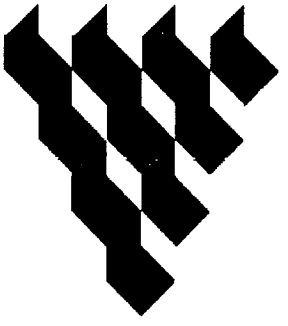
Work Plan
Addendum # 1

Ground-Water Treatment Facility

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT
FRIDLEY, MINNESOTA



SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract #N62467-93-D-1106
Delivery Order #0042
Statement of Work #050

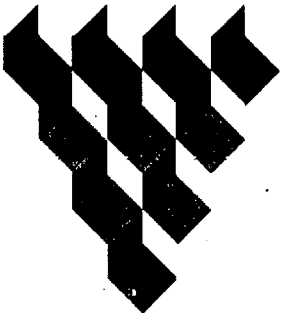
March 12, 1998

Revision # 0

Work Plan
Addendum # 1

Ground-Water Treatment Facility

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT
FRIDLEY, MINNESOTA



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GROUND-WATER TREATMENT FACILITY

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT
FRIDLEY, MINNESOTA

Revision # 0

March 12, 1998

CONTRACT #N62467-93-D-1106
DELIVERY ORDER #0042
STATEMENT OF WORK #050

Prepared for:
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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MK Project Engineer — 13 Mar '98 Date

APPROVALS:

R. Scott Newman
MK Program Manager — 17 Mar 98 Date

CLIENT ACCEPTANCE

U.S. Navy Responsible Authority — 23 MAR 98 Date

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LIST OF APPENDICES

ACRONYMS

ASU	air stripping unit
DFOW	Definable Features of Work
GWTF	ground-water treatment facility
HDPE	high density polyethylene
MK	Morrison Knudsen Corporation
NIROP	Naval Industrial Reserve Ordnance Plant
O&M	operations and maintenance
POTW	publicly owned treatment works
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
UDLP	United Defense Limited Partnership

1.0
INTRODUCTION

1.1 BACKGROUND

This Work Plan Addendum # 1 has been prepared by Morrison Knudsen Corporation (MK) for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), under contract number N62467-93-D-1106, Delivery Order 0042, Statement of Work 050. This addendum was prepared to include additional requirements to the approved Work Plan [MK, 1997a] and the design and specifications prepared by RMT, Inc. [RMT, 1997].

Naval Industrial Reserve Ordnance Plant (NIROP) at Fridley is located near the twin cities of Minneapolis and St. Paul, Minnesota. NIROP is operated by United Defense Limited Partnership (UDLP) for U.S. Navy.

MK prepared a Work Plan for removal of an existing pilot air stripping unit (ASU) and installation, construction and start-up of a new ground-water treatment facility (GWTF) [MK, 1997a]. The Work Plan was based on the design and specifications prepared by RMT, Inc. [RMT, 1997]. After the Work Plan was prepared, additional requirements for the GWTF were identified and these requirements are discussed in this Work Plan Addendum # 1.

MK completed several elements of the original Work Plan under Delivery Order 0039, Statement of Work 047, including:

- Disassembly and removal of existing treatment equipment from Building 52
- Removal and modifications to existing piping, valves and other equipment in Building 53
- Structural modifications to connect Buildings 52 and 53
- Installation of new equipment, including piping, electrical, instrumentation and control system in Buildings 52 and 53
- Installation of an electric power line from the NIROP Building to Building 52
- Installation of a potable water line from the NIROP Building to Building 52
- Installation and connection of a discharge pipe from Building 52 to an existing 72-inch storm drain

After completion of the above elements, the ground-water recovery system was turned over to UDLP for continued operation. Currently, the recovered ground-water is being discharged to the sanitary sewer for eventual treatment at a publicly owned treatment works (POTW).

The implementation of the remaining elements of the Work Plan and modifications under Delivery Order 42, Statement of Work 050 will allow complete transfer of the treatment system to UDLP.

2.0
ADDITIONAL WORK ELEMENTS

2.1 GENERAL

Some additional work elements were identified by SOUTHNAVFACENGCOM and MK after the Work Plan [MK, 1997a] was completed and approved. These work elements were not included in the approved Work Plan or the design by RMT, Inc. [RMT, 1997]. The additional work elements are:

- Anti-scale polymer subsystem
- Miscellaneous items
- Operations and maintenance (O&M)

The Definable Features of Work (DFOW) and the Three Phases of Control will be used to maintain Quality Control. The anti-scale polymer subsystem and miscellaneous items will be performed as part of "Equipment Installation" DFOW described in the Work Plan [MK, 1997a]. O&M will be performed as a separate DFOW, in accordance with an O&M Manual to be prepared at a later date.

2.2 ANTI-SCALE POLYMER SUBSYSTEM

An anti-scale polymer subsystem will be constructed to minimize scaling of the ASU and other equipment of the GWTF. The anti-scale polymer subsystem was designed by MK to supplement the acid washing system included in the RMT design [MK 1997b]. The drawings and specifications of the anti-scale polymer subsystem were submitted to SOUTHNAVFACENGCOM on 09 Dec 1997. A copy of the anti-scale polymer subsystem report is provided with this Work Plan Addendum in Appendix A.

2.3 MISCELLANEOUS ITEMS

The miscellaneous items provided below represent additions or changes to the GWTF design prepared by RMT Inc. These miscellaneous items will be installed and constructed as part of the GWTF. Cited drawings were prepared by RMT Inc. [RMT, 1997].

- Power usage meters will be installed for motor control centers
- A 4-inch high density polyethylene (HDPE) pipeline will be installed from south of Gate 7 to north parking/north 40 fence line (Refer to drawings C-2, C-3 and C-4). A field inspection checklist for HDPE piping is provided in Appendix B
- Indicators and alarms will be installed on valves 170, 171 and 125 to avoid well water from direct discharging to the 72-inch storm sewer. Electronic data will be tied to Control Room to record valve operations (Refer to drawing M-2)
- A concrete berm will be constructed around the filter press. The concrete berm will allow washing and cleaning of the concrete floor during operations (Refer to drawing M-5)
- The concrete floor of the treatment equipment area in the NIROP building will be sealed with chemical resistant epoxy (Refer to drawing M-17)
- The door of the control room will be installed on the north side rather than the east side as shown in drawing M-18

- An air-conditioning unit will be installed in the control room (Refer to drawing M-18)
- The weir plate shown on drawing S-6 will not be installed
- Two 220-volt and four 110-volt convenience outlets will be installed in the treatment equipment area
- The mezzanine structure in the NIROP Building will be removed to allow installation of treatment equipment
- A vacuum vent valve and an emergency vent will be installed in the waste water tank T102 in Building 52
- Identification tags will be installed for pipes and valves
- The existing flowmeter in the storm drain 020 will be replaced with new flowmeters
- The exhaust stack will be provided with a hood or drain pipes

Several miscellaneous items were identified after the work elements under Delivery Order 39 and Work Order 047 were completed. These items include:

- Data archiving and output needs from the computer control system will be identified and provided. Data archiving will be resolved by installing a re-writable compact disc system or an equivalent device
- A spill prevention feature (such as a standpipe) on vacuum relief valve V-172 will be installed to prevent untreated groundwater from spilling each time the valve reseats
- Site restoration work in Anoka County Park will be completed to repair ruts created during the data acquisition efforts of November/December, 1997
- A siphon break in the lines entering tank T-101 will be installed to prevent water from siphoning from the tank to an extraction well when the well pump is turned off
- Water level indication and software interfacing for wells AT-2 and AT-5B will be provided
- A problem with the pump timers was identified during startup. This problem will be evaluated and corrected

2.4 OPERATIONS AND MAINTENANCE

After completion of installation and performance testing of the GWTF, MK will provide three months of O&M services. The O&M services will include routine monitoring and maintenance as well as any troubleshooting required to keep the GWTF in operational condition. During the initial three months of O&M, operational goals have been established at 90 percent of available time. For the remaining 10 percent of the time, maintenance or performance adjustments will be performed on the GWTF.

MK will prepare a draft O&M Manual when the installation and construction of the GWTF are in progress. A final O&M Manual will be prepared after completion of construction and SOUTHNAVFACENGCOM's review of the draft O&M Manual.

The O&M Manual will include:

- Procedure for start-up
- Procedure for shut down
- Maintenance procedures and schedule
- Equipment manufacturers' manuals
- Health and safety requirements for performing O&M
- Quality control of O&M process
- Media Monitoring requirements

The maintenance procedures and schedules will include both the extraction system (including well and pump maintenance) and the treatment system. For media monitoring requirements, the O&M Manual will refer to the Multi-Media Monitoring Plan being prepared by Brown & Root Environmental.

