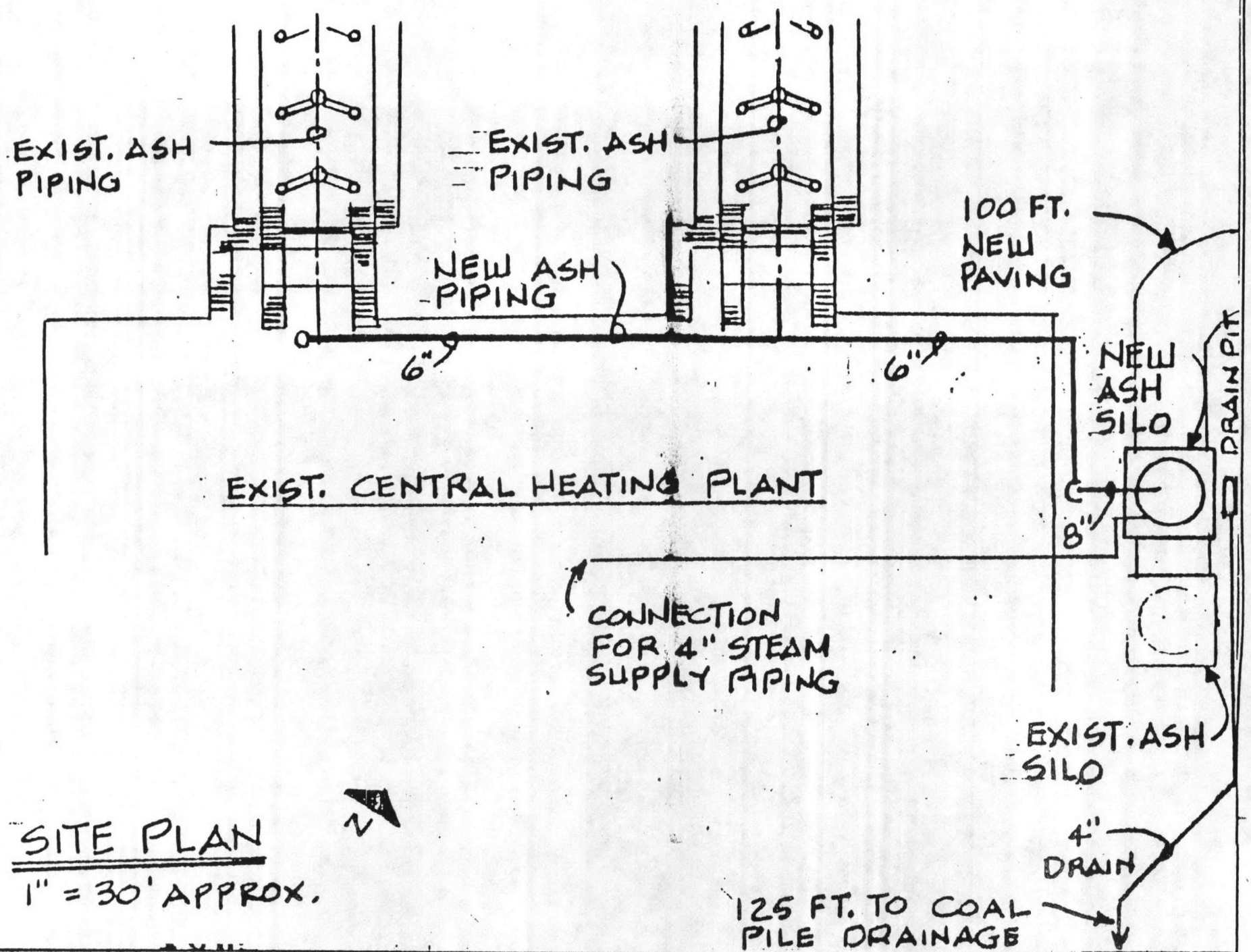
5. Install compressed air on existing dampers:

Installation of a compressed air manifold along the seating track of the damper may keep the dust from allowing the damper to seal properly. Compressed air could be used to blow the track clear prior to closing the damper.

E. Recommendations

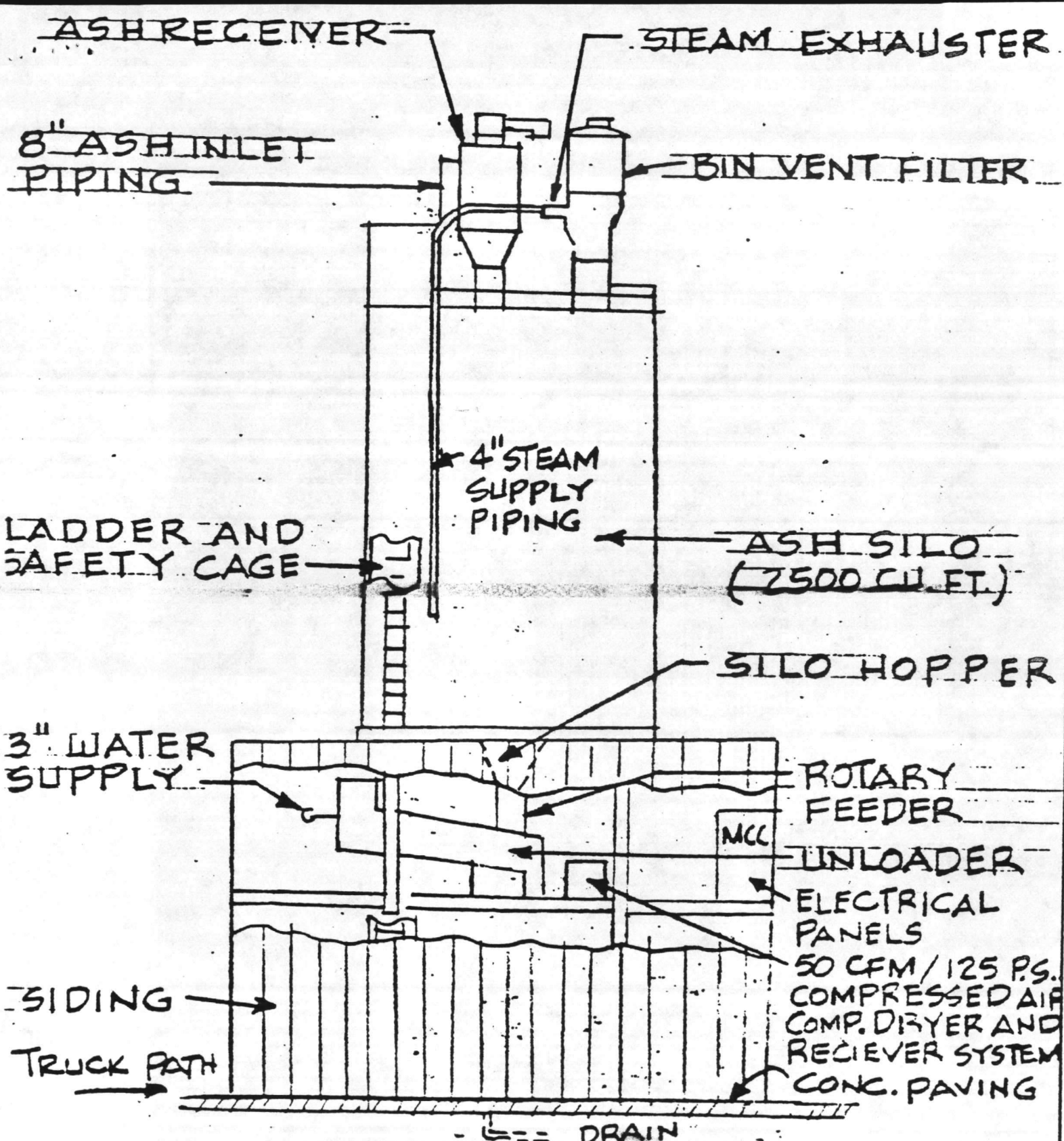
Recommend compressed air be installed on the existing damper tracks to reduce the amount of leakage to an acceptable level. If leakage is still excessive, recommend double guillotine dampers be installed.

Installation of a double guillotine damper will eliminate the flyash from entering the hopper and prevent any plugging due to rain. No additional adverse effects should be produced such as would be experienced with any of the alternatives investigated to prevent rain from entering the stacks.

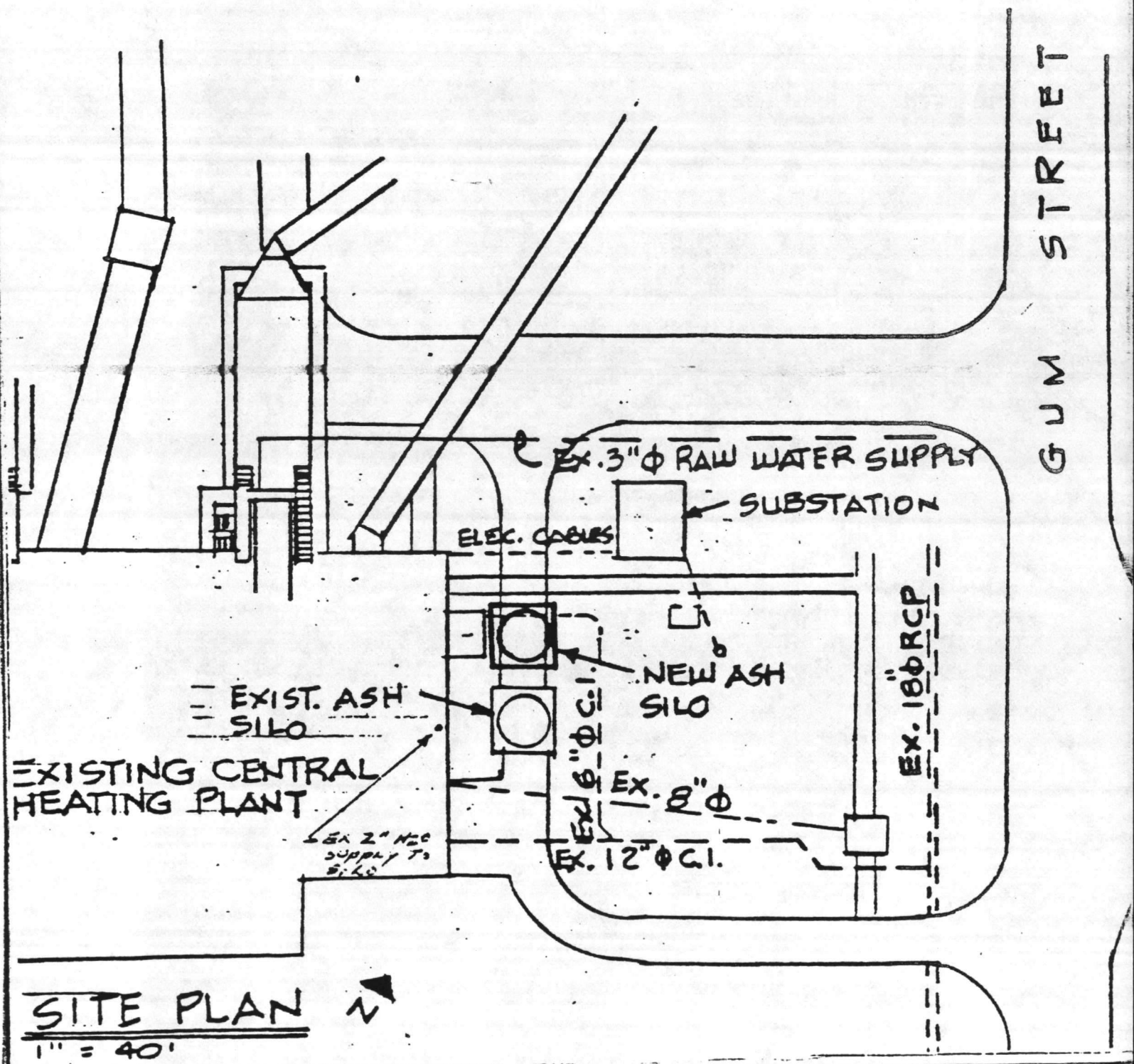


SITE PLAN

1" = 30' APPROX.



ELEVATION
NEW ASH SILO



EXISTING FACILITY INFORMATION ON ALTERATION, REHAB, EXPANSION PROJECTS AND DEMOLITION

BUILDING BUDGET ESTIMATE SUMMARY SHEET FOR P- 829

Title: Fly Ash Control System Bld 1700 Costs Escalated to: 1 APRIL 1989

Location: Camp Lejeune, North Carolina Escalation: 9%

Prepared by: Larry Harrison Date: 3 Nov 86 Contingency: 5%

	$/SF	$/SYS	SYS QUAN	TOTAL	BUILDING	BUILT-IN EQUIPMENT
~~Building~~ FACILITY						
Ash System		LS	LS	340400	340400	
Steam Pipe		74.67/LF	150 LF	11200	11200	
Drain Pipe		LS	LS	21200	21200	
Compressed AIR		39.64/LF	275 LF	10900	10900	
Electrical		31.58/LF	2400 LF	75800	75800	
Roadway / Platform		416.07/SY	112 SY	46600	46600	
Water Piping		30.67/LF	225 LF	6900	6900	
Subtotal Building					513000	
Supporting Facilities						
Subtotal Supporting Facilities						

Total Contract Cost w/o Contingency:	$ 513000
Contingency 5 %	$ 26000
Total Contract Cost	$ 539000
SIOH 5.5 %	$ 30000
Total Budget Cost	$ 569000
Rounded	$ 570000

*Asterisk indicates these totals on 1391s.

P-829

UNITED STATES MARINE CORPS
Marine Corps Base
Camp Lejeune, North Carolina 28542-5001

IN REPLY REFER TO:
11010
PWO

From: Commanding General, Marine Corps Base, Camp Lejeune
To: Commander, Atlantic Division, Naval Facilities Engineering Command (Code 114), Norfolk, VA 23511-6287

Subj: POLLUTION ABATEMENT (PA) MCONS

Ref: (a) COMLANTNAVFACENGCOM ltr 6280 1142DPG dtd 23 Jul 85
(b) CG, MCB, CLNC ltr PWO 11000 dtd 16 Aug 85

1. In response to reference (a), the following projects were submitted by reference (b) for the FY-89 Program:

P-822: Salvage Fuel Boiler
P-829: Fly Ash System
P-845: Oil Spill Control

2. Request that P-782, "Culverts" be cancelled.

3. For further information, contact Mr. E. G. Jones, Jr. at AV 484-1833.

R. A. TIEBOUT
By direction

Blind Copy to:
Fac
EnvirEngr
Maint

typed
8-16-85

P-829

PWO
11000

From: Commanding General, Marine Corps Base, Camp Lejeune
To: Commandant of the Marine Corps (Code LFF)
Via: (1) Commander, Atlantic Division, Naval Facilities Engineering Command, Norfolk, VA 23511 (Code 09A21B3)
(2) Commander, Naval Facilities Engineering Command, 200 Stovall St., Alexandria, VA 22332

Subj: POLLUTION ABATEMENT PROGRAM, ENERGY CONSERVATION INVESTMENT (ECIP) PROGRAM, AND NAVY OCCUPATIONAL SAFETY AND HEALTH (NAVOSH) DEFICIENCY ABATEMENT PROGRAM; SUBMISSION OF FY-89 PROJECTS

Ref: (a) CMC ltr 11000/LFF-1 dtd 5 Apr 1985
(b) MCO P11000.12B
(c) NAVFACINST 11010.32F

Encl: (1) Pollution Abatement Project Package for P-822, Refuse Burning Supplemental Steam Plant; Consisting of DD Form 1391/1391C and Site Location Map, all dtd 15 Aug 85
(2) Pollution Abatement Project Package for P-829, Fly Ash Control System (Bldg. 1700); Consisting of DD Form 1391/1391C and Site Location Map, all dtd 15 Aug 85
(3) Pollution Abatement Project Package for P-845, Oil Spill Control (Bldg. 1450); Consisting of DD Form 1391/1391C and Site Location Map, all dtd 15 Aug 85
(4) Navy Occupational Safety and Health (NAVOSH) Deficiency Abatement Project Package for P-864, Provide Exterior Stairways; Consisting of DD Form 1391/1391C with NAVFAC Form 11013/7 and Site Location Map, all dtd 15 Aug 85

1. References (a) through (c) provided detailed guidance for submission of subject programs. Accordingly, enclosures (1) through (3) submits three pollution abatement projects and enclosure (4) submits one NAVOSH project. This Command has a negative response at this time for ECIP projects.

2. By copy of this letter, the Atlantic Division, Naval Facilities Engineering Command is requested to certify the cost of all projects to the Commander, Naval Facilities Engineering Command.

R. A. TIEBOUT
By direction

Copy to:
CMC (LFF) (Advance)
NAVFACENGCOM (Advance)

Subj: POLLUTION ABATEMENT PROGRAM, ENERGY CONSERVATION INVESTMENT (ECIP) PROGRAM, AND NAVY OCCUPATIONAL SAFETY AND HEALTH (NAVOSH) DEFICIENCY ABATEMENT PROGRAM; SUBMISSION OF FY-89 PROJECTS

Blind Copy to:
FAC (2)
Maint
Fire Dept (encl (4) only)
LANTNAVFACENGCOM (Code 114)
LANTNAVFACENGCOM (Code 408)

Writer: E.G. JONES
Typist: dkh, Ext 1833, 14 Aug 85

PLANNING BRANCH ACTION CHIT

LOGGED BY: Mary ON: 7/7/83

EGJ

BJD

File P-829

ACTION GIVEN TO:

DEPARTMENT OF THE NAVY SELF-DUPLICATING NOTE

Use only for an informal, preferably hand-written note. Make duplicate only when required for follow-up or working file. See correspondence manual for formal, official memoranda.