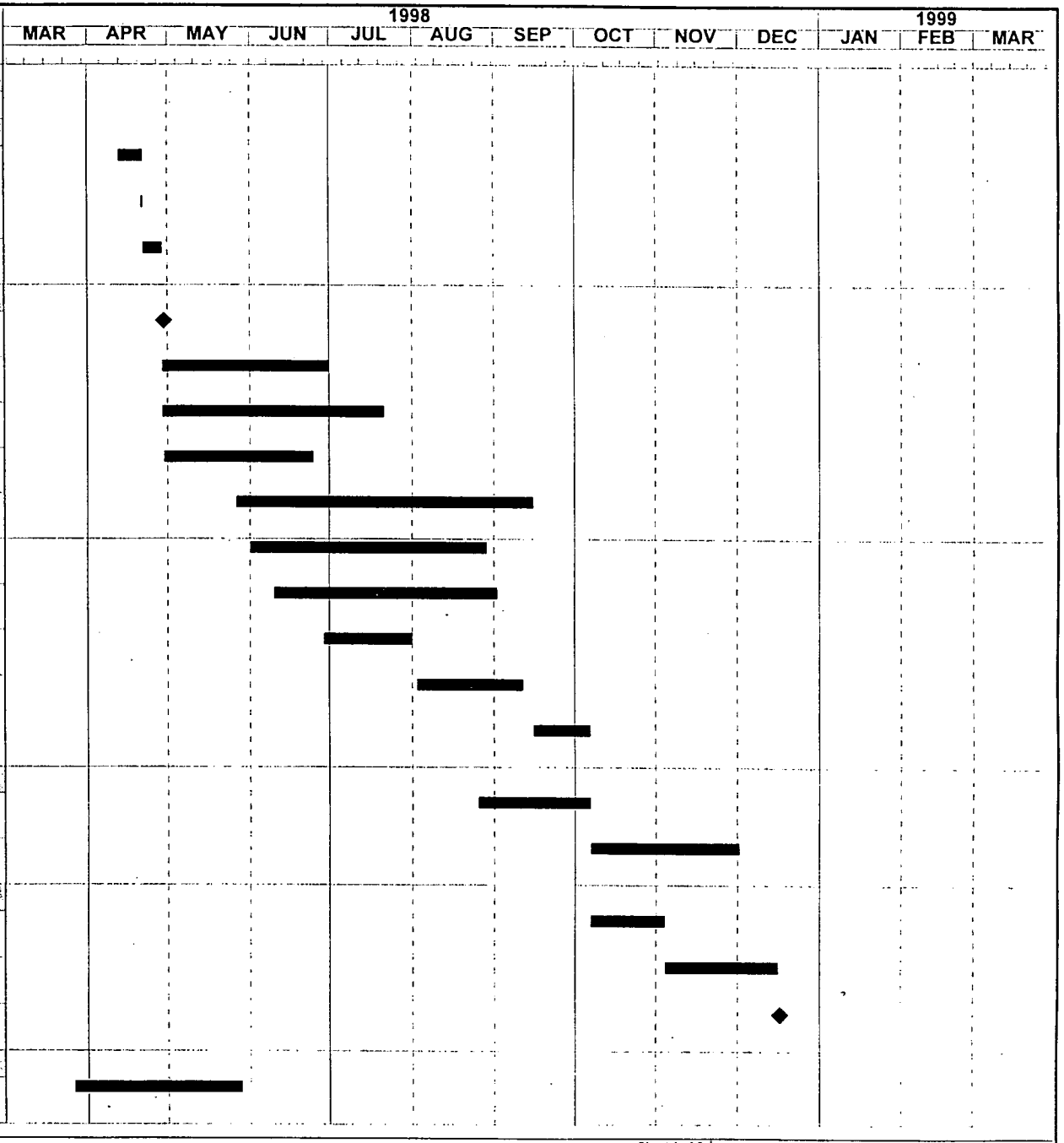
3.0
SCHEDULE

A schedule for the work activities in the field is provided in the following pages. Milestones are listed below:

Complete MK Mobilization	April 21, 1998
Preconstruction Meeting	April 21, 1998
Complete Subcontractor Mobilization	April 28, 1998
Begin Construction	April 29, 1998
Complete Construction & Sub-System Testing	October 06, 1998
Complete Start-up	December 01, 1998
Complete Draft Completion Report	December 16, 1998
Complete Three Months of O&M	March 11, 1999

MK has completed all preconstruction activities approximately one month ahead of schedule. Therefore, the field activities are also expected to be completed ahead of schedule.

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
DO#0042 NIROP FRIDLEY, MINNESOTA				
SOW#050, Phase 30				
Mobilization				
DB3010	MK Mobilization	7	13APR98	21APR98
DB2737	Const - Preconstruction Meeting	1	21APR98	21APR98
DB3013	S/C Mobilization	5	22APR98	28APR98
Installation/Construction				
DB3110	Begin GWTF Construction	0		29APR98
DB3116	Place Concrete Containment & Sump	44	29APR98	30JUN98
DB3113	Procure Electrical/Mechanical Equipment	58	29APR98	21JUL98
DB3131	Erect Structural Steel	39	30APR98	24JUN98
DB3122	Install Electrical & Instrumentation	78	27MAY98	15SEP98
DB3119	Install Interior Piping	64	01JUN98	28AUG98
DB3137	Install Exterior Piping	59	10JUN98	01SEP98
DB3134	Install Air Stripper Units	24	29JUN98	31JUL98
DB3140	Install Ductwork & Exhaust Stack	29	03AUG98	11SEP98
DB3160	Sub-System Testing & Checkout	15	16SEP98	06OCT98
Start-Up				
DB3210	Prepare Start-Up Plan	29	26AUG98	06OCT98
DB3213	Sub-System Checkout & Start-Up	38	07OCT98	01DEC98
Reports				
DB3310	Prepare As-Built Drawings	20	07OCT98	03NOV98
DB3313	Prepare Draft Completion Report	28	04NOV98	15DEC98
DB3316	Completion Report Draft to SOUTHDIV	0		16DEC98
Operations & Maintenance				
DB3410	Prepare Draft O & M Manual	44	27MAR98	28MAY98



Project Start 01MAR94
Project Finish 31MAR99
Data Date 01MAR94
Plot Date 12MAR98

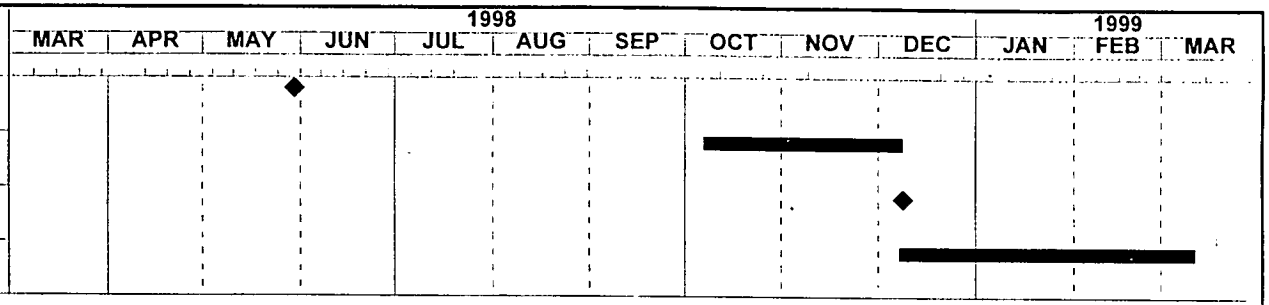
Early Bar
Progress Bar

NAT1

SOUTHDIV ERAC PROGRAM - WO# 4324
NIROP FRIDLEY, MINNESOTA
DO#0042, SOW#050 FIELD BASELINE

MORRISON KNUDSEN CORPORATION
Date Revision Checked Approved

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
DB3413	Submit Draft O & M Manual to SOUTHDIV	0		29MAY98
DB3416	Revise O & M Manual	43	07OCT98	08DEC98
DB3440	Start O & M	0		08DEC98
DB3445	O & M (three months)	66	08DEC98	11MAR99



Project Start 01MAR94
Project Finish 31MAR99
Data Date 01MAR94
Plot Date 12MAR98

Early Bar
Progress Bar

NAT1

Sheet 2 of 2

SOUTHDIV ERAC PROGRAM - WO# 4324
NIROP FRIDLEY, MINNESOTA
DO#0042, SOW#050 FIELD BASELINE

MORRISON KNUDSEN CORPORATION

Date	Revision	Checked	Approved

4.0
REFERENCES

RMT, Inc., July/September 1997. *Approved Drawings and Specifications.* [RMT, 1997]

Morrison Knudsen Corporation, September 1997. *Work Plan Ground-Water Treatment Facility.* [MK, 1997a]

Morrison Knudsen Corporation, November 1997. *Operations and Maintenance Cost Analysis Report.* [MK, 1997b]

APPENDIX A
ANTI-SCALE POLYMER SUBSYSTEM

DRAFT

Anti-Scale Polymer Subsystem
Ground Water Treatment Facility

NIROP Fridley
Fridley, Minnesota

Unit Identification Code: N91191
Contract No. N62467-93-D-1106

December 1997

Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina
29419-9010

TABLE OF CONTENTS

ATTACHMENTS

1.0
INTRODUCTION

1.1 BACKGROUND

This Anti-Scale Polymer Subsystem document has been prepared by Morrison Knudsen Corporation (MK) for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), under contract number N62467-93-D-1106, Delivery Order 0039, Statement of Work 047, Task 2.

The Naval Industrial Reserve Ordnance Plant (NIROP) in Fridley, Minnesota, is a Superfund site undergoing cleanup with oversight from the U.S. Environmental Protection Agency (USEPA), Region 5, and the Minnesota Pollution Control Agency (MPCA). Currently, ground water impacted with volatile organic compounds is extracted and discharged directly to the local publicly owned treatment works (POTW) of the Metropolitan Council Environmental Services (MCES). The Superfund Record of Decision (ROD) requires the eventual treatment of the extracted ground water and discharge of the treated effluent to the Mississippi River under a National Pollution Discharge Elimination System (NPDES) permit.

To comply with the ROD, a ground water treatment facility (GWTF) was designed based on the operation of a pilot GWTF at the site [RMT, 1997]. The design included an acid washing system to minimize scaling of the air stripping unit (ASU). However, during a review of the design, MK expressed concern regarding the cost and effectiveness of the acid washing system. Consequently, SOUTHNAVFACENGCOM directed MK to evaluate the scaling potential and to provide budgetary cost data for operations and maintenance of the GWTF based on a study of various options for an anti-scaling subsystem. The Operations and Maintenance Cost Analysis Report was prepared and submitted to SOUTHNAVFACENGCOM [MK 1997].

1.2 OBJECTIVES

This document provides details of the anti-scale polymer subsystem discussed in the Operations and Maintenance Cost Analysis Report. The objectives of this document are to:

- develop specifications for the procurement of the anti-scale polymer subsystem
- provide modifications to Specification 06931106 developed by RMT Inc.
- provide drawings and figures required for construction of the anti-scale polymer subsystem

2.0
SPECIFICATIONS AND FIGURES

2.1 SPECIFICATIONS

The design drawings and specifications for the GWTF were prepared by RMT Inc. [RMT, 1997]. As discussed in Section 1.1, an anti-scale polymer subsystem was not included in the RMT design. To incorporate the anti-scale polymer subsystem to the existing GWTF design, MK has developed additional specifications and drawings.

Attachment 1 provides the following new specification sections:

- SECTION 15545 ANTI-SCALE POLYMER SUBSYSTEM
- SECTION 15550 ANTI-SCALE POLYMER CHEMICAL

Section 15545 provides the specifications for the materials and equipment needed to construct the anti-scale polymer subsystem. The specified equipment includes pumps, injection device, instrumentation, valves, piping and accessories.