TO: PWO (Planning)

☒ ACTION	☐ COORDINATE	☐ PREPARE FOR SIGNATURE
☐ AS DISCUSSED	☐ CORRECTION	☐ REPORT BACK
☐ CALL/SEE ME	☐ INFORMATION	☐ RETURN
☐ COMMENT/CLEAR	☐ PREPARE DRAFT	☐

Please prepare Pollution Abatement Project for item 1C Attached.

According to 11000.12B & Guidance letter QA. Projects May be Submitted as Required Rather than on a Due-Date.

Coord w/ Fred Cone - he has Corresp from LANT Div Recommending we Build a Fly Ash Silo

VR

RECEIVED 0 JUL 1983

FROM: A.L. Austin

DATE: 30 Jun 83

EXT. 3034

OPNAV 5216/142 (Rev. 5-74) S/N 0107-LF-778-7110 ☆ U.S. Government Printing Office: 1982—505-106/8666 2-1

27 JUN 1983

FAC ROUTING	ACTION	INFO	INT
FACO			
4..			
4 B			
4 C			
4 D			A
4 E			
4 FC			
4 LC			
SEC			
CLK			

MR Alexander
1. Have Austin get PWO on project
2. Do we owe anyone a reply?
NO
AnM

BASE MAINTENANCE DIVISION
Marine Corps Base
Camp Lejeune, North Carolina 28542

MAIN/FEC/shk
6280
JUN 2 7 1983

From: Base Maintenance Officer
To: Assistant Chief of Staff, Facilities

Subj: N. C. Air Pollution Regulations; compliance with

Ref: (a) AC/S FAC ltr FAC/REA/el 6280 of 10 June 1983
(b) Division of Environmental Management (DEM) meeting of 21 April 1983 at MCB, Camp Lejeune

Encl: (1) Grainger Laboratories Analysis of 10 June 1983

1. As requested by reference (a), the following information is provided:

a. As a follow-up to reference (b), Base Maintenance sent samples of #2 and #6 fuel oils to Grainger Laboratories for analysis. The results are provided in the enclosure. Mr. Don Finney (DSSC) is presently determining what action is required to have the supplier provide a fuel analysis with each shipment. Base Maintenance will periodically sample and analyze the fuel oil if the supply contract for this year cannot be modified to include providing a fuel analysis.

b. Mr. Greg McLawhorn (State of North Carolina) will be holding a training session on visible emission reading at Wilmington on 3 August 1983. He is forwarding information regarding the class. Base Maintenance will send approximately ten operators to the training class. Additional operators will be provided training in future classes.

c. Base Maintenance concurs with LANTDIV's recommendation to install a separate flyash collection and storage system for the following reasons:

(1.) A separate silo will correct the excessive dust problem that presently exists at building 1700. Besides being an environmental problem, the dust has become a serious maintenance problem to controls and equipment in the plant.

(2.) An additional silo could be designed to provide back-up ash handling capacity in the event one silo was down for repair. The existing silo is a high maintenance item that is subject to continual repair. Without ash handling capability (when the silo or unloader is inoperable) the plant must be fired on #6 fuel oil which is approximately 2.5 times as expensive to burn.

(3.) With the installation of a separate silo to handle precipitator ash, the possibility of selling flyash to a private concrete company in the

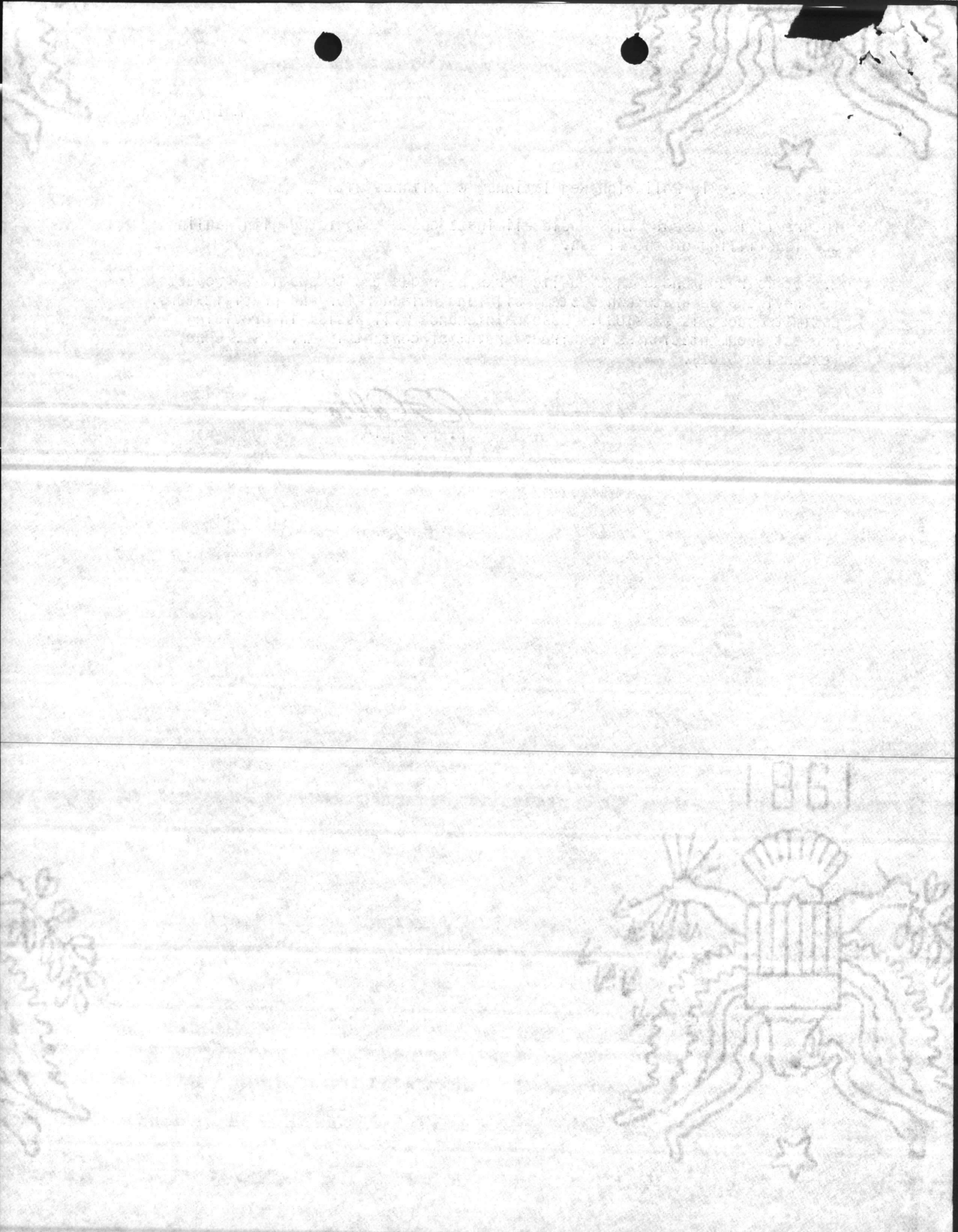
MAIN/FEC/shk
6280

Subj: N. C. Air Pollution Regulations; compliance with

future is increased. This would eliminate costs associated with hauling and landfilling of the flyash.

2. It is recommended that Public Works be requested to submit a project to provide a separate ash system, silo and unloader for the precipitators. Estimated cost is $350,000. Base Maintenance will assist in providing project documentation as required. Point of contact is Mr. F. E. Cone (extension 5161).

R. F. CALTA


1861

MAIN/FEC/shk
6280
JUN 27 1983

From: Base Maintenance Officer
To: Assistant Chief of Staff, Facilities

Subj: N. C. Air Pollution Regulations; compliance with

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MAIN/FEC/shk
6280

Subj: N. C. Air Pollution Regulations; compliance with

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R. F. CALTA

See enclosure #1

para 6g

Project ??

UNITED STATES MARINE CORPS
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA 28542

FAC/REA/el
6280
21 JUN 1983

N. C. Department of Natural Resources
and Community Development
Division of Environmental Management
Wilmington Regional Office
Attn: Mr. Charles Wakild
7225 Wrightsville Avenue
Wilmington, NC 28403

Re: Air Pollution Source Registration
and Permits

Dear Mr. Wakild:

On 21 April 1983, Messrs. Ronald Edwards and Bill Cochrane of your staff met with Mr. Michael Davenport, of the Atlantic Division, Naval Facilities Engineering Command and personnel from Marine Corps Base, Camp Lejeune (MCB CAMP LEJEUNE) to discuss air pollution source registration, Navy Air Pollution Source Information System (NAPSIS) and air pollution permits.

The items discussed and agreements reached are presented in enclosure (1). Further, MCB CAMP LEJEUNE plans to submit the NAPSIS to you by July 1983. The air permit application submittals are planned for in three phases.

The tentative schedule is as follows:

Phase	Location	Date
I	Courthouse Bay and Hadnot Point	Sep. 1983
II	Marine Corps Air Station and Camp Geiger	Oct. 1983
III	All remaining areas	Nov. 1983

Thank you for your assistance in air pollution registrations and permits at MCB CAMP LEJEUNE.

Sincerely,

J. T. MARSHALL
Colonel, U. S. Marine Corps
Assistant Chief of Staff, Facilities
By direction of the Commanding General

Encl: (1) LANTNAVFACENGCOM Memo
114:HMD:gmc 11300 of 17 May 83

Copy to:
CMC (Code LFF-2)
LANTNAVFACENGCOM (Code 114)

Blind copy to:
PWO
BMO
NREAD

(804) 444-9591

114:HMD:gmc
11300

1 7 MAY 1983

MEMORANDUM FOR FILE

Via: (1) Code 114
(2) Code 11

Subj: North Carolina Department of Natural Resources and Community Development, Division of Environmental Management (DEM) meeting of 21 April 1983 at MCB CAMP LEJEUNE

Encl: (1) Agenda of subject meeting

1. The following personnel were in attendance at the subject meeting:

a. Marine Corp Base, Camp Lejeune Facilities Command
Mr. B. Alexander, Environmental Engineer
Mr. J. Wooten, Natural Resources Director
Mr. D. Sharpe, Ecologist

Base Maintenance Division
Mr. F. Cone, Utilities Director
Mr. D. Southerland, Assistant Utilities Director

b. U. S. Navy LANTNAVFACENGCOM
Mr. M. Davenport, Environmental Engineer

c. North Carolina DEM, Wilmington Region
Mr. R. Edwards, Environmental Technician
Mr. B. Cochrane, Environmental Engineer

2. In response to the items discussed in enclosure (1):

a. Air emission registration and Navy Air Pollution Source Information System (NAPSIS).

(1) The North Carolina DEM will accept the NAPSIS as the air emission registration and will require an annual update every July first. In compliance with North Carolina Administrative Code 15 Chapter 2 Subchapter 2D.0200 Registration of Air Sources, LANTNAVFACENGCOM will submit the NAPSIS to MCB CAMP LEJEUNE by 24 June 1983 for forwarding to the North Carolina DEM by July 1983.

(2) The North Carolina DEM requests the following air sources be registered in the NAPSIS:

NOTE: The number of sources are identified in brackets.

Enclosure (2)

ENCLOSURE (1)

(a) All boilers over 1 million BTU per hour heat input (42 boilers at MCB, 2 NMRC, 10 MCAS (H)).

(b) All incinerators (2 at MCB, 1 NMRC).

b. All fuel storage tanks greater than 1,000 gallons capacity with a vapor pressure greater than 1.5 pounds per square inch absolute (i.e. JP-4, AVGAS and gasoline) (36 tanks at MCB and 6 tanks at MCAS (H)).

c. All fuel storage tanks greater than 10,000 gallons capacity with vapor pressure less than 1.5 pounds per square inch absolute. (i.e. JP-5, no. 2, no. 6, diesel and kerosene) (42 tanks at MCB, 4 at NMRC and 18 at MCAS (H)).

d. All paint spray booths, spray cleaning booths and fiber glass booths which are exhausted outside (4 booths at MCB. and 5 at MCAS (H)).

e. All vapor degreasers, and solvent cleaning tanks which are exhausted outside. (12 tanks at MCB).

f. All dry cleaning facilities (1 facility at MCB).

g. All carpentry shops which are exhausted outside (4 shops at MCB and 1 at MCAS) (H)).

h. All bulk lime storage silos which are exhausted outside (2 at MCB and 1 at MCAS) (H)).

i. Aircraft Engine Test Stand (1 at MCAS) (H)).

j. Fire fighting training (1 at MCB and 1 at MCAS) (H)).

3. The North Carolina DEM requires air permits for:

a. All boilers burning no. 6 or coal.

b. All boilers burning no. 2 fuel oil with a heat input of greater than or equal to 100 million BTU per hour.

c. All incinerators.

d. All paint spray booths, spraying cleaning booths and fiberglass booths with an air pollution control device.

e. All vapor degreasers and solvent cleansing tanks with an air pollution control device.

f. All carpentry shops with an air pollution control device.

g. All bulk lime storage silos with an air pollution control device.

h. All fuel storage tanks greater than 50,000 gallons size with a vapor pressure greater than 1.5 pounds per square inch absolute or dispensing stations loading more than 20,000 gallons in one day (i.e. AVGAS, JP-4, and gasoline).

ENCLOSURE (1)

j. All air pollution sources which have an air pollution control device as stated in North Carolina Administrative Code Title 15 Chapter 2 Subchapter 2H Section .0600 Air Quality Permits.

4. North Carolina DEM does not require permits or registration for welding booths, vehicle exhaust system, nor emergency generators.

5. Air pollution permits will be grouped by geographic area of location.

6. From the subject meeting, action items for MCB CAMP LEJEUNE are:

a. Submit NAPSIS updates by July 1983 and annual NAPSIS updates every July first.

b. Notify the DEM if any permitted sources are changed, moved or replaced.

c. Notify the DEM of change of ownership on the old hospital pathological incinerator (NH-78).

d. Notify the DEM of any projects with asbestos removal and disposal work, and consider annual notification of all scheduled projects with asbestos work.

e. Notify the DEM 30 days prior to any permit renewal.

f. Discuss with MCB CAMP LEJEUNE Legal Service Office the legal ownership of MCAS (H) New River regarding air pollution permits.

g. Submit a project to LANTNAVFACENGCOM to install a separate fly ash collection and storage system for the electrostatic precipitators on the boilers at Building 1700.

h. Submit an ESR to LANTNAVFACENGCOM to assist in air pollution permits at MCB CAMP LEJEUNE.

i. Obtain fuel analysis of fuel oil burned on regular basis. Analysis should include sulfur percent, heating value, percent ash, viscosity and percent moisture.

j. Provide training in U.S. Environmental Protection Agency visible emission reading for boiler operators personnel.

H. M. DAVENPORT
Environmental Engineer
Code 114

Blind Copy to:
114
114S
Doc.#0068d.

ENCLOSURE (1)

INVESTIGATION OF

ASH COLLECTION AND DISPOSAL SYSTEM,

HIGH DUST LOADING IN BREECHING,

AND BYPASS STACK CAPS

AT THE

CENTRAL HEATING PLANT, BUILDING 1700

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

DECEMBER 1982

DESIGN DIVISION
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGNIA 23511

PREPARED BY:

R. W. TISDALE, JR.
MECHANICAL ENGINEER

I. Investigation of Ash Collection and Disposal System

A. Description of System

The ash collection and disposal system at the central heating plant was installed as a part of the original plant construction in the early 1940's. The system is of the dry pneumatic vacuum conveying type with a vertical storage silo and was manufactured by United Conveyor Corporation. A two stage steam ejector produces vacuum on the conveying system. Ash from the silo is loaded into open bed dump trucks by means of a rotary feeder and horizontal screw conveyor with water conditioning.

B. Major Modifications to Original System

Within the past five years, several modifications have been made to the original ash system. A new two stage steam ejector and a new rotary feeder and unloader have been installed to replace the original components. Additional ash collection piping has also been installed for transporting fly ash collected from two new electrostatic precipitators. No other major modifications are known to have been made to the original ash system.

C. System Operation

The original function of the ash system was to remove and temporarily store ash generated from the operation of four 100,000 pound per hour pulverized coal fired steam boilers. Ash was collected from the boiler, air preheater, mechanical collectors and stack hoppers, transported through the vacuum conveying system and stored in the silo (see figure 1). Stored ash was then unloaded into open dump trucks for hauling to the base landfill for disposal. Based on conversations with plant personnel, no undue problems were experienced with the removal and disposal of ash until the electrostatic precipitators were added. The methods of collecting, storing, removing and disposing of the ash have remained basically unchanged, however problems have been encountered since flyash collected by the precipitators have been added to the system.

D. Operational Problems Incurred

Since the flyash has been added to the system, the rate of ash flow from the silo through the rotary feeder and unloader has become very inconsistent. As a result of continuous variations in ash flow, proper water conditioning cannot be maintained. Operating personnel have been manually readjusting water flow in an attempt to provide proper mixing with limited success. During severe changes in ash flow, either a "water rich" or "water lean" mixture passes through the unloader outlet. As ash flow reduces suddenly due to large clinkers being unloaded, excessive water totally saturates the ash previously unloaded. In addition, the excess water drains from the truck creating additional water pollution problems at the silo as well as a nuisance during

transport. When ash flow suddenly surges due to fine precipitator ash being unloaded, unconditioned ash is discharged with the unwetted particles becoming airborne. These dust clouds have been severe at times, creating a nuisance to surrounding facilities. This dust eventually settles and creates additional water pollution problems in the area storm drainage system. Unconditioned ash that does fall into the truck also has a tendency to become airborne during transport and dumping, creating additional nuisances.

E. Probable Cause

The primary cause of the problems experienced in unloading and disposing of the ash stems from the variations in particle size of the ash being unloaded. The variations in flow are caused by the smaller particles being more densely packed when passing through the rotary feeder. In addition, the surface area of the smaller particles per unit volume is greater and requires more water for wetting. One other possible problem is that the charged particles collected by the precipitator may have a greater surface tension reducing the wetting capability.