Section 15550 provides the specifications for the anti-scale polymer chemical which will be injected into the ground-water feed. The two polymer chemicals identified in Section 15550 have been approved by MPCA for use at the NIROP site. Section 15550 also includes the service requirements from the supplier during start-up and operations.

Attachment 2 provides modifications to various sections of the GWTF specifications No. 06931106 prepared by RMT Inc. These modifications specify the requirements for an additional sump and pump, and changes to process controls and graphic screens.

2.2 FIGURES

Attachment 3 includes six figures for the anti-scale polymer subsystem. Figure 1 provides the piping and instrumentation (P&ID) drawing for the anti-scale polymer subsystem. Figure 2 is a plan view of the proposed building addition for housing the polymer subsystem. Figures 3, 4, and 5 are sketches of the piping additions in Building 52, including anti-scale polymer lines, a sump pump process drain and a potable water line. Figure 6 provides a piping addition to allow the future use of a vendor-supplied deposition monitor.

3.0
ADDITIONAL BUILDING REQUIREMENTS

An addition to Building 52 will be constructed to house the anti-scale polymer subsystem. The scope of work does not include preparation of specifications for this building addition. However, a sketch (Figure 2) of the proposed building addition is included in Attachment 3 and the requirements for construction and operations are provided below.

- The building will be heated sufficiently to maintain a minimum temperature of 35 degrees Fahrenheit in the area where the polymer is stored
- The building will have a floor sump and wash down water
- The building foundations and floors will be sufficient to support forklift traffic
- The building will be insulated
- A roll-up door or similar opening will be provided with sufficient clearance to allow the transfer of tote tanks by forklift in and out of the building
- The building size will be sufficient to store at least three totes, assuming stacking of two totes
- The building size will be sufficient to move equipment such as the ASU pumps out of Building 52 past other equipment without damage
- The building will be supplied with lighting and electricity

4.0
REFERENCES

Morrison Knudsen Corporation, November 1997. *Operations and Maintenance Cost Analysis Report.* [MK 1997]

RMT Inc., September 1997. *Approved Plans and Specifications.* [RMT, 1997]

ATTACHMENT 1
SPECIFICATIONS

(Note: The format of the following sections are similar to Specification 06931106 prepared by RMT Inc.)

INDEX

NIROP GROUNDWATER TREATMENT FACILITY

SECTION 15545

ANTI-SCALE POLYMER SUBSYSTEM

PART 1 GENERAL

1.1 ITEMS INCLUDED

This section describes requirements for providing the polymer feed subsystem for anti-scale chemical treatment of the feed water to the Air Stripping Units (ASU). The work includes furnishing and installing equipment, modifying existing subsystems, providing control panels and connections to the plant's existing programmable logic controller (PLC) and man-machine interface (MMI). The anti-scale polymer feed subsystem includes the following components: 1) a skid-mounted anti-scale polymer injection system containing a chemical-duty, electronic metering pump P-501, anti-scale polymer flow calibration equipment and control valves; 2) connecting piping to the anti-scale polymer storage totes; 3) distribution piping, valves, and fittings, 4) a potable water connection including piping, valves and fittings; and 5) the anti-scale polymer room floor sump piping system, including a chemical-duty sump pump (P-502), process drain piping, valves, and fittings.

1.2 SERVICE

The anti-scale polymer is a sequestering agent to reduce deposits and adjust pH. Anti-scale polymer types include polyacrylates and synthetic polymer polyelectrolytes. Compatible piping and equipment materials shall be used for the polymer including polyethylene, polypropylene, polyvinyl chloride (PVC), 304 or 316 stainless steel, Viton™, and Teflon™. The design characteristics of the anti-scale polymer are as follows:

Polymer viscosity	Up to 500 centipoise
Polymer temperature	35 - 75 degrees F
Polymer injection rate	0.08 - 1.6 gph

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D 1785	(1996) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2466	(1996 Rev. A) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651 (1992) Disinfecting Water Mains

1.4 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures." Submittals for equipment referenced to another Specification Section, such as the anti-scale polymer room floor sump pump, shall be submitted in accordance with the requirements of the referenced Section.

1.4.1 SD-01, Data

1.4.1.1 Skid-mounted injection system *G*

a. Electronic metering pump

Include manufacturer's data sheet; pump performance curve showing pump total head, pump break horsepower, net positive suction head requirements, and pump efficiency; equipment weight; local and external control signal and power requirements; equipment parts list; and recommended spare parts list.

a. Motor-operated control valves

Include manufacturer's data sheets; enclosure ratings and materials, flow characteristics, control schematics, and signal and power requirements.

1.4.1.1 Polymer tote level transmitter *G*

Include manufacturer's data sheets; dimensions, ratings, and materials, flow control schematics, and signal and power requirements.

1.4.2 SD-02, Manufacturer's Catalog Data

1.4.2.1 Skid-mounted injection system *G*

a. Electronic metering pumps *G*

Include manufacturer's catalog cuts, capacity descriptions, materials of construction, and specifications for pumps and pump components.

b. Polymer piping, fittings, valves, and accessories *G*

Include manufacturer's catalog cuts, capacity descriptions, materials of construction and specifications for polymer piping including fittings, valves, and accessories.

1.4.2.2 Piping, fittings, valves, and accessories *G*

Include manufacturer's catalog cuts, capacity descriptions, materials of construction and specifications for piping including fittings, valves, and

accessories.

1.4.2.1 Skid-mounted injection system *G*

Include manufacturer's catalog cuts, descriptions, materials of construction and specifications.

1.4.3 SD-04, Drawings

1.4.3.2 Skid-mounted injection system shop drawings *G*

a. Skid-mounted injection system

Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

b. Electronic metering pump

Include outline dimensional drawing, electrical schematics, and control diagrams.

1.4.3.2 Piping, fittings, valves, and accessories *G*

Include dimensional drawings, detail of supports, system schematic, and equipment locations.

1.4.4 SD-06, Instructions

a. Installation instructions *G*

b. Operating instructions *G*

1.4.5 SD-08, Statements

a. Manufacturer's warranty statements *G*

1.4.7 SD-13, Certificates

a. Piping, fittings, joints, and couplings *G*

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or not, and that production control tests have been performed at the intervals of frequency specified in the publication. Other tests shall have been performed within three years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.4.8 SD-18, Records

1.4.8.1 Submittal register

State for each submittal the Contractor's planned submittal date. Submit

within 30 days after the authorization of the Contract change. Insert dates on copies of the "Submittal Register."

1.4.8.2 Anti-Scale Polymer Subsystem *G*

Submit record information in accordance with Section 01770, "Closeout Procedures, " including as-built drawings, record of materials, posted warranty information, and equipment/product extended warranty tags, where applicable.

1.4.8.2 Electrical and Instrumentation As-built Drawings *G*

Submit record information including as-built process control and wiring diagrams; installation details; layout, dimensions, and arrangement; control panels and accessories. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment.

1.4.9 SD-19, Operation and maintenance manuals *G*

a. Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data," Data Package 2.

1.5 QUALITY ASSURANCE

Acceptable manufacturers and fabricators:

1.5.1 Electronic metering pump

a. Liquid Metronics (LMI)

b. Other manufacturer as approved by the Contracting Officer

1.5.2 PVC ball valves and motor operators

a. Asahi/America

b. Hayward

c. Other manufacturer as approved by the Contracting Officer

1.5.3 Back pressure valve

a. Griffco Valve Inc.

b. Other manufacturer as approved by the Contracting Officer

1.5.4 Skid-mounted polymer injections system

a. Stranco Water Quality Control

b. Other fabricators as approved by the Contracting Officer

c. Skid-mounted polymer injection system fabricator qualifications : Company shall have a minimum of five years experience specializing in the fabrication and assembly of skid-mounted chemical injection systems similar to the system specified in this Section. Company shall have local representatives or affiliates, and full time service personnel.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Delivery and Storage

Inspect materials delivered to the site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under cover out of direct sunlight. Do not store materials directly on ground. Keep inside of pipes, fittings, and valves free of dirt and debris.

1.6.2 Handling

Handle pipe, fittings, valves, and other accessories in a manner to ensure delivery to installation point in a sound, undamaged condition. Store plastic piping and jointing materials under cover, out of direct sunlight.

1.7 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

1.7.1 One permanent base tote and one refillable stacking tote, both with forklift channels on four sides for polymer storage. The totes shall have pressure relief valves, a sight-glass level indicator and 2-inch outlet with isolation valve and cap.

1.8 RELATED SECTIONS

1.8.1 Section 02510 - Underground Pressure Piping

1.8.2 Section 15050 - Basic Mechanical Materials and Methods

1.8.3 Section 15061 - Carbon Steel Piping System, Unlined, Black and Galvanized

1.8.4 Section 15080 - Mechanical Insulation Section

1.8.5 Section 15911 - Personal Computer-Man-Machine Interface

1.8.6 Section 15912 - PLC System/Instrumentation and Control Valves

1.8.7 Section 15913 - Control Panels

1.8.8 Section 15995 - Process Controls Narrative

1.8.9 Section 16050 - Basic Electrical Materials and Methods

1.8.10 Section 16402 - Interior Distribution System (Electrical)

1.9 PROJECT/SITE CONDITIONS

The Contractor shall become familiar with details of the work, verify existing and planned equipment and work area dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

1.10 ELECTRICAL WORK

Electrical work for equipment shall conform to the requirements of the Sections 15913 "Control Panels", 16050 "Basic Electrical Materials and Methods", and 16402 "Interior Distribution System." Electrical motor-driven equipment specified herein shall be provided complete with motors. Equipment shall be rated at 60 Hz, single phase, AC, unless otherwise indicated.

1.10 Instrumentation

Instrumentation logic and components shall be compatible with the GWTF Man-Machine Interface (MMI) and Programmable Logic Controller (PLC) system, and shall be in accordance with Section 15911 "Personal Computer Man-Machine Interface" and Section 15912 "PLC System/Instrumentation and Control Valves."

PART 2 PRODUCTS

2.1 Pumps

2.1.1 Anti-scale polymer Room Floor Sump Pump

a. General: Chemical-duty, vertical centrifugal, sump pump and integral motor: Anti-scale polymer Room Floor Sump Pump, P-502, meeting all the performance and submittal requirements and pump data of the Section 11218 "Pumps, Vertical Sump, Chemical Duty."

b. Service: Semi-continuous duty in the floor sump in the anti-scale polymer room. Pump shall be capable of pumping floor and anti-scale polymer subsystem wash down water containing filterable solids, and diluted polyacrylate dispersion type polymer solutions.

c. Control: Control logic is described in Section 15995 "Process Control Narrative."