F. Possible Solutions

Several possible solutions to reduce or eliminate the problems being experienced were investigated. These possible solutions and their probable effects on the system are as follows:

1. Install aeration blocks and diverter core in the ash storage silo to provide better mixing of different size particles.

   This solution may lessen the extreme variations in flow but will not resolve the problem of wetting the fine particles. The ash is segregated in the silo due to the ash being pulled from only one hopper at a time with resulting layers of ash of a particular size in the silo. Mixing at the outlet probably would have only minimum effects on the problems.

2. Install an air operated valve on the water conditioning line in lieu of a manual valve.

   An air operated valve may increase response time but will not resolve the variations in flow and the wetting problem.

3. Utilize a surfactant to provide better wetting of the finer particles.

   Wetting agents have met with limited success and do not totally resolve the problem of variations in flow. Wetting agents may help improve the wetting of the fine ash but variations in ash flow will probably minimize the improvement.

4. Install a rotary unloader designed to handle fine particles.

A rotary unloader such as the Model D-40 manufactured by Allen, Sherman, Hoff (see figure 2) would probably provide better mixing and wetting of fine particles but the variations in flow may continue to cause some minor problems. Initial cost of the unloader would be approximately $40,000.00.

5. Install a separate ash system for the precipitators.

A separate silo and unloader to handle fine ash from the precipitators separately should resolve the major problems currently being experienced. (See figures 3 and 4) By separating the fine ash from the larger particles, each system would be handling ash of similar size and consistency. Variations in flow due to particle size should be minimized. The rotary feeder and unloader could be selected to handle fine material and could be set up to properly condition fine material only. The major drawback to this solution is initial cost. A separate system would cost approximately $350,000.00.

6. Install a dust collector system to control dust emissions in the unloader outlet.

A dust suppression and collection system could be installed on the unloader outlet to contain any dust emissions. This system would probably effectively contain fugitive dust but would not affect overwetting due to variations in flow. In addition, fine particles would only be recirculated and may only build up within the silo.

G. Additional Considerations

Interest has been expressed by the activity to sell the precipitator ash to local private businesses. If the ash can be easily sold, plant personnel would be required to dispose of approximately two thirds of the ash presently handled. However, the precipitator ash would have to be handled separately and a separate silo required.

H. Recommendations

The only solution investigated that will probably solve all of the current problems would be to install a separate ash system, silo and unloader for the precipitators. The separate system would also allow sale of the flyash if desired. The major drawback to this solution is the initial cost of $350,000.00.

II. Investigation of High Dust Loading in Breeching

A. Description of System

Each of the two new precipitators is connected to two existing coal fired boilers. The arrangement of the new breeching is shown in figure 5. The common breeching was designed for a velocity of 30 feet per second assuming two boilers operating at full load. The transition into the precipitator was designed to provide a maximum velocity of 5 feet per second assuming two boilers at full load. Turning vanes and ladder vanes in the transitions and a perforated plate at the precipitator inlet were installed to provide equal air distribution into the precipitator.

B. Operational Problems Incurred

During normal operation, flue gas to the precipitator varies from one fourth to maximum design velocity. When the velocity reduces , ash falls out in the duct and on the ladder vanes. Some vanes near the top and bottom fill to where the opening becomes almost totally blocked. In addition, ash falls out and accumulates at the base of the inlet transition to the precipitator along the walkways. These ash buildups cause unequal velocity distribution through the precipitator as well as emissions when the velocity suddenly increases. The accumulated ash on the walkway also causes problems when entry into the precipitator is required for maintenance.

C. Recommendations

A team from the Navy Energy and Environmental Support Activity was requested to investigate the ash build up problems and to determine the velocity distribution through the precipitator. Site investigations were made in August 1980 and September 1981. Recommendations contained in the final report of February 1982 include removal of an 8 inch section at the bottom of the inlet perforated plate and the addition of a sonic sootblower to keep the inlet vanes free. Removal of the 8 inch section of the plate and installation of the sonic sootblowers are recommended and should alleviate the ash buildup problems at the precipitator inlet. Ash buildup in the inlet duct is not considered a major problem and should have no serious adverse effects on the system operation.

III. Investigation of Stack Caps

A. Description of System

The original boiler arrangement had flue gas breeching from each boiler passing vertically through the roof and connecting to to individual roof mounted stacks through a 90° transition. Each stack had a hopper at its base that was connected to the flyash collection system piping. No interconnections occurred between boilers.

B. Modifications to Systems

When electrostatic precipitators were added to the boilers, the flue gas breeching from two boilers were connected and a single duct routed to a common precipitator and ground mounted stack. The original breeching and roof mounted stacks were retained for use as a bypass. Two single blade guillotine dampers were installed on each boiler, one at the connecting to the old stack and one in the new breeching prior to connecting with the second boiler. This arrangement allowed isolation from the old stack or the new precipitator as required.

C. Operational Problems

Leakage has occurred past the bypass stack guillotine damper ever since the initial operation. The leakage could be caused by or significantly increased from ash accumulating in the damper seating track. Leakage of flue gas results in flyash accumulating in the bypass stack hopper and emissions occurring from the bypass stack. Whenever rain occurs, the ash in the hopper is wetted and hardens. Plant personnel are then required to manually remove the material to free the hopper outlet.

D. Possible Solutions

The possible solutions investigated are as follows:

1. External stack caps:

   The use of external stack caps which are generally limited to small boilers are not considered an acceptable solution. In order to be effective, the cap must be larger in diameter than the stack by one half and must be located above the stack at the height of one half the stack diameter when located to effectively block out the rain, the stack cap will create a downdraft around the plant. The resulting fumigation problem will not be acceptable. If the rain cap is designed to minimize the fumigation problem, the effectiveness of preventing rain from entering the stack will be greatly reduced.

2. Internal stack damper:

Use of a damper similar to a butterfly damper (see figures 6 & 7) investigated. Due to wind loading, the damper must be located inside the existing stack or within an extension to the stack. This arrangement would require a platform mounted on the existing stack or an extended operator drive from the base of the stack. The addition of a platform to the existing stack was not recommended structurally and extended drive mechanisms would probably not be reliable. From a maintenance standpoint, this solution would be no better than the current situation.

3. Double bladed guillotine damper:

Installation of a double bladed guillotine damper with compressed air pressurizing the space between the blades, should prevent leakage into the bypass stack. This alternative should prevent flyash from entering the stack hopper and therefore eliminate the problem. The initial cost for installing these dampers is estimated to be $150,000.00.

4. Install baffles and drainage trough in stack:

Installation of baffles and collection trough in the stack were investigated and determined to be ineffective. This solution would add additional draft loss and would plug up with flyash.

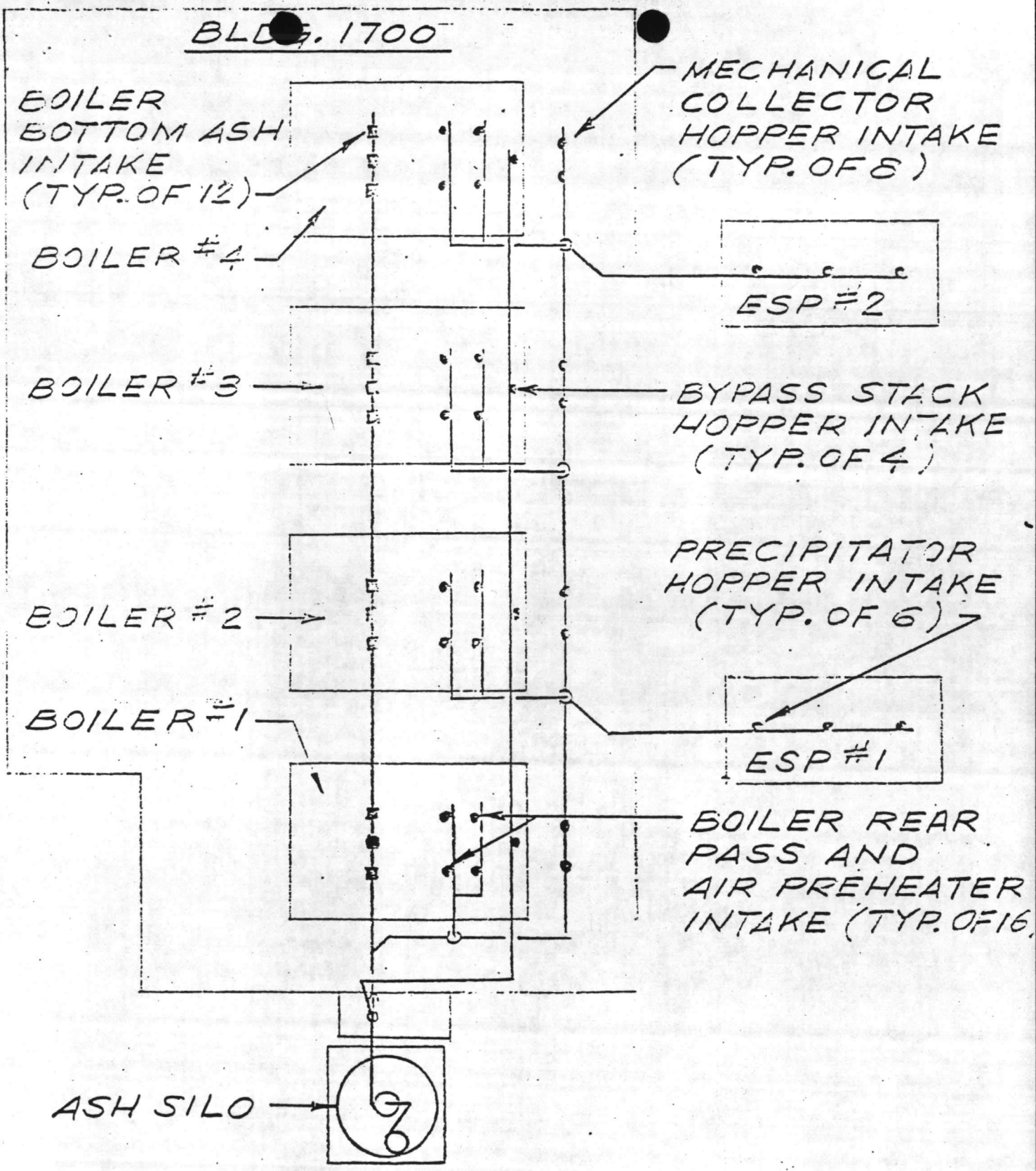
5. Install compressed air on existing dampers:

Installation of a compressed air manifold along the seating track of the damper may keep the dust from allowing the damper to seal properly. Compressed air could be used to blow the track clear prior to closing the damper.

E. Recommendations

Recommend compressed air be installed on the existing damper tracks to reduce the amount of leakage to an acceptable level. If leakage is still excessive, recommend double guillotine dampers be installed.

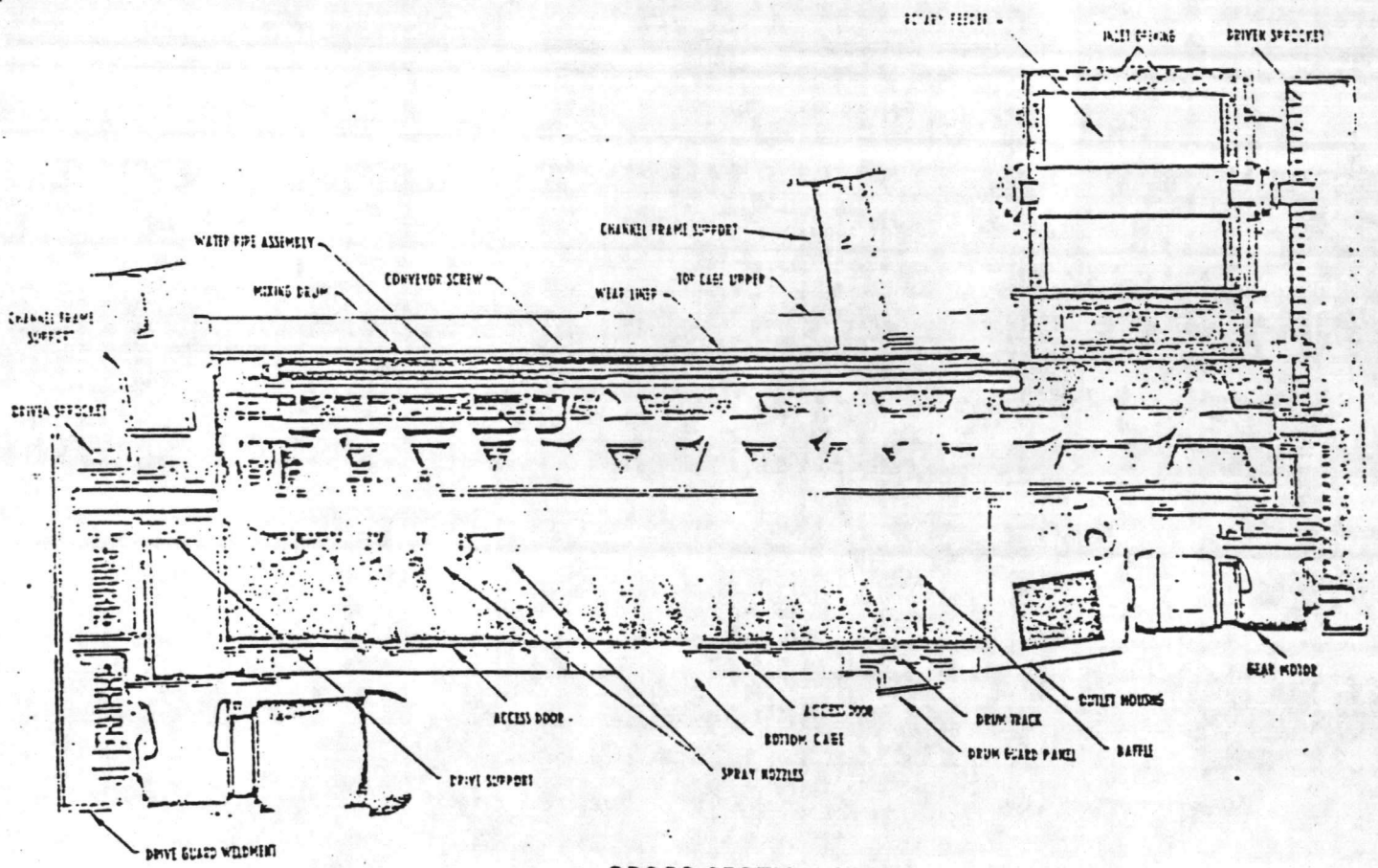
Installation of a double guillotine damper will eliminate the flyash from entering the hopper and prevent any plugging due to rain. No additional adverse effects should be produced such as would be experienced with any of the alternatives investigated to prevent rain from entering the stacks.



ASH COLLECTION SYSTEM

FIGURE 1

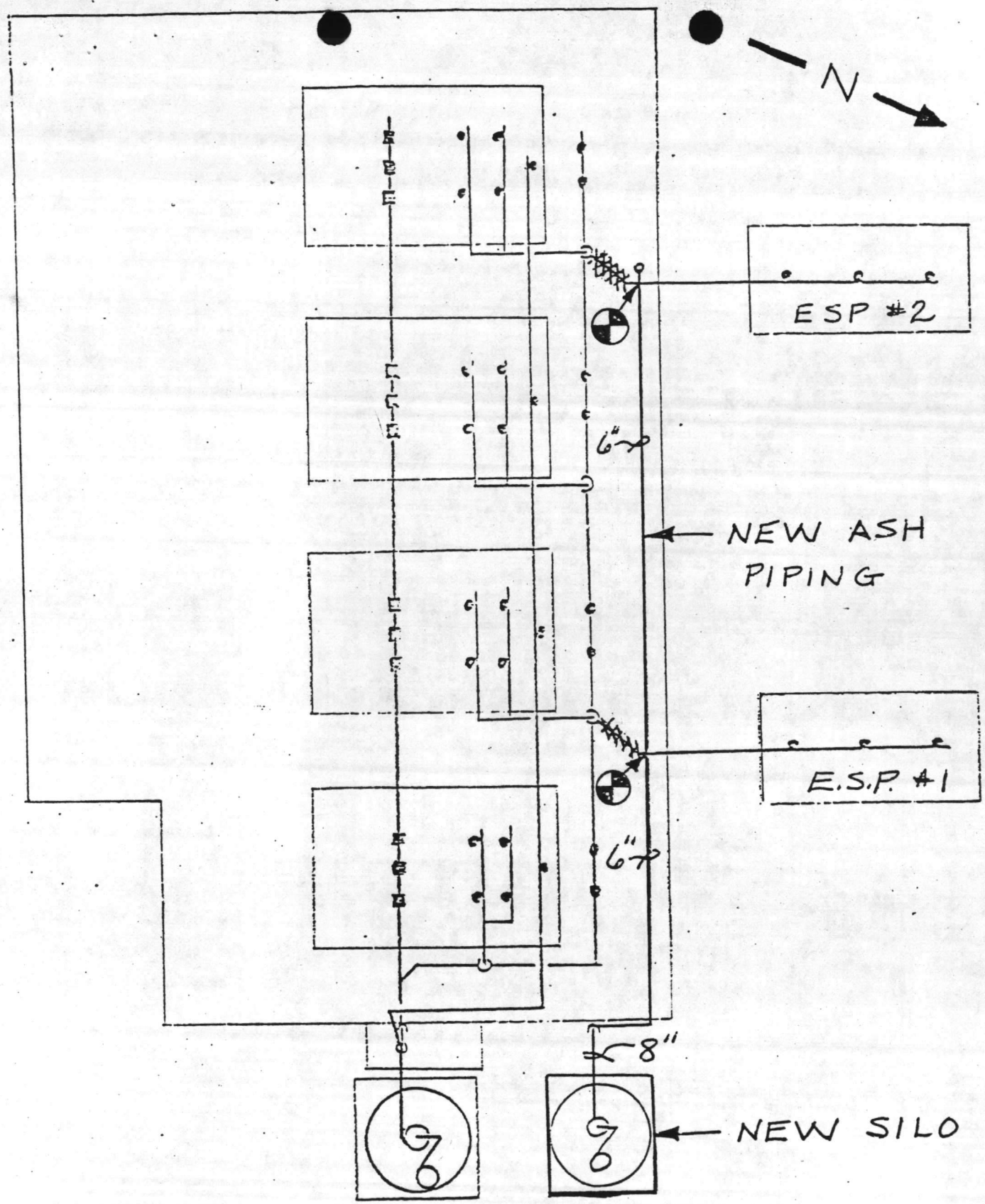
END VIEW



CROSS SECTION VIEW

ASH ROTARY UNLOADER

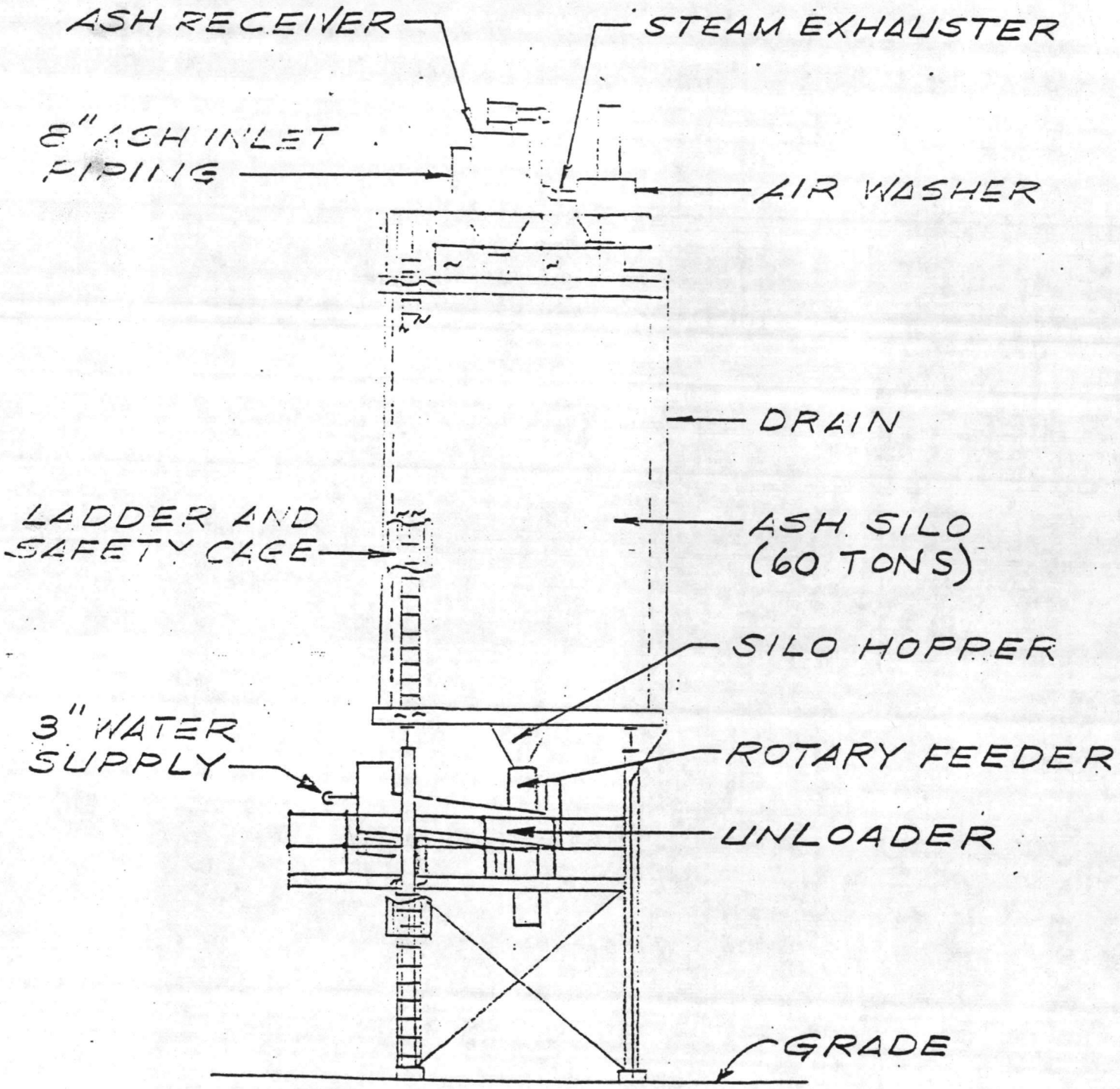
FIGURE 2



PLAN VIEW

NEW ASH SILO

FIGURE 3



ELEVATION

NEW ASH SILO

FIGURE 4

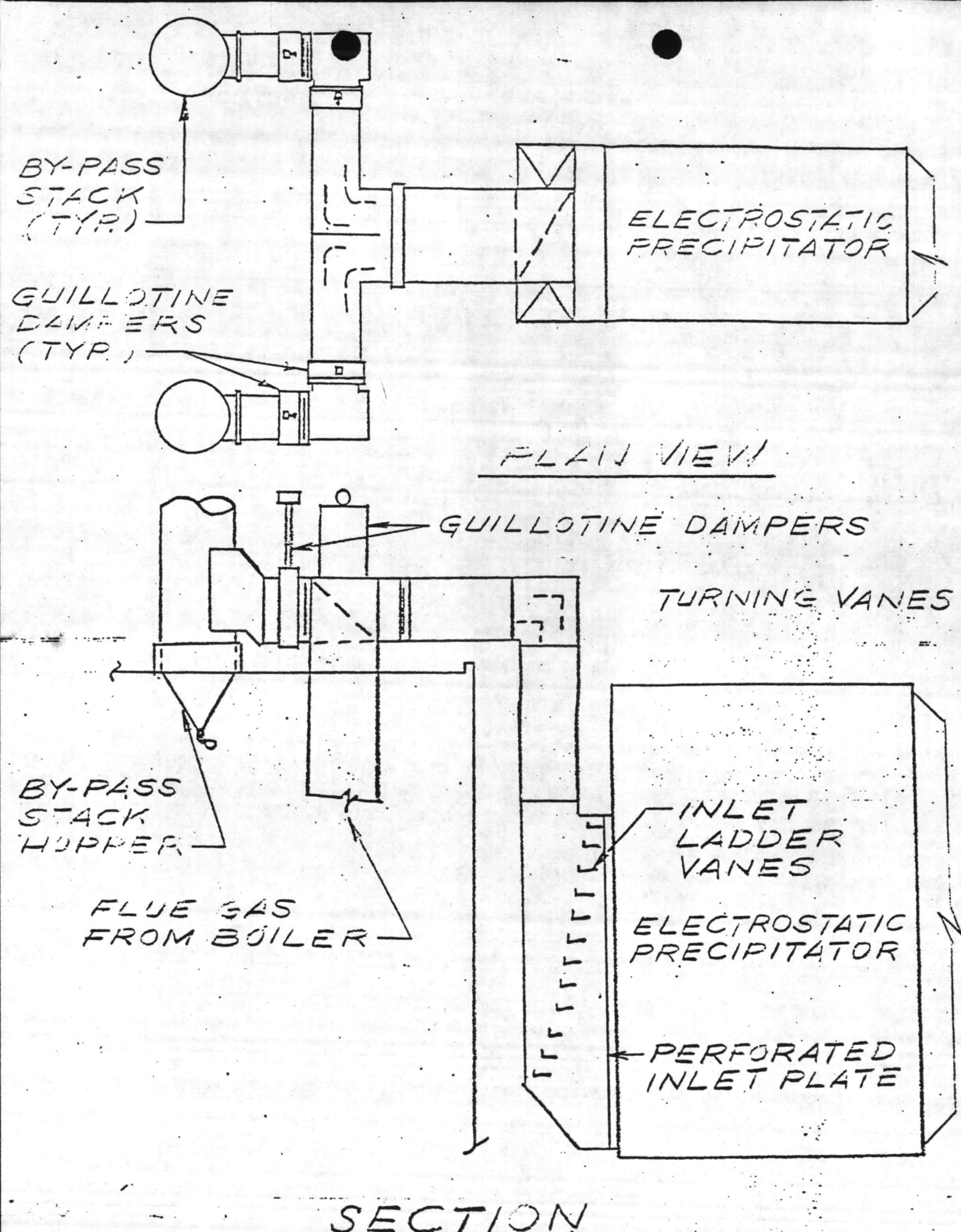
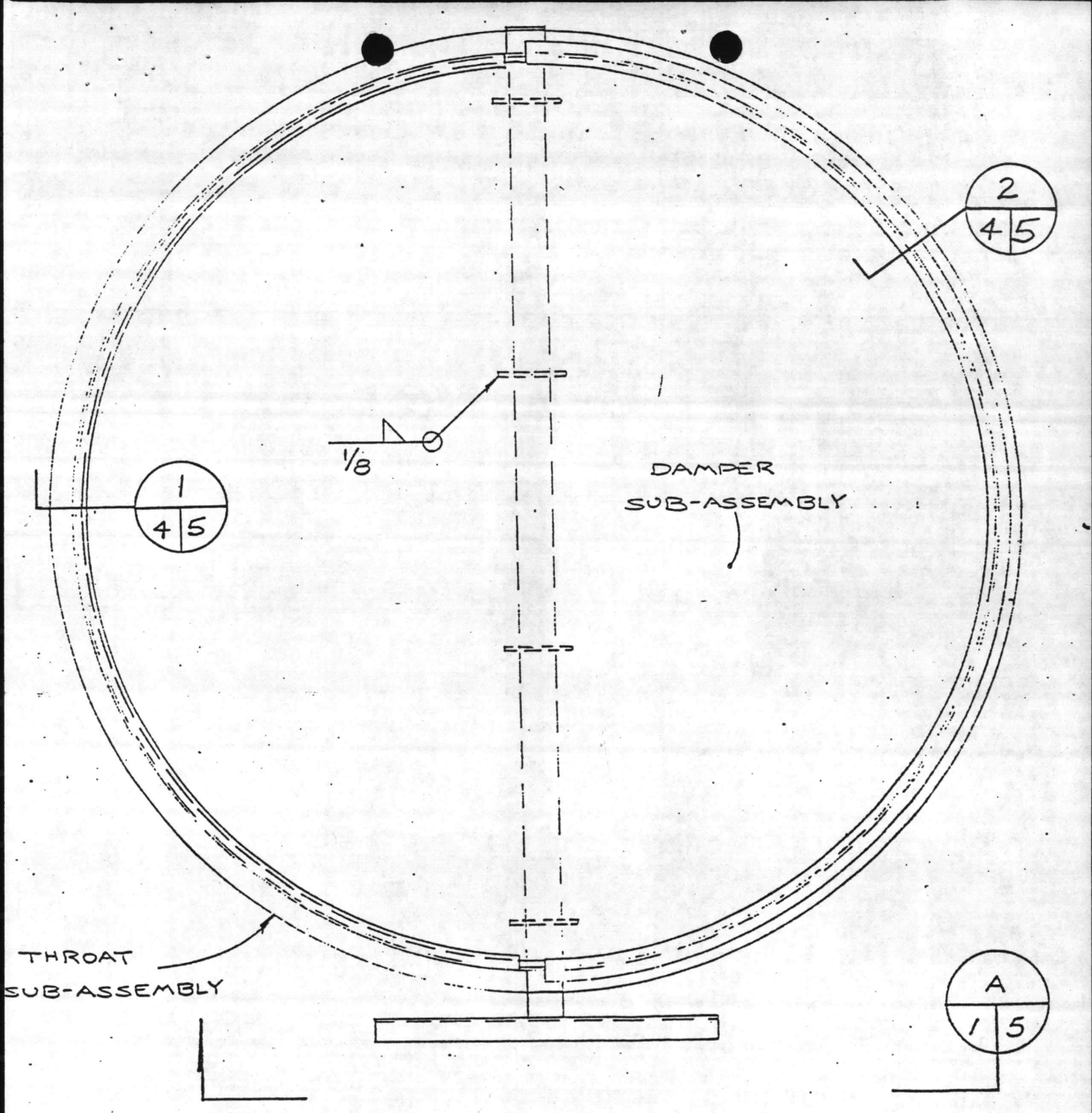