2.1.2 Polymer Metering Pump

a. General: Solid state electronic positive displacement diaphragm type pump, with single pumping head, and liquid end capable of handling high viscosity fluids.

b. Rated Service: 0 to 1.6 gph at injection pressures up to 100 psi.

c. Design capacity: 0.4 gph at a maximum operating pressure of 50 psi.

d. Pump Materials: Pump liquid ends shall be compatible with polyacrylate, dispersant-type, anti-scale polymers. Compatible materials include polyethylene, polypropylene, PVC, 304 or 316 stainless steel, Viton™ and Teflon™.

e. Control: Manually adjustable stroke and frequency, plus switch adjustment conversion to external control and electronic hardware to receive a 4-20 ma control signal. Pump output can be reduced to zero when in external mode. Control logic is described in Section 15995 "Process Control Narrative."

f. Motor: The pump shall operate using 115 VA/60Hz power.

2.2 Piping Materials:

2.2.1 Pipe:

2.2.1.1 Potable water piping shall be galvanized carbon steel as specified in the Section 15061 "Carbon Steel Piping System, Un-lined, Black and Galvanized."

2.2.1.2 Sump process drain piping shall be carbon steel as specified in the Section 15061 "Carbon Steel Piping System, Un-lined, Black and Galvanized."

2.2.1.3 Polymer feed piping shall be polyvinyl chloride (PVC), plastic piping, Schedule 80, in conformance with ASTM D 1785 and as specified for plastic pipe in the Section 02510 "Underground Pressure Piping.

2.2.2 Fittings:

2.2.2.1 Polymer feed pipe fittings shall be solvent socket welded, Schedule 80, in conformance with ASTM D 2467 for pressure fittings and as specified in the 02510 "Underground Pressure Piping.

2.2.2.2 Unions between plastic and metal piping shall be made with composite metal-to-plastic Schedule 80 transition fittings. Fittings shall have molded-in-place 316 stainless steel NPT threads with expansion O-ring and a stainless steel skirt on one side, and a Schedule 80 PVC socket on the other. Threaded connections between plastic and metal piping will not be allowed.

2.2.2.3 Quick connect fittings shall be stainless steel FNPT to male MIL-C-27487 quick connect fittings.

2.2.3 Valves

2.2.3.1 Potable Water System

a. Gate valves under 3 inches in size for clear water shall be 125-pound bronze, double disc, rising stem, screwed end valves. Each valve shall be furnished with handwheel and shall open counterclockwise.

b. Hose valves shall be threaded 3/4 inch bronze angle hose valves.

c. Check valves and ball valves shall be in accordance with Section 15061 "Carbon Steel Piping System, Unlined, Black and Galvanized."

2.2.3.2 Anti-scale Polymer Subsystem

a. Plastic ball valves shall have a body of PVC and Viton™ O-rings. Valves shall be rated at 150 psi from 30 to 150 degrees F and shall block in either direction, allowing full pressure on the opposite end. End connections shall be true union design allowing installation and removal without line expansion.

b. Motor operators for ball valves shall be normally closed, quarter-turn electric actuators. The operators shall have brushless, capacitor run, reversing type motors, 115 V/60 Hz with a declutchable manual override and a visible position indicator. Enclosures shall be rated NEMA 4, water tight with 18-inch termination leads, minimum. Valves shall open and close with a single control signal.

c. Back pressure regulating valves shall be diaphragm type with a 3/4 inch NPT end connection, a PVC or polypropylene body, a PTFE faced EDPM diaphragm with a 0-150 psi pressure adjustment spring rating. Valve shall provide constant back pressure and act as an anti-siphon valve. Back pressure valve set point shall be field adjusted to the lowest pressure that provides an accurate continuous flow of polymer at the injection quill.

d. Injection quill assembly shall consist of an injection check valve, a polypropylene, PVC, or CPVC nozzle and a bronze corporation stop. The corporation stop shall have a 3/4 inch NPT process connection and the nozzle shall have a 3/8 inch tube inlet extending through the corporation stop to the center of a 10 inch pipe. The assembly shall allow the safe removal of the injection check valve and nozzle for service.

e. Plastic ball check valves shall be made of polyvinyl chloride (PVC). Check valves shall be of the ball type and shall have union-type end connections. Seals shall be made of Viton™.

2.2.4 Sump process drain piping

a. Check valves and ball valves shall be in accordance with Section 15061 "Carbon Steel Piping System, Unlined, Black and Galvanized."

b. Flushing connections shall have a 3/4 inch PVC ball valve, a metal-to-plastic pipe transition fitting, and a 3/4 inch bronze female threaded hose connection.

2.2.5 Accessories

2.2.5.1 Anti-scale polymer subsystem

a. Y-strainer shall be PVC body with a PVC screen. The strainer basket shall have an open area at least 2 times the cross-section of the pipe size. The cap and screen shall have Viton™ O-Ring seals and shall be easily unscrewed for cleaning.

b. Calibration cylinder shall be clear PVC with graduations in milliliters per second and gallons per hour. The cylinder shall have a 250 millileter capacity and a 1/2 inch NPT inlet connection.

c. Flushing connections shall have a 3/4 inch PVC ball valve, a plastic to metal pipe union, and a 3/4 inch bronze female threaded hose connection.

d. Pressure gauge shall have Type 316 stainless bourdon tube measuring element. Socket tips for bourdon tube shall be stainless steel. The socked tips of gauges shall be not less than 1/2 inch size. Gauge shall shall indicate pressure in a range from 0 to 100 psi and shall be fitted with shatterproof glass. Gauges shall be mounted on diaphragm seals with type 316 stainless steel diaphragm and bottom housing. The bottom housing shall be fitted with a flushing connections. This flushing connection shall be fitted with a Type 316 stainless steel close nipple and a cock. The diaphragm seal gauge assembly shall also be fitted with a snubber. The snubber shall dampen pressure fluctuations in the filled system. All diaphragm seal gauge assemblies shall be filled with silicon and the snubber filter disc shall be sized to prevent the gauge from pulsing violently. The snubber shall be made of stainless steel.

e. Pipe saddle shall be Type 304 Stainless steel with insulating gaskets. Threads on bolts shall have anti-gall coating. Size of the tapped NPT boss shall match the connecting line size.

2.2.5.2 Anti-scale polymer Tote Level Transmitter

An ABB Datum L160 level transmitter and Datum P881 pressure transducer or equivalent shall be used. The transmitter Model No. L160/10100/STD shall have 4-20 ma output capability, require 128 vac/ 60 Hz power, an LED display and a NEMA 4X enclosure complete with pipe mounting kit, No. 4600/0133. The pressure sensing transducer Model No. P881/01010 shall be stainless steel construction, 1/2" NPT process connection and 10 feet of cable for signal connection to the L160 transmitter. Transducer range shall be 0 to 10.88 psi.

2.3 MECHANICAL INSULATION

Insulate piping and equipment in accordance with Section 15080 "Mechanical Insulation."

3.0 EXECUTION

3.1 PUMP INSTALLATION

Install pumps in accordance with manufacturer's written instructions.

3.2 SHOP TESTING SKID-MOUNTED POLYMER INJECTION SYSTEM

3.2.1 Before shipment of injection system, perform checks and tests of all mechanical and electrical equipment, instrumentation piping, tubing, valves, and accessories.

3.2.2 Checking and testing shall include the following at a minimum:

a. Alignment checking of equipment to demonstrate that equipment has been fabricated and assembled correctly.

b. Mechanical testing of equipment valves, and specialty items to demonstrate proper working conditions and function as designed.

c. Hydraulic testing of equipment and piping using potable water to demonstrate that equipment and piping do not leak at pressures 1½ times maximum operating pressure for two hours. Schedule 80 PVC piping shall be pressure tested at 125 psi for two hours.

d. Electrical equipment, instrumentation, and controls testing to demonstrate proper operating conditions and function as designed.

e. Checking to confirm that all wiring is in accordance with approved wiring diagrams and will function as designed.

f. Testing each control circuit for short circuits and improper ground.

3.3 DELIVERY, STORAGE, AND HANDLING

3.3.1 Skid-mounted injection system, equipment, and pumps shall be adequately prepared and crated or protected for shipment such that damage to equipment does not occur during shipment or storage. Provide shipping stops, bolts, ties, shunts, and related accessories in all instruments and devices prior to shipping as required to prevent damage during shipment.

3.3.2 Tag items shipped loose with the respective pump or tank tag number.

3.4 INSTALLATION OF PIPING

3.4.1 Installation of water service piping

a. Location

Connect water service piping for the anti-scale polymer room to the new water service piping inside Building No. 52 downstream of the backflow prevention device.

b. Installation

Install pipe and fitting in accordance with Section 02510 "Underground Pressure Piping," where applicable for above ground piping, and with Section 15061 "Carbon Steel Piping System, Un-Lined, Black and Galvanized."

C. Disinfection

Disinfect and test new water piping and existing water piping affected by the Contractor's operations in accordance with AWWA C651 and Section 02510 "Underground Pressure Piping."

3.4.2 Installation of Anti-scale polymer Sump Process Drain Piping

a. Location

Route sump process drain piping from the anti-scale polymer room sump pump to discharge into the Building 52 Floor Sump S-103.

b. Installation

Install pipe and fitting in accordance with Section 15061 "Carbon Steel Piping System, Un-Lined, Black and Galvanized."

3.4.3 Installation of Anti-scale Polymer Subsystem

3.4.3.1 Location

a. The anti-scale polymer subsystem will be located in the Anti-scale Polymer Room in the new addition to Building No. 52, as indicated.

b. Connect the suction side of the polymer metering pump, P-501, to the anti-scale polymer storage base tote T-501. Connect the polymer pump discharge to two injection points in the Air Stripping Units (ASU) groundwater feed piping, upstream of the ASU feed pumps, as indicated

c. Route instrumentation via the existing Building No.52 control panel.

3.4.3.2 Installation of Plastic Piping

Install plastic pipe and fittings in accordance with Section 02510 "Underground Pressure Piping," and Part 3, "Execution" of Section 15061 "Carbon Steel Piping System, Un-Lined, Black and Galvanized," where applicable for above ground plastic pipe, and except as modified herein.

3.5 Anti-Scale Polymer Subsystem Instrumentation Description

Because of the simplicity of the subsystem and the standard equipment used, drawings have not been added or revised to reflect the installation details of the anti-scale polymer subsystem instrumentation and controls. However, the following subsection addresses the installation requirements for the metering pump controls, open/close motor-actuated valves, and the polymer storage tote level transmitter. Reference Section 15995 "Process Control Narative," and Anti-Scale Polymer Subsystem Process and Instrumentation Diagrams (P&ID) and Control Panel Ladder Diagrams.

3.5.1. Polymer Metering Pump

a. Installation and materials shall be as called out in Section 16050.

b. Use submittals supplied by manufacturer for power and signal interconnection installation detailed instructions.

c. The 4-20 ma signal outputs from the ASU groundwater feed flowmeters shall be totalized by the PLC/MMI. The PLC/MMI shall provide a 4-20 ma control anolog output signal to the polymer metering pump which is proportional to the totalized flow through all of the ASU flowmeters. The pump's stroke and pumping rate require manual adjustment to deliver at the proper dosing rate. The metering pump shall have both local and remote control capability. Remote control output signal for the metering pump is interlocked with the operation of the ASU Feed Pumps P-101A and P-101B.

d. Power shall be provided for the pump from the most convenient and cost effective source. Details shall be determined in the field, and documented and submitted on revised drawings by the Contractor.

3.5.2. Motor-operated Flow Control Valves

a. Electrical installation and materials shall be according to the requirements in Section 16050 "Basic Electrical Materials and Distribution."

b. Use submittals supplied by manufacturer for power interconnection details installation instructions.

c. The control or open/close signal to the valve shall be initialed by a PLC output. See Section 15912 "PLC System/Instrumentation and Control Valves' and Section 15913 "Control Panels." This output shall be 120 volt AC/60 HZ.

d. Electrical Installation details shall be determined in the field, and documented and submitted as revised drawings by the Contractor.

3.5.3. Polymer Feed Tote Level Transmitter

a. Electrical installation and materials shall be as called out in Section 16050.

b. Use submittals supplied by manufacturer for power and signal interconnection detailed installation instructions.

c. The pressure transducer and level transmitter shall sense the static head pressure of the anti-scale polymer feed tank, display a local level reading, and transmit a 4-20 ma signal to the control PLC. The tank level shall be displayed at the GWTF Man-Machine Interface(MMI). A low level alarm shall also be displayed at the control MMI. Signal wire for the 4-20 ma isolated transmitter output shall be wired to an appropriate 4-20 ma PLC analog input card.

d. Electrical installation details shall be determined in the field, and documented and submitted as revised drawings by the Contractor.

3.6 TESTING

3.6.1 Hydrostatic Tests

Hydrostatically test metallic piping systems and PVC piping at 125 psi. Protect all components that may be damaged by the testing. Test pressure shall be held for two hours with an inspection of all joint and connections. Correct defects and retest complete system until no leaks are found.

3.6.2 Anti-scale polymer pump and system performance tests

After installation of pump, piping, and all accessories is complete, perform tests to demonstrate that the pump and injection system operates properly. Operate pump at its rated capacity for a minimum of one hour. Monitor for objectionable heating, vibration, operation, or noise from any part, verify anti-scale polymer dosing rates and line pressure set point adjustment and confirm that all manual and automatic controls function properly. Correct any deficiencies and repeat the test.

3.7 ON-SITE TECHNICAL ASSISTANCE

Provide the services of a competent representative of the skid-mounted polymer injection system fabricator to assist Contractor's personnel in start-up and placing the anti-scale polymer subsystem in successful service, and to train the Government's operation and maintenance personnel in the correct operation and maintenance of the injection system. The fabricator's representative shall be capable and experienced in design, start-up, operations, and maintenance of systems similar to the system provided by the Contractor. Provide the following minimum number of 8-hour workdays of on-site technical equipment.

a. For start-up assistance: 2 days

b. For training government personnel: 1 day

The specified number of on-site workdays for start-up assistance and training assistance shall not overlap.

END OF SECTION

SECTION 15550

ANTI-SCALE POLYMER CHEMICAL

PART 1 GENERAL

1.1 SECTION INCLUDES:

1.1.1 Anti-scale polymer chemical supplied in tote tanks

1.1.2 Startup and ongoing technical service.

1.2 SUMMARY OF WORK

1.2.1

Provide anti-scale polymer in tote tanks of at least 275 gallons. The polymer manufacturer shall supply a larger, stationery, base tote of at least 400 gallons and a secondary stacking tote of at least 275 gallons to refill the base tote.

1.2.2

Furnish the services of a competent representative of the anti-scale polymer manufacturer for startup assistance and periodic technical support of the anti-scale polymer subsystem. Include the onsite use of a monitoring device to indicate fouling rates and scale deposition. Provide technical support during installation of the monitoring device.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330 titled "Submittal Procedures"

1.3.1 SD-02 Manufacturer's Catalog Data
Catalog Data *G*

a. Catalog cuts, brochures, circulars, specifications and product data, and other printed information containing sufficient data and of adequate scope to allow the Contracting Officer to verify compliance with requirements of the Contract documents.

1.3.2 SD-04 Drawings
Equipment and Materials *G*

a. Shop Drawings: Include outline dimensional drawings.

1.3.3 SD-06, Instructions

a. Installation Instructions *G*

b. Material Safety Data Sheets

b. Operating Instructions *G*

1.3.4 SD-12, Field Test Reports

a. Polymer Manufacturer's Field Reports: Submit under provisions of Section 01330, SD-12. Indicate start-up of anti-scale polymer subsystem when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

1.3.5 SD-19, Operations and Maintenance Manuals

Submit data package in accordance with Section 01781, "Operation and Maintenance Data". Include data on anti-scale polymer feed totes, injection procedures and dosing rates, tote level sensor, deposit monitor evaluation, refilling and replacing tote tanks, and cleaning and flushing of polymer piping. Include a recommended tool list and step by step instructions on operations procedures.

1.4 RELATED SECTIONS

1.4.1 Section 15995 - Process Controls Narrative

1.4.2 Section 15545- Anti-scale Polymer Subsystem

1.5 REFERENCES

1.5.1 National Pollution Discharge Elimination System (NPDES) Permit No. MN 0000710.

1.6 PROJECT RECORD DOCUMENTS

1.6.1 Submit under provisions of Section 01770 titled "Closeout Procedures."

1.6.2 Record actual size and type of equipment and piping provided, including capacity, materials, dimensions, statistics, valves, piping and accessories.

1.7 QUALIFICATIONS

1.7.1 Polymer Manufacturer: Company specializing in manufacturing the chemical products specified in this Section with minimum three years documented experience manufacturing scale inhibitors. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.8 REGULATORY REQUIREMENTS

1.8.1 Anti-scale chemical products must be approved by the Minnesota Pollution Control Agency (MCA).

1.8.2 Conform to the requirements of the NPDES permit for addition of chemicals to the treated groundwater discharge.

1.9 TECHNICAL SERVICE

1.9.1 Startup and Training Assistance

Provide the services of a competent representative of the polymer manufacturer to assist Contractor's personnel in startup and placing the anti-scale polymer subsystem in successful service, and to train the Government's operation and maintenance personnel in correct operation and maintenance of anti-scale polymer subsystem. Manufacturer's representative shall be capable and experienced in startup, operation, maintenance, and operator training for anti-scale polymer systems similar to the units provided by Contractor.

1.9.2 Monthly Service Visits

For the first year of operation, provide monthly technical service visits to perform field inspections and water analysis on site. Detail findings, in writing, on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.

1.9.3 Laboratory and Technical Assistance

Provide laboratory and technical assistance services during the terms of the contract with the Navy.

1.9.4 Shutdown Inspections

Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations, in writing, based upon these inspections.

1.10 MAINTENANCE MATERIALS

1.10.1 Provide maintenance materials under provisions of Section 01770 "Close Out Procedures".

PART 2 PRODUCTS

2.1 MATERIALS

Sequestering agent to reduce deposits and adjust pH. Agents include polyacrylates and synthetic polymer polyelectrolytes. All anti-scale polymer chemicals must be approved by the MPCA and conform to the discharge requirements of the NPDES permit.

2.1.1 Anti-Scale Polymer Manufacturers:

a. Calgon : Product pHreeguard 1300
b. Nalco: Product Nalco 8356D

2.2 TOTE TANKS

2.2.1 Manufacturers

Manufacturers: Tote tanks will be supplied by the same manufacturer who supplies the polymer.

2.2.2 Base Tote Tank

Base or Permanent Tote Tank: 400 gallon capacity minimum, constructed of plastic lined, stainless steel or other materials suitable for the product. Tote shall be rectangular. Tote includes at least two top bung openings for hose or pipe connections and at least one 2 inch connection at the base of the unit for discharge and for attaching the level sensor. The top of the base tote shall provide a frame or platform to hold a refill tote, and the bottom shall have forklift channels on four sides. Include a sight-glass style level gauge. Include quick-connect coupling hose assembly to allow transfer of chemical from the refill tote to the base tote. Include a 2-inch valve on the discharge line at base of tote tank. Include pressure relief valve at top of base tote tank. Tank will be delivered empty.

2.2.3 Refill Tote

Refill Tote Tank: 275 gallon minimum capacity, constructed of plastic lined, stainless steel or other materials suitable for the product. Tote shall include at least two top bung openings for hose or pipe connections and at least one connection at the base of the unit. The refill tote shall stack on top of base tote and shall have forklift channels on four sides. Include a discharge line and valve and quick-connect coupling at base of tote tank for transfer by polymer from base tote. Include pressure relief valve at top of refillable tote tank.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1

The base tote shall be filled with polymer for system testing only after installation of the tote tank level transmitter, piping and pipe testing conducted by others; and with the approval of the contracting officer. Install empty base tote level and plumb in accordance with contract drawings and manufacturer's instructions. Install sight-glass level gauge on the base tote.