BY-PASS STACK (TYP.)
GUILLOTINE DAMPERS (TYP.)
ELECTROSTATIC PRECIPITATOR
PLAN VIEW
GUILLOTINE DAMPERS
TURNING VANES
BY-PASS STACK HOPPER
FLUE GAS FROM BOILER
INLET LADDER VANES
ELECTROSTATIC PRECIPITATOR
PERFORATED INLET PLATE
SECTION

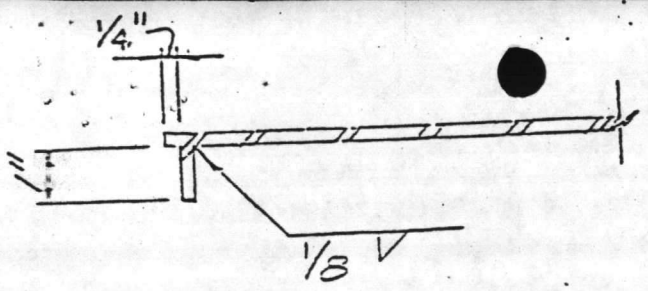
FIGURE 5



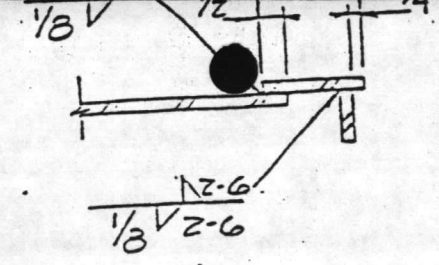
PLAN - STACK CAP ASSEMBLY

SCALE : 1"-1'-0"

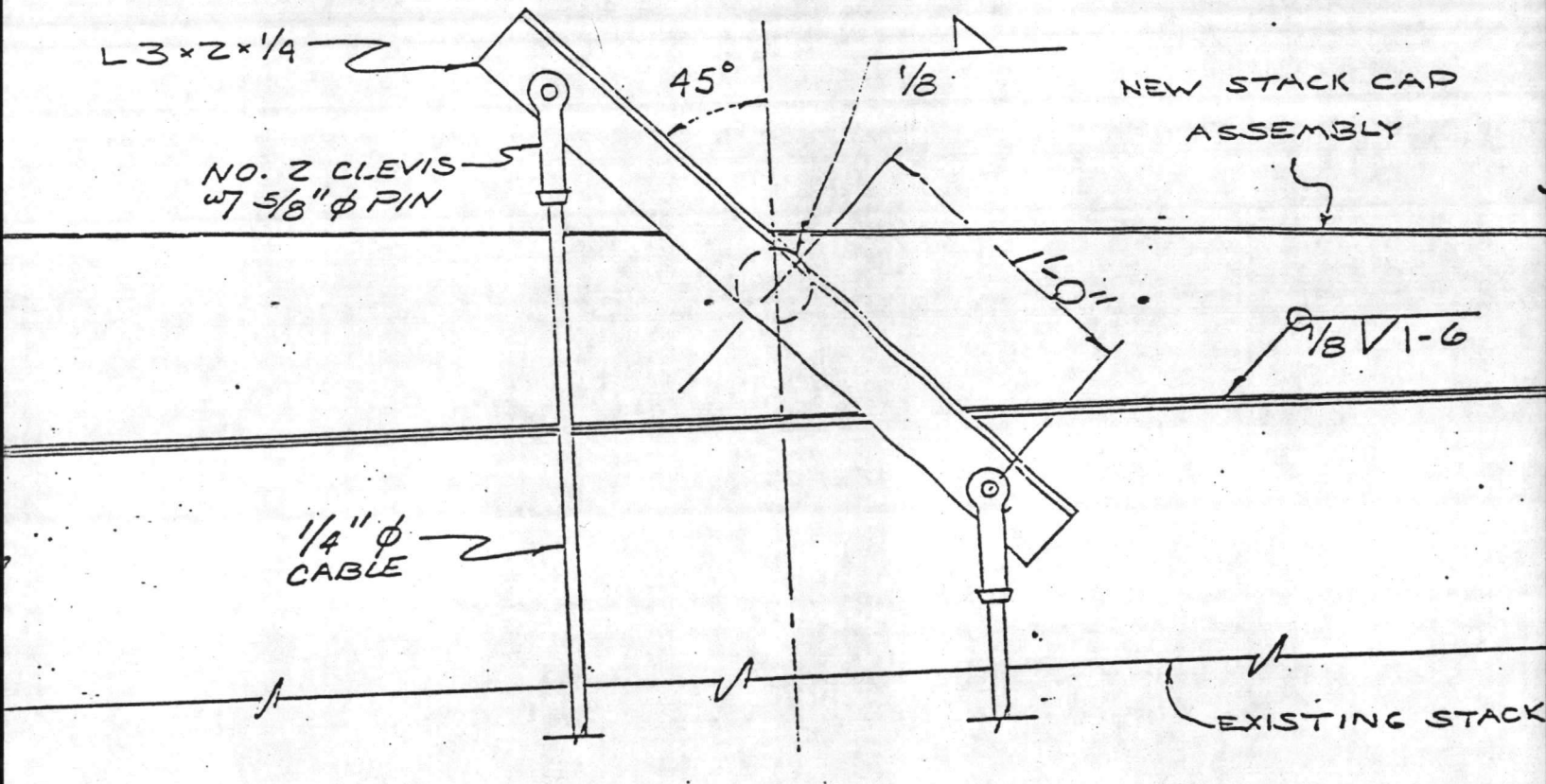
FIGURE 6



SECTION 1 / SCALE 3"=1'-0" — 4 | 5



SECTION 2 / SCALE: 3"=1'-0" — 4 | 5



ELEVATION A / SCALE 1½"=1'-0" — 1 | 5

STACK CAP DETAILS

FIGURE 7