END OF SECTION

ATTACHMENT 2
MODIFICATIONS TO SPECIFICATIONS NO. 06931106

(3 PAGES)

Modifications to NIROP Contract Technical Specifications No. 06931106

1. Add Polymer Room Floor Sump Pump to Section 15911 2.8 Graphics Design Screen.

   Revise as follows:

   Section 15911 2.8.10 After SUMPS S-103, S-303, S-406, **ADD "S-502"**

2. Add Anti-scale Polymer Subsystem screen to Section 15911 2.8 Graphics Design Screen.

   Add the following paragraph to Section 15911 2.8.17:

   2.8.17 Anti-scale Polymer Subsystem

   This Screen shall contain the following as a minimum: operation of polymer metering pump and run indication; the two polymer flow control valves open/close indications; and polymer tote tank level indication and low level alarm condition. This Screen shall also show totalized flow from individual ASU groundwater flowmeters as indicated at FQI-501 and FI-501, used to set a proportional signal to control the rate and stroke of the metering pump; and the ASU Feed Pumps P-101A and P-101B operation and run indication. This Screen shall contain the operation Input/Output, monitoring, and alarm points or values.

3. Add Polymer Room Floor Sump to Section 15995 2.1 Process Overview

   Revise Section 15995 2.1 n. as follows:

   AFTER, "...for the Cleaning System Area Floor Sump (S-406)" **ADD "; one Sump Pump (P-502) for the Anti-Scale Polymer Room Floor Sump (S-502)."**

4. Add Anti-scale Polymer Subsystem to Section 15995 2.1 Process Overview

   Add a new paragraph toto the end of Section 15955 2.1 as follows:

   o. Anti-Scale Polymer Subsystem: The primary components of the anti-scale polymer subsystem are the polymer tote tanks (T-501); the polymer tote tank level transmitter (LIT 501); a skid-mounted polymer injection system which includes a polymer metering pump (P-501), two motor-operated polymer flow open/close valves, a calibration column, and related piping; and additional polymer distribution and injection piping and accessories.

5. Add Sump Pump P-502 to Section 15995 2.8 Floor Sumps Subsystem

6. Add two new paragraphs to the end of Section 15995 2.8 as follows:

   h. When HS-502 is in "Hand " position. Sump Pump HS-502 runs. Run Indicator YL-502 displays the running of P-502.

   I. When HS-502 is in "Auto" position, Sump Pump P-502 starts when high level (LSH-502) is reached in the Anti-Scale Polymer Room Sump (S-502). P-502 stops when low level is reached (LSL-502) or HS-502 is manually set to the "Off" position. LAHH-502 alarms on the MMI when high-high level is reached in S-502.

7. Add Anti-Scale Polymer Subsystem to Section 15995 Part 2 Process Control

   Add a new subpart to the end of Section 15955 Part 2 as follows::

   2.10 Anti-Scale Polymer Subsystem

   a. The Anti-Scale Polymer Subsystem has functional interfaces to other equipment and to the GWTF PLC/MMI control system.

   b. The polymer injection skid which includes the polymer metering pump and the polymer flow control open/close valves is connected to the polymer feed tank by a single inlet piping connection. The two piping outlets of the skid are connected to injection nozzles at the suction piping of the ASU Feed Pumps P-101A and P-101B, in Building No. 52.

   c. Remote control and monitoring of the polymer metering pump is provided at the GWTP PLC /MMI control system. Manual operation is provided at a local control panel mounted on the skid. The interfaces to the PLC /MMI control system are as follows:

      1) The PLC/MMI and control software shall provide a 4-20 ma control analog output signal (FC-501) to the polymer metering pump. This signal is proportional to and represents a summation of all four ASU groundwater flowmeters. The metering pump's stroke and pumping rate requires manual adjustment to enable the pump to deliver at the proper dosage. The MMI shall display a summation or totalized flow value (FQI-501) for all ASU groundwater flow, and a display value (FI-501) of the summed total instantaneous flow.

      2) The polymer metering pump's motor status shall be a discrete input for monitoring at the MMI, YL-501.

d. The PLC/MMI shall provide a control output signal to each of the two polymer motor-operated flow control valves, V-514 and V-515. The signals shall open the valves when:

   1) There is groundwater flow through the ASU and a groundwater totalized/calculated flow value or signal, and

   2) Either ASU Feed Pump P-101A or P-101B is on/running.

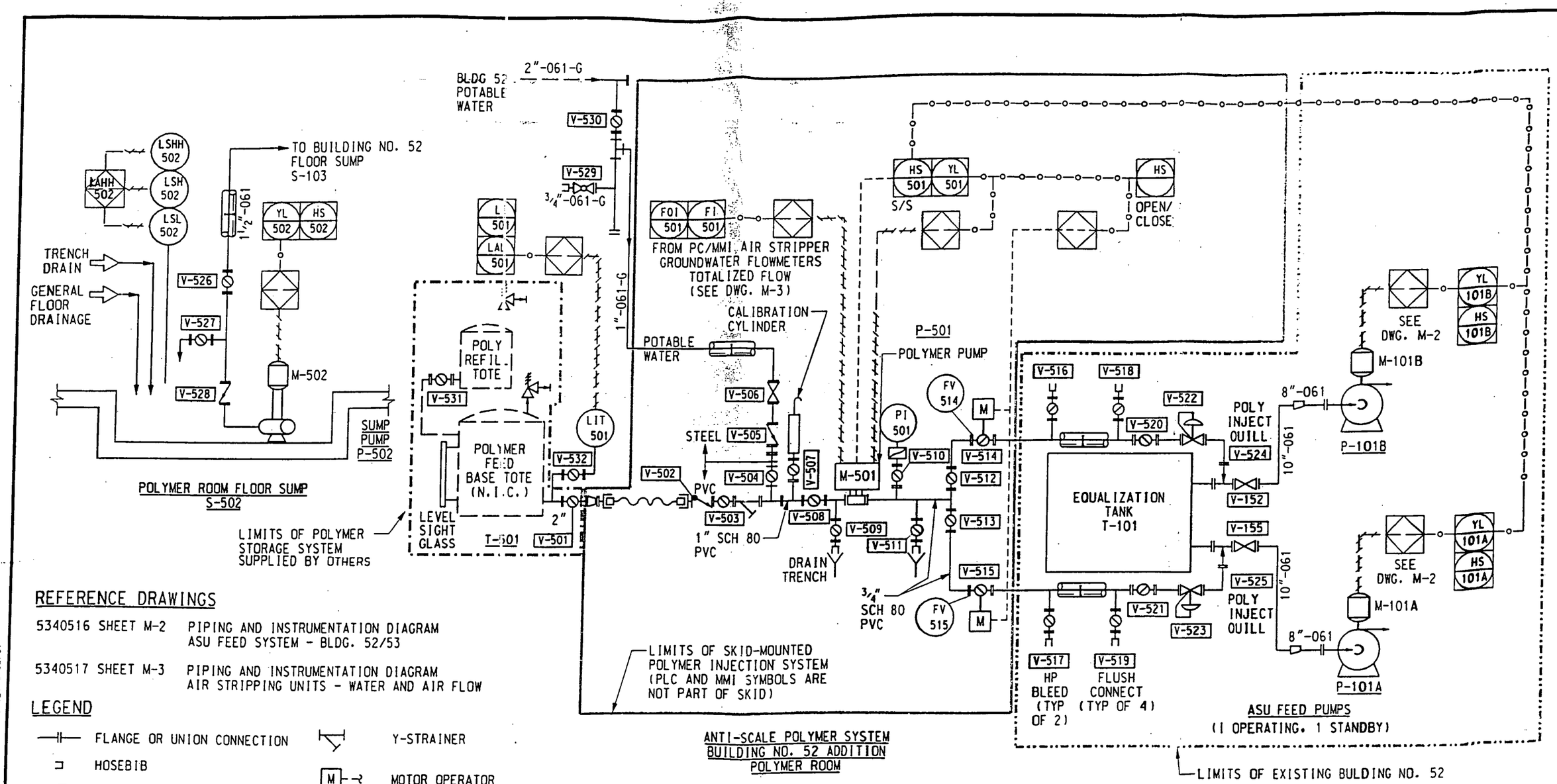
   The signals shall close the valves when the pumps are off, regardless of calculated flow value or signal. Valve V-515 is opened/closed by the status of ASU Feed Pump P-101A, via HS-101A; and Valve V-514 is opened/closed by the status of Pump P-101B, via HS-101B.

e. When the ASU Feed Pumps P-101A and P-101B are both off (YL-101A and YL-101B MMI indicators) then the polymer metering pump shall be shut off by a control output from the PLC/MMI control system. The metering pump shall have both a local HOA switch (hand-off-auto) control and receive a start/stop remote automatic control signal.

f. The Polymer Tote Tank (T-501) level shall be an input to the PLC/MMI control system. The PLC/MMI will receive a 4-20 ma signal. The MMI shall display the tank level value, LI-501. Low Polymer Tote Tank level shall alarm at the MMI, LAL-501.

ATTACHMENT 3
FIGURES

INDEX



REFERENCE DRAWINGS

5340516 SHEET M-2	PIPING AND INSTRUMENTATION DIAGRAM ASU FEED SYSTEM - BLDG. 52/53
5340517 SHEET M-3	PIPING AND INSTRUMENTATION DIAGRAM AIR STRIPPING UNITS - WATER AND AIR FLOW

LEGEND

- FLANGE OR UNION CONNECTION
- HOSEBIB
- QUICK CONNECT FITTING
- GATE VALVE
- BALL VALVE
- GLOBE VALVE
- CHECK VALVE
- BALL CHECK VALVE
- BACK PRESSURE VALVE
- PRESSURE RELIEF VALVE
- Y-STRAINER
- M — MOTOR OPERATOR
- FLEXIBLE HOSE WITH QUICK-CONNECT FITTINGS
- ELECTRIC BINAR' SIGNAL
- COMPUTER LINE
- ELECTRIC SIGNAL
- INSULATED PIPING
- N.I.C. — NOT IN CONTRACT
- HP — HIGH POINT

DATE: 12/02/97

FILENAME: FILENAME: P:/4324/DGN/4324FIG1.DGN

MORRISON KNUDSEN CORPORATION

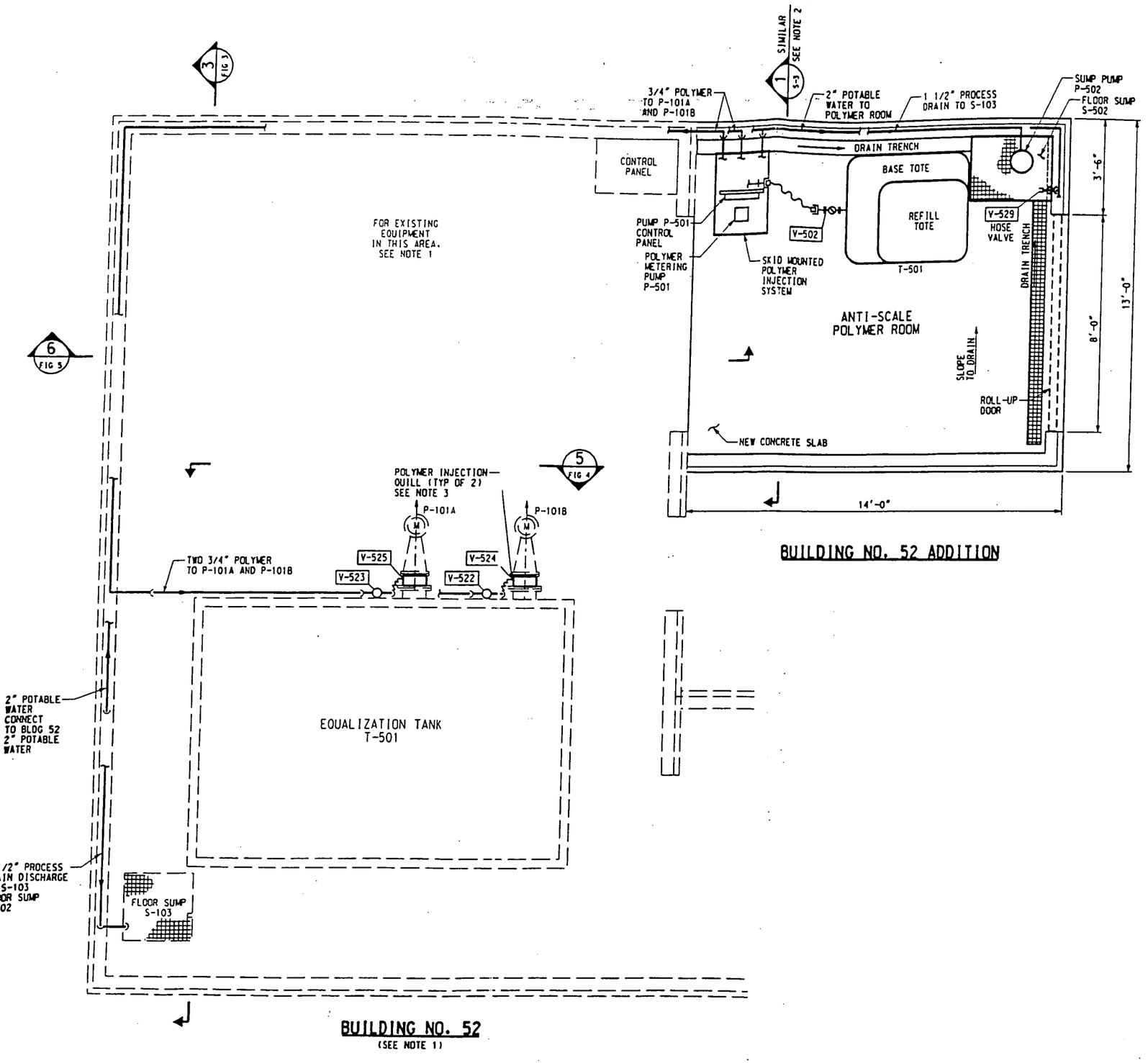
NAVAL FACILITES ENGINEERING COMMAND
SOUTHERN DIVISION - CHARLESTON, SC

NIROP — FRIDLEY, MN

PIPING AND INSTRUMENTATION DIAGRAM
ANTI-SCALE POLYMER SYSTEM BUILDING NO. 52 ADDITION

FIGURE 1

PROJECT NO.	ORIGINATOR	CHECKER	DATE
4324-0039	CFF	HGH	DEC. 97



BUILDING NO. 52
(SEE NOTE 1)

BUILDING NO. 52 ADDITION

NOTES

1. ALL CONSTRUCTION DIMENSIONS AND EQUIPMENT LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR. FOR PIPING AND EQUIPMENT LOCATIONS IN BUILDING NO. 52, SEE REFERENCE DRAWING 5340521, SHEET M-7.
2. FOR SIMILAR STRUCTURAL SECTION FOR BUILDING NO. 52 ADDITION, SEE REFERENCE DRAWING 5340542, SHEET S-3.
3. POSITION PIPE SADDLE ON 10 INCH PIPE SPOOL TO INSERT POLYMER INJECTION QUILL INTO BOTTOM OF PIPE.

REFERENCE DRAWINGS

5340521 SHEET M-7 BUILDING NO. 52 & 53 PIPING & EQUPMENT - PLAN

5340542 SHEET S-3 BUILDING NO. 52 - 53 CONNECTION PLAN AND SECTION

0 2 4 6
SCALE: 1/2" = 1' - 0"

MORRISON KNUDSEN CORPORATION

NAVAL FACILITES ENGINEERING COMMAND
SOUTHERN DIVISION - CHARLESTON, SC

NIROP — FRIDLEY, MN

BUILDING NO. 52 ADDITION
PIPING AND EQUIPMENT PLAN

FIGURE 2

PROJECT NO.	ORIGINATOR	CHECKER	DATE
4324-0039	CFF	HGH	DEC. 97

DATE: 12/02/97

FILENAME: P:/4324/4324F102.DGN

1 1/2" TO CARBON DRUM

1½" PROCESS DRAIN

AIR EXHAUSTER

TWO ¾" POLYMER

4"

2"

1½"

2"

V-122

1½" PROCESS DRAIN

2" WATER

VACUUM RELIEF VALVE

V-119

CK-126

V-163

V-121

8"

8"

STEEL FLEX COUPLING LOCATE AS REQUIRED

V-170

V-172

CK-138

V-124

V-123

8"

8"

4"

2"

8"

3"

V-530

CK-139

V-127

V-133

2"

2" WATER

8"

2"

V-143

V-131

FIT 100

CK-150

V-135

3"

V-171

CK-134

V-132

P-103

10"ø HDPE

EXIST 6" TO SANITARY

FLOOR PENTRATION SEE DETAIL 14 M8 | M10

10"ø HDF

FROM TREATMENT AREA MAIN PLANT BUILDING

BUILDING NO. 52
ELEVATION LOOKING WEST

3 M7 | M11

SECTION

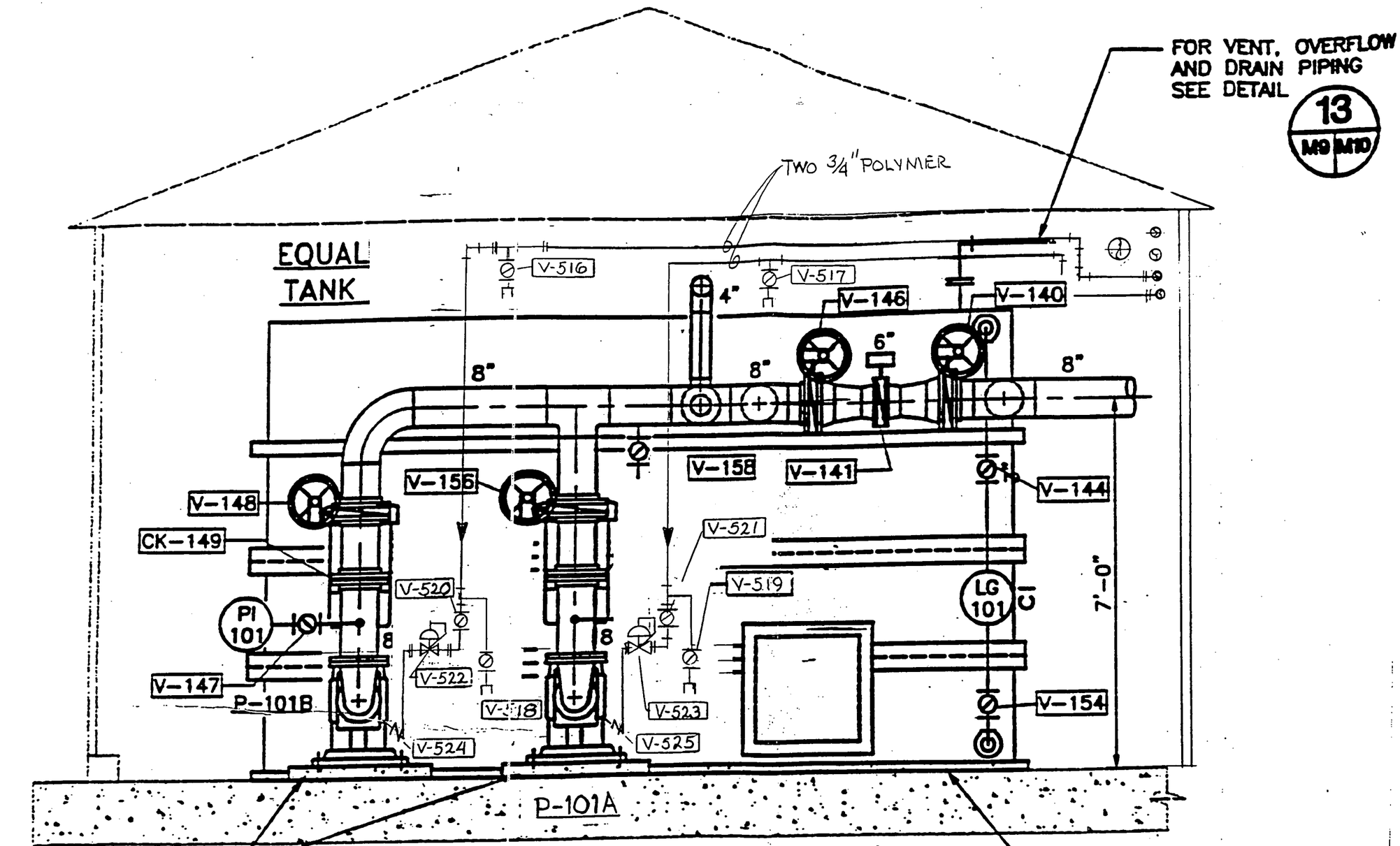
SCALE: 1/2"=1'-0"

0 2 4

m7|m8

BUILDING NO. 52 & 53
PIPING & EQUPMENT – SECTIONS

FIGURE 3



BUILDING NO. 52
ELEVATION LOOKING SOUTH

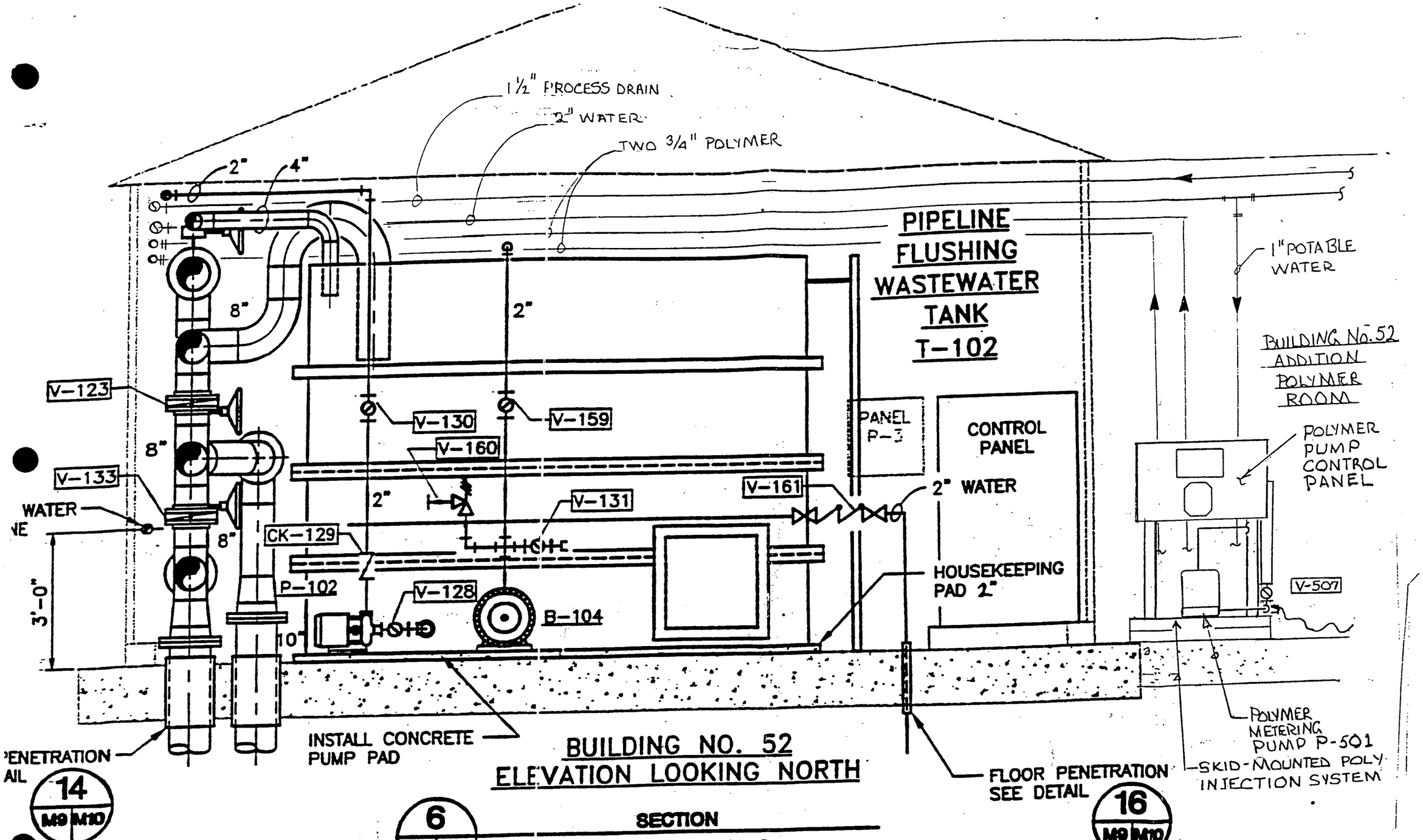
5 M7 M9 SECTION

SCALE: 1/2"=1'-0"

0 2 4

BUILDING NO. 52 & 53
PIPING & EQUPMENT – SECTIONS

FIGURE 4



BUILDING NO. 52
ELEVATION LOOKING NORTH

6 M7 M9

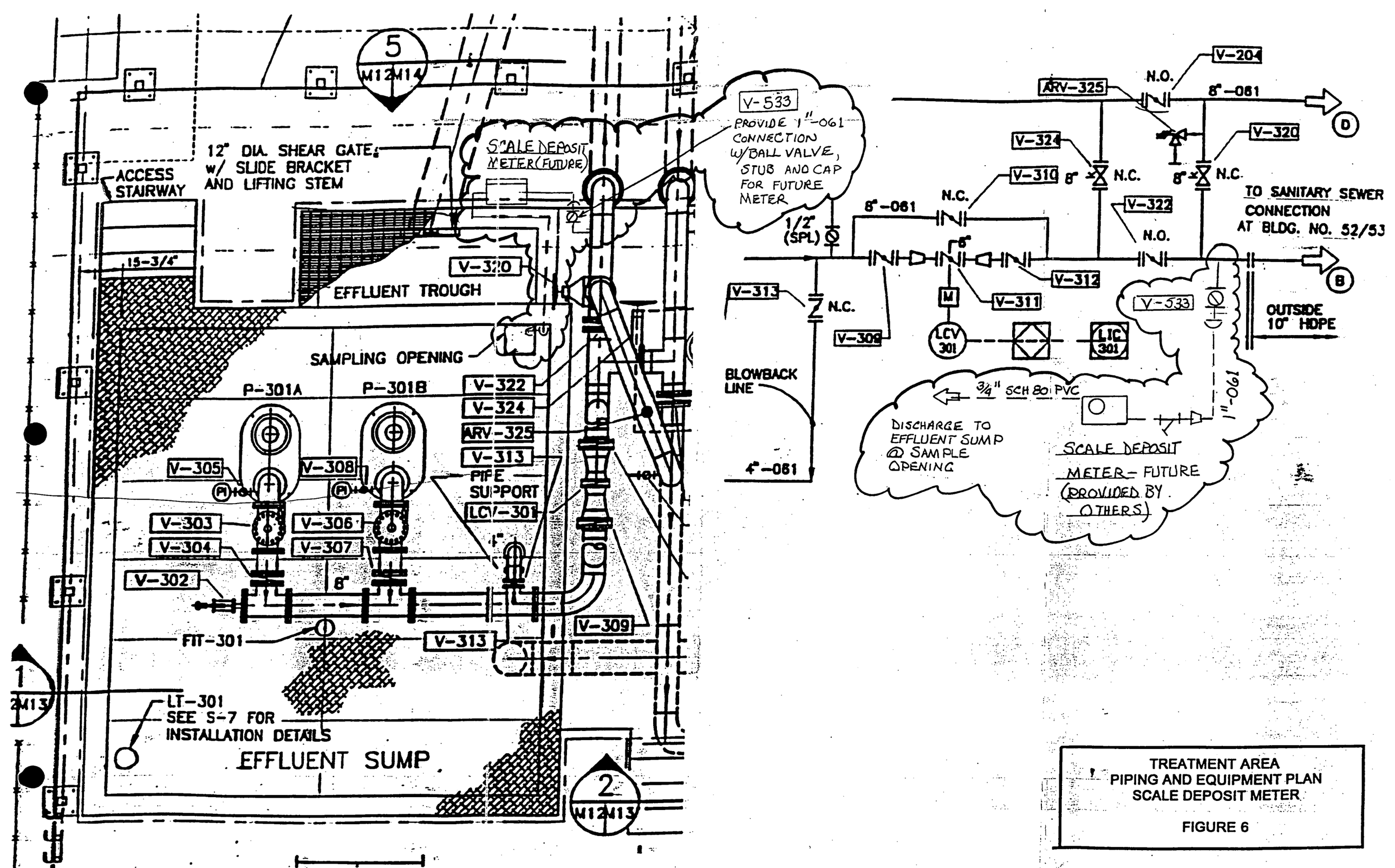
SECTION

SCALE: 1/2"=1'-0"

0 2 4

BUILDING NO. 52 & 53
PIPING & EQUPMENT – SECTIONS

FIGURE 5



TREATMENT AREA
PIPING AND EQUIPMENT PLAN
SCALE DEPOSIT METER

FIGURE 6

APPENDIX B
QUALITY CONTROL DOCUMENTATION

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Piping Installation	PI-01	Rev. A	Page 1 of 2

References:

Item No.	Item Checked	Accept/Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1.	Observe that pipe, fittings, and accessories are handled in such a manner as to avoid damage by impact, abrasions, or other causes.			
2.	Check mechanical or finished ends for damage and pipe interior for dirt and foreign material, where accessible.			
3.	Ensure gaskets, lubricants, compounds, and other mechanical joint materials are handled and stored in accordance with manufacturer's recommendations.			
4.	Ensure all piping, fitting and miscellaneous components meet American Water Works Association (AWWA) Standard C906.			
	Initial Inspections			
5.	Ensure all piping is laid in straight lines to alignment shown on drawings and to uniform grades between elevations shown on drawings at terminal structures, change of direction, and other locations.			
6.	Verify pipe size and layout prior to glueing.			
7.	Verify location of loops and anchor points.			
8.	Ensure joints are in accordance with manufacturer's recommendations.			
9.	Observe that welds are made according to specifications.			
10.	Ensure end surfaces are clean when joints are made.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Piping Installation	PI-01	Rev. A	Page 2 of 2

References:

Item No.	Item Checked	Accept/Reject	Remarks	Verified By /Date
	Follow-Up Inspections			
11.	Ensure all required inspections, tests, hydrostatic/pneumatic tests, and/or NBE work for the piping has been performed.			
12.	Verify that all equipment has been inspected upon arrival at site for general conditions to Ensure that all safety systems and alarms are functional and tested.			
13.	Verify all workmanship is neat, excess glue is removed.			
14.	Verify that all metal surfaces are protected against corrosion.			
15.	Verify insulation has been installed according to drawings and specifications.			
16.	Verify that all tests, inspections, and NBE have been documented and the reports filed.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable: