
OPERATIONS AND MAINTENANCE MANUAL

VOLUME II

**ROCHESTER FIRE TRAINING ACADEMY
ROCHESTER, NEW YORK**

**NEW YORK STATE INACTIVE HAZARDOUS WASTE SITE
NO. 8-28-015**

MARCH 1999

MALCOLM PIRNIE, INC.

**P.O. Box 1938
Buffalo, New York 14219**

**ROCHESTER FIRE TRAINING ACADEMY
OPERATIONS AND MAINTENANCE MANUAL**

VOLUME II

TABLE OF CONTENTS

EXHIBIT 2-1	March 11, 1998 Letter from the City of Rochester to the NYSDEC Regarding Institution Controls for the Rochester Fire Academy Site (Registry Number 828023)
EXHIBIT 2-2	Record of Decision (March 1993), Rochester Fire Academy Monroe County, New York - Site Number 828015
EXHIBIT 2-3	Selected Sections / Information from 1991, Rochester Fire Academy Remedial Investigation
EXHIBIT 2-4	Selected Sections / Information from 1991, Rochester Fire Academy Remedial Investigation Report Appendices
EXHIBIT 2-5	Quarterly Inspection and Maintenance Manual, December 1998
EXHIBIT 2-6	Half-Sized Rochester Fire Academy As-Build Drawings
EXHIBIT 2-7	Citizen Participation Plan, Rochester Fire Academy Inactive Hazardous Waste Site (NYS Registry No. 828015)
EXHIBIT 2-8	Boring Logs for New Wells 9S and 9I Located at the Groudwater Treatment Plant

February 8, 1999

David A. Crosby, P. E.
Environmental Engineer
NYSDEC
50 Wolf Road
Albany, New York 12233

Re: Rochester Fire Academy
Operations and Maintenance Manual, Site No. 828015

Dear Mr. Crosby:

As discussed, we will be submitting the revised O&M Manual to the City of Rochester and your office early next week for simultaneous review. We have assembled a second volume of the O&M Manual that will contain specific documents and pertinent sections of Malcolm Pirnie's 1991 Remedial Investigation (RI) Report. The addition of Volume 2 results in a stand alone document as recommended. Our responses to your comments on the Rochester Fire Academy (RFA) Operations and Maintenance Manual are summarized below.

Comments:

Comment #1: *The correct New York State Inactive Hazardous Waste Site ID No. is 8-28-015. Please Include the site number on the cover of the document.*

Response: The correct NYS Inactive Hazardous Waste Site ID No. has been included on the cover.

Comment #2: *The Operation and Monitoring (O&M) Manual should be a complete document which should be able to stand alone and be easily implemented by individuals unfamiliar with the site. As such, relevant documents associated with the site's remedial program should be included in the document. The following document should be incorporated into the O&M Manual:*

- a.) A copy of the Record of Decision;
- b.) Copy of the Consent Order;
- c.) The site specific Citizen Participation Plan;

- d.) *As-built half size drawings including, but not limited to. Site map, topography, any mechanical and electrical drawings, treatment systems, etc.; and*
- e.) *The March 11, 1998 letter to the NYSDEC which describes the institutional controls that are in place to control the site and protect the long term remedial systems.*

Response: The referenced documents will be included in the O&M Manual in Volume 2.

Comment #3: *Historical groundwater data for the monitoring wells proposed for use during the long term monitoring program should be provided in a tabular format. This would form a baseline for comparison with future data collected during the O&M phase of the project.*

Response: The historical groundwater data for the monitoring wells, will be included in Volume 2. Pertinent sections of the May 1991 Remedial Investigation (RI) which contain this information have been reproduced.

Comment #4: *Any groundwater monitoring wells installed during the investigative phases of the project which are not planned to be used in the O&M phase of the project should be decommissioned using appropriate NYSDEC guidance.*

Response: The groundwater monitoring wells that were not planned to be used during the O&M phase were decommissioned during the Construction Phase (1995).

Comment #5: *The boring logs for the monitoring wells proposed for the O&M program should be included in the document.*

Response: The boring logs for the monitoring wells will be included in Volume 2 of the O&M. Pertinent sections of the 1991 RI that contain this information were reproduced.

Comment #6: *The site background should include a subsection which briefly discusses the environmental setting of the site. The subsection should discuss the site's topography, the natural and man-made setting, the geology, the hydrology, and land use on and surrounding the site.*

Response: Detailed site information will be included in Volume 2 of the O&M Manual. Pertinent sections of the 1991 RI including this information have been reproduced.

Comment #7: *Section 1 should include a subsection which presents the goals and major elements of the O&M plan and the proposed duration of the plan. The section should include the following wording: "If the data generated during the O&M phase of the project indicates the need for a modification in the remedy or the O&M plan, the NYSDEC will be notified immediately and corrective measures will be implemented as soon as practical upon approval of the NYSDEC."*

Response: This subsection has been added to the O&M Manual as recommended.

Comment #8: *The O&M Manual must include more details as to the number, type and frequency of quality control/quality assurance (QA/QC) samples for each media sampled during the program. A tabular presentation similar to Table 3-3 seem prudent. Further, a section briefly outlining QA/QC procedures, reporting and deliverable requirements, and requirements for analytical protocol utilized should be included in the manual.*

Response: A Quarterly Report Document has been prepared that addresses this comment. The Quarterly Report Document will be included as Volume 2 of the O&M Manual.

Comment #9: *The O&M manual should have listing on emergency contacts with addresses and phone numbers. The NYSDEC contact should be Mary Jane Peachey at the Region 8 Regional Office, phone number (716) 226-2466.*

Response: An emergency contact list will be included with the O&M.

Comment #10: *The annual report should be submitted in lieu of the fourth quarterly report. The finding of the fourth quarter O&M activities should be presented in the annual report.*

Response: Comment acknowledged.

Comment #11: *The annual report should include a section which summarizes the reporting requirements of the O&M program. This should include but not be limited to, groundwater monitoring, air emissions monitoring, sanitary sewer discharge monitoring, and inspection reporting. The report should also summarize any maintenance activities performed on the remedial system (e.g; pump replacement, cap repair, etc.). The report should include a summary on the groundwater quality data and comparisons with background conditions and appropriate NYS standards, guidance and criteria (SCGs). Special attention should be given to significant changes in water quality which have occurred throughout the years and the overall O&M period.*

Response: Comment acknowledged.

Comment #12: *The quarterly reports should be submitted within 30 days of the end of the reporting period, and the annual report should be submitted within 60 days of the end of the annual cycle. Copies of the report should be submitted to the following:*

- a) Mary Jane Peachey*
- b) David Napier*
- c) Gerald Rider*
- d) The document depository as listed in the site Citizen Participation Plan (annual report only).*

Response: Comment acknowledged.

Comment #13: *Section 2.3.2.2, Alternative Cooperation: The NYSDEC must be notified of a change in the sequestering agent.*

Response: Comment acknowledged

Comment #14: *Exhibit B, Description of Process Water to be Discharged to the Sanitary Sewer, Section 2.1, page 3: the section refers to Exhibit A, Sheet G 16, which is not provided in the O&M.*

Response: Exhibit B has been edited.

Comment #15: *Exhibit B indicates that an Oil & Water Separator is part of the treatment system. However, it is not discussed in the main body of the O&M Manual. Please clarify.*

Response: Exhibit B has been edited. The treatment system does not include an oil and water separator.

Comment #16: *Appendix E, Well Purging Prior to Sampling, Section 2.0: The equations presented in the text of the manual to calculate the volume of water to be removed does not match the equation on the Well Development/Purge Log Sheet. Please make consistent.*

Response: The equations have been made equivalent.

Comment #17: *Section 2.1.1.5, page 2-2: Please clarify the sentence ...should be monitored to ensure drawdown to the desired elevation.:*

Response: Section 2.2.2.5 has been edited and corrected, to read "to ensure draw down to the desired elevation."

The following comment is provided by the NYSDOH:

DOH 1: The Health and Safety Plan (HASP) does not include maintenance of the groundwater pump and treatment system as a task with potential exposure to human health. There is the potential for contaminated groundwater to be released (broken pipe, valve, etc.) in the groundwater pump and treatment (GWPT) building which presents potential exposure via inhalation and direct contact. The HASP should include a section which addresses potential exposure in the GWPT building.

**MALCOLM
PIRNIE**

David A. Crosby, P.E.
NYDEC

February 8, 1999
Page 6

Response: The HASP has been edited to address this comment.

Please do not hesitate to contact us if you require further detail or have any questions.

Very truly yours,

MALCOLM PIRNIE, INC.

Fordyce Ritz, P.E.
Project Engineer

Enclosures

c: M. Gregor (COR)
 J. DiNardo (COR)
 R. Martens (MPI)
 J. Raleigh (MPI)

0965/086/o&mrep/o&m-review.doc

EXHIBIT 2-1

**March 11, 1998 letter from the City of Rochester to the
NYSDEC regarding Institution Controls for the
Rochester Fire Academy Site
(Registry Number 828023)**



City of Rochester

FAX (716) 428-6010
TDD/Voice 232-3260

Department of
Environmental Services

Office of the Commissioner
Division of Environmental Quality
30 Church Street, Rm 300B
Rochester, New York 14614-1278
Tel#: (716) 428-6011

March 11, 1998

Amar Nagi, P.E.
Bureau of Construction Services
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12233-7010

RE: Rochester Fire Academy Site (Registry Number 828023)
Institutional Controls

Dear Mr. Nagi:

As you have requested, this letter describes the institutional controls that are currently in place and those that will be established to control site activities and protect the long-term remedial systems at the Rochester Fire Academy. You will be receiving the Operations and Maintenance (O&M) Plan prepared by Malcolm Pirnie for the site shortly and many of the institutional controls discussed in this letter are also described in the O&M Plan. The City's planned controls fall into four areas:

1. Required Filings and Notices

The City has filed a declaration of covenants in the Monroe County Clerks Office in accordance with its consent order requirements in order to give notice to the public and bind any successors in title to the provisions of the consent order. In addition, as required in the 1993 Record of Decision (ROD), a copy of the ROD will be filed with the Monroe County Clerks Office.

2. Site Operations and Maintenance Planning

The O&M Plan will be submitted separately and will describe in detail the necessary remedial system operational, maintenance and monitoring activities for the site. The O&M Plan will require notification to and approval by the NYSDEC for construction or physical alterations to the North Disposal Area, South Disposal Area, Training Grounds and Genesee Valley Park areas of the site that constitute a substantial changes in use as identified in the 6NYCRR Part 375-1.6.

3. Monroe County Public Safety Training Facility Lease Arrangement

As you know, the City and Monroe County are jointly working plans to redevelop portions of the site into a regional Public Safety Training Facility (PSTF). The new PSTF, including all of the current training grounds area, will be leased from the City to Monroe County, and the draft lease agreement included language that requires the County to operate and maintain the site in accordance with the City's



current obligations. The language in the proposed lease agreement between the City of Rochester and Monroe County for the Training Ground Area of the site is as follows:

"Furthermore, pursuant to letters dated February 21, 1997 and April 9, 1997 between City and County, the County agrees to undertake, at its expense, a DEC required capping system for fire training grounds in accordance with Site Record of Decision and the Consent Order, Index No. B8-0205-87-09; the County is also responsible for operating and maintaining the facility consistent with the Site Record of Decision and the New York State approved Operations and Maintenance Manual for the Site. The County agrees to defend, indemnify and hold the City and MCC [Monroe Community College] harmless against any and all liability, loss, damage, claim, suit, expense, fine, fee, penalty or cost of any kind, including attorney fees and consultant fees which the City or MCC may directly or indirectly incur, suffer or be required to pay as a result of the remediation work, undertaken by the County."

In the course of working with Monroe County on the PSTF project, the City prepared a Training Grounds soils management plan for the project construction bid specifications. The County's contractor will be responsible for conducting its work in accordance with the soils management plan. The plan has been incorporated in Malcolm Pirnie's O&M Plan as well for future Training Grounds excavation and construction work. Another institutional control, fencing of the site, is now partially complete and will be finished during the PSTF project next year.

4. Procedural Controls

The City has established a procedure for "flagging" of property tax account numbers that are require special environmental reviews as a result of hazardous waste or substance contamination. The reviews are conducted as referrals to the City's Environmental Quality unit for any permit applications for properties where soils management plans or environmental contingency plans need to be established and followed during construction activities.

The City will "flag" the parcel at the Fire Academy that will be subject to the requirements of the approved Site Operations and Maintenance Plan. A special notation will be added to the City's mainframe computer database of property information for the site parcel tax account number, 135.18-2-1. The notation will appear as a "flag" to City staff that receive various building and site preparation permit applications. The flag will require a referral to the City's Division of Environmental Quality before the application can be processed for approval. DEQ staff will review the permit for consistency with the O & M plan and final remedial system designs. If DEC wishes we can also include a notification to the NYSDEC at the time the permit is reviewed. The applicant will also be informed of the need for notifications under 6NYCRR Part 375. This system is currently in use for another City inactive hazardous waste site, the former Emerson Street Landfill.



March 11, 1998 letter
Page 3

Please let me know if you have any questions about these institutional controls. We believe that our efforts will maintain the integrity of the site remediation and will result in an appropriate level of protection to site users. Thank you for your on-going assistance with this project.

Sincerely,



Mark D. Gregor, CHMM
Manager, Division of Environmental Quality

c: E.Doherty
L.Kingsley
J.Brennan
J.Biondolillo
F.Ritz/MPI ✓
R.Elliott/MCDOH
D.Napier/NYSDOH

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EXHIBIT 2-2

**Record of Decision
(March 1993)
Rochester Fire Academy
Monroe County, New York
Site Number 828015**



File 0965-04-1, C-6

Department of Environmental Conservation

Division of Hazardous Waste Remediation

Rochester Fire Academy

Monroe County, New York

Site Number 828015

Record of Decision

March 1993

Funded Under Title 3
of the
1986 Environmental Quality Bond Act



New York State Department of Environmental Conservation

MARIO M. CUOMO, Governor

THOMAS C. JORLING, Commissioner

**RECORD OF DECISION
ROCHESTER FIRE ACADEMY
MONROE COUNTY, NEW YORK
ID NUMBER 828015**

**PREPARED BY
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
MARCH 1993**

TABLE OF CONTENTS

	<u>PAGE(S)</u>
Declaration.....	Preface
I. Site Location and Description.....	1
II. Site History.....	1
III. Enforcement Status.....	2
IV. Current Site Status.....	2
A. Summary of Field Investigations.....	2
B. Summary of Site Conditions/Contaminants of Concern & Risk.....	2
V. Goals for the Remedial Actions.....	4
VI. Summary of the Evaluation of the Alternatives.....	6
A. Initial Screening of the Alternatives.....	6
B. Compliance with Standards, Criteria and Guidance.....	6
C. Evaluation of the Alternatives.....	7
D. Selection of the Preferred Alternative.....	11
VII. Highlights of Community Participation.....	12
VIII. Summary of the Government's Proposal.....	13
IX. Documentation of Significant Change.....	14
X. Proposed Remediation Schedule.....	14

FIGURES

1. Site Location Map
2. Areas of Remediation Map

EXHIBITS

- A. Registry
- B. Administrative Record
- C. Responsiveness Summary

DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

Rochester Fire Academy
City of Rochester
Monroe County, New York
Site Code: 828015
Funding Source: 1986 Environmental Quality Bond Act

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Rochester Fire Academy hazardous waste site which was chosen in accordance with the New York State Environmental Conservation Law (ECL), and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et., seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Exhibit B identifies the documents that comprise the Administrative Record for the site and includes the final Remedial Investigation and Feasibility Study (RI/FS) reports. The documents in the Administrative Record are the basis for the selected remedial action.

ASSESSMENT OF THE SITE

Actual or threatened release of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present a current or potential threat to public health, and the environment.

SUMMARY OF GOVERNMENT PROPOSAL

The State's selected remedial action is: alternative SD-1 on-site soil enhanced volatilization with VOC destruction by catalytic oxidation; alternative TG-3 excavation and off-site disposal of PCB soils above 50 ppm, soil stabilization between 10 and 50 ppm, excavation and on-site treatment of VOC contaminated soils and an asphalt cover of the remaining area in the Training Grounds area; alternative ND-3 synthetic/soil cover of the entire North Disposal area; alternative GVP-2 excavation of soils from the Genesee Valley Park and on-site placement under the cover in the North Disposal area; and alternative GW-2 groundwater pump and treatment by a 210 ft trench and air stripping. Extracting and treating the area of highest contamination will provide short-term effectiveness in extracting contaminants, and, in combination with natural attenuation processes, will reduce pollutant levels to SCGs in the long term. The effectiveness of this approach will be evaluated throughout the operation of the system to determine whether any modification to the system is necessary to achieve the remedial goal. Periodic monitoring will also be used to reassess the timeframe and technical practicality of achieving clean-up standards. The site will be fenced and will have deed restrictions to prevent future uses of the site that would interfere with the remedial measures.

I. Site Location and Description

The Rochester Fire Academy is located at 1190 Scottsville Road in the City of Rochester, Monroe County, New York (Figure 1). The property is 18 acres in size. It is bounded by Scottsville Road to the west, publicly owned properties to the north and south, Genesee River to the east. A number of buildings are located on-site including a five story fire training tower. The Fire Academy is situated on alluvium river deposits. The site has three distinct areas of contamination: North Disposal area (ND-2.5 acres), Training Grounds area (TG-5.4 acres), and South Disposal area (SD-0.8 acres). These areas are shown on Figure 2. The remaining acreage does not appear to have received any potential hazardous waste. The area between the river and the site is called the Genesee Valley park and has a bicycle path.

II. Site History

The Rochester Fire Academy has been owned and operated by the City of Rochester as a training facility used by the City's Fire and Police Departments since its inception in 1954. Prior to 1954, the area was undeveloped park land. During the period from 1954 to 1980, the Fire Academy accepted flammable liquids from local industries and other sources for training activities. No records were kept on materials accepted by the Fire Department for burning practices. On-site personnel indicated that solvents, paint thinners, other organic chemicals and petroleum fuels in addition to metallic residue material were burned and/or disposed of at the Training Grounds and North and South Disposal areas.

Aerial photographs taken during the period from 1961 to 1970 indicate disposal activities were occurring in the North and South Disposal areas. 1976 aerial photographs indicate disposal in the North Disposal area had ceased, while the South Disposal area remained disturbed. In 1980, the New York State Department of Environmental Conservation (NYSDEC) began investigating the facility's disposal practices and subsequently directed the removal of more than 200 drums and numerous chemical reagent bottles from the three areas of concern. Late in 1981, soil sampling was performed and inorganic and organic chemicals were found in the Training Grounds area. The Fire Academy was placed on the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites (Site No. 828015).

Preliminary investigations in 1983 and 1985 concluded that the Fire Academy was a significant threat to Human Health and/or the environment. In 1986, the site was designated a "Class 2" inactive hazardous waste site, and the City of Rochester was directed to begin to remediate the site. Crushed stones were placed in the Training Grounds area to eliminate direct contact with contaminated soils.

The City of Rochester contracted with Malcolm Pirnie, Inc. to perform the required Remedial Investigation/Feasibility Study (RI/FS). During the period of November 1989 through August 1990, Malcolm Pirnie conducted field investigation activities required by the NYSDEC approved work plan. The findings of this investigation led to more field investigations during the period from December 1991 to July 1992. The result of these studies are summarized below and can be obtained in greater detail from the actual RI and FS reports.

The Fire Academy has three areas where past activities have caused distinctly different contamination patterns. These areas are called: North Disposal area (ND), Training Grounds area (TG), South Disposal area (SD). While no hazardous waste disposal occurred in the Genesee Valley Park, the park has been impacted by the Fire Academy wastes.

Soil Sampling Results:

The Remedial Investigation found soil contamination of Poly Chlorinated Biphenyls (PCBs), Lead, Cadmium and Volatile Organic Compounds (VOCs). The North Disposal area (ND) is mainly construction and demolition debris and the contaminants of concern are Lead, Cadmium, and PCBs. The Training Grounds area (TG) contamination appears to have been caused mainly by spills and leaks during fire training exercises. The contaminants of concern in this area are VOCs, Lead, Cadmium and PCBs. The South Disposal area (SD) was used to dispose of organic chemicals which were not used for fire training activities and also the residue of the fire training exercises. The contaminants of concern in this area are VOCs, PCBs, Lead and Cadmium. The Genesee Valley Park (GVP) is a wooded area adjacent to the Genesee River. A bicycle path, which runs from Lake Ontario to Letchworth State Park 30 miles south of Rochester, is part of the Park. The contaminants of concern in this area are Cadmium and PCBs. Contaminant levels in the soils of each area are outlined below.

The findings of the initial and supplemental Remedial Investigations are separated into the four distinct areas (ND, TG, SD, GVP) as described above. The contaminant levels listed below are the highest concentrations of the contaminant found in each area.

The North Disposal area soils concentrations are: PCBs 10 ppm, Lead 7860 ppm, Cadmium 20 ppm. The Training Grounds area soils concentrations are: VOCs 570 ppm, SVOCs 1355 ppm, PCBs 85 ppm, Lead 4380 ppm, Cadmium 12 ppm. The South Disposal area soils concentrations are: VOCs 5810 ppm, SVOCs 85 ppm, PCBs 330 ppm, Lead 4880 ppm, Cadmium 151 ppm. A tarry sludge (44,000 ppm PCBs) was removed and disposed as part of an IRM. The Genesee Valley Park area surficial soils concentrations are: VOCs 1 ppm, SVOCs 3 ppm, PCBs 14 ppm, Lead 84 ppm, Cadmium 17 ppm.

Groundwater Sampling Results:

Up to ninety percent of all groundwater contamination may be in the shallow overburden of the South Disposal area. Contamination was detected in the bedrock aquifer downgradient of all areas of the site. The upgradient bedrock wells detected low concentrations of VOCs. Contaminant levels are outlined below. The overburden aquifer yields low volumes of water due to the fine-grained nature of the alluvium deposits. The upper ten feet of the bedrock aquifer can yield large volumes of water due to large fractures in the rock. Both the overburden and shallow bedrock aquifer discharge to the Genesee River.

Groundwater exhibited widespread low levels of contamination. First round groundwater samples showed groundwater samples higher in contamination than subsequent rounds. During the first round sampling, there was significant rainfall. The rainfall after a drought of one year may have altered the concentrations. There were also laboratory protocol compliance problems which made discerning discrepancies of contaminant levels from one round to the next

2. Protection of Human Health and the Environment--This criterion is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with SCGs.
3. Short-term Impacts and Effectiveness--The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated. The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.
4. Long-term Effectiveness and Permanence--If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.
5. Reduction of Toxicity, Mobility, and Volume--Department policy is to give preference to alternatives that permanently and significantly reduce the toxicity, mobility, and volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.
6. Implementability--The technical and administrative feasibility of implementing the alternative is evaluated. Technically, this includes the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, rights-of-way for construction, etc.
7. Cost--Capital and operation and maintenance costs are estimated for the alternatives and compared on a present worth basis. Although cost is the last criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, lower cost can be used as the basis for final selection.

The overall objective of the remediation is to reduce the concentrations of contaminants and the routes of exposure to levels which are protective of human health and the environment. The site-specific goals for remediating the site can be summarized in general as follows:

- o Reduce, control, or eliminate the contamination present within the soils on-site.
- o Eliminate the threat to surface waters by eliminating any future contaminated surface runoff from the contaminated soils on-site.
- o Eliminate the potential for direct human or animal contact with the contaminated soils on-site.
- o Mitigate the impacts of contaminated groundwater to the environment.

Clean-up goals for this site are: PCBs 1 ppm surficial soil, 10 ppm subsurface soil; VOCs 10 ppm; Lead 250 ppm; Cadmium 10 ppm, SVOC levels are compound specific and protective of groundwater. Groundwater clean-up goals are NYSDEC groundwater standards. The following section addresses the alternatives that have been evaluated to achieve these goals.

standards), action-specific (e.g., designs of a landfill), and location-specific (e.g., protection of wetlands). Certain policies and guidance that do not have the status of SCGs that are considered to be important to the remedy selection process are identified as To-Be-Considered (TBC) criteria. If the implementation of a remedy results in one or more SCGs not being met, a waiver of the SCG must be justifiable based upon one of the four reasons specified in 6NYCRR Part 375.

The key SCGs associated with this site are the requirements for PCB soil remediation under the Toxic Substances Control Act (TSCA) and Resource Conservation and Recovery Act (RCRA) Regulations including land disposal restrictions, ambient air standards, surface water quality standards, and groundwater standards.

Groundwater standards were exceeded downgradient of each area of the site. However, up to 90 percent (90%) of the contaminant loading is downgradient of the South Disposal Area. By treating groundwater downgradient of the South Disposal Area, over time and through natural attenuation, groundwater should improve downgradient of the entire site. Therefore, SCGs will be achieved, if proven technically practical, by treating water downgradient of the South Disposal Area.

In order to substantially reduce impacts to fish and wildlife from PCB contaminated runoff, the Department has selected a cleanup goal of 1 ppm PCB for surface soils (top 12 inches of soil). For PCBs below the surface, 10 ppm is the clean-up goal. Lead clean-up goal is 250 ppm. Cadmium has a clean-up goal of 10 ppm. VOCs have a clean-up goal of 10 ppm. PAHs are considered on a compound specific basis which are protective of groundwater.

C. Evaluation of Alternatives

Alternative 1 involves No Action at the site. This alternative would require groundwater to be monitored, and workers informed of the contamination. Fences and signs limiting access to areas that remain contaminated will be left in place. In addition, storage tanks on-site will need to be decommissioned. Alternative No. 1 would not meet all Standards, Criteria, and Guidances (SCGs). There is no justification for waiving all SCGs.

Present Worth: \$ 884,900.00
Capital Cost: \$0.00

Annual Cost: \$ 78,600.00
Time to Implement: 4 weeks

Alternative 2, Institutional Controls, addresses the risk of exposure pathways by restricting site access with the reparation of the perimeter fence and additional fencing and signs. The Bicycle path would need to be rerouted. Alternative 2 includes restrictions on the use of the facility so that training does not disturb or allow contact with the contaminants left on-site. For this alternative, fire training personnel will be informed of the presence and location of contaminants on-site. Personnel will be informed of the procedures to minimize contaminant contact and maintain the integrity of institutional controls. The final component of Alternative 2 is to place deed restrictions on the site. Alternative 2 will also include a long-term monitoring program for groundwater.

Although Alternative 2 reduces risks associated with direct exposure by fencing, and institutional control will help protect human

contamination. It would reduce the mobility of the contamination by reducing the infiltration of water through the waste. This alternative, in conjunction with groundwater collection, would meet SCGs.

Present Worth: \$ 4,597,300.00
Capital Cost: \$ 1,507,700.00

Annual Cost: \$ 274,440.00
Time to Implement: 8 months

Training Grounds Area:

Alternative TG-1 is the excavation and off-site disposal of all VOC and PCB contaminated soils. This alternative would require the excavation of soils with PCB concentrations greater than 1 ppm at the surface and 10 ppm subsurface. The excavation would also remove soils contaminated with VOCs greater than 10 ppm. The soils would be disposed of in an approved, permitted facility. This alternative would reduce the volume of soils on-site. It would also comply with SCGs.

Present Worth: \$ 4,181,300.00
Capital Cost: \$ 4,181,300.00

Annual Cost: \$ 00.00
Time to Implement: 4 months

Alternative TG-2 is the excavation of VOC contaminated soils with an asphalt cover of PCB contaminated soils. VOC contaminated soils would be excavated and volatilized with enhanced volatilization of the soils of the South Disposal area. The remaining areas in the training grounds area would be covered with an engineered asphalt cover to reduce infiltration through the remaining contaminated soils. This alternative would slightly reduce the volume of waste in this area, but would leave a significant amount of waste in place. The mobility and direct contact with the waste would be substantially reduced. This alternative would require institutional controls including, but not limited to deed restrictions. This alternative would meet all SCGs. Clean-up objectives for PCBs (1 ppm surface, 10 ppm subsurface) would not be achieved.

Present Worth: \$ 955,100.00
Capital Cost: \$ 643,000.00

Annual Cost: \$ 27,720.00
Time to Implement: 4 months

Alternative TG-3 is the excavation and off-site disposal of PCB contaminated soils over 50 ppm, on-site stabilization of PCB contaminated soils between 10 ppm and 50 ppm and Lead contaminated soils greater than 250 ppm, excavation of VOC contaminated soils above 10 ppm with on-site treatment and an asphalt cover of the remaining Training Grounds area. This alternative would significantly reduce the volume, mobility and direct contact with hazardous wastes in this area of the site. This alternative would require institutional controls including, but not limited to deed restrictions. This alternative would meet all SCGs.

Present Worth: \$ 3,112,500.00
Capital Cost: \$ 2,800,400.00

Annual Cost: \$ 27,720.00
Time to Implement: 2 years

North Disposal Area:

Alternative ND-1 is an asphalt cover of the entire area. This would require clearing the area of trees, placement of fill to achieve a 2 percent grade, the asphalt cover and fencing. Institutional controls, including but not limited to, deed restrictions would be required. The mobility and direct contact with the waste would be greatly reduced. The SCGs in this area would be met.

Alternative GW-2 is collection of overburden groundwater and treatment by air stripping. A 210 foot trench would be installed to a depth 22 feet below grade. The collected groundwater would be 10,000 gallons per day. The groundwater would enter a treatment train which would include filtration and iron removal pretreatment, the shallow tray air stripper and post-treatment activated carbon for PCB removal and discharge to a POTW. This alternative would reduce the volume and mobility of contaminants on-site. This alternative would meet all SCGs for this area.

Present Worth: \$ 1,468,000.00
Capital Cost: \$ 534,000.00

Annual Cost: \$ 83,000.00
Time to Implement: 6 months

Alternative GW-3 is collection of overburden groundwater and treatment by advanced oxidation process. A 210 foot long trench would be installed to a depth of 22 feet below grade. The collected groundwater would be 10,000 gallons per day. The groundwater would enter a treatment stream which would include filtration and iron removal pretreatment, advanced oxidation process and discharge to a POTW. This alternative would reduce the volume and mobility of contaminants on-site. This alternative would meet all SCGs for this area of the site.

Present Worth: \$ 1,863,000.00
Capital Cost: \$ 670,000.00

Annual Cost: \$ 106,000.00
Time to implement: 6 months

D. Selection of the Preferred Alternative:

The selected alternative must result in a remedy which is both protective of health and the environment and feasible, recognizing the unique conditions associated with the Fire Academy.

The Remedial Alternative costs are based on the selected soil cleanup levels (PCBs-1 ppm surface, 10 ppm subsurface, VOCs 10 ppm, lead-250 ppm, and Cadmium-10 ppm). Based on routes of exposure and associated risks these cleanup levels have been determined to be protective of human health and the environment for this site.

Alternatives one and two presented in the ROD do not comply with SCGs and are not protective of human health and the environment. Combinations of area specific alternatives will be used to compose a final alternative which is protective of human health and the environment, attains SCGs and provides the best overall balance between long-term effectiveness; short-term effectiveness; reduction of toxicity, mobility and volume; implementability; and cost.

The Groundwater Remedial Alternative evaluation was between GW-1: no action alternative or GW-2 & GW-3: pump and treat alternative. The no action alternative would not meet SCGs nor would it be protective of human health and the environment. The pump and treat alternative evaluated the costs between GW-2: shallow tray air stripper and GW-3: advanced oxidation process. Both treatment systems would provide similar protection of groundwater at this site. Therefore, based on cost analysis, a pump and treat alternative employing a 210 foot trench and using a shallow tray air stripper is the preferred alternative and is the most cost effective and protective of human health and the environment. This alternative, if demonstrated to be effective, would meet all SCGs.

The South Disposal Area presented an unique situation because of the high levels of VOCs in the loose granular incineration residue and in the tight soils below the incineration residue. For any action involving the disturbance of the residue, the site perimeter

events have been held to update the the community and firemen on remedial activities, as summarized in the following chronolgy:

November 29, 1989: Public meeting concerning the RI/FS work plan.

February 10 to March 12, 1993: Public comment period on the Proposed Remedial Action Plan (PRAP).

February 23, 1993: Public meeting to present the PRAP.

A Citizen Participation (CP) Plan was developed and implemented by the City of Rochester with oversight and participation by the NYSDEC. All major reports were placed in the document repositories in the vicinity of the site and made available to the public for review. A public contact list was developed and used to distribute meeting announcements.

Inquiries and comments (written and verbal) were received and responded to throughout the course of the project. Comments received regarding the PRAP have been addressed and are documented in the Responsiveness Summary (Exhibit B)

VIII. Summary of the Government's Selected Remedy

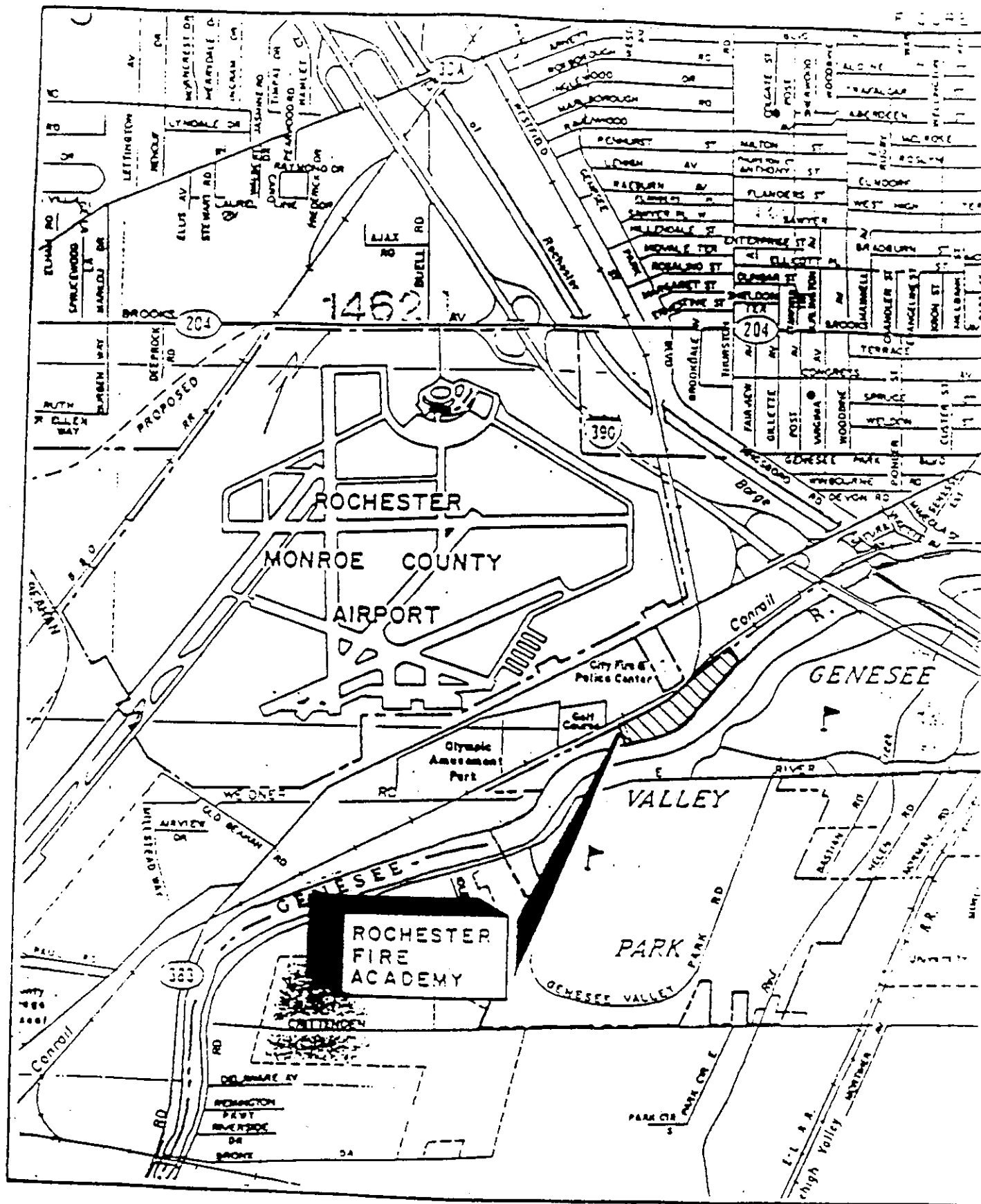
The State's selected remedial action is: alternative SD-1 on-site soil enhanced volatilization with VOC destruction by catalytic oxidation; alternative TG-3 excavation and off-site disposal of PCB soils above 50 ppm, soil stabilization between 10 and 50 ppm, excavation and on-site treatment of VOC contaminated soils and an asphalt cover of the remaining area in the Training Grounds area; alternative ND-3 synthetic/soil cover of the entire North Disposal area; alternative GVP-2 excavation of soils from the Genesee Valley Park and on-site placement under the cover in the North Disposal area; and alternative GW-2 groundwater pump and treatment by a 210 ft trench and air stripping. Extracting and treating the area of highest contamination will provide short-term effectiveness in extracting contaminants, and, in combination with natural attenuation processes, will reduce pollutant levels to SCGs in the long term. The effectiveness of this approach will be evaluated throughout the operation of the system to determine whether any modification to the system is necessary to achieve the remedial goal. Periodic monitoring will also be used to reassess the timeframe and technical practicality of achieving clean-up standards. This alternative would require deed restrictions.

The costs of the selected alternative is:

<u>Area of Concern</u>	<u>Capital Costs</u>	<u>Present worth Costs</u>	<u>Annual Costs</u>
SD-1	\$ 2,802,000.	\$ 3,140,100.	\$ 30,300.
TG-3	\$ 2,800,400.	\$ 3,112,500.	\$ 27,720.
ND-3	\$ 314,500.	\$ 655,600.	\$ 30,300.
GW-2	\$ 534,000.	\$ 1,468,000.	\$ 83,000.
GVP	\$ 77,000.	\$ 77,000.	\$ 0.
Mob/Demob	\$ 168,000.	\$ 168,000.	\$ 0.
Health/Safety	\$ 468,000.	\$ 468,000.	\$ 0.
Total:	\$ 7,163,900.	\$ 9,089,200.	\$171,320.

The total present worth for this remedial action is \$ 9,089,200.

The selected alternative would use institutional controls, including, but not limited to, filing of this Record of Decision (ROD) with the Monroe County Clerk, and notification to, and approval by, the Department of any physical alteration or construction constituting a



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ROC - 04

ROCHESTER FIRE ACADEMY
RI/FS'
SITE LOCATION MAP

CITY OF ROCHESTER, NEW YORK

JULY 19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2

REGION: 8

SITE CODE: 828015

EPA ID: NYD980533116

NAME OF SITE : Rochester Fire Academy

STREET ADDRESS: 1190 Scottsville Road

TOWN/CITY:

Rochester

COUNTY:

Monroe

ZIP:

14624

SITE TYPE: Open Dump-X Structure- Lagoon- Landfill- Treatment Pond-
ESTIMATED SIZE: 3 Acres

SITE OWNER/OPERATOR INFORMATION:

CURRENT OWNER NAME....: City of Rochester

CURRENT OWNER ADDRESS.: c/o City Hall, 30 Church St., Rochester, N

OWNER(S) DURING USE....: City of Rochester

OPERATOR DURING USE....:

OPERATOR ADDRESS.....:

PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From 1955 To 1980

SITE DESCRIPTION:

Lat 43 06'58"N Long. 77 39'15.9"W

Flat topography: Commercial area

Nearest waterbody: The Genessee river is approx. 50 ft. away.

This site is used as a training area for the Fire Academy. Various chemicals were burned in the training procedures. These chemicals were supplied by many local hazardous waste generators. The City signed a Consent Order (CO) to conduct an RI/FS at the site. They received approval to get a 75% reimbursement for their costs under an EQBA grant. The fieldwork for the RI/FS was completed in 1990. A draft RI/FS report is expected in the spring of 1991.

HAZARDOUS WASTE DISPOSED: Confirmed-X
TYPE

Suspected-
QUANTITY (units)

Methyl Ethyl Ketone (MEK; a.k.a. 2-Butanone)
Toluene
Other organic solvents

unknown
unknown
unknown

EXHIBIT B
ADMINISTRATIVE RECORD
ROCHESTER FIRE ACADEMY
INACTIVE HAZARDOUS WASTE SITE NO. 828015

A. Reports and Work Plans:

1. "Proposed Remedial Action Plan; Rochester Fire Academy; Monroe County, New York ID No. 828015," prepared by the New York State Department of Environmental Conservation, dated February 1993.
2. "Feasibility Study; Rochester Fire Academy; Rochester, New York," with appendices, prepared by Malcolm Pirnie, Inc., dated October 1992, revised January 1993.
3. "Supplemental Remedial Investigation Report; Rochester Fire Academy; Rochester, New York," prepared by Malcolm Pirnie, Inc., dated May, 1992.
4. "Remedial Investigation Report; Rochester Fire Academy; Rochester, New York," with Appendices, prepared by Malcolm Pirnie, Inc., dated May 1991, revised December 1991.
5. "Rochester Fire Fire Academy; Supplemental Remedial Investigation Workplan," prepared by Malcolm Pirnie, Inc., dated October 1991
6. "Remedial Investigation/Feasibility Study Work Plan; Rochester Fire Academy; Rochester, New York; Site No. 828015" prepared by Malcolm Pirnie, Inc., dated June, 1988, with December 1988 Addendum.

B. Court Orders:

1. Order on Consent between the New York Stae Department of Environmental Conservation and the City of Rochester, Index No. B8-0205-87-09, dated June 21, 1989.

C. Correspondence:

1. Letter dated January 26, 1989 from J. Swanson (NYSDEC) to E. Doherty (City of Rochester) Re: Approval of Work Plan.
2. Letter dated September 5, 1989 from M. Gregor (City of Rochester) to G. Burke (NYSDEC) Re: Citizen Participation Plan.
3. Letter dated October 23, 1991 from G. Burke (NYSDEC) to M. Gregor (City of Rochester) Re: Approval of Supplemental Remedial Investigation Work Plan.

EXHIBIT C
RESPONSIVENESS SUMMARY

Rochester Fire Academy Site (828015)

INTRODUCTION:

The issues and questions addressed in the following Responsiveness Summary were raised during a public meeting held by the New York State Department of Environmental Conservation (NYSDEC) on February 23, 1993 at the Rochester City Hall and letters received during a 30 day comment period. The purpose of the meeting was to discuss the results of the Remedial Investigation/Feasibility Study (RI/FS) of the Rochester Fire Academy Inactive Hazardous Waste Site (#828015) and receive comments on NYSDEC's Proposed Remedial Action Plan (PRAP) for the site. Representatives of the NYSDEC, The New York State Department of Health (NYSDOH), and the City of Rochester and the City's consultants were present at the meeting.

The following individuals submitted written comments regarding the proposed remedy:

Daniel J. Cavuoto, Rochester, New York.
Ronald Di Chario, Rochester, New York.
Allen D. Friedman, Rochester, New York.

QUESTIONS AND RESPONSES:

- Q: Our (Rochester Firefighter's Association) concern is for our membership's wellbeing. We expect that they will not be exposed to any contaminants during the remedial stages. Excavations, especially in the south corridors of the Fire Academy, will raise dusts, etc., and our members would be exposed to ingestions (of Contaminants). We will expect that the health of our members, especially those who are assigned as instructors and those who work in the repair shop, will not be exposed to any health risks.
- Q: My concern is that you will create a greater problem through excavation. I think you're opening a major exposure pathway to anyone in the area by doing the excavation.
- Q: What is the risk to the safety of personnel being trained going to be during excavation?
- A: For all remedial activities at this site, there will be a Health and Safety Plan which will protect the workers doing the remedial activities and will provide safeguards to protect the surrounding community's health including police and firefighter personnel working at the academy. The Health and Safety plan typically has several types of monitoring for specific chemical compounds, groups of compounds and dusts, both at the working area and at the perimeter of the working area and at the site boundary. Safeguards will be in place to stop all remedial activity if contaminants above acceptable

exclusion zone and will be performed in an enclosure. If action levels are exceeded in the exclusion zone, remedial activities will be stopped. The remedial activity in the South Disposal area should not interfere with training activities. During remediation in the Training Grounds area, there will be no training allowed at the facility. Remediation of the North Disposal area and Genesee Valley Park will not affect training activities. There will be notification of the public prior to initiation of remedial construction. However, it is not necessary to "warn" the people in this area since the health and safety plan will incorporate safeguards to protect the general public.

Q: Can you delineate the extent of groundwater contamination as you defined it? If I asked you to draw a single line that represents drinking water quality on the map, where would it be?

A: Groundwater contamination is defined as contaminant concentrations above drinking water standards or background conditions. There is significant groundwater contamination in the bedrock and overburden groundwater downgradient (toward the Genesee River) of the South Disposal area. There is lesser concentrations of contamination downgradient of the Training Grounds and North Disposal area. Groundwater upgradient of the site has no contamination in the overburden groundwater across the site and very low contamination above drinking water standards in the bedrock upgradient of the Training Grounds.

Q: Are the structures and fire tower on-site going to have to be removed as part of the remediation? Will they be rebuilt?

A: The firetower will stay. Other structures may need to be demolished. This will be evaluated in the Remedial Design.

Q: How will excavated material be removed from the site?

A: Material excavated for off-site disposal will be removed by the access road that passes alongside the Fire Academy classroom and office building. Trucks would proceed on Scottsville Road east to Interstate 390.

Q: How many trucks are anticipated?

A: The anticipated truck traffic is one per week during the excavation and off-site disposal activities.

EXHIBIT 2-3

Selected Sections / Information from 1991 Rochester Fire Academy Remedial Investigation

Includes:

- **Historical Groundwater Monitoring Well Data**
- **Site Description**
- **Site Geology and Hydrogeology Information**
- **Site Characterization Data**

Section 2.0	Introduction Section - Includes Site Location and Description Information
Section 3.0	Physiography, Climate and Soils
Section 5.0	Geology and Hydrogeology - Includes Historical Boring and Groundwater Monitoring Well Information
Section 7.0	Site Contamination Characterization

NOTES:

1. **A complete copy of the Remedial Investigation (R. I.) Report is on file in the Groundwater Treatment Plant Office.**
2. **A copy of the R. I. Table of Contents has been included for reference.**

Engineering Report

REMEDIAL INVESTIGATION REPORT FOR THE ROCHESTER FIRE ACADEMY SITE

**City of Rochester
Rochester, New York**

May 1991

Project No. 9885-04-1

Revised DECEMBER 1991

**MALCOLM
PIRNIE**

ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

**CITY OF ROCHESTER
REMEDIAL INVESTIGATION REPORT**

ROCHESTER FIRE ACADEMY SITE

**MAY 1991
Revised DECEMBER 1991**

MALCOLM PIRNIE, INC.

**S-3515 Abbott Road
P. O. Box 1938
Buffalo, New York 14219**

Table of Contents

TABLE OF CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1-1
1.1 BACKGROUND	1-1
1.2 RI FIELD INVESTIGATION	1-2
1.3 GEOLOGIC/HYDROLOGIC CONDITIONS	1-3
1.4 SITE CONTAMINATION CHARACTERIZATION	
1.4.1 Soil Sampling and Analysis	1-4
1.4.2 Sediment Sampling and Analysis	1-5
1.4.3 Surface Water Sampling and Analysis	1-5
1.4.4 Ground Water Sampling and Analysis	1-6
1.4.5 Contaminant Migration	1-7
1.5 PUBLIC HEALTH AND ENVIRONMENTAL CONCERNS	1-8
2.0 INTRODUCTION	2-1
2.1 SITE LOCATION AND DESCRIPTION	2-1
2.2 SITE HISTORY	2-2
2.3 PURPOSE OF STUDY	2-3
2.4 SCOPE	2-4
3.0 PHYSIOGRAPHY, CLIMATE, AND SOILS	3-1
3.1 LAND USE AND DEMOGRAPHY	3-1
3.2 TOPOGRAPHY	3-2
3.3 DRAINAGE	3-2
3.4 CLIMATOLOGY	3-3
3.5 SOILS	3-4
4.0 PRELIMINARY SITE SURVEYS	4-1
4.1 INVESTIGATIVE METHODOLOGY	4-1
4.2 SUMMARY OF SURVEY RESULTS	4-2
4.2.1 Radiological Survey	4-2
4.2.2 Geophysical/Soil Organic Vapor Screening Surveys	4-2
4.2.2.1 North Disposal Area	4-2
4.2.2.2 South Disposal Area	4-3
4.2.2.3 Training Grounds Area	4-3
4.2.2.4 Police Obstacle Course and Firing Range Area	4-4
4.2.2.5 Genesee Valley Park Area	4-5
4.2.2.6 Genesee Valley Canal Area	4-5
4.2.3 Summary	4-6
5.0 GEOLOGY AND HYDROGEOLOGY	5-1
5.1 INVESTIGATIVE METHODOLOGY	5-1
5.1.1 Borehole/Monitoring Well Completion	5-1
5.1.2 Monitoring Well/Piezometer Development	5-3
5.1.3 Hydraulic Conductivity Testing	5-3
5.1.4 Ground Water and Genesee River Water Level Monitoring	5-4

TABLE OF CONTENTS (Continued)

	Page
5.2 REGIONAL GEOLOGIC/HYDROGEOLOGIC CONDITIONS	5-4
5.2.1 Regional Geology	5-4
5.2.2 Regional Hydrogeology	5-5
5.3 SITE GEOLOGY	5-6
5.3.1 Fill Material	5-6
5.3.2 Alluvial Deposits	5-7
5.3.3 Bedrock	5-8
5.4 SITE HYDROGEOLOGY	5-9
5.4.1 Hydrostratigraphic Units	5-9
5.4.2 Overburden Water-Bearing Zone	5-10
5.4.3 Bedrock Aquifer	5-11
5.4.4 Summary of Hydrogeologic Properties of the Hydrostratigraphic Units	5-12
6.0 HYDROLOGY	6-1
6.1 WATER BALANCE	6-1
6.1.1 Recharge	6-2
6.1.2 Discharge	6-4
6.2 DRAINAGE BASIN CHARACTERISTICS	6-4
6.3 FLOOD PLAIN	6-4
6.4 RELATIONSHIP BETWEEN RIVER LEVEL AND OVERBURDEN WATER-BEARING ZONE	6-5
7.0 SITE CONTAMINATION CHARACTERIZATION	7-1
7.1 RI SAMPLING PROGRAM	7-1
7.1.1 Soil Sampling at Survey Anomalies	7-2
7.1.1.1 Test Pit Excavation/Sampling	7-2
7.1.1.2 Surficial Soil Sampling	7-3
7.1.1.3 Shallow Soil Boring/Sampling	7-3
7.1.2 Sediment Sampling	7-3
7.1.3 Ground Water Sampling	7-4
7.1.4 Surface Water Sampling	7-4
7.2 ANALYTICAL RESULTS FOR SOIL/FILL	7-5
7.2.1 North Disposal Area	7-5
7.2.2 Training Grounds Area	7-8
7.2.3 Firing Range	7-11
7.2.4 South Disposal Area	7-11
7.2.5 Genesee Valley Park Area	7-14
7.2.6 Genesee Valley Park Area	7-17
7.2.7 Summary	7-17

TABLE OF CONTENTS (Continued)

	Page
7.3 ANALYTICAL RESULTS FOR GROUND WATER	7-18
7.3.1 Overburden Water-Bearing Zone	7-19
7.3.1.1 North Disposal Area	7-20
7.3.1.2 Training Grounds Area	7-20
7.3.1.3 South Disposal Area	7-22
7.3.2 Bedrock Water Bearing Zone	7-23
7.3.2.1 North Disposal Area	7-24
7.3.2.2 Training Grounds Area	7-25
7.3.2.3 South Disposal Area	7-27
7.3.3 Summary of Ground Water Results	7-27
7.4 ANALYTICAL RESULTS FOR SURFACE WATER	7-29
7.4.1 On-site Ponds and Drainage Swales	7-29
7.4.2 Genesee River	7-30
7.5 ANALYTICAL RESULTS FOR SEDIMENT SAMPLING	7-30
7.5.1 Swale Sediment	7-30
7.5.2 Genesee River Sediment	7-30
8.0 CONTAMINANT MIGRATION	8-1
8.1 CONTAMINANT PATHWAYS	8-1
8.2 ASSESSMENT METHODOLOGY	8-1
8.2.1 Free-Product (Well M-14S)	8-1
8.2.2 Overland Flow/Mechanical Transport	8-2
8.2.3 Ground Water	8-3
8.2.4 Underground Utilities Investigation	8-4
8.3 CONTAMINANT LOADINGS	8-5
8.3.1 Free-Product Migration	8-5
8.3.2 Ground Water Migration	8-5
8.4 SUMMARY	8-6
9.0 PUBLIC HEALTH AND ENVIRONMENTAL CONCERNS	9-1

REFERENCES

LIST OF TABLES

Table No.	Description	Following Page
3-1	Zip Code Area Population and Water Supply Wells in the Vicinity of the Fire Academy Site	3-2
3-2	Meteorological Data for 1960-1989 at the Greater Rochester International Airport	3-4
3-3	Comparison of Period Specific Precipitation Data to 30-Year Averages .	3-4
4-1	Summary of Major Survey Anomalies	4-6
5-1	Monitoring Well Locations	5-2
5-2	Well Development Data	5-3
5-3	Summary of Ground Water/Surface Water Elevations	5-4
5-4	Stratigraphic Summary	5-6
5-5	Summary of Grain Size Analysis, Atterberg Limits and Vertical Permeability	5-8
5-6	Correlation of Geologic and Hydrogeologic Units	5-9
5-7	Summary of Horizontal Hydraulic Gradients	5-10
5-8	Summary of Vertical Hydraulic Gradients	5-10
5-9	Summary of Hydraulic Conductivity	5-11
5-10	Summary of Hydrogeology	5-11
7-1	Analytical Methods and Parameters	7-1
7-2	Summary of Environmental Sampling Events	7-2
7-3	Test Pit Excavation Summary	7-3
7-4	Surface Soil Sample Summary	7-3
7-5	Soil Boring Sample Summary	7-4
7-6	Summary of Surface Water/Sediment Samples	7-4
7-7	Summary of Analytes Detected in Surficial and Subsurface Soils of North Disposal Area	7-6

TABLE OF CONTENTS (continued)

LIST OF TABLES (continued)

Table No.	Description	Follows Page
7-8	Comparison of Inorganic Concentrations to Natural Soils, North Disposal Area	7-8
7-9	Summary of Analytes Detected in Surficial and Subsurface Soils of Training Grounds	7-9
7-10	Summary of 2,3,7,8 Tetrachlorodibenzo-p-dioxin	7-11
7-11	Comparison of Inorganic Concentrations to Natural Soils, Training Ground Area	7-11
7-12	Summary of Analytes Detected in Surficial and Subsurface Soils of Firing Range Area and Off-site Location	7-11
7-13	Comparison of Inorganic Concentrations to Natural Soils, Firing Range Area	7-12
7-14	Summary of Analytes Detected in Surficial and Subsurface Soils of South Disposal Area	7-12
7-15a	Comparison of Inorganic Concentrations to Natural Soils, South Disposal Area (Incineration Residue)	7-14
7-15b	Comparison of Inorganic Concentrations to Natural Soils, South Disposal Area (Soil/Fill)	7-14
7-16	Summary of Analytes Detected in Surficial and Subsurface Soils of Bicycle Path	7-16
7-17	Comparison of Inorganic Concentrations to Natural Soils, Genesee Park Area	7-17
7-18	Frequency of Detection in Surficial and Subsurface Soil	7-18
7-19	Summary of Remediation Assessment and Field Parameters, North Disposal Area	7-20
7-20	Summary of Remediation Assessment and Field Parameters, Training Grounds	7-20

TABLE OF CONTENTS (continued)

LIST OF TABLES (continued)

Table No.	Description	Follows Page
7-21	Summary of Remediation Assessment and Field Parameters, South Disposal Area	7-20
7-22	Summary of Analytes Detected in Overburden Water-Bearing Zone, North Disposal Area	7-20
7-23	Summary of Analytes Detected in Overburden Water-Bearing Zone, Training Grounds Area	7-21
7-24	Summary of Analytes Detected in Free-Product, Training Grounds Area	7-21
7-25	Summary of Analytes Detected in Overburden Water-Bearing Zone, South Disposal Area	7-23
7-26	Summary of Analytes Detected in Bedrock Aquifer, North Disposal Area and Area to North	7-25
7-27	Summary of Analytes Detected in Bedrock Aquifer, Training Grounds Area	7-26
7-28	Summary of Analytes Detected in Bedrock Aquifer, South Disposal Area	7-27
7-29	Frequency of Detection in Overburden Ground Water	7-29
7-30	Frequency of Detection in Bedrock Ground Water	7-29
7-31	Summary of Analytes Detected in On-Site Surface Water	7-30
7-32	Summary of Remediation Assessment and Field Parameters, On-Site Surface Water	7-30
7-33	Summary of Analytes Detected in Genesee River Surface Water	7-30
7-34	Summary of Remediation Assessment and Field Parameters, Genesee River	7-30
7-35	Summary of Analytes Detected in Genesee River and On-Site Swale Sediment	7-31

TABLE OF CONTENTS (continued)

LIST OF TABLES (continued)

Table No.	Description	Follows Page
8-1	Ground Water Loading Through the Overburden	8-4
8-2	Ground Water Loading Through the Upper Bedrock	8-4

LIST OF FIGURES

Figure No.	Description	Following Page
2-1	Site Location Map	2-1
2-2	Specific Areas at Academy Site	2-1
3-1	Zip Code Areas	3-2
3-2	Site Topography	3-2
3-3	On-Site Drainage Areas	3-3
3-4	Soils Map in the Vicinity of the Rochester Fire Academy Site	3-5
4-1	Horizontal Control Survey Grid	4-2
5-1	Monitoring Well Locations	5-1
5-2	Stratigraphic Section in the Vicinity of the Genesee Valley	5-5
5-3	Cross-Section Lines	5-6
5-4	Cross-Section A-A'	5-6
5-5	Cross-Section B-B'	5-6
5-6	Cross-Section C-C'	5-6
5-7	Cross-Section D-D'	5-6
5-8	Cross-Section E-E'	5-6
5-9	Top of Bedrock Contour Map	5-9

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES (CONTINUED)

Figure No.	Description	Follows Page
5-10	Isopach Map of the Overburden Water-Bearing Zone (5/21/90)	5-9
5-11	Approximate Extent of Semi-Confining Unit	5-10
5-12	Isopotential Map for the Overburden Water-Bearing Zone (5/21/90) ..	5-10
5-13	Isopotential Map for the Overburden Water-Bearing Zone (8/27/90) ..	5-10
5-14	Isopotential Map for the Upper Portion of the Bedrock Aquifer - Intermediate Wells (5/21/90)	5-11
5-15	Isopotential Map for the Upper Portion of the Bedrock Aquifer - Intermediate Wells (8/27/90)	5-11
5-16	Isopotential Map for the Upper Portion of the Bedrock Aquifer - Deep Wells (5/21/90)	5-12
5-17	Isopotential Map for the Upper Portion of the Bedrock Aquifer - Deep Wells (8/27/90)	5-12
6-1	North Disposal Area Water Balance	6-1
6-2	Training Grounds Area Water Balance	6-1
6-3	South Disposal Area Water Balance	6-1
6-4	The Genesee Valley River Basin	6-5
6-5	Flood Control of the Mt. Morris Dam	6-5
6-6	Water Levels in Genesee River and Wells Near the North Disposal Area	6-6
6-7	Water Levels in Genesee River and Wells Near the Training Grounds Area	6-6
6-8	Water Levels in Genesee River and Wells Near the South Disposal Area	6-6

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES (CONTINUED)

Figure No.	Description	Follows Page
7-1	Soil and Surface Water Sampling Locations	7-2
7-2	Monitoring Well Locations	7-5
7-3	Fill Thickness in the North Disposal Area	7-6
8-1	Schematic of Pollutant Migration (Pathways/Fate)	8-1
8-2	Soil Gas Survey Results near MW-14S	8-5

APPENDICES
(presented in separate volume)

Appendix	Description
A	Order on Consent
B	Work Plan Modification Documentation
C	Geology/Hydrogeology
C.1	Borehole Logs
C.2	Well Construction Procedures
C.3	Well Construction Details
C.4	Well Development Data
C.5	Hydraulic Conductivity Testing
C.5.1	Pressure Packer Testing
C.5.2	Slug Testing
C.6	Soil Testing Report
C.7	Test Pit Logs
D	HELP Model Simulations
E	Laboratory Data and Report Documentation Packages
F	Laboratory Data Validation
F.1	First Round
F.2	Second Round
F.3	Third Round
G	Contaminant Loading Calculations
H	Environmental Fate and Transport
I	Toxicological Summaries

Section 2.0

Introduction Section - Includes Location and Description Information

2.0 INTRODUCTION

2.1 SITE LOCATION AND DESCRIPTION

The Rochester Fire Academy site is a 21-acre tract of land used as a training facility by the City of Rochester Fire and Police Departments. This site is located on the west bank of the Genesee River at 1190 Scottsville Road in the City of Rochester, Monroe County, New York (Figure 2-1).

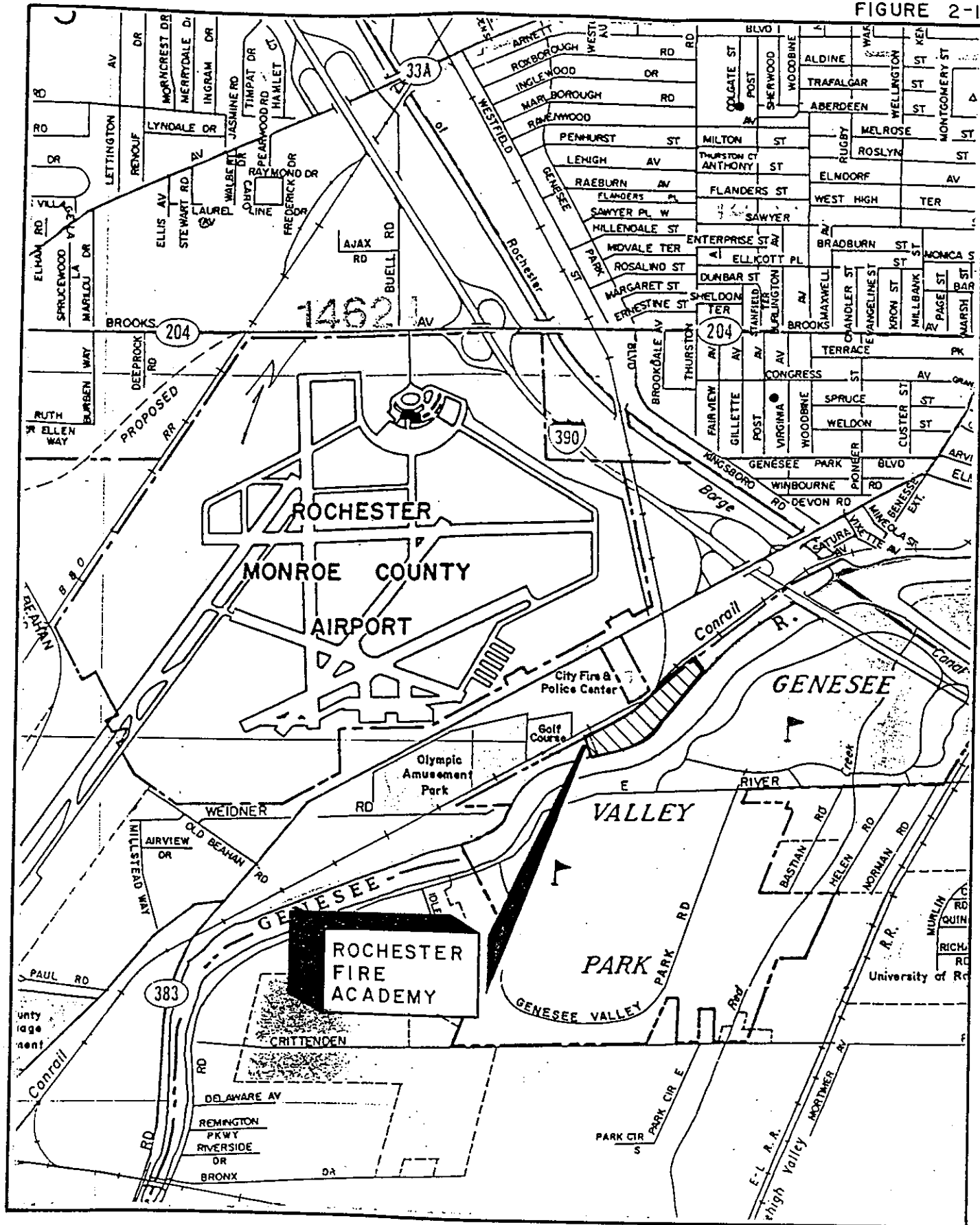
The site is bordered to the northwest by the former Genesee Valley Canal and the former Consolidated Railroad (ConRail) right-of-way. The location of the former Canal is apparent as a linear depression in the ground surface. The railroad runs along the southeastern bank of the Canal, as evidenced by a 10-15 foot wide path of slag and cinder bedding material.

A 75 to 125-foot portion of the City of Rochester's Genesee Valley Park is located along the southeastern edge of the Fire Academy site. The park is traversed by a paved bicycle path and encompasses a New York State Department of Environmental Conservation (NYSDEC) designated wetland between the bicycle path and the west bank of the Genesee River.

The City of Rochester has erected a 7-foot high chain-link fence around the perimeter of the site, including the portion of the Genesee Park adjacent to the site, except where the Genesee River forms the eastern boundary of the park. Consequently, the portion of the bicycle path located adjacent to the site is not presently accessible to the public.

The 21-acre Fire Academy site consists of four distinct areas, three of which have been involved with the facility's chemical use and disposal (Figure 2-2). These three areas of concern are the North Disposal Area, the Training Grounds Area, and the South Disposal Area, which are 2.5, 5.4 and 0.8 acres in size, respectively. The remaining area, the Police Obstacle Course and Firing Range, and two adjacent areas included in the Remedial Investigation study area, the Genesee Valley Park Area and the Genesee Valley Canal Area, are not believed to have received any potentially hazardous wastes.

The North Disposal area is generally flat and overgrown with small trees and underbrush. This area was utilized for drum disposal. Drums placed in this area were



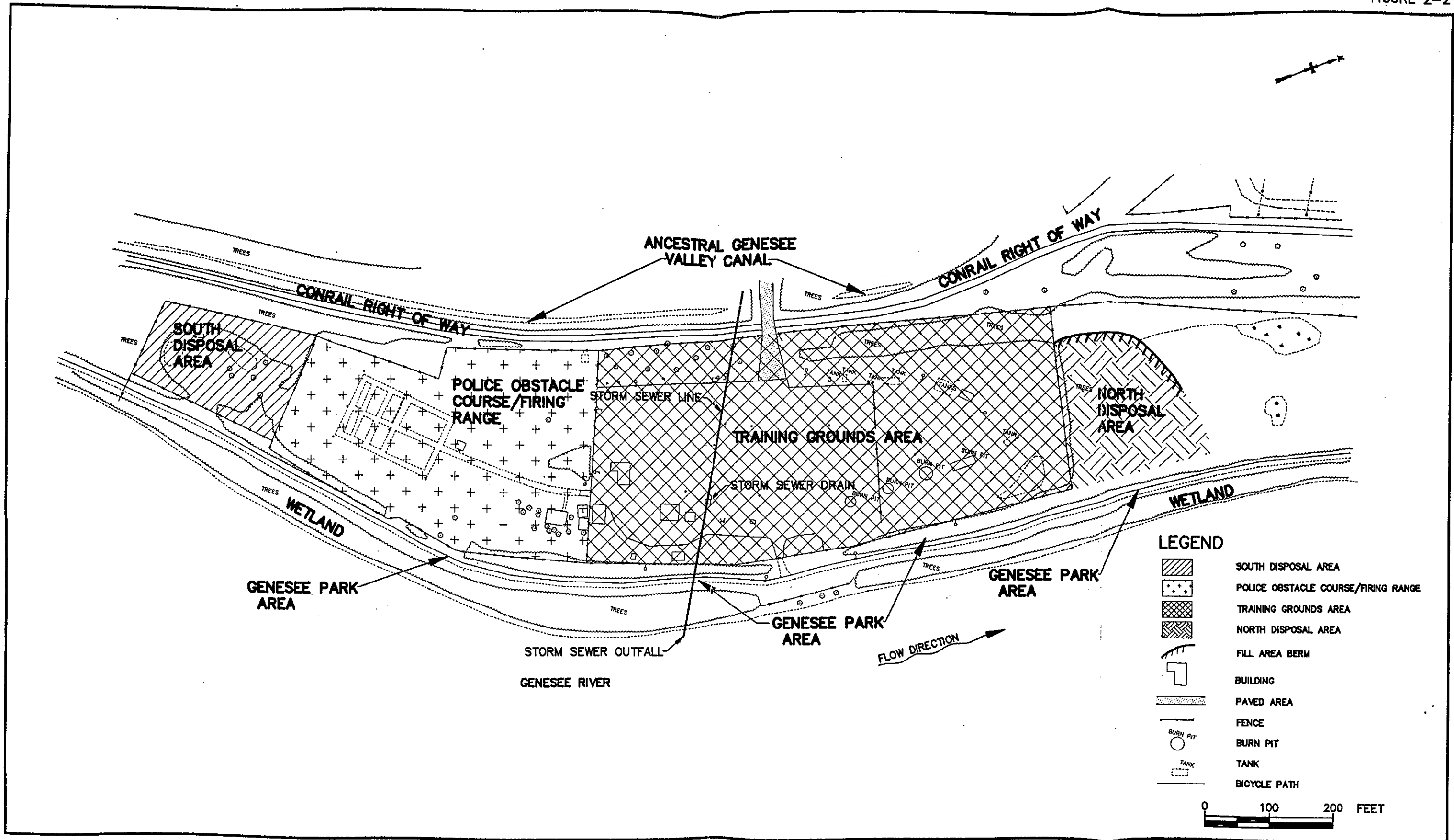
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**ROCHESTER FIRE ACADEMY
RI / FS
SITE LOCATION MAP**

CITY OF ROCHESTER, NEW YORK

JULY 1990



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ROC-04-FAS

ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
SPECIFIC AREAS AT ACADEMY SITE

CITY OF ROCHESTER

MARCH 1991

ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
SITE TOPOGRAPHY
CITY OF ROCHESTER
MARCH 1991

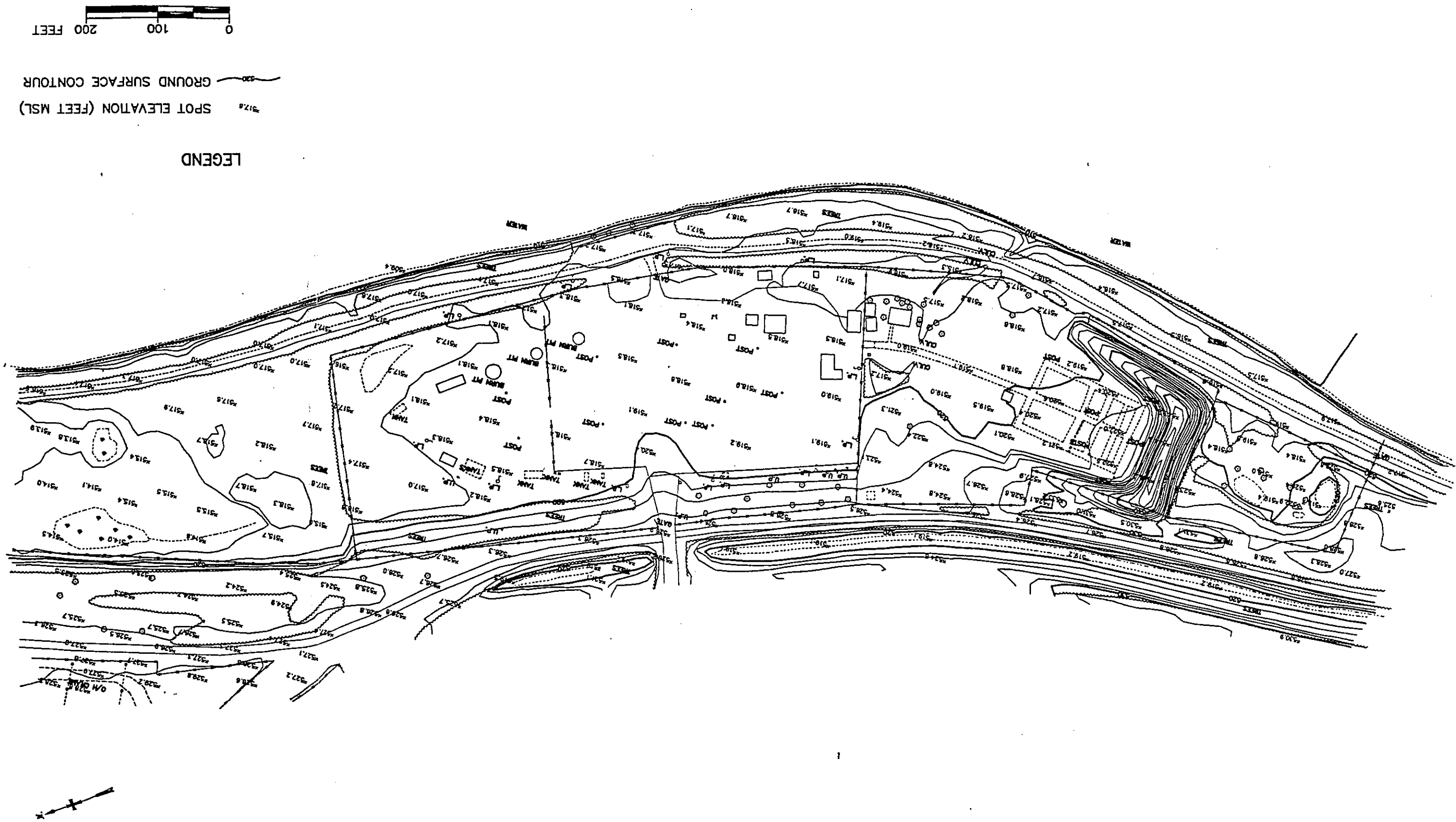


FIGURE 3-2

apparently crushed and buried using heavy construction equipment. A discontinuous layer of coarse-textured soil and debris covers the drums. Additionally, construction and demolition debris is present in this area. Drum fragments are visible at the face of the berm along the north-northwest edge of the fill area.

The Training Grounds Area, which is centrally located at the site, contains several small buildings, fuel storage tanks, burn pits, and fire training equipment. A three-inch thick layer of crushed stone covers native soil materials within the Training Grounds Area. A small surface runoff retention basin is located in its northeast corner. A stormwater sewer, which originates at the Fire Academy parking lot to the west of the site on Scottsville Road passes under the center of this area.

The South Disposal Area is located in the southwest corner of the site. Drummed and uncontained wastes were disposed of in this area. A number of drums were previously removed from this area resulting in several depressions which have since filled with water.

2.2 SITE HISTORY

The Rochester Fire Academy has been owned and operated by the City of Rochester as a training facility used by the City's Fire and Police Departments since its inception in 1954. Prior to 1954, the area was undeveloped park land. During the period from approximately 1954 through 1980, the Fire Academy accepted flammable liquids from local industries and other sources for training activities. No records were kept on materials accepted by the Fire Department for burning practices. On-site personnel indicated that solvents, paint thinners and other organic chemicals in addition to metallic residue sludge-like materials were burned and/or disposed of at the Training Grounds and North and South Disposal Areas.

Aerial photographs taken during the period from 1961 to 1970 indicate that disposal activities had occurred in the North and South Disposal Areas. By 1976, other aerial photographs indicate that waste disposal activities in the Northern Disposal Area had ceased, although the Southern Disposal Area remained "disturbed". The New York State Department of Environmental Conservation (NYSDEC) began investigating the facility's disposal practices in 1980 and subsequently directed the removal of over 200 drums and numerous chemical reagent bottles from the three area of concern. Late in 1981, Empire

Soils Investigations of Buffalo, New York was retained by the City of Rochester to perform a soil sampling and analysis program. Inorganic and organic constituents were detected in soil samples collected from the Training Grounds Area. During 1982, the City of Rochester applied to the NYSDEC for a hazardous waste treatment, storage and disposal permit, but the application was rejected and the Fire Training Academy ceased the practice of using industrial wastes for training purposes. Subsequently, the Fire Academy Site was placed on the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites (Site No. 828015).

Since being identified as a hazardous waste disposal site, the Fire Academy site has been the subject of NYSDEC Phase I (Recra Research, Inc. 1983) and Phase II (Recra Research, Inc. 1985) State Superfund investigations. Based on the results of these preliminary investigations, the NYSDEC assigned the site a "Class 2" designation in late 1986 and directed the City of Rochester to remediate the site. City personnel who use the site and union representatives have raised concerns about potential health effects. In response to these concerns, a 3-inch deep layer of crushed stone was placed over soil in the actively-used portions of the Training Grounds Area in the spring of 1987 to minimize personnel contact with contaminated soil. In early 1988, the Monroe County and New York State Departments of Health, and the National Institute for Occupational Safety and Health requested the City to limit public access to the site. Consequently, the City erected a fence around the Genesee Valley Park Area and northern portion of the training grounds and repaired the existing fencing around the remainder of the Training Grounds Area and the South Disposal Area.

2.3 PURPOSE OF STUDY

As a result of the Fire Academy's Class 2 designation, the NYSDEC has required that a Remedial Investigation/Feasibility Study (RI/FS) be conducted to determine the nature and extent of hazardous waste contamination at the site, evaluate potential risks, and identify feasible alternatives for site remediation. Subsequently, during 1989 the City of Rochester entered into a Consent Order Agreement with NYSDEC to conduct an RI/FS at the Fire Academy as the first step in the remediation process.

The City of Rochester contracted Malcolm Pirnie, Inc. to perform the required RI/FS. During the period of November 1989 through August 1990,

Malcolm Pirnie conducted the field investigation activities required by the RI scope of work. The purpose of this document is to present the findings of the Remedial Investigation.

2.4 SCOPE

The approach of the required RI/FS investigative and reporting activities was identified in the Order-on-Consent (Appendix A). This scope was specifically based upon a Work Plan/Quality Assurance Plan (Malcolm Pirnie, 1988a), addended to incorporated modifications/additions based upon NYSDEC/NYSDOH review comments (Malcolm Pirnie, 1988b). This NYSDEC approved Work Plan, as addended, includes a Remedial Investigation Plan which identifies all the field investigative activities and methodology, including sample collection procedures and analytical protocol, that were employed to perform the investigation and the quality assurance/quality control procedures.

During the course of the field investigative activities, a number of modifications to the scope of work and/or investigative procedures were recommended on the basis of new information discovered and/or mitigating circumstances encountered in the field. All such modifications were implemented after mutual agreement by Malcolm Pirnie, NYSDEC and City of Rochester. A chronology of all modifications is presented in Appendix B.

Collectively, the Work Plan/Quality Assurance Plan and the documents presented in Appendix B define the specific methodology that was employed to generate the data presented in this document. This methodology will only be referenced and/or summarized in the text of this document as appropriate for interpretation of results and findings. The reader is referred to the Work Plan (Malcolm Pirnie, 1988a and 1988b) and Appendix B for a detailed presentation of the specific investigative procedures and methods employed.

Section 3.0

Physiography, Climate and Soils

3.0 PHYSIOGRAPHY, CLIMATE, AND SOILS

3.1 LAND USE AND DEMOGRAPHY

The training areas of the site, the Training Grounds Area and Obstacle Course/Firing Range Area, are primarily used by the City Fire and Police departments. The Fireman's Training Grounds Area is utilized by over 2,000 industrial, Academy, and other users annually. The Obstacle Course/Firing Range Area is utilized by Police in-service training personnel, recruits, special response team, K-9 units and other outside agencies (i.e., Federal, State, County and local government agencies) totalling over 1,000 users annually. The Genesee Valley Park, which abuts the eastern boundary of the site, is a wooded area that is traversed by a recreational bicycle path. According to the City of Rochester Parks Operations Manager, use of the park in the vicinity of the Fire Academy Site consists of approximately 30 recreational users per day during the summer months. Recreational use decreases to 5-15 users per day during the winter months. Use is restricted by fencing on the North and South Site perimeters; however, unauthorized personnel were observed on the bicycle path within the site boundaries during the site investigation. The wooded area between the bicycle path and the Genesee River has been designated as a New York State Class II Wetland Area (County Wetland Number RH-2-II). There are no critical habitats of endangered species identified in this area.

The abandoned channel of the former Genesee Valley Canal is located along the southwestern site boundary. This area has been recently purchased by the City of Rochester. The northern portion of the Canal adjacent to the site has been infilled. The canal was completed in 1856 and connected the City of Olean with the City of Rochester. The canal was abandoned in 1887. Railway service, recently abandoned, ran parallel to the ancestral canal channel.

The Rochester Fire Training Academy Site is located in an urbanized area that generally consists of commercial development. The site is currently zoned General Commercial per land use zoning mapping obtained from the City of Rochester Department of Community Development.

The nearest residential area is approximately 1/4-mile to the southwest. A water well is known to provide a source of supply for one resident. The household water supply

was tested by the County Health Department and was determined to be within ground water quality standards. Table 3-1 presents the 1980 population and the number of drilled and dug wells used as a primary or secondary water supply source for zip code areas in the vicinity of the Fire Academy Site (see Figure 3-1).

3.2 TOPOGRAPHY

The Fire Academy Site is located within the Genesee Valley Region. The topographic relief in this region is generally low. Major topographic features in the area includes: a beach ridge present a few miles to the north of the City of Rochester; a lake plain extending northward from the beach ridge to Lake Ontario; and glacially-derived landforms including end moraines, till plains, kames and drumlins south of the beach ridge.

The Fire Academy Site is located within the Genesee River flood plain, an area that is generally flat lying with occasional relief associated with past landfilling and excavation activities. The surface of the Training Grounds Area is relatively flat and is covered with approximately three (3) inches of coarse gravel. A man-made berm, steeply rising to a height of 22 feet above grade, serves as a backstop for the Police Firing Range. The remainder of the obstacle course/firing range is relatively flat.

The North Disposal Area is somewhat mounded with construction and demolition (C & D) debris partially crushed drums, and foundry sand. This landfilling activity has resulted in gentle downward slope toward the north. The South Disposal Area has been landfilled and partially excavated with local relief varying between 3 to 5 feet.

A channel-like narrow depressed area (approximately ten feet deep) is present along the southwestern edge of the site. This depressed area is the ancestral channel of the Genesee Valley Canal. The canal channel is in-filled along the western boundary of the North Disposal area. Parallel to the canal along the entire western boundary of the Fire Academy site, there is a slightly mounded ridge of railroad ballast fill material from the pre-existing ConRail railway. A topographic contour map is provided in Figure 3-2.

3.3 DRAINAGE

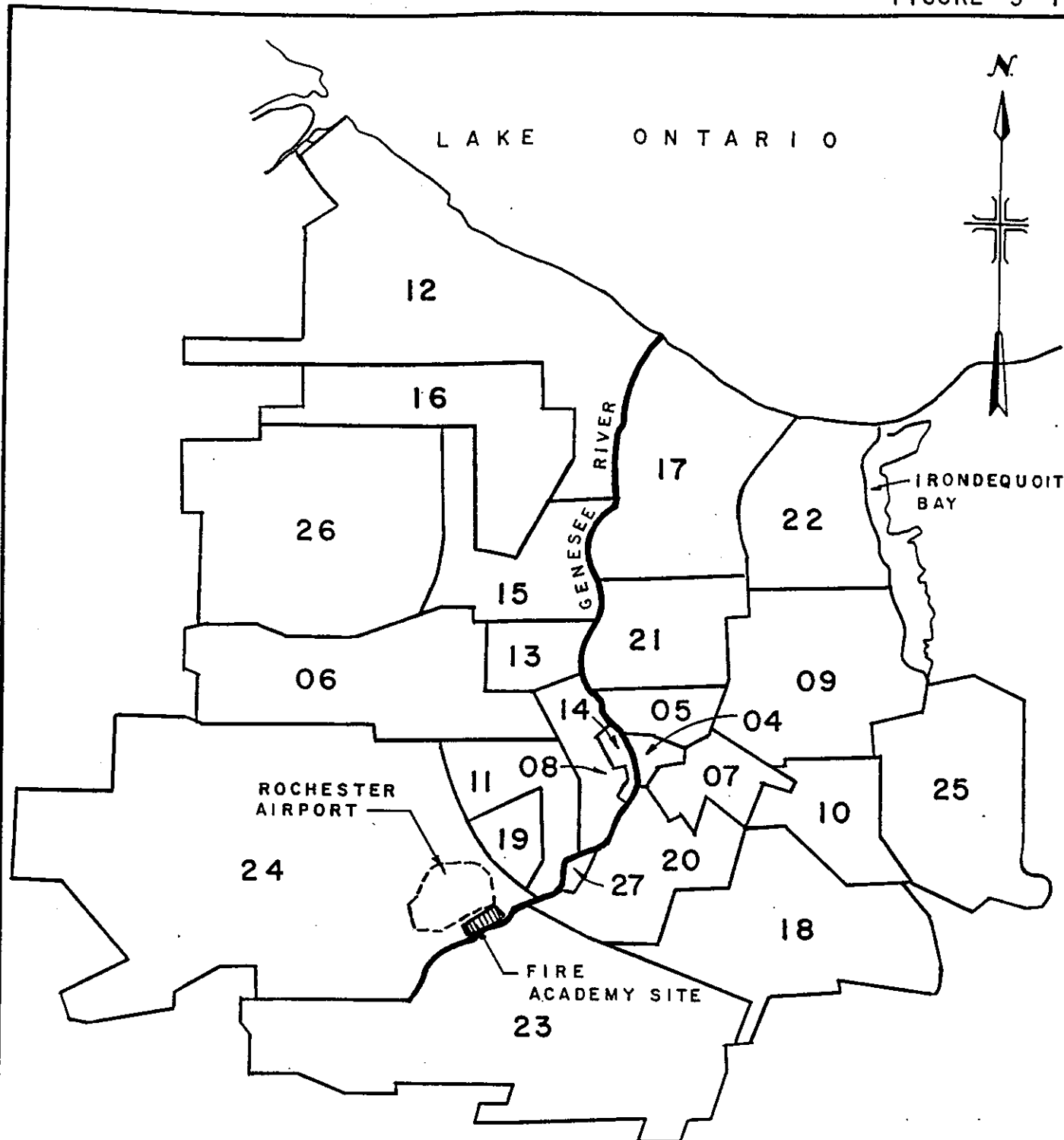
The regional drainage characteristics are discussed in Section 6.2. Surface water drainage at the Fire Academy site is toward the Genesee River. Discrete on-site drainage

TABLE 3-1

ZIP CODE AREA POPULATION AND WATER SUPPLY WELLS IN THE VICINITY OF
THE FIRE ACADEMY SITE

ZIP CODE	1980 POPULATION	DRILLED WELL	DUG WELL
14608	15,137	0	0
14611	22,009	11	0
14619	16,849	11	0
14620	27,208	8	6
14623	28,053	66	4
14624	34,674	264	13
14627	2,895	0	0

Source: National Water Well Association Database



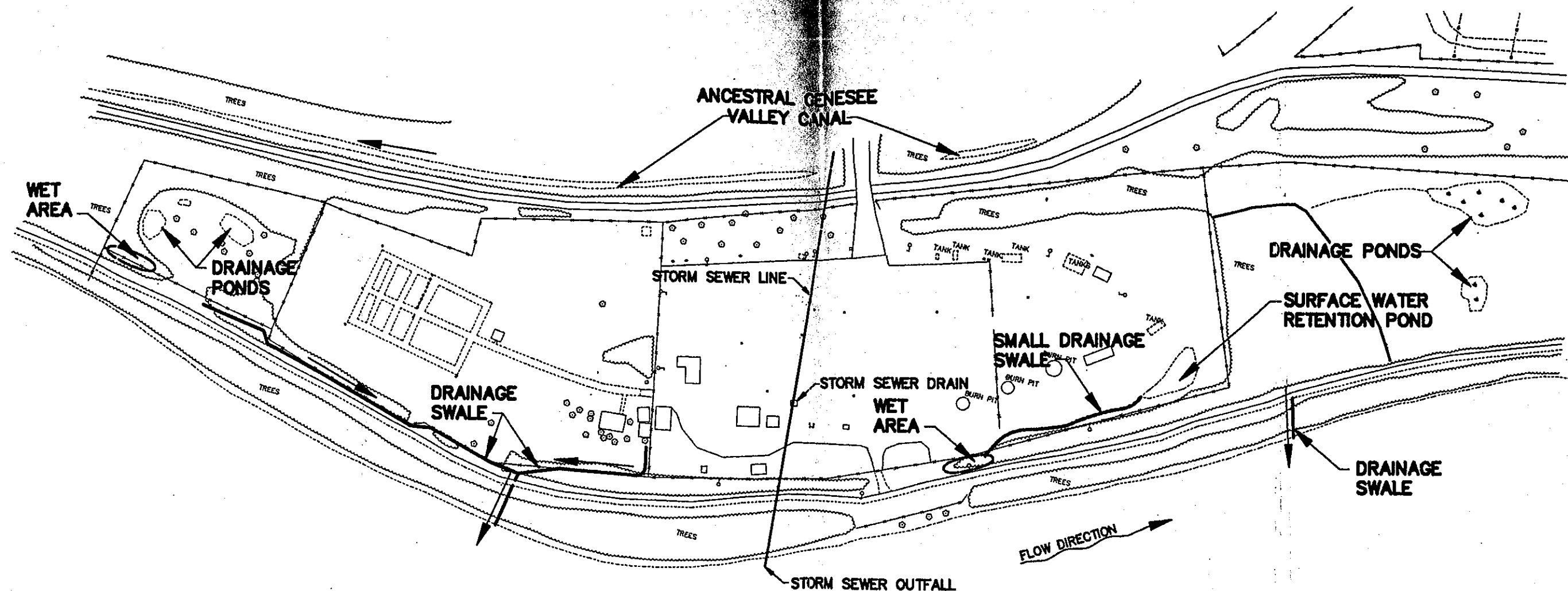
NOTE: 146 + TWO DIGITS SHOWN = ZIP CODE
 SOURCE: U.S. POSTAL SERVICE, ROCHESTER, N.Y.

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ROCHESTER FIRE ACADEMY
 RI / FS
 ZIP CODE AREAS

CITY OF ROCHESTER, NEW YORK NOVEMBER 1990



LEGEND

← FLOW DIRECTION

0 100 200 FEET

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ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
ON-SITE DRAINAGE AREAS

CITY OF ROCHESTER

MARCH 1991

areas are shown in Figure 3-3. The Training Grounds Area drains via a storm sewer located near the center of the area and a drainage swale along the southeastern boundary of the area. Surface water flowing into the storm sewer drain is discharged beneath the Training Grounds area via a storm sewer outfall and directly discharges to the Genesee River. Some surface water ponding occurs in the northeast corner of the training grounds area behind a small surface water retention berm. South of the surface water retention pond is a small drainage swale formed by the shallow excavation of soil during construction of a one to two-foot berm along the fence line east of the burn pit area. A small portion of the flow in the swale recharges the wet area near the exit gate. This wet area seasonally expands into the vicinity of the burnpits. Overland flow occurs during periods of heavy precipitation where surface runoff moves across the wetland area and discharges directly into the Genesee River.

A shallow pond exists slightly north of the North Disposal Area. Ponding is attributed to the low permeability of the surface soil and the near surface water table (described in Section 4.0). During periods of heavy precipitation, the ponded area overflows and the surface water flows toward the wetland area ultimately discharging to the Genesee River.

Two (2) shallow ponds are present within the South Disposal Area which collects surface water during periods of heavy precipitation. Surface water not collected by the ponds drains to a swale originating near the gate at the east side of the South Disposal Area. This swale drains northward paralleling the fence along the police obstacle course/firing range where it merges with a drainage swale originating in the police obstacle course/firing range area. The two drainage swales merge at a 12-inch diameter corrugated culverts which underlies the bike path, and is conveyed directly to the Genesee River. The former Genesee Valley Canal, located along the western boundary of the site, appears to drain to the south.

3.4 CLIMATOLOGY

A National Oceanic and Atmospheric Administration (NOAA) weather station is located at the Greater Rochester International Airport, approximately 0.5 miles west of the site.

The climate of the Rochester area is characterized as humid continental and is influenced by Lake Ontario, which tends to moderate temperatures throughout the year. Precipitation is evenly distributed throughout the year and is also influenced by the near proximity of the lake. Table 3-2 presents climatic data for a 30 year period of record (1960 - 1989).

The site climate can be generally defined from the following statistics:

Mean Average Annual Precipitation	32.64 inches
Mean Average Annual Temperature	47.8° F
Maximum Average Annual Temperature	56.3° F
Minimum Average Annual Temperature	39.3° F

Wind direction is generally from the west southwest with a mean wind speed of 9.7 mph.

Snow and frozen soil conditions from November through April may influence potential remedial alternatives. The following is the monthly mean snowfall for the past 30 year period of record:

November	6.5 inches
December	19.4 inches
January	22.9 inches
February	22.4 inches
March	13.9 inches
April	3.4 inches

The last killing frost occurs in late April. In the Fall, the growing season is extended by the influence of the warmer waters of the lake, with the first killing frost occurring in late October.

Climatological data were obtained for the months of November 1989 and April through August 1990, the period during which the Remedial Investigation field studies were performed. These data are compared with the 30-year averages in Table 3-3.

3.5 SOILS

The native soil cover in the vicinity of the Fire Academy Site has been extensively disturbed (excavated, mixed with fill and/or paved or covered). A large portion of the site is covered with fill material. Soils present in the area prior to site development were

TABLE 3-2

METEOROLOGICAL DATA FOR 1960 - 1989
AT THE GREATER ROCHESTER INTERNATIONAL AIRPORT

AVERAGE MONTHLY TEMPERATURE (°F)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean	24.6	24.5	32.9	45.1	56.9	66.4	71.4	69.3	62.5	51.4	39.8	28.9	47.8
Max.	31.5	31.9	40.6	54.1	66.8	76.5	81.3	78.9	72.1	60.2	46.6	35.2	56.3
Min.	17.6	17.1	25.2	36.1	46.9	56.3	61.4	59.7	52.92	42.5	33.0	22.6	39.3

AVERAGE MONTHLY PRECIPITATION (in.)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean	2.46	2.36	2.61	2.58	2.89	3.00	3.07	2.89	2.77	2.74	2.69	2.58	32.64

TABLE 3-3

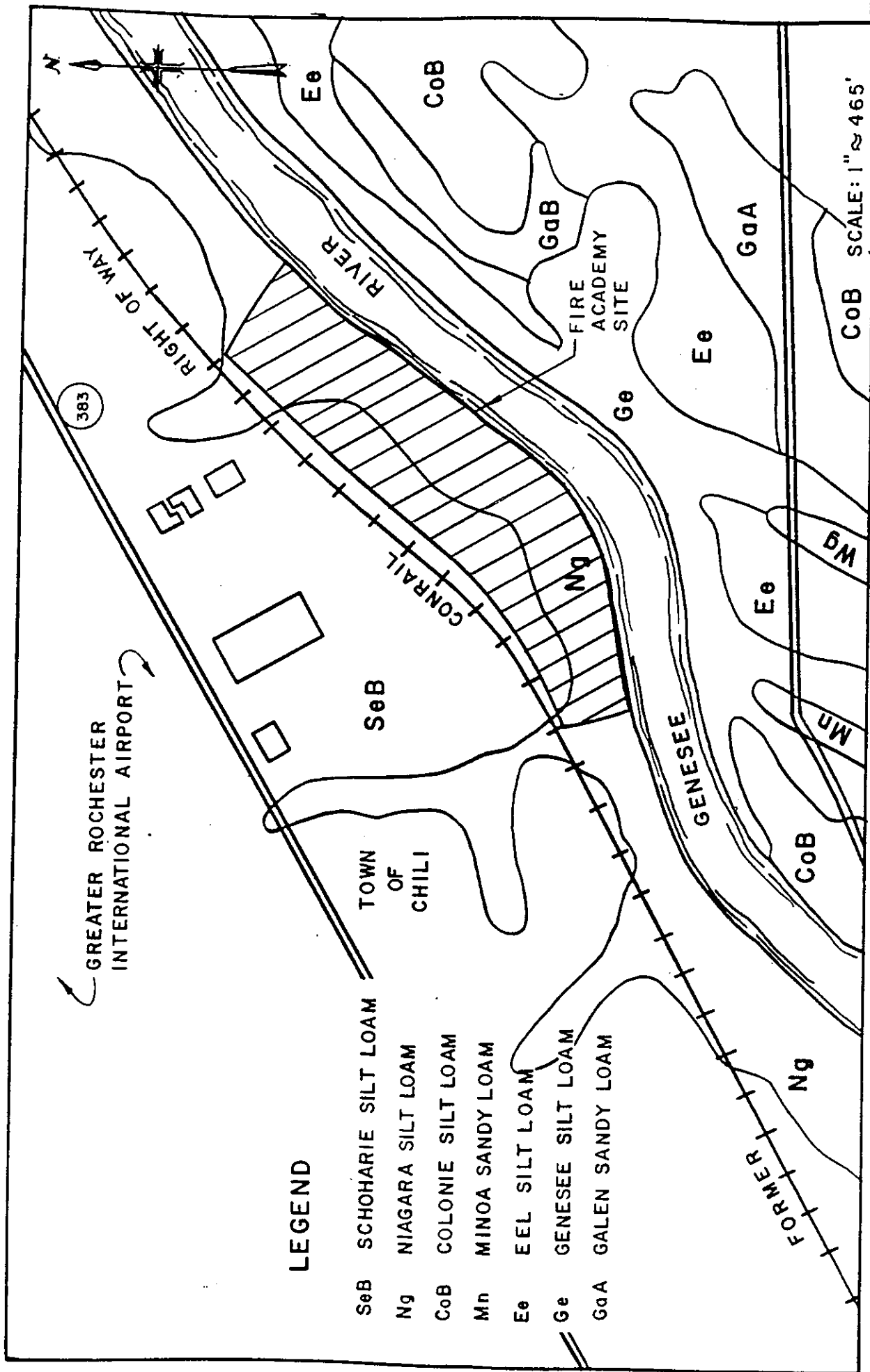
COMPARISON OF PERIOD SPECIFIC PRECIPITATION DATA
TO 30-YEAR AVERAGES

MONTH/YEAR OF FIELD ACTIVITY		PERIOD SPECIFIC PRECIPITATION (inches)	30-YEAR AVERAGE PRECIPITATION (inches)
November	1989	2.01	2.69
December	1989	1.58	2.58
January	1990	1.61	2.46
February	1990	3.93	2.36
March	1990	1.56	2.61
April	1990	3.58	2.58
May	1990	5.76	2.89
June	1990	2.88	3.00
July	1990	3.05	3.07
August	1990	3.59	2.89
September	1990	3.36	2.77
October	1990	4.37	2.24
November	1990	2.27	2.69
TOTAL		39.55	35.33

mapped by the U.S. Department of Agriculture Soil Conservation Service (1973). Figure 3-4 illustrates the various soil types in the vicinity of the site. As depicted, two soil types occur on-site: the Niagara Silt Loam (Ng) and the Schohaire Silt Loam (SeB).

The two native soil types appear to have similar compositional characteristics. The Niagara Silt Loam is described as a dark brown to yellow brown silt and very fine sand with some clay. This soil type is described as poorly drained. The Schohaire Silt Loam is a dark brown to reddish brown silt and clay and is moderately well drained. The range of pH values for the Niagara Silt Loam and the Schohaire Silt Loam are 6.1-7.6+ and 6.5-7.6+, respectively.

Overlying the native soils are various types of fill material. The Training Grounds area is currently covered with a three-inch layer of coarse angular gravel. In the North Disposal area, a 2-3 foot layer of sandy construction and debris fill material, including some foundry sand, extends approximately 200 feet northeastward of the Training Ground Area, covering the native soil material. Ash and cindery material, as well as other fill material, covers the native soils in the South Disposal Area. The fill materials across the site appear to be well drained. The fill material is described in detail in Section 5.3.1.



NOTE: FROM U.S. SOIL CONSERVATION SERVICE, 1973

ROCHESTER FIRE ACADEMY

RI/FS

SOILS MAP IN THE VICINITY OF THE
ROCHESTER FIRE ACADEMY SITE

CITY OF ROCHESTER, NEW YORK

JULY 1990

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Section 5.0

Geology and Hydrogeology Includes Historical Boring and Groundwater Monitoring Well Information

5.0 GEOLOGY AND HYDROGEOLOGY

5.1 INVESTIGATIVE METHODOLOGY

The geologic and hydrogeologic investigations for the Rochester Fire Academy Remedial Investigation (RI) were conducted from November 1989 through May 1990. The scope of these investigations and specific work tasks performed were in accordance with the Work Plan (Malcolm Pirnie Inc., 1988) and addendum (Malcolm Pirnie Inc., October 1988) as modified on the basis of the findings of the preliminary surveys (Malcolm Pirnie, Inc. February 1990).

Field activities performed to characterize the geologic and hydrogeologic conditions at the site involved the following tasks:

- drilling of twenty-two (22) borings at eleven (11) locations including continuous sampling of the deepest borehole at each location;
- installation of twenty-one (21) monitoring wells and one (1) piezometer;
- development of all newly installed monitoring wells/piezometer;
- in-situ hydraulic conductivity testing of all newly installed wells/piezometers;
- installation of two (2) staff gauges in the Genesee River adjacent to the site; and
- monitoring of water levels in the Genesee River, the newly installed wells/piezometer and existing wells.

5.1.1 Borehole/Monitoring Well Completion

Twenty-one (21) boreholes/monitoring wells were completed in accordance with the recommendations presented in the Interim RI Report, February 1990 at the locations shown in Figure 5-1.

Stratigraphic information used to characterize the overburden material was obtained during borehole advancement using continuous split spoon sampling techniques in the deepest well at each triplet/couplet well location and at each single well location. Split

spoon samples were logged and placed in labeled sample jars for archiving purposes. Sample descriptions/boring logs are presented in Appendix C.1.

Three (3) well clusters were installed at locations MW-6, MW-7, and MW-8. These clusters included a shallow overburden well with the screened portion of the well straddling the water table, an intermediate bedrock well screened in the upper portion of the bedrock, and a deeper bedrock well screened ten feet below the top of the rock. For description purposes, the shallow wells have been identified by a "S", the intermediate wells by an "I", and the deep wells by a "D".

Well pairs consisting of a shallow overburden well and an intermediate bedrock well were installed at four (4) locations: MW-9, MW-10, MW-11 and MW-12.

Single shallow wells were installed at three (3) locations: MW-13, MW-14, and MW-15. Additionally, a decision was made in the field to add a single intermediate bedrock well (MW-16I) and a piezometer PZ-9 (documented in Appendix B). The piezometer (PZ-9) was installed in the lower overburden to determine if lower overburden and the upper bedrock are hydraulically connected. Monitoring well MW-16I was installed to provide additional geologic/hydrogeologic data and water quality information for the extreme northern area of the site.

The monitoring well installation procedures and construction details are documented in Appendices C.2 and C.3, respectively. Well construction details are summarized in Table 5-1.

The following soil samples were collected from some boreholes for physical testing:

- Shelby tube samples (undisturbed soil samples) were collected from boreholes MW-9S at 12-14 feet and MW-6I at 12-14 feet and 32-34 feet to determine the vertical hydraulic conductivity of the overburden at those locations; and
- split-spoon samples collected from each screened zone of the upgradient shallow wells and the piezometer (MW-6S, MW-9S, PZ-9, and MW-10S) were submitted to the laboratory for grain size analysis.

In order to minimize the risk associated with handling potentially contaminated soils, only soil samples collected from upgradient boreholes were submitted for testing. Soil testing results are discussed in Section 5.3.

To better define the bedrock underlying the site, samples of bedrock were obtained from all intermediate and deep boreholes using either an HQ (4" diameter) or an NX (3"

TABLE 5-1
ROCHESTER FIRE ACADEMY RIFES
WELL CONSTRUCTION SUMMARY

WELL BORE #	GROUND ELEV	TOP OF PVC RISER ELEVATION	BOREHOLE DIAMETER (in) (1)	BOREHOLE DEPTH/ BOTTOM EL	BOTTOM PERMANENT CASING DEPTH/ELEV	TOP OF SEAL DEPTH/ELEV	TOP PRIMARY SAND PACK DEPTH/ELEV	TOP OF SCREEN DEPTH/ELEV	SCREEN BOTTOM DEPTH/ELEV	BASE OF SUMP DEPTH/ ELEV	PRIMARY SAND PACK BOTTOM DEPTH/ELEV	TYPE OF SAND PACK	SCREENED INTERVAL/ LENGTH (ft) x SLOT SIZE (in)
MW-6S	526.3	527.86	10"	17.1	N/A (2)	2.4	4.4	6.3	16.3	16.5	17.1	#2	8.3 - 16.3 10 x 0.010
MW-6I	526.2	528.01	10 3/4"	45.1	N/A	30.5	34.0	35.0	45.0	45.1	45.1	#4	35.0 - 45.0 10 x 0.010
MW-6D	526.3	528.19	10 3/4"	54.4	N/A	37.6	43.0	44.0	54.0	54.1	54.4	#4	44.0 - 54.0 10 x 0.010
MW-7S	517.4	519.38	10"	13.6	N/A	1.5	2.8	3.0	13.0	13.2	13.6	#2	3.0 - 13.0 10 x 0.010
MW-7I	517.4	519.57	10 3/3"	41.0	31.0	24.8	28.8	30.8	40.8	41.0	41.0	#4	30.8 - 40.8 10 x 0.010
MW-7D	517.3	519.54	10 3/3"	50.2	31.0	37.5	43.0	45.0	50.0	50.2	50.2	#4	45.0 - 50.0 10 x 0.010
MW-8S	517.5	519.73	10"	14.2	N/A	1.5	3.0	4.0	14.0	14.0	14.2	#2	4.0 - 14.0 10 x 0.010
MW-8I	517.3	520.00	10 3/4"	41.5	31.0	25.0	28.5	30.3	40.3	40.3	40.5	#4	30.3 - 40.3 10 x 0.010
MW-8D	517.2	519.77	10 3/4"	50.0	31.0	38.5	42.5	43.8	48.8	49.0	49.0	#4	43.8 - 48.8 5 x 0.010
PZ-9	526.8	528.79	10"	48.2	N/A	47.7	47.7	47.7	48.4	48.2	48.2	#2	33.1 - 38.1 5 x 0.010
MW-9S	526.6	528.22	10"	14.9	N/A	1.9	3.9	4.8	14.8	14.9	14.9	#2	4.8 - 14.8 10 x 0.010
MW-9I	526.5	528.55	10 3/4"	511.7	N/A	524.7	522.7	521.8	511.8	511.7	511.7	#4	39.5 - 49.5 10 x 0.010

NOTES:

- (1) Diameter of overburden portion of borehole/Diameter of bedrock portion of borehole.
 - (2) Not Applicable (permanent casing not installed in overburden wells and upgradient bedrock wells).
- All depths in feet below ground surface
All elevations in feet above mean sea level
All wells have 2" diameters

TABLE 5-1
ROCHESTER FIRE ACADEMY RI/FS
WELL CONSTRUCTION SUMMARY

WELL BORE #	GROUND ELEV	TOP OF PVC RISER ELEVATION	BOREHOLE DIAMETER (in) (1)	BOREHOLE DEPTH/ BOTTOM EL	BOTTOM PERMANENT CASING DEPTH/ELEV	TOP OF SEAL DEPTH/ELEV	TOP PRIMARY SAND PACK DEPTH/ELEV	TOP OF SCREEN DEPTH/ELEV	SCREEN BOTTOM DEPTH/ELEV	BASE OF SUMP DEPTH/ ELEV	PRIMARY SAND PACK BOTTOM DEPTH/ELEV	TYPE OF SAND PACK	SCREENED INTERVAL/ LENGTH (ft) x SLOT SIZE (in)
MW-10S	523.9	525.62	10"	20.0 503.9	N/A (2)	5.1 518.8	7.9 516.0	9.8 514.1	19.8 504.1	20.0 503.9	20.0 503.9	#2	9.8 - 19.8 10 x 0.010
MW-10I	523.9	525.61	10 7/4"	43.0 480.9	N/A	26.9 497.0	31.1 492.8	32.8 491.1	42.8 481.1	43.0 480.9	43.0 480.9	#4	32.8 - 42.8 10 x 0.010
MW-11S	517.3	518.94	10"	14.3 503.0	N/A	1.5 515.8	3.0 514.3	4.1 513.2	14.1 503.2	14.3 503.0	14.3 503.0	#2	4.1 - 14.1 10 x 0.010
MW-11I	517.4	519.79	10 7/4"	35.2 482.2	25.0 492.4	18.7 498.7	22.7 494.7	25.0 492.4	35.0 482.4	35.2 482.2	35.2 482.2	#4	25.0 - 35.0 10 x 0.010
MW-12S	518.6	521.23	10"	14.0 504.8	N/A	1.5 517.1	3.0 515.8	3.8 514.8	13.8 504.8	14.0 504.8	14.0 504.8	#2	3.8 - 13.8 10 x 0.010
MW-12I	518.8	521.38	10 7/4"	35.0 483.8	25.0 493.8	19.0 499.8	23.0 495.8	26.8 492.0	31.8 487.0	32.0 486.8	32.5 486.3	#4	26.8 - 31.8 5 x 0.010
MW-13S	519.4	521.75	10"	16.1 503.3	N/A	2.0 517.4	4.0 515.4	5.9 513.5	15.9 503.5	16.1 503.3	16.1 503.3	#2	5.9 - 15.9 10 x 0.010
MW-14S	518.1	520.55	10"	14.4 503.7	N/A	1.5 516.8	3.4 514.7	4.2 513.9	14.2 503.9	14.4 503.7	14.4 503.7	#2	4.2 - 14.2 10 x 0.010
MW-15S	517.7	520.18	10"	14.0 503.7	N/A	1.5 516.2	3.0 514.7	3.8 513.9	13.8 503.9	14.0 503.7	14.0 503.7	#2	3.8 - 13.8 10 x 0.010
MW-16I	516.1	519.43	10 7/4"	29.4 486.7	19.5 498.6	12.3 503.8	16.9 499.2	19.2 496.9	29.2 486.8	29.4 486.7	29.4 486.7	#4	19.2 - 29.2 10 x 0.010

NOTES:

- (1) Diameter of overburden portion of borehole/Diameter of bedrock portion of borehole.
- (2) Not Applicable (permanent casing not installed in overburden wells and upgradient bedrock wells).
- All depths in feet below ground surface
- All elevations in feet above mean sea level
- All wells have 2" diameters

diameter) core barrel. Each rock core was logged in the field by a field geologist and placed in a labeled wooden core box for archiving purposes. Bedrock core logs are presented in Appendix C.1.

5.1.2 Monitoring Well/Piezometer Development

Monitoring wells/piezometer were developed by either bailing or a combination of bailing and suction lift pumping until turbidity values were less than 50 NTU or until at least 10 to 20 well volumes were removed, and no visual improvement in turbidity was observed and pH and specific conductivity had stabilized. Wells were monitored for pH, temperature, specific conductivity, and turbidity in accordance with the Work Plan. A summary of well/piezometer development data and methodology is presented in Table 5-2. Well development data sheets are presented in Appendix C.4.

5.1.3 Hydraulic Conductivity Testing

In-situ hydraulic conductivity testing was conducted on all new wells and the piezometer. In accordance with the Work Plan, rapidly recharging wells were tested using the "rising head" method with changes in water levels recorded by an electronic pressure transducer and data logger. Slower recharging wells were monitored with an electronic water level indicator and stopwatch. Monitoring well MW-6D, a very slow recharging well, was monitored over a period of several days as it recovered from installation/development. The data from the deeper wells/piezometer, which have fully saturated screens were analyzed using SLUGIX Inc. software by the methods of Hvorslev (1951). Data from the shallow wells which have partially saturated screens were analyzed using SLUGIX software by the methods of Bouwer and Rice (1976).

Pressure packer testing was performed in each of the deeper bedrock boreholes MW-6D, 7D and 8D. The following intervals were tested in each borehole:

MW-6D 10-20 feet below the top of rock (Single Packer)
0-10 feet below the top of rock (Double Packer)

MW-7D 13-20 feet below top of rock (Single Packer)
0-10 feet - Not tested due to borehole collapse

MW-8D 13-20 feet below top of rock (Single Packer)
0-10 feet below top of rock (Double Packer)

TABLE 5-2
ROCHESTER FIRE ACADEMY RI/FS
WELL DEVELOPMENT DATA

WELL #	pH	TEMP °C	SPECIFIC CONDUCTANCE (u/mhos)	TURBIDITY (NTU)	FIELD OBSERVATION	TOTAL VOL REMOVED/WELL VOLUMES	METHOD	COMPLETION DATE
MW-6S	7.02	10.4	1850	48	CLEAR	5.3/5	BAILER	5/4/90
MW-6I	7.76	16.7	1150	25	CLEAR, SULFIDE ODOR	30.5/6	BAILER/SUCTION PUMP	5/2/90
MW-6D	7.42	14.2	1225	35	CLEAR, SULFIDE ODOR	49.5/7	BAILER/SUCTION PUMP	5/2/90
MW-7S	6.53	12.2	990	53	CLEAR, SOLVENT ODOR	21/10	BAILER	5/9/90
MW-7I	7.56	12.5	1150	20	CLEAR, OIL SHEEN	63/10	BAILER/SUCTION PUMP	5/9/90
MW-7D	7.50	16.7	1500	32	CLEAR, SULFIDE ODOR	45/6	BAILER/SUCTION PUMP	5/9/90
MW-8S	6.11	11.1	300	30	CLEAR	45.5/28	BAILER	5/8/90
MW-8I	7.11	12.7	1150	>100	TURBID, LIGHT GRAY	83/14	BAILER	5/8/90
MW-8D	7.28	12.9	2200	19	CLEAR, SULFIDE ODOR	38/6	BAILER	5/8/90
PZ-9	7.11	14.6	1050	24	CLEAR	50.5/10	BAILER/SUCTION PUMP	5/2/90
MW-9S	7.06	8.7	600	47	CLEAR	10.8/6	BAILER	5/1/90
MW-9I	7.19	12.5	1100	46	CLEAR, SULFIDE ODOR	185/29	BAILER/SUCTION PUMP	5/1/90
MW-10S	7.08	9.8	800	15	CLEAR	10/4	BAILER	5/4/90
MW-10I	7.14	13.3	1050	46	CLEAR, SULFIDE ODOR	25.4/5	BAILER	5/3/90
MW-11S	6.74	9.2	1350	>100	TURBID, LIGHT BROWN	18/10	BAILER	5/8/90
MW-11I	7.15	11.0	1300	42	SLIGHTLY CLOUDY	55/11	BAILER	5/8/90
MW-12S	6.00	9.8	760	46	CLEAR	19.5/13	BAILER	5/9/90
MW-12I	6.79	15.1	1475	35	CLEAR, SULFIDE ODOR	50/11	BAILER/SUCTION PUMP	5/9/90
MW-13S	7.02	9.4	1800	33	CLEAR	9.2/4	BAILER	5/10/90
MW-14S	6.71	10.2	1900	>100	TURBID, FUEL-OIL ODOR	24/12	BAILER	5/11/90
MW-15S	6.60	10.5	750	41	CLEAR	13/7	BAILER	5/10/90
MW-16I	7.12	10.6	1200	>100	TURBID, SULFIDE ODOR	81/19	BAILER	5/8/90

Specific Conductance

mean	std dev	min	max
1110	576	300	1900
1050	-	1050	1050
1197	134	1050	1475
1642	503	1225	2200

pH

mean	std dev	min	max
6.69	0.39	6.00	7.08
7.11	0.00	7.11	7.11
7.23	0.30	6.79	7.76
7.40	0.11	7.28	7.50

'S' series wells (shallow overburden)
'PZ' piezometer (lower overburden)
'I' series wells (upper bedrock)
'D' series wells (deeper bedrock)

Packer testing procedures were in conformance with the Work Plan. Results from these analyses are discussed in Section 5.4 Site Hydrogeology. Documentation of pressure and slug tests data collection/analysis is presented in Appendices C.5.1 and C.5.2, respectively.

5.1.4 Ground Water and Genesee River Water Level Monitoring

Water levels were collected in all existing and newly installed wells on several occasions during the month of April and May 1990. These water levels were used to determine vertical and horizontal hydraulic gradients and determine ground water flow directions in the overburden and bedrock beneath the site.

Additionally, two staff gauges were established near shore in the Genesee River to monitor river water levels. A summary of water level data collected is presented in Table 5-3. Locations of the staff gauges are shown in Figure 5-1.

5.2 REGIONAL GEOLOGIC/HYDROGEOLOGIC CONDITIONS

5.2.1 Regional Geology

The regional geology of the Genesee Valley Region generally consists of Lower Paleozoic (Ordovician to Devonian) sedimentary bedrock veneered by glacially-derived deposits. The bedrock beneath the overburden dips gently to the south with a gradient of approximately 40 to 60 feet per mile. The older bedrock units (Ordovician in age) are exposed in the northern portion of the region. The bedrock becomes successively younger (Middle Devonian) towards the south. The bedrock exposed along the Genesee River from the Niagara Escarpment (located south of the City of Rochester) toward Lake Ontario in a series of water falls (Upper Falls, Middle Falls, Lower Falls).

In the City of Rochester, the Lockport Group is exposed at the Upper Falls and along the Erie Barge Canal (approximately 1/2 mile north of the site). The Lockport Group in this area consists of three dolostone formations: the Decew - olive gray to brown gray medium grained enterolithic dolostone with rare gypsum filled vugs; the Penfield - dark gray to brown gray laminated quartz-rich dolostone with abundant crinoid fragments; and the Oak Orchard (youngest) - brown gray laminated medium grained dolostone with ubiquitous stylolites and vugs with secondary mineralization occurring in some openings in the rock. Further to the south, the Salina Group overlies the Lockport Group. The bedrock unit

TABLE 5-3

ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF GROUND WATER/SURFACE WATER ELEVATIONS

WELL #	GROUND SURFACE ELEVATION (1)	DATES:	4/8/90	4/13/90	4/18/90	4/20/90	4/23/90	4/24/90	4/30/90	5/7/90	5/11/90	5/14/90	5/18/90	5/21/90	5/24/90	8/27/90	8/30/90
MW-1	517.8	513.28	614.53			510.56	510.89	513.16	512.60	513.38	512.77	513.72	513.96	513.98	513.47	512.34	512.34
MW-2	517.1	512.67	512.49			511.82	512.26	513.01	512.36	513.58	512.76	513.70	513.98		513.27	512.11	511.93
MW-3	516.9	511.31	512.92			511.09	511.14	512.78	512.43	512.96	512.51	513.12	513.18	513.18	512.85	510.15	510.01
MW-4	520.1	516.77	516.86			516.25	516.58		517.13	517.14	516.84	517.59	518.31	518.30	517.86	513.88	513.71
MW-5	517.7	515.30	515.51			514.95	515.16	516.22	515.67		515.50	516.15	516.81	516.75	516.35	512.90	512.90
MW-6S	526.3				DRY	511.42	512.98	513.38	515.30	513.34	515.16	516.05	520.28	517.99	516.32	514.69	514.32
MW-6I	526.2				514.64	514.03	514.06	514.39	514.26	514.89	514.55	515.35	516.13	516.35	515.81	513.76	513.71
MW-6D	526.3				514.88	513.89	513.94	514.28	514.06	514.59	514.13	514.81	515.36	515.36	515.30	513.01	512.94
MW-7S	517.4						516.68	516.64	516.26	516.32	516.12	516.51	517.08	516.98	516.75	513.13	512.78
MW-7I	517.4									514.99	514.66	515.54	516.38	516.57	516.03	513.72	513.62
MW-7D	517.3									514.98	514.62	515.41	516.23	516.44	516.03	513.72	513.59
MW-8S	517.5					513.31	513.98	513.77	513.08	513.75	513.13	514.55	514.68	514.88	514.13	511.18	510.93
MW-8I	517.3					512.05	511.91	512.76	512.27	513.16	512.50	513.10	513.44	513.45	513.20	512.15	512.10
MW-8D	517.2					512.17	512.01	512.82	512.27	513.19	512.48	513.08	513.32	513.44	513.18	512.27	512.07
PZ-9	526.8				520.14	520.00	520.39	520.28	520.32	517.20	516.91	518.16	519.74	520.03	518.32	515.28	514.98
MW-9S	526.6				522.55	522.52	522.70	522.67	522.46	522.54	522.51	523.16	523.24	523.02	522.71	516.87	516.27
MW-9I	526.5			515.30	514.37	514.02	514.23	514.34	514.47	515.27	514.97	515.87	516.79	517.15	516.57	513.98	513.85
MW-10S	523.9						518.96	519.01	518.58	518.41	519.28	519.33	519.89	520.27	519.62	515.01	514.62
MW-10I	523.9						512.43	512.95	512.65	513.47	512.84	513.43	513.81	513.86	513.66	512.38	512.28
MW-11S	517.3								514.89	514.84	514.44	516.00	516.10	516.54	515.24	509.71	509.64
MW-11I	517.4								511.55	512.57	511.98	512.56	512.82	512.79	512.64	511.91	511.89
MW-12S	518.6									514.46	514.06	515.69	516.49	516.38	514.94	511.91	511.78
MW-12I	518.8									513.62	512.85	513.86	514.19	514.11	512.48	511.95	511.86
MW-13S	519.4									517.32	517.69	517.65	518.24	518.19	517.95	514.42	514.25
MW-14S	518.1									516.27	516.15	516.39	517.13	517.04	516.74	(2)	(2)
MW-15S	517.7									514.65	514.12	515.23	515.60	515.68	514.79	513.23	513.48
MW-16I	516.1									511.41	512.43	511.53	512.03	512.15	511.92	511.61	511.53
STAFF GAUGE	513.0*											512.85	512.66	512.91	513.08	511.64	511.54
STAFF GAUGE	513.4*											512.20	512.03	512.10	512.26	511.62	511.49

NOTES: (1) All elevations in feet above mean sea level

(2) LNAPL Present in well: LNAPL Elevation/Ground Water Elevation - 514.15/511.95 (8/27/90) & 513.75/512.65 (8/30/90)

BLANK SPACE - water level not recorded (well not completed)

* - Elevation of "0" mark

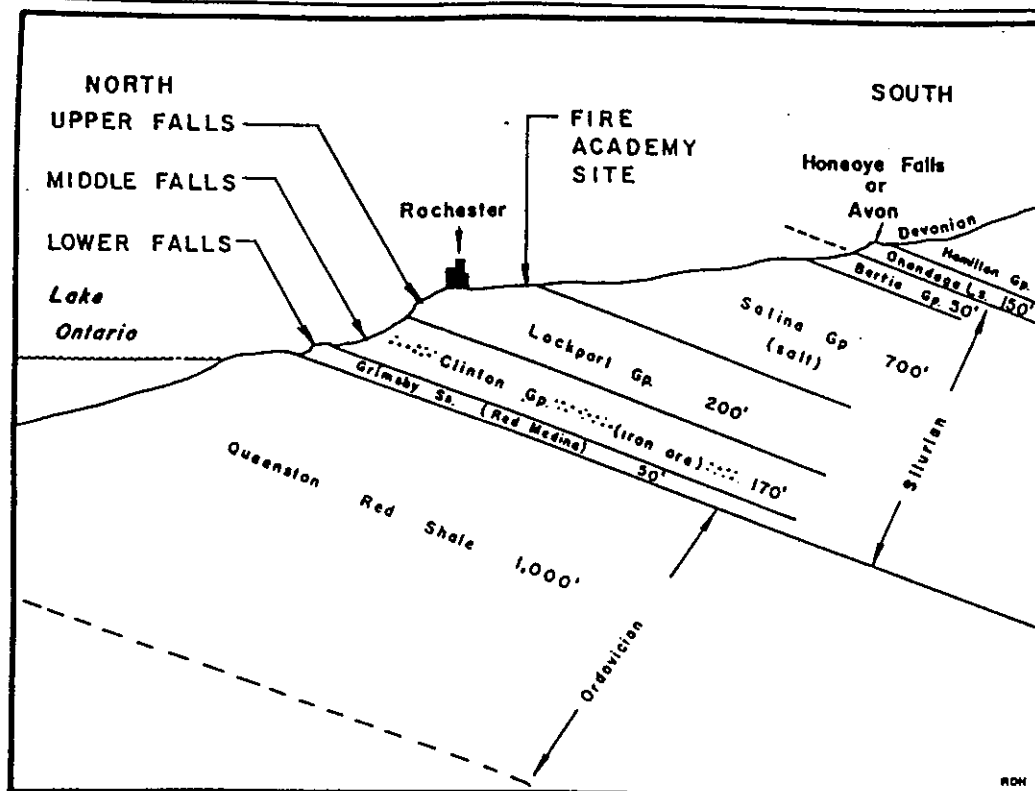
directly overlying the Oak Orchard Formation is the Pittsford shale member of the Vernon Formation. The complete stratigraphic section of the bedrock units in the Genesee Valley Region as modified by Brett (per. comm., 1991) is provided in Figure 5-2.

Generally, deposition during glacial advance/retreat is responsible for the sediments that directly overlie the bedrock. The depositional and geomorphic history of the Genesee Valley has been the subject of many geologic studies. Regional geologic summaries are included in the work of Leverett (1902), Fairchild (1932a, 1932b), MacClintock and Apfel (1944) and Muller (1965, 1967). Geomorphological changes of the Genesee Valley Region is included in the work of Muller et. al. (1988). These glacial deposits consist of till, glaciofluvial and glaciolacustrine sediments. The till is generally composed of dense, poorly sorted clay, silt, sand, gravel, cobble and boulder size material usually directly overlie bedrock. Glaciolacustrine deposits generally overlie the till or bedrock. These deposits were laid down by proglacial lakes, formed during different periods of ice advances and retreats and generally consist of varied silt and clay. A succession of ice regression have produced a series of parallel beach ridges indicative of ancestral lake shorelines. In proximity to the Genesee River, recent alluvial deposits mantle the sedimentary bedrock. These deposits consist of stratified silt, sand, gravel, and cobble size material with assorted vegetative matter.

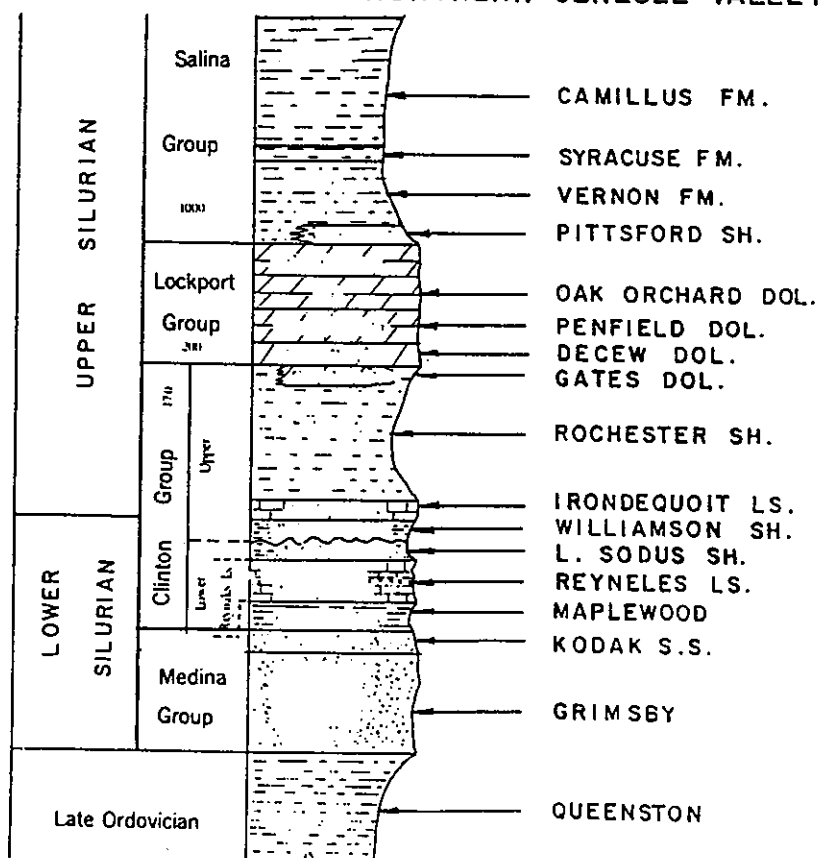
5.2.2 Regional Hydrogeology

Ground water occurs in significant quantities within the coarser grained deposits of the glacially-derived overburden material. These deposits generally include, but are not limited to, glaciofluvial and beach ridge deposits. A major source of ground water in the overburden in this region is the coarse grained deposits of the sediment-filled valley of the ancestral channel of the Genesee River and its tributaries southeast of the City of Rochester (Young, 1983). The regional direction of ground water flow is to the north down the regional slope towards Lake Ontario. Locally ground water flow directions vary as a result of topography, pumping and surface water boundary conditions.

The bedrock in this region is generally water-bearing. Available yields for water supply use are highly dependent on the distribution and interconnection of fractures and/or solution cavities within the rock. In the Lockport Group, the upper portion of the bedrock (upper 10 feet) is typically highly fractured and contains numerous solution cavities



CROSS SECTION OF THE NORTHERN GENESEE VALLEY



SOURCE: GRASSO, 1983; MODIFIED BY BRETT, PER. COMM., 1991

MALCOLM
PIRNIE

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ROCHESTER FIRE ACADEMY
RI/FS
STRATIGRAPHIC SECTION IN
THE VICINITY OF THE GENESEE VALLEY

CITY OF ROCHESTER, NEW YORK

MAY 1991

(Johnston, 1964). These properties provide for a highly transmissive water-bearing zone within the upper bedrock. The frequency of fractures generally decreases with depth. The recharge of the bedrock aquifer is principally through downward leakage through the overburden and direct infiltration in areas of bedrock exposure. The general direction of ground water flow in this region is toward Lake Ontario and deeply scoured valleys.

While water supplies for some rural areas in this region are obtained from ground water, the water supply for the City of Rochester is obtained from Hemlock Lake and Lake Ontario. The Monroe County Water Authority obtains its water supply from Lake Ontario.

5.3 SITE GEOLOGY

The current Remedial Investigation at the Fire Academy Site has provided an extensive geologic data base. Interpretation of site geology and hydrogeology is based upon this database, as well as information provided in the literature concerning regional geologic and hydrogeologic conditions.

Stratigraphic units identified during the RI from youngest to oldest include:

- fill of variable composition;
- alluvium associated with deposition of the Genesee River; and
- dolostone bedrock.

The detailed descriptions of these geologic units were derived from the borehole logs presented in Appendix C.1 and are described in the following sections.

Table 5-4 summarizes the stratigraphic data base obtained from wells/boreholes completed during the RI. The table presents survey data and a summary of the stratigraphic unit thicknesses. The locations of cross sections of the site are shown on Figure 5-3 and the stratigraphic profiles are presented in Figures 5-4 through 5-8.

5.3.1 Fill Material

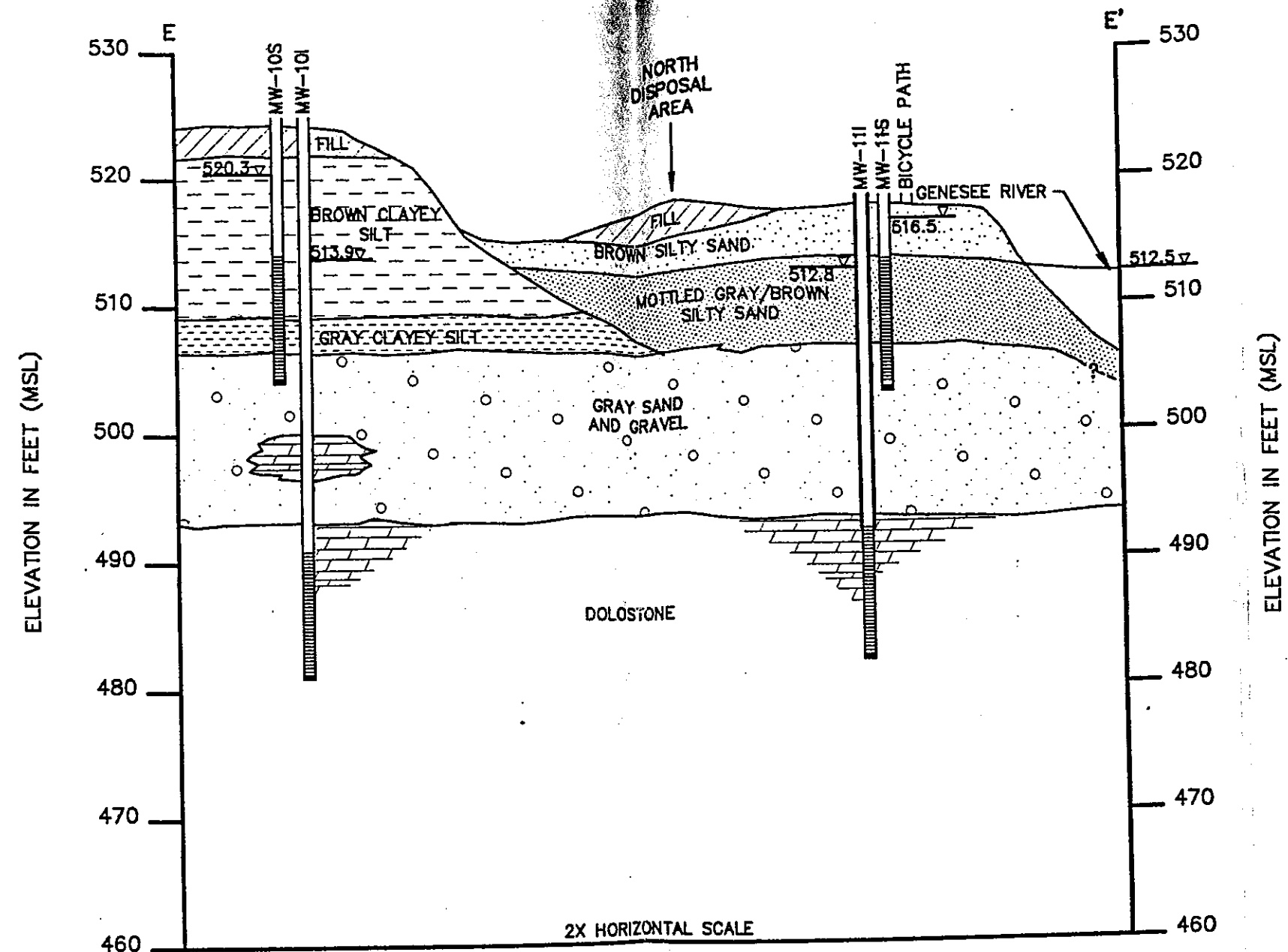
The composition of the fill material varies with location across the site. In the North Disposal Area, fill extends approximately 200 feet north of the fence separating the disposal

TABLE 5-4
ROCHESTER FIRE ACADEMY RIFFS
STRATIGRAPHIC SUMMARY

ALLUVIAL DEPOSITS										
WELL #	GROUND SURFACE ELEV	FILL MATERIAL		BROWN SILTY SAND	MOTTLED BROWN/ GRAY SILTY SAND	BROWN CLAYEY SILT	GRAY CLAYEY SILT	GRAY OR BROWN SAND and GRAVEL	BED ROCK	
		FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	FEET BELOW GRADE / TOP ELEV	
MW-6D	526.3	0 - 4.0 526.3	-	-	-	4.0 - 18.0 522.3	18.0 - 31.0 508.3	31.0 - 34.0 495.3	34.0 492.3	
MW-7D	517.3	0 - 0.3 517.3	0.3 - 4.0 517.0	4.0 - 10.0 513.0	-	-	-	10.0 - 30.2 505.2	30.2 487.1	
MW-8D	517.2	-	0 - 4.0 517.2	4.0 - 11.0 513.2	-	-	-	11.0 - 30.0 506.2	30.0 487.2	
MW-9I	526.5	0 - 6.0 526.5	-	-	6.0 - 19.0 520.5	-	-	19.0 - 38.1 (1) 507.5	38.1 488.5	
MW-10I	523.9	0 - 2.3 523.9	-	-	2.3 - 14.9 521.8	14.9 - 17.5 509.0	17.5 - 24.0 (2) 508.4	24.1 493.3	31.0 492.9	
MW-11I	517.4	-	0 - 4.0 517.4	4.0 - 10.7 513.4	-	-	10.7 - 24.1 508.7	24.0 494.8	24.1 493.3	
MW-12I	518.8	-	0 - 7.0 518.8	7.0 - 12.1 511.8	-	-	12.1 - 24.0 (3) 506.7	24.0 494.8	24.0 494.8	
MW-13S	519.4	0 - 1.0 519.4	-	-	1.0 - >16.0 518.4	-	-	-	-	
MW-14S	518.1	0 - 2.9 518.1	2.9 - 4.0 515.2	4.0 - 10.5 (4) 514.1	-	-	10.5 - >14.0 507.6	-	-	
MW-15S	517.7	-	0 - 4.0 517.7	4.0 - 11.4 513.7	-	-	11.4 - >14.0 508.3	-	-	
MW-16I	516.1	-	0 - 4.0 516.1	4.0 - 9.3 512.1	-	-	9.3 - 18.5 (5) 508.8	18.5 497.6	18.5 497.6	

NOTES:

- (1) Brown sand and gravel in MW-9I
 - (2) A bedrock boulder or shelf was encountered from 24.0-27.5 ft below grade in MW-10I, basal gravel was encountered from 27.5 to 31.0 ft below grade
 - (3) Brown sand and gravel from 14.4-18.3 ft and 22.0-24.0 ft in MW-12I
 - (4) Brown sand from 8.0-10.5 ft in MW-14S
 - (5) Brown sand and gravel from 12.7-18.5 ft in MW-16I
- All elevations are given in feet above mean sea level



LEGEND

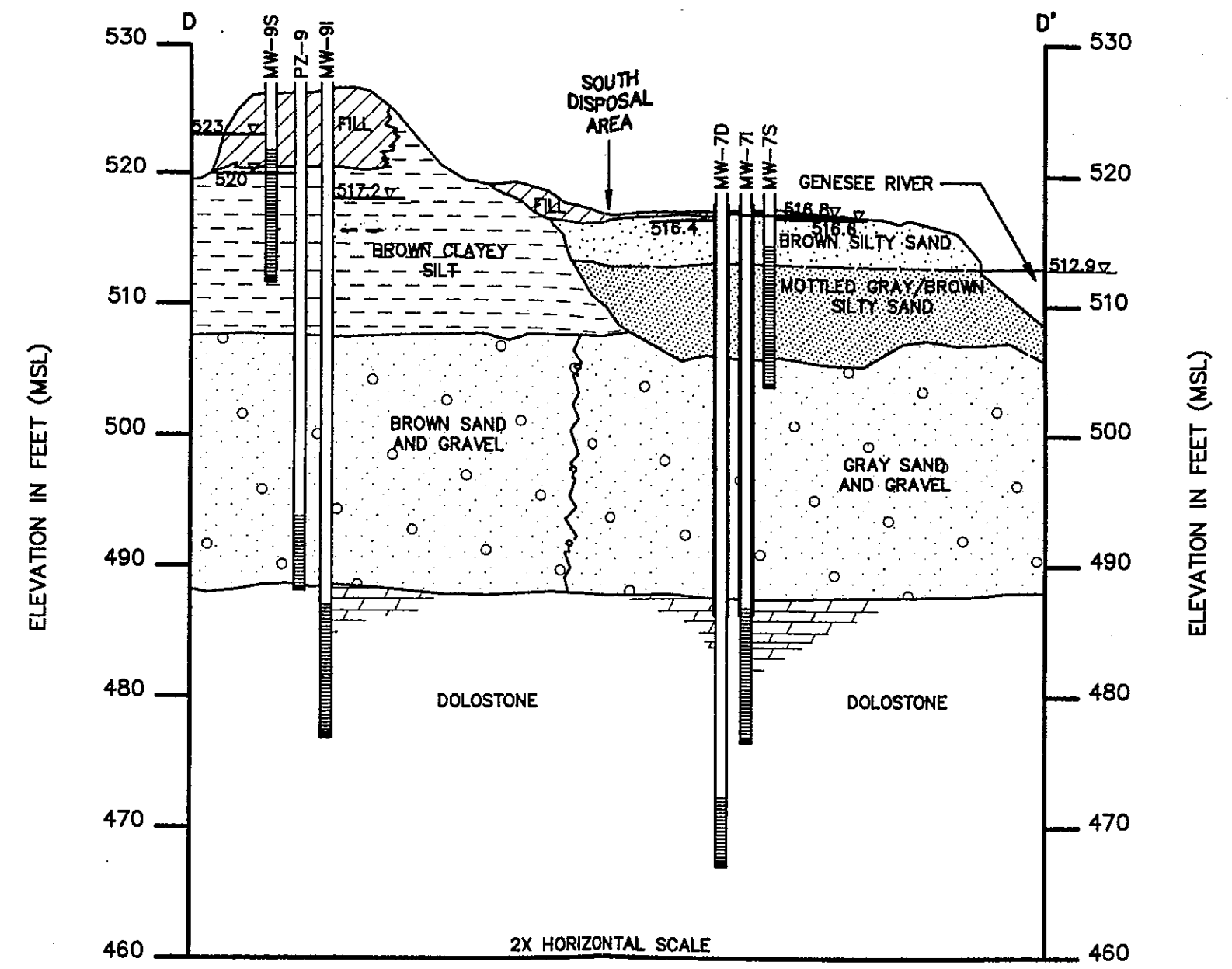
ALLUVIAL		FILL MATERIAL	MONITORING WELL NUMBER	 4" STEEL CASING LITHOLOGIC CONTACT SCREENED INTERVAL BOTTOM CAP AND/OR CUTTINGS/SAND
		BROWN SAND AND SILT		
		MOTTLED BROWN AND GRAY SILTY SAND		
		BROWN CLAYEY SILT		
		GRAY CLAYEY SILT		
BEDROCK		GRAY OR BROWN SAND AND GRAVEL		
		DOLOSTONE (LOCKPORT GROUP)		
- 518.7 ▽ GROUND WATER ELEVATION (5/21/90)



**MALCOLM
PIRNIE**

ROC-04-CEE

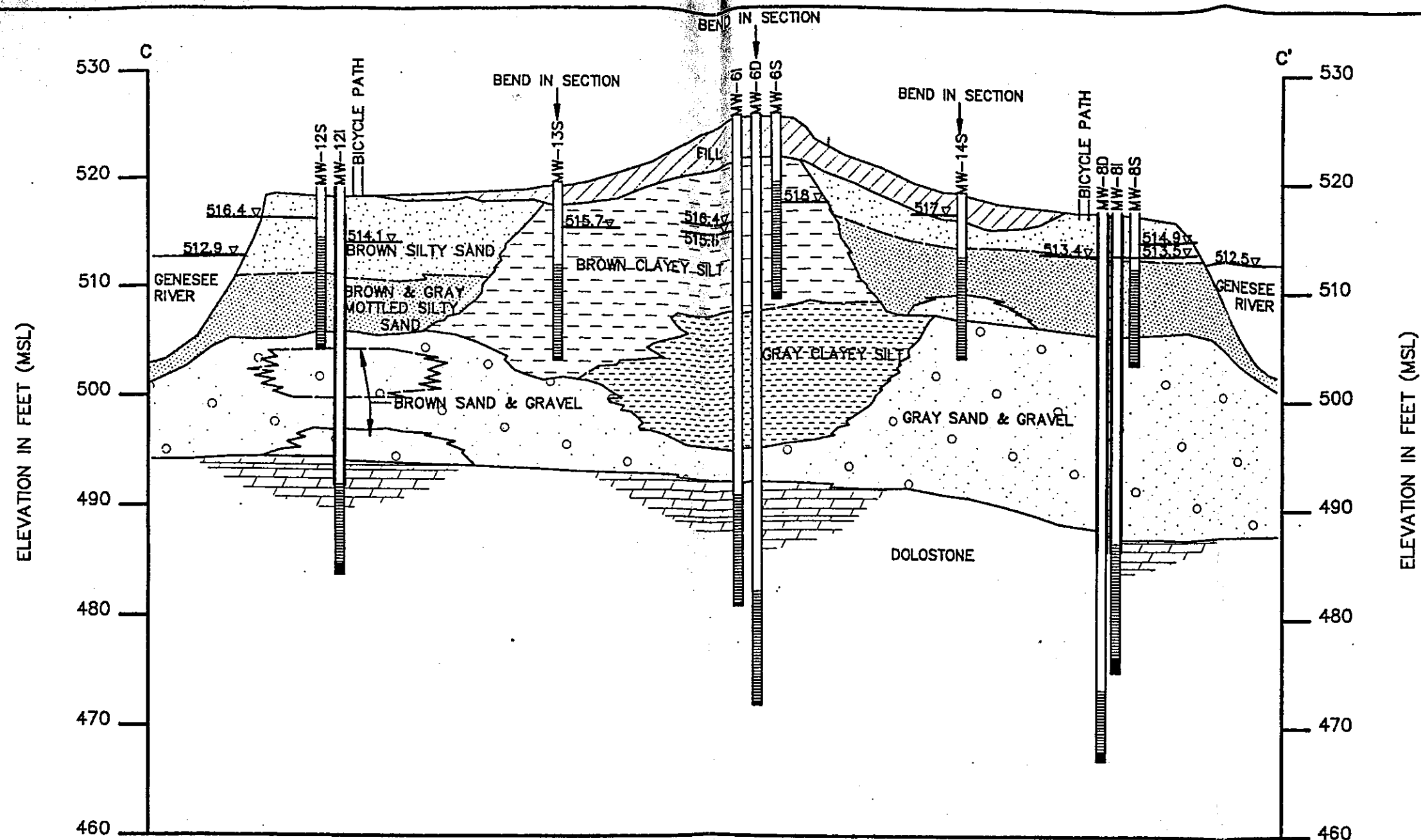
CITY OF ROCHESTER
REMEDIAL INVESTIGATIONS
CROSS SECTION E - E'
ROCHESTER FIRE ACADEMY MARCH 1991



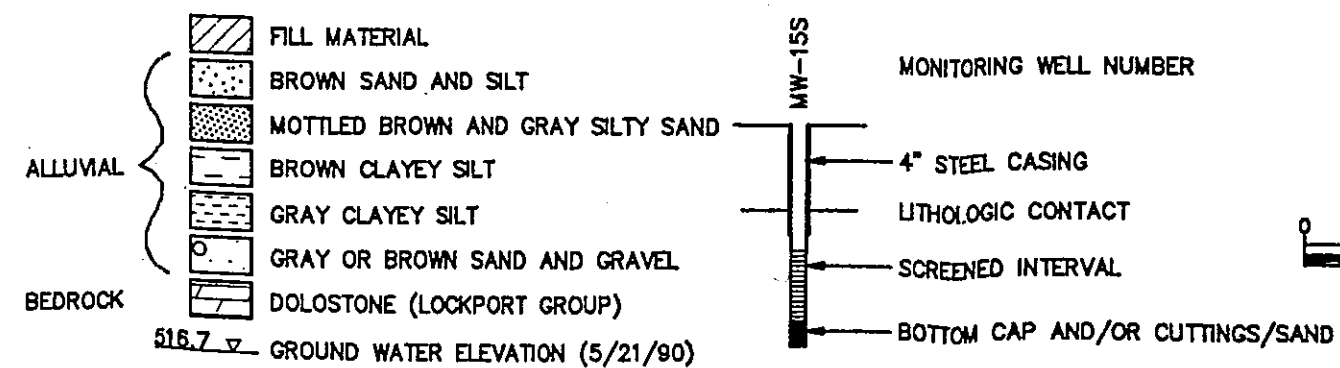
LEGEND

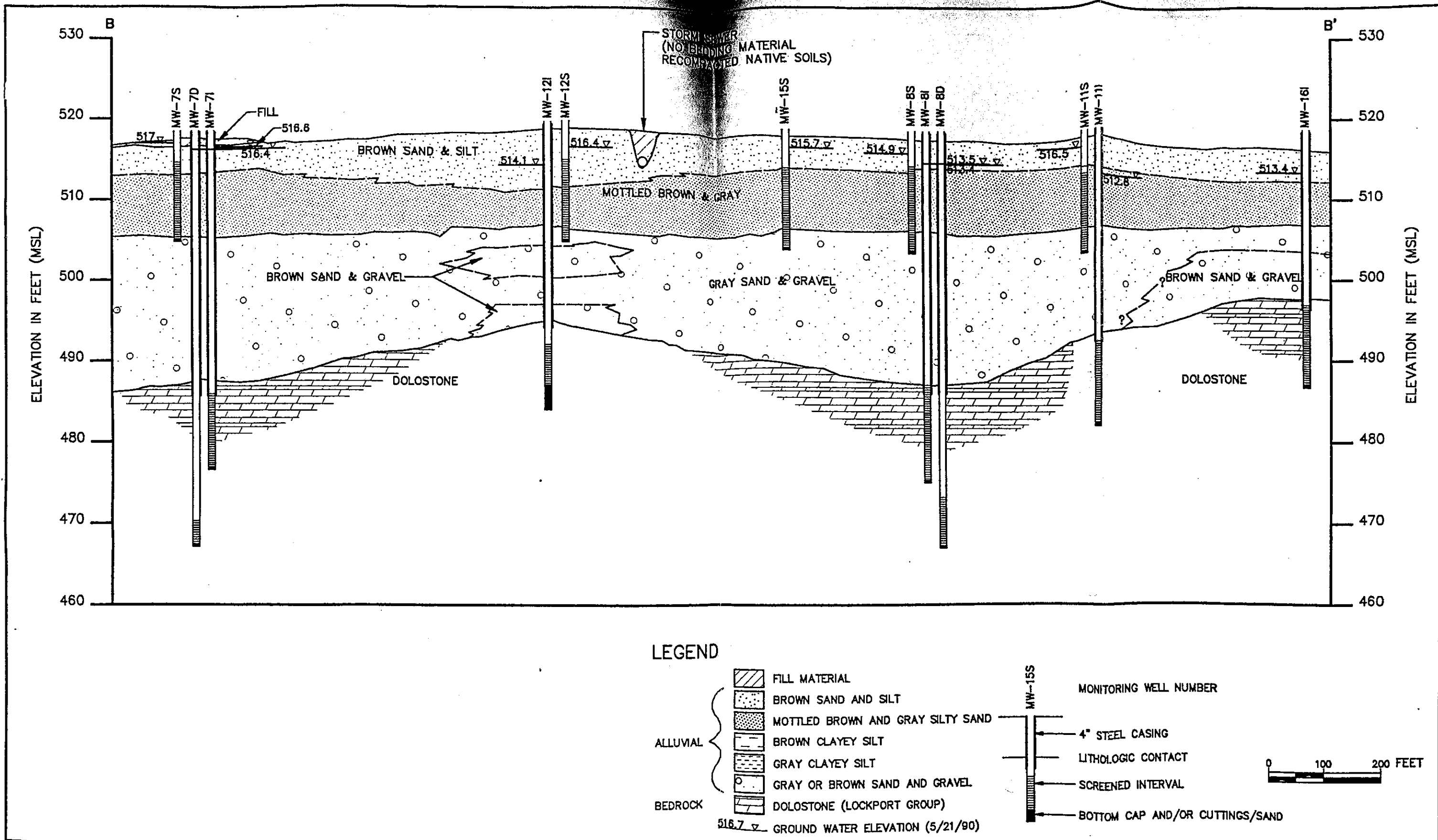
- FILL MATERIAL
 - BROWN SAND AND SILT
 - MOTTLED BROWN AND GRAY SILTY SAND
 - BROWN CLAYEY SILT
 - GRAY CLAYEY SILT
 - GRAY OR BROWN SAND AND GRAVEL
 - DOLOSTONE (LOCKPORT GROUP)
 - GROUND WATER ELEVATION (5/21/90)
- ALLUVIAL
- BEDROCK
- MONITORING WELL NUMBER
- 4" STEEL CASING
- LITHOLOGIC CONTACT
- SCREENED INTERVAL
- BOTTOM CAP AND/OR CUTTINGS/SAND





LEGEND

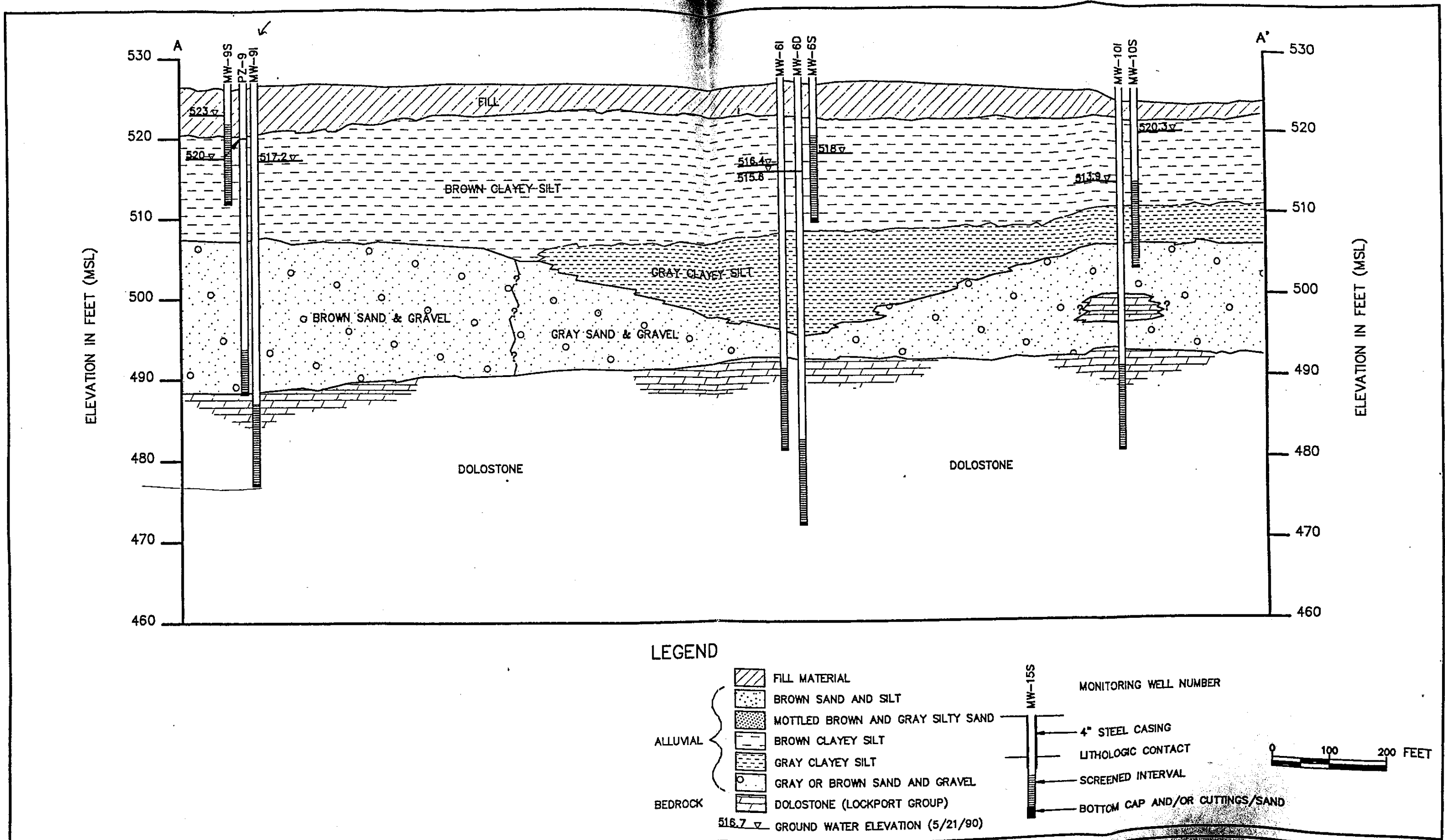




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CITY OF ROCHESTER
REMEDIAL INVESTIGATIONS
CROSS-SECTION B - B'
ROCHESTER FIRE ACADEMY MARCH 1991



area and Training Grounds. The fill generally consists of debris (bricks, glass, automotive parts), cinders and foundry sand (black silty-sand) placed directly above native soil. Drum fragments were also observed in this area. No fill was observed north of this area. Moisture conditions observed within the fill during the field investigation were generally dry to wet. Based upon soil boring and test pit excavation data, the thickness of the fill in this area ranges from 0-4 feet.

The fill in the Training Grounds Area consists of a 3-inch layer of coarse angular gravel overlying a dark gray to black silty fine to medium sand with some gravel. Moisture conditions vary from dry to moist. The thickness of the fill in this area varied from 0.3 feet (TP-8) to 2.9 feet (MW-14S).

In the South Disposal Area, the fill consists of reworked native soil from previous excavation and landfilling, and black sandy silt with ash and cinder-like material from prior burning practices. Some construction and debris fill is present in addition to drum and glass fragments, and a few laboratory reagent bottles. Based upon soil boring and test pit excavations, the thickness of the fill in this area ranges from 0 - 2.5 feet.

Along the western site boundary, the fill consists of railway ballast material consisting of black coarse sand and slag and clayey silt interbedded with cinder-like material associated with the former Genesee Valley Canal. The thickness of the fill in this area ranged from 4.0 feet (MW-10I) to 6.0 feet (MW-9I).

As shown in cross sections B-B', C-C' and D-D', fill was not encountered in the Genesee Valley Park Area east of the bicycle path.

5.3.2 Alluvial Deposits

Alluvium attributed to depositional activities of the Genesee River was encountered across the entire site. The depositional materials are bedded, and have been subdivided into several distinct units with differing grain size and color. These units include: brown silty sand; mottled brown/gray silty sand; brown on gray clayey silt; and gray or brown sand and gravel.

The alluvium ranges in thickness from 18.5 feet (MW-16I) to 32.1 feet (MW-9I). As shown in cross section C-C'; the brown sandy silt unit ranges from 7.0 feet (MW-12I) to 1.1 feet (MW-14S) and thins to extinction to the west, away from the river. The mottled

gray/brown silty sand unit was encountered in all of the eastern boreholes. Its thickness varies from 5.1 feet (MW-12I) to 7.4 feet (MW-15S).

Further to the west of the Genesee River (cross section A-A') the fill is underlain by alluvial overbank deposits (boreholes MW-6, MW-9, MW-10, and MW-13). These deposits consist of a brown or gray clayey silt. In boreholes MW-6 and MW-10, the brown clayey silt is underlain by gray clayey silt. Fine sand and silt layers are occasionally present in both of these units.

The color difference most likely represents oxidizing/reducing conditions (i.e., brown and gray to oxidizing and reducing environments, respectively). These differing conditions indicate that the gray unit most likely restricts the downward movement of ground water.

The brown clayey silt ranges in thickness from 12.6 (MW-10I) to greater than 15.0 feet (MW-13S). The gray clayey silt ranges in thickness from 2.6 feet (MW-10I) to 13 feet (MW-6D).

Gray or brown sand and gravel deposits directly overlie the bedrock across the entire site. In general, grain size coarsens downward within the unit. At several locations vegetative matter was observed. This unit ranges from 3.0 feet (MW-6D) to 20.2 feet (MW-7D) and averages 14.2 feet in thickness.

Table 5-5 presents the grain size analysis results for samples collected from the screened interval in the upgradient shallow wells and the piezometer. These results support visual observations made during field activities. Other soils testing results for these samples, including vertical permeability and Atterberg Limits, are also summarized in Table 5-5. The complete soil testing report is provided in Appendix C.6.

5.3.3 Bedrock

The bedrock beneath the site consists of a hard dark medium to coarse grained, laminated dolostone of the Middle Silurian Lockport Group. Stylolites and solution vugs (some mineralized with dolomite, gypsum and/or sphalerite crystals) are common. Some larger solution cavities occur in areas where dolomitized, weathered biostromes are present. The dolostone shows distinct fracturing along horizontal bedding planes. The frequency of fracturing decreases with depth.

TABLE 5-5
SUMMARY OF GRAIN SIZE ANALYSIS, ATTERBERG LIMITS AND VERTICAL PERMEABILITY

GRAINSIZE:

BOREHOLE NO.	SAMPLE DESCRIPTION	SAMPLE INTERVAL (ft.)	% GRAVEL	% SAND	% SILT	% CLAY
MW-6S	Brown Clayey Silt Brown Clayey Silt	4-10 10-16	0.0 1.3	15.7 11.2	58.8 53.6	25.5 33.9
MW-9S	Sandy Fill/Brown Clayey Silt	4-8	6.8	39.4	45.3	8.5
PZ-9	Gray Sand/Gravel	32-38	38.3	37.6	21.8	2.3
MW-10S	Gray Sand/Gravel	16-20	19.5	27.7	37.4	15.4

ATTERBERG LIMITS:

BOREHOLE NO.	SAMPLE DESCRIPTION	SAMPLE INTERVAL (ft.)	% GRAVEL	% SAND	% SILT	% CLAY	PLASTIC LIMIT%	LIQUID LIMIT%	PLASTICITY INDEX
MW-9S	Brown Clayey Silt	8-16	5.2	2.4	61.5	30.9	15	26	11
MW-10S	Brown Clayey Silt/ Gray Clayey Silt	8-16	0.0	1.4	83.4	15.2	18	21	3

NOTE (1): Insufficient sample quantity to test MW-6S

VERTICAL PERMEABILITY:

BOREHOLE NO.	SAMPLE DESCRIPTION	SAMPLE INTERVAL (ft.)	PERMEABILITY (cm/S)
MW-6S	Brown Clayey Silt Gray Sand/Gravel	12-14 32-34	4.2 x 10 ⁻⁸ Non-cohesive sample; unable to test
MW-9S	Brown Clayey Silt	12-14	2.0 x 10 ⁻⁷

The bedrock unit was encountered at depths ranging from 38.1 (MW-9I) to 18.5 (MW-16I) feet below ground surface. Based upon the physical features described, the bedrock is probably the Oak Orchard Formation of the Lockport Group. The younger Vernon Shale or Pittsford Shale was not encountered during the Remedial Investigation. The Lockport Group/Vernon Shale contact is believed to be further south of the site. The total thickness of the Lockport Formation in this area is approximately 170 feet (Zenger, 1965). Beneath the Lockport Group lies the Gates Limestone member of the Rochester Shale.

The upper surface of the bedrock is slightly undulated but generally rises toward the northeast (Figure 5-9). In the MW-10I borehole, rock was initially contacted at 24.0 feet below ground surface. The borehole was subsequently cored to a depth of 27.5 feet where gravel was encountered. Bedrock coring resumed at 31.0 feet below ground surface. The sequence of rock-gravel-rock can be interpreted as a boulder outlier overlying basal gravel, a bedrock bench eroded by prior fluvial events, or a gravel filled solution channel.

5.4 SITE HYDROGEOLOGY

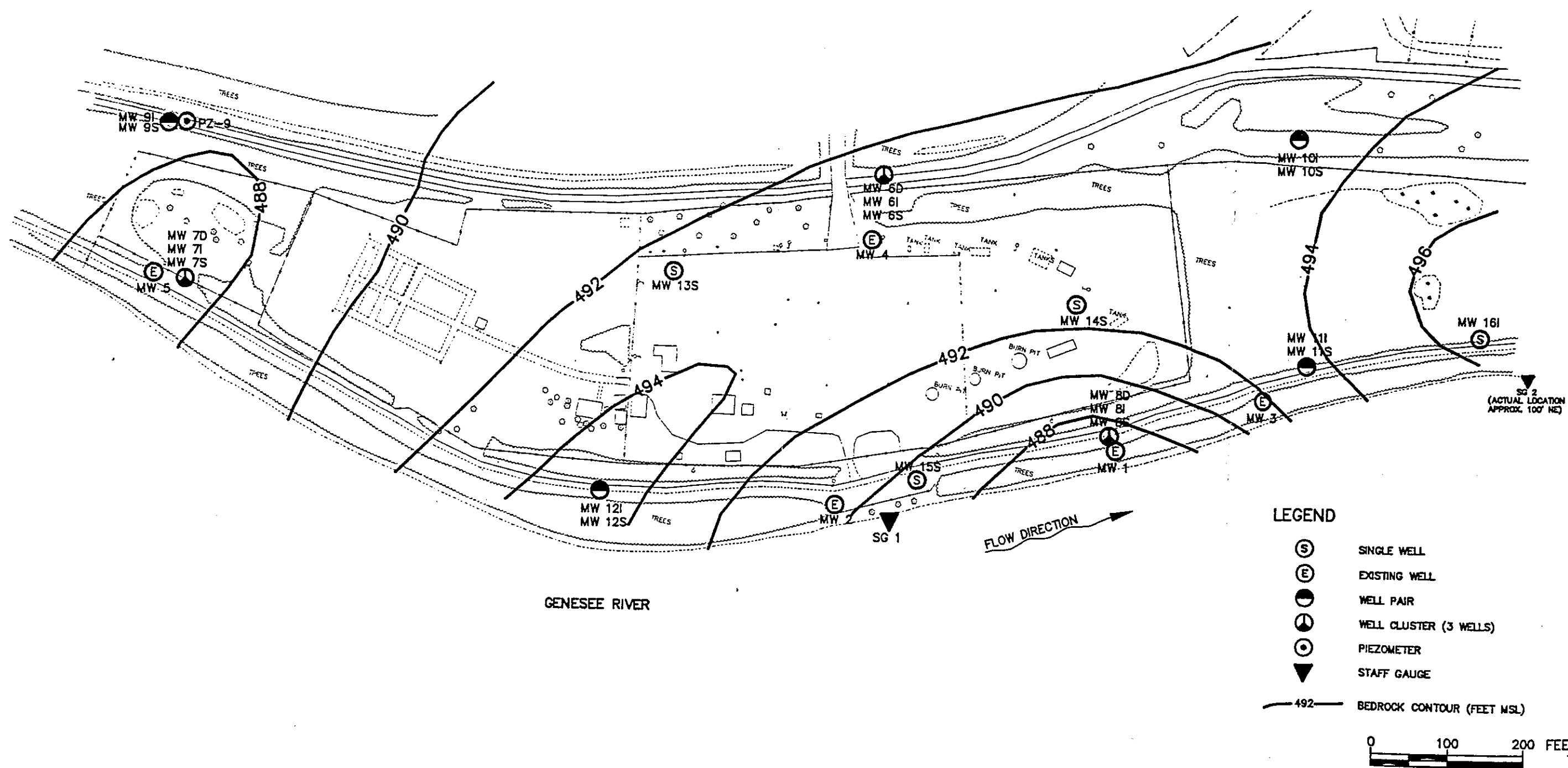
5.4.1 Hydrostratigraphic Units

Hydrostratigraphic units are sequences of geologic materials that possess similar hydrogeologic properties including hydraulic conductivity, storage and porosity. The hydrostratigraphy of the site, as derived from an assessment of hydraulic properties of the geologic units previously described, is illustrated in Table 5-6. The two major hydrostratigraphic units are:

- an overburden water-bearing zone consisting of fill material, and alluvium;
- a bedrock aquifer.

The overburden water-bearing zone varies in saturated thickness from about 21.5 to 34.5 feet. The unit thickness increases near the southwestern site boundary. An isopach map of this unit, based upon the first round of ground water sampling (May 1990), is presented in Figure 5-10.

The bedrock aquifer which directly underlies the shallow water-bearing zone is comprised of dolostone bedrock of the Lockport Group. Based upon the reported thickness



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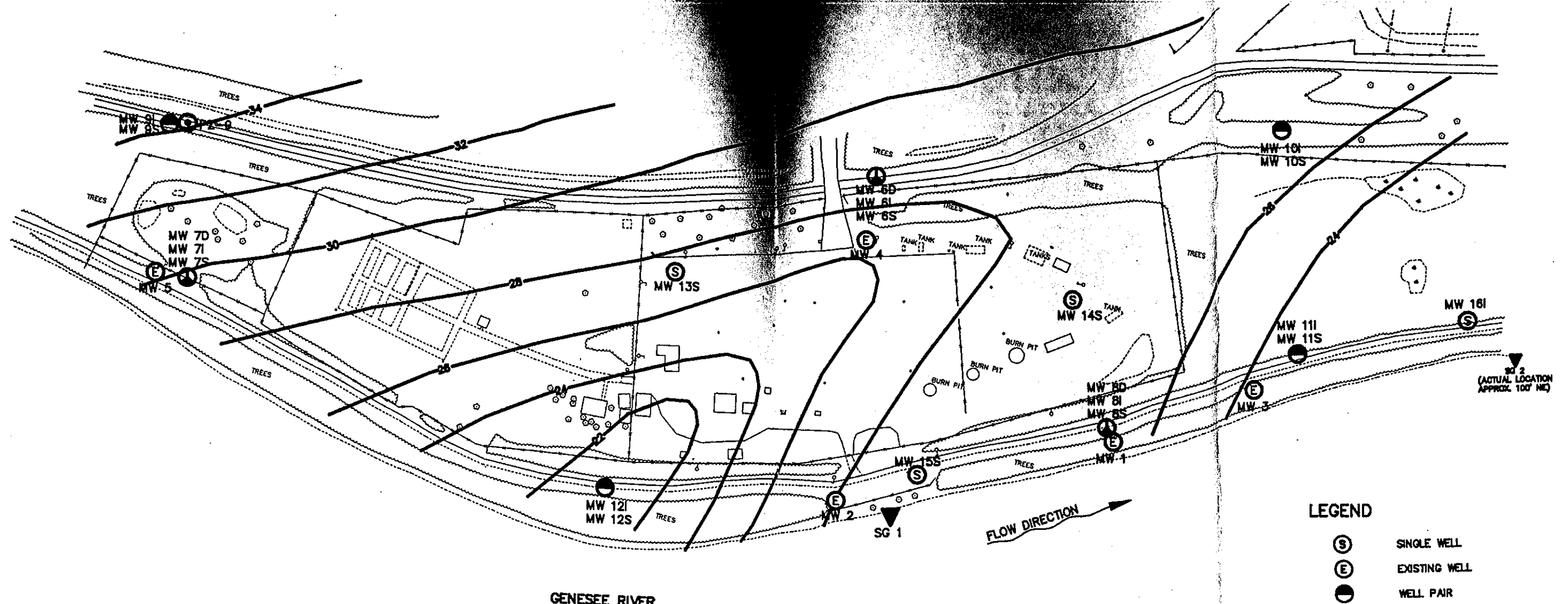
ROC-04-F49

ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
TOP OF BEDROCK CONTOUR MAP
CITY OF ROCHESTER MARCH 1991

TABLE 5-6
ROCHESTER FIRE ACADEMY R/F/S
CORRELATION OF GEOLOGIC AND HYDROGEOLOGIC UNITS

GEOLOGIC UNIT	HYDROGEOLOGIC UNIT
FILL SILT, SAND, GRAVEL, C&D DEBRIS, ASH and CINDERS	OVERBURDEN WATER-BEARING SEMI-CONFINING LAYER
ALLUVIAL DEPOSITS BROWN SILTY SAND MOTTLED BROWN AND GRAY SILTY SAND BROWN CLAYEY SILT GRAY CLAYEY SILT GRAY OR BROWN SILTY SAND AND GRAVEL	
BEDROCK DOLOSTONE	BEDROCK AQUIFER

FIGURE 5-10



of this unit (Zenger, 1965), the saturated thickness of this aquifer is approximately 150 to 170 feet although aquifer potential is probably restricted to the upper 10 to 20 feet of the unit.

5.4.2 Overburden Water-Bearing Zone

The overburden water-bearing zone at the Fire Academy site occurs within some areas of the fill material and within the alluvial deposits. Ground water in this zone occurs under unconfined (water table) conditions. In the western portion of the site, the gray clayey silt restricts vertical flow and may be considered a semi-confining unit. Figure 5-11 shows the approximate extent of the gray clayey silt which acts as a semi-confining unit.

During the first round of ground water sampling, May 1990, the average depth to this zone was 2.1 feet below ground surface. During the second round of ground water sampling, August 1990, the average depth to this zone was 5.7 feet below ground surface. Hydraulic head distribution within this zone for the two sampling events are depicted in isopotential maps presented as Figures 5-12 and 5-13. Shallow ground water movement at the site is to the east towards the Genesee River in the direction of decreasing hydraulic head. Recharge to the water-bearing zone occurs principally through the infiltration of precipitation. Additionally, recharge occurs from the ponded water in the former Genesee Valley Canal located along the western site boundary.

Horizontal hydraulic gradients for the overburden water-bearing zone are generally low for all areas of the site and are reflective of the low topographic relief at the site. A summary of the horizontal hydraulic gradient across the site is presented in Table 5-7. As indicated in Table 5-7, horizontal hydraulic gradients were greater during the May 1990 sampling even than the August 1990 event. This increase is primarily attributable to greater precipitation volume in the spring relative to the late summer of the study period.

Vertical hydraulic gradients measured in monitoring well couplets triplets and are presented in Table 5-8. During the May 1990 sampling event, hydraulic gradients were vertically downward between the shallow water-bearing zone and the bedrock aquifer. The vertical gradients were less in wells closest to the Genesee River compared with wells located further away from the Genesee River. During the August 1990 sampling event period, hydraulic gradients were vertically downward between the shallow water-bearing

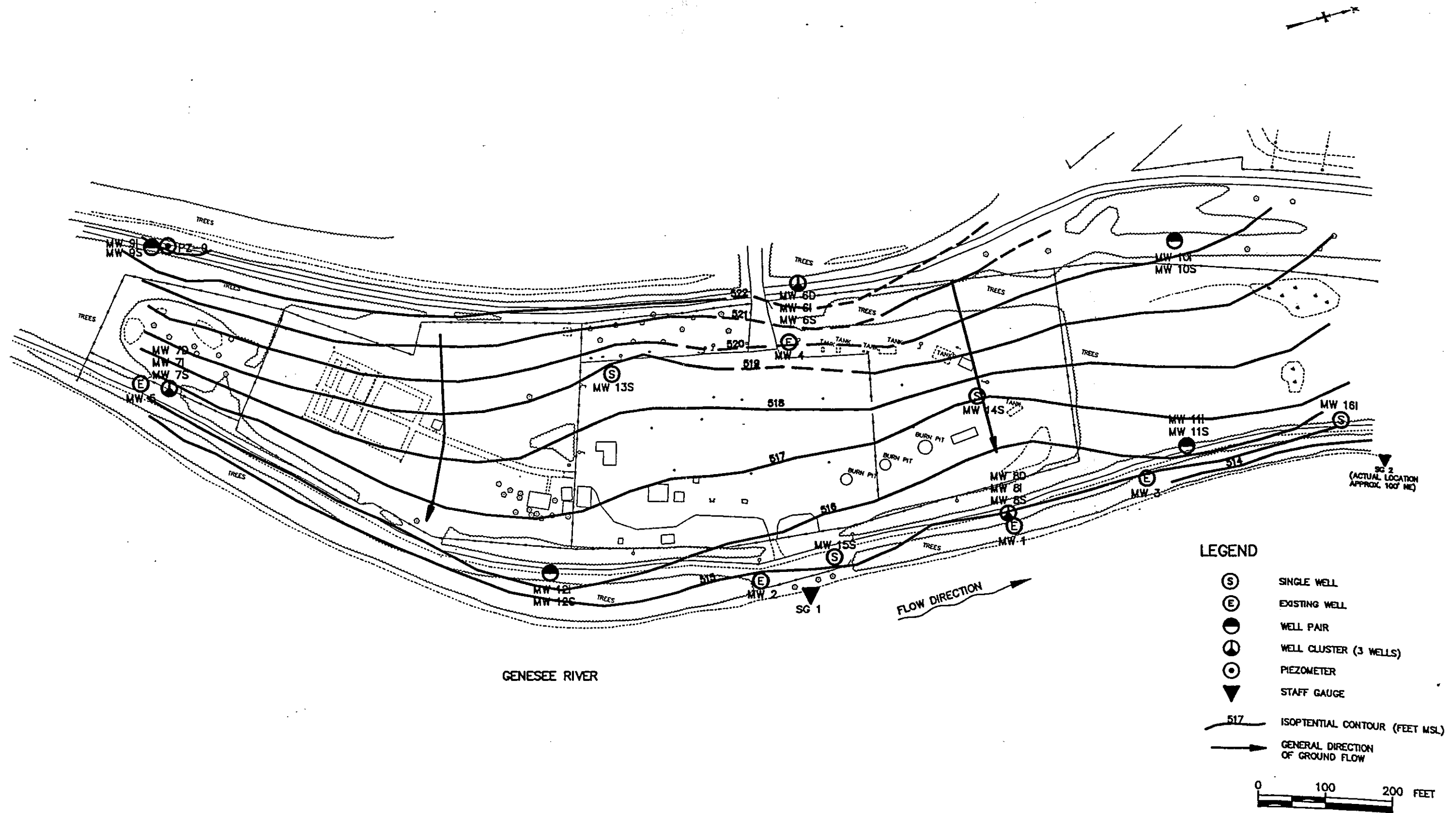


TABLE 5-10
ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF HYDROGEOLOGY

HYDROSTRATIGRAPHIC UNIT	GEOLOGIC UNIT(S)	PHYSICAL PROPERTIES			GROUND WATER FLOW PROPERTIES		
		SATURATED THICKNESS (2) (ft)	HYDRAULIC CONDUCTIVITY (cm/s)	EFFECTIVE POROSITY (4)	PRINCIPAL FLOW DIRECTION	HORIZONTAL GRADIENT (2) (ft/ft)	FLOW VELOCITY (3) (ft/day)
OVERBURDEN WATER-BEARING ZONE	SOUTH DISPOSAL TRAINING GROUNDS NORTH DISPOSAL						
BEDROCK AQUIFER	SOUTH DISPOSAL TRAINING GROUNDS NORTH DISPOSAL						
UPPER (0-10 ft)	SOUTH DISPOSAL TRAINING GROUNDS NORTH DISPOSAL						
LOWER (10-20 ft)	SOUTH DISPOSAL TRAINING GROUNDS NORTH DISPOSAL						

NOTES:

- (1) Most bedrock flow through upper 20 feet of fractured rock.
- (2) Ground water level data from 5/21/90
- (3) Flow velocities for the lower portion of the overburden water-bearing zone are expected to be higher than the reported values.
- (4) Porosity values are estimated from a range of values provided in the geologic literature (Freeze and Cherry, 1979 and Fetter, 1980). Bedrock porosity values are fracture porosity values. Average excludes MW-6S

TABLE 5-7
ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF HORIZONTAL HYDRAULIC GRADIENTS

HYDROSTRATIGRAPHIC UNIT	AREA	MONITORING WELLS	5/21/90 (1) GRADIENT (ft/ft)	8/27/90 (1) GRADIENT (ft/ft)
<u>OVERBURDEN WATER-BEARING ZONE</u>	SOUTH DISPOSAL	9S/7S	0.023	0.019
		13S/15S	0.006	0.003
	TRAINING GROUNDS	4/15S	0.008	0.002
		6S/15S	(2) 0.016	0.004
<u>BEDROCK AQUIFER (3)</u>	NORTH DISPOSAL	10S/11S	0.012	0.018
	SOUTH DISPOSAL TRAINING GROUNDS NORTH DISPOSAL	9I/7I 6I/8I 10I/11I	0.003 0.006 0.004	0.001 0.003 0.002
		6D/8D	0.005	0.001
<u>DEEPER BEDROCK (10-20 ft)</u>				

NOTES:

- (1) Ground water monitoring date
- (2) MW-6S was not fully recovered. Water level was estimated at 522.7 ft based on nearby wells and the Genesee Canal.
- (3) Shallow bedrock zone includes wells screened in the upper 10 feet of rock.
Deeper bedrock zone includes wells screened from 10 to 20 feet below the top of rock.

TABLE 5-8
ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF VERTICAL HYDRAULIC GRADIENTS

HYDROSTRATIGRAPHIC UNIT	MONITORING WELLS	5/21/90 (1) GRADIENT (ft/ft)	8/27/90 (1) GRADIENT (ft/ft)
Upper/Lower Overburden Water-Bearing Zone	PZ-9/9S	-0.129	-0.069
Lower Overburden Water-Bearing Zone/ Shallow Bedrock	PZ-9/9I	-0.246	-0.126
Overburden Water-Bearing Zone/ Shallow Bedrock	6S/6I 7S/7I 8S/8I 9S/9I 10S/10I 11S/11I 12S/12I	* -0.161 -0.015 -0.054 -0.169 -0.278 -0.180 -0.128	-0.032 +0.022 +0.036 -0.126 -0.115 +0.106 +0.012
Shallow Bedrock/Deeper Bedrock	6I/6D 7I/7D 8I/8D	-0.089 -0.014 -0.001	-0.104 0.0 +0.113

NOTES:

(1) Ground water monitoring date

'-' Negative sign indicates downward vertical gradient.

+' Positive sign indicates upward vertical gradient.

* MW-6S not fully recovered. Water level was estimated at 522.7 ft based on water levels in nearby wells and the Genesee Canal.

zone and the bedrock aquifer in wells removed from the river and upward in wells closest to the Genesee River.

Ground water flow rates for the overburden water-bearing zone were determined for the site using in-situ hydraulic conductivity testing data described in Section 5.1.4. The hydraulic conductivity testing results are summarized in Table 5-9 and the supporting data is presented in Appendix C.5.2. Hydraulic conductivity values ranged from 1.9×10^{-8} cm/s (MW-6S) to 2.7×10^{-3} cm/s (MW-9S). The lower limit of this range was several orders of magnitude lower than other values for this zone. It is believed that smearing of the borehole wall occurred at MW-6S during borehole drilling of the clayey silt material creating a low permeability "skin" around the screened portion of the borehole. The "skin" effect was not diminished during well development. The average hydraulic conductivity value for the shallow wells screened in the overburden water-bearing zone, excluding the value obtained from MW-6S, is 5.0×10^{-4} cm/s.

A hydraulic conductivity value of 3.2×10^{-3} cm/s was obtained for the piezometer (PZ-9) screened in the lower portion of this zone. This higher hydraulic conductivity value reflects the increase in permeability due to the coarser grain size associated with the sand and gravel deposits.

Ground water flow rates for the overburden water-bearing zone for different areas of the site were calculated using the horizontal gradients (from the May 1990 sampling period) and hydraulic conductivity values determined for the site. Effective porosity values used in the velocity calculations were selected from a range of values presented in the hydrogeologic literature for each of the geologic materials described (Freeze and Cherry, 1979). These flow rates, in addition to other ground water flow properties and physical properties of the overburden water-bearing zone, are summarized in Table 5-10.

5.4.3 Bedrock Aquifer

The upper portion of the bedrock beneath the site (Lockport Group) is water-bearing. Bedding-plane fractures, vertical fractures and solution voids are the principal water-bearing openings within the dolostone bedrock. The average depth to this aquifer is 28.7 feet below the ground surface. Ground water flow conditions during the May and August sampling periods within the upper weathered portion of the bedrock are shown in isopotential maps in Figures 5-14 through 5-17. Figures 5-14 and 5-15 present hydraulic head distribution in

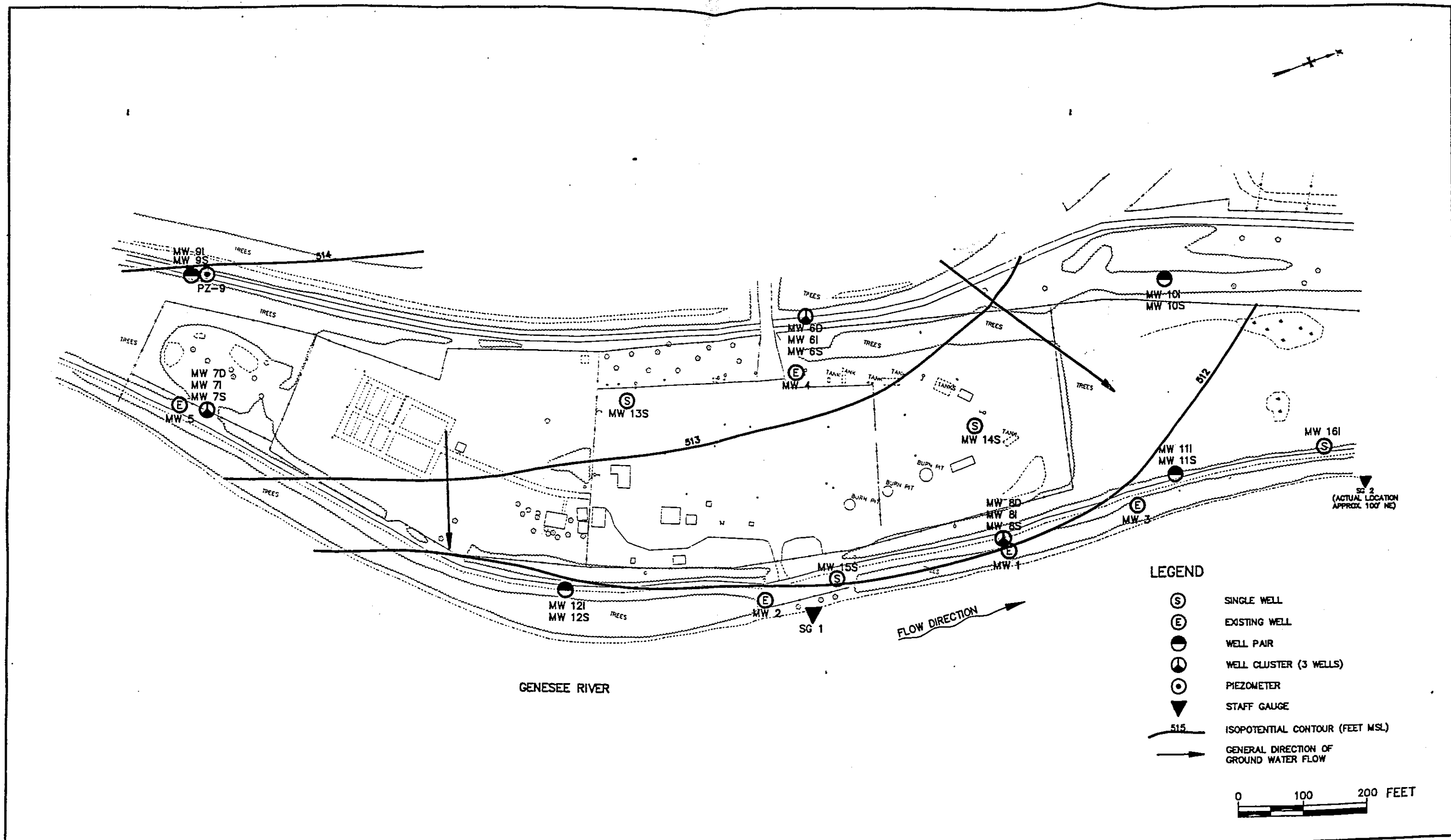
TABLE 5-9
ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF HYDRAULIC CONDUCTIVITY

WELL #	MATERIAL SCREENED	SOIL TESTING RESULTS (cm/s)	PACKER TEST RESULTS (cm/s)
MW-6S	Brown Clayey Silt	1.9E-08	
MW-6I	Shallow Bedrock	3.4E-02	> 8.8E-04
MW-6D	Deeper Bedrock	3.7E-03	2.1E-05
MW-7S	Mottled Brown/Gray Sand	1.2E-04	
MW-7I	Shallow Bedrock	1.4E-02	(1)
MW-7D	Deeper Bedrock	3.3E-03	6.5E-04
MW-8S	Mottled Brown/Gray Sand	9.5E-04	
MW-8I	Shallow Bedrock	1.4E-02	> 1.2E-03
MW-8D	Deeper Bedrock	2.1E-03	9.2E-05
PZ-9	Brown Sand and Gravel	3.2E-03	
MW-9S	Brown Clayey Silt	2.7E-03	
MW-9I	Shallow Bedrock	4.1E-02	
MW-10S	Mottled Brown/Gray Silt	9.0E-05	
MW-10I	Shallow Bedrock	1.4E-02	
MW-11S	Mottled Brown/Gray Silt	8.2E-05	
MW-11I	Shallow Bedrock	2.1E-02	
MW-12S	Mottled Brown/Gray Silt	1.8E-04	
MW-12I	Shallow Bedrock	9.2E-03	
MW-13S	Brown Clayey Silt	2.9E-05	
MW-14S	Mottled Brown/Gray Sand	3.1E-04	
MW-15S	Mottled Brown/Gray Sand	7.6E-05	
MW-16I	Shallow Bedrock	2.1E-02	

STATISTICS	Mean	Std Dev	Min	Max	
	(cm/s)	(cm/s)	(cm/s)	(cm/s)	# of Wells
'S' series wells (shallow overburden) (2)	5.0E-04	8.4E-04	1.9E-08	2.7E-03	9
'PZ' piezometer (deep overburden)	3.2E-03	-	3.2E-03	3.2E-03	1
'I' series wells (upper bedrock)	2.1E-02	1.1E-02	9.2E-03	4.1E-02	8
'D' series wells (deeper bedrock)	3.0E-03	8.3E-04	2.1E-03	3.7E-03	3

(1) Not tested due to borehole collapse

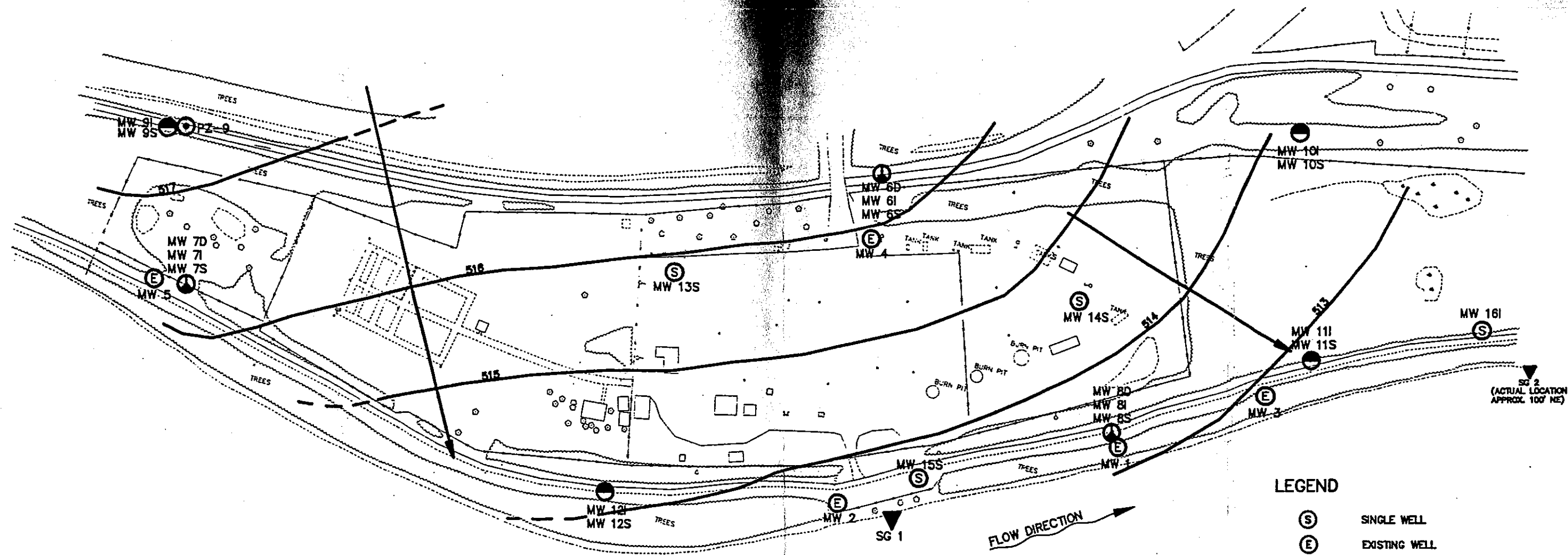
(2) Mean value excludes MW-6S



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ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
ISOPOTENTIAL MAP FOR THE UPPER PORTION
OF THE BEDROCK AQUIFER - INTERMEDIATE WELLS
(8/27/90)
CITY OF ROCHESTER MARCH 1991



LEGEND

- (S) SINGLE WELL
 - (E) EXISTING WELL
 - (●) WELL PAIR
 - (▲) WELL CLUSTER (3 WELLS)
 - (○) PIEZOMETER
 - (▽) STAFF GAUGE
 - 515 ISOPOTENTIAL CONTOUR (FEET MSL)
 - GENERAL DIRECTION OF GROUND WATER FLOW
- 0 100 200 FEET

**MALCOLM
PIRNIE**

ROC-04-AIW

ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
ISOPOTENTIAL MAP FOR THE UPPER PORTION
OF THE BEDROCK AQUIFER - INTERMEDIATE WELLS
(5/21/90)
CITY OF ROCHESTER MARCH 1991

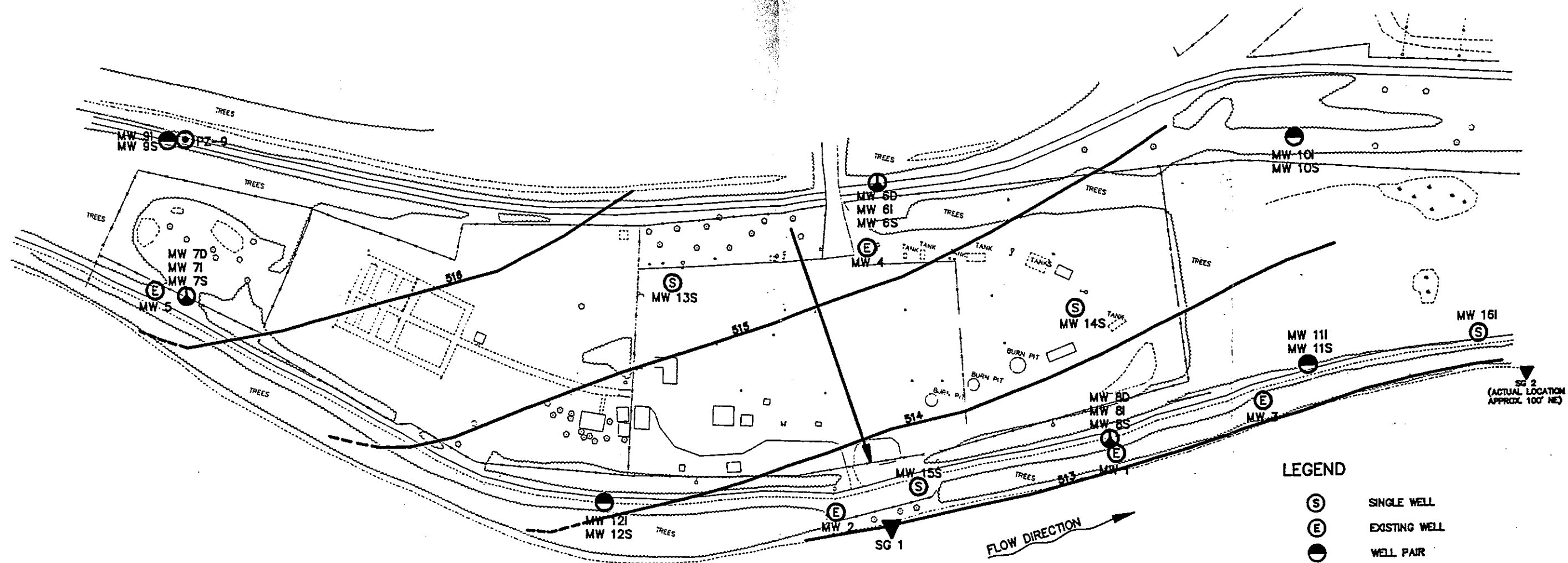
ground water and flow directions for the May 1990 and August 1990 sampling events, in the upper 10-feet of the bedrock where the occurrence of water-bearing openings are most frequent. Figures 5-16 and 5-17 show hydraulic head distribution and flow directions for the same sampling events at a slightly deeper depth within the aquifer where the presence of water bearing openings are less frequent (10 to 20 feet below the top of the aquifer) . The general direction of ground water flow in the upper portion of the bedrock aquifer during both sampling periods was northeast.

Horizontal hydraulic gradients for the bedrock aquifer, as determined from monitoring well data, are summarized in Table 5-7. Horizontal hydraulic gradients in the bedrock aquifer are generally low and are consistent across the site. Vertical hydraulic gradients within the bedrock aquifer near the Genesee River vary from downward under high water level conditions (May 1990) to upward following water levels decline (August 1990). As suggested by the upward vertical gradients in the bedrock, the bedrock aquifer is discharging to the Genesee River. These vertical gradients are summarized in Table 5-8.

Ground water flow rates in the bedrock aquifer were determined using the horizontal hydraulic gradients calculated for the May 1990 sampling period and hydraulic conductivity data presented in Tables 5-7 and 5-9, respectively. Porosity values used in the velocity calculations are secondary porosity values selected from the midpoint of a range of values presented in the literature for carbonate rocks (Freeze and Cherry, 1979). Porosity values are variable and are dependent upon fracture properties. Therefore, calculated horizontal flow velocities are only approximate values. The calculated flow rates are presented in Table 5-10. The greater flow velocity in the South Disposal Area is primarily due to a steeper hydraulic gradient.

5.4.4 Summary of Hydrogeologic Properties of the Hydrostratigraphic Units

1. The overburden water-bearing zone consists of fill material and alluvial deposits.
2. The general direction of ground water flow within the overburden water-bearing zone is east toward the Genesee River.
3. Ground water in the overburden water-bearing zone discharges to the Genesee River as well as recharges the bedrock aquifer during seasonally high water levels.



LEGEND

- (S) SINGLE WELL
- (E) EXISTING WELL
- WELL PAIR
- ⊙ WELL CLUSTER (3 WELLS)
- ⊕ PIEZOMETER
- ▼ STAFF GAUGE
- 514 ISOPOTENTIAL CONTOUR (FEET MSL)
- GENERAL DIRECTION OF GROUND WATER FLOW

0 100 200 FEET

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ROC-04-ADW

ROCHESTER FIRE ACADEMY
REMEDIAL INVESTIGATIONS
ISOPOTENTIAL MAP FOR THE BEDROCK
AQUIFER - DEEP WELLS (5/21/90)

CITY OF ROCHESTER

MARCH 1991

4. Horizontal flow velocities within the overburden water-bearing zone are 0.46, 0.06 and 0.02 ft/day for the South Disposal Area, Training Grounds Area, and the North Disposal Area, respectively. The relatively greater flow velocity in the South Disposal Area is attributable to the higher hydraulic gradient in this area.
5. The bedrock aquifer consists of dolostone bedrock of the Lockport Group. The occurrence of ground water is primarily in bedding plane fractures and interconnected solution voids.
6. The frequency of water-bearing openings in the bedrock decreases with depth.
7. The general direction of ground water flow within the bedrock aquifer is to the northeast.
8. Horizontal flow velocities within the extreme upper portion of the bedrock aquifer ranges from 4.3 to 6.5 ft/day. Flow velocities decrease at depth within the bedrock aquifer.
9. The bedrock aquifer discharges to the Genesee River.

A summary of hydrogeologic properties and the hydrostratigraphic units is presented in Table 5-10.

Section 7.0

Site Contamination Characterization

7.0 SITE CONTAMINATION CHARACTERIZATION

7.1 RI SAMPLING AND ANALYSIS PROGRAM

The characterization of site contamination was accomplished by analysis of soil, sediment, surface water, and ground water samples. Samples were collected during the period of April - October 1990. Documentation of the sampling procedures and rationale has been presented in the RI Work Plan dated June 1988, in the Preliminary Survey report dated February 1990 and in the chronology of work scope modifications in Appendix B.1.

All final soil sampling locations and water monitoring well locations were determined on the basis of preliminary non-intrusive surveys (radiological, electromagnetic (EM) terrain conductivity, and soil gas surveys) conducted in November 1989. The preliminary surveys were performed on a surveyed grid established across the site. Sampling locations were selected at locations of discrete survey anomalies, which indicated a possibility of contaminated soil or fill. No radiologic survey anomalies were identified; therefore, final sampling locations were selected on the basis of the EM and soil gas surveys alone. Grid coordinates of survey anomalies are presented in Table 4-1.

Samples collected for the Rochester Fire Academy RI were analyzed for the parameters listed in Table 7-1. Sampling events are categorized as Rounds 1, 2, or 3 based on the analytical protocols and parameter list that were established for each sampling event by agreement with NYSDEC. As shown in Table 7-1, all environmental samples collected during Round 1 were analyzed for parameters included on the 1987 New York State Contract Laboratory Protocol Target Compound List. Analytical parameters that were detected at elevated concentrations during Round 1 sampling were selected as parameters of interest and analyzed for in Round 2 samples. Analytical methods for Round 2 were modified from Round 1 to obtain a lower detection limit (by GC methods) for the parameters of interest. Round 3 was conducted at the request of NYSDEC to confirm specific analytical results obtained during Round 1 and Round 2.

Analysis of the samples collected during the RI program was performed by the following laboratories (see Table 7-1):

TABLE 7-1

ROCHESTER FIRE ACADEMY
ANALYTICAL METHODS AND PARAMETERS

Sampling Round	Parameters	Methodology	Laboratory ⁽⁵⁾
Round 1	TCL Volatile Organics	NYS CLP	GTC
	TCL Semi-Volatile Organics	NYS CLP	GTC
	TCL Pesticides/PCBs	NYS CLP	GTC
	TCL Metals	NYS CLP	E ₃ I
	2,3,7,8 TCDD (Dioxin)	⁽²⁾	CCI
	Remediation Assessment Parameters	⁽¹⁾	TOX
Round 2	Halogenated Volatile Organics	8010 ⁽³⁾	GTC
	Aromatic Volatile Organics	8020 ⁽³⁾	GTC
	PCBs	8080 ⁽³⁾	GTC
	Acid Extractable Organics	8270 ⁽³⁾	GTC
	Select Total Metals	⁽⁴⁾	E ₃ I
	Remediation Assessment Parameters	⁽¹⁾	TOX

(continued)

TABLE 7-1

**ROCHESTER FIRE ACADEMY
ANALYTICAL METHODS AND PARAMETERS**

Sampling Round	Parameters	Methodology	Laboratory ⁽⁵⁾
Round 3	TCL Volatile Organics	NYS CLP	GTC
	TCL Semi-Volatile Organics	NYS CLP	GTC
	TCL PCBs	NYS CLP	GTC

NOTES:

NYS-CLP: 1987 New York State Contract Laboratory Protocols

TCL: NYS-CLP Target Compound List

- (1) Ground water samples only analyzed for alkalinity, bicarbonate, hardness, TKN, NH₃, phosphate, SO₄, sulfide, COD, TOC, Oil and Grease, TDS, pH, and specific conductivity in accordance with Methods of Chemical Analysis for Water and Wastes. USEPA, Cincinnati, Ohio, EPA 600/4-79-020, Revised March 1983.
- (2) Method presented in laboratory report. Only soil sample nos. SS-6, SS-7, SS-10, SS-12, MW-15S and BKGD were analyzed for Dioxin.
- (3) From Test Methods for Evaluation of Solid Waste USEPA-OSWER SW-846, Third Edition, Nov. 1986.
- (4) SW-846 Protocol using ICP or AA.
- (5) GTC - General Testing Corp. E₃I - Energy & Environmental Engineering, Inc.
TOX - Toxikon, Inc. CCI - Compuchem, Inc.

LABORATORY	ANALYSES PERFORMED
General Testing Corp.	TCL Organics
Energy & Environmental Engineering, Inc.	Metals
Toxikon	Remediation Assessment Parameters
Chemwest Analytical Labs, Inc.	2,3,7,8 TCDD

The analytical results are summarized and discussed in this section of the RI report. The detailed laboratory reports of analytical results and documentation packages are provided as Appendix E. In addition, a report of the results of an analytical data validation, performed to assess the data quality, is presented as Appendix F.

The organic analytical data packages, generated from soil samples collected during the first round of sampling, failed to comply with the requirements of the 1987 NYSDEC CLP. Specifically, contractual requirements for initial and continuing calibrations were not met and contract required quantitation limits (CRQLs) were not calculated in the manner required by the 1987 NYSDEC CLP. Therefore, quantitation of detected analytes is questionable and the organic data for soil samples has been accepted by the NYSDEC as screening level data.

The following subsections discuss the sampling program for a) soil sampling at survey anomalies (including test pit, surficial soil, and shallow boring sampling), b) sediment sampling, c) ground water sampling, and d) surface water sampling. A summary of RI sampling program showing the number and type of samples for each sampling event is presented in Table 7-2.

7.1.1 Soil Sampling at Survey Anomalies

The preliminary non-intrusive surveys identified 29 areas of elevated volatile organic vapor concentrations and 21 unidentified EM anomalies, which are representative of either soil types, contaminated soil/fill, or buried metallic objects. A total of 41 discrete survey anomalies were selected for further investigation by environmental sampling. The remaining anomalies were attributable to either buried utilities or conductive soil conditions in the Police Obstacle Course and Firing Range Area where no waste disposal is known to have occurred. The sampling program at survey anomalies, which included the sampling of test pit excavations, surficial soil, and shallow soil borings, is described below.

7.1.1.1 Test Pit Excavation/Sampling

A total of eleven (11) test pits (designated TP-1 to TP-11) were excavated at locations where geophysical anomalies attributed to buried metallic debris had been detected. Test pit locations are shown in Figure 7-1. The intended location for TP-9 was

TABLE 7-2

**ROCHESTER FIRE ACADEMY
SUMMARY OF ENVIRONMENTAL SAMPLING EVENTS⁽¹⁾**

Sampling Point	Analytical Protocol⁽²⁾	Sampling Event	Soil	Sediment	Surface Water	Ground Water
Test Pits	Round 1	4/90	11			
Shallow Borings	Round 1	4/90	8			
Surficial Soil	Round 1	4/90	21			
Monitoring Wells	Round 1	4/90	3			
Monitoring Wells	Round 1	5/90				21
Monitoring Wells	Round 2	8/90				21
Monitoring Wells	Round 3	10/90				10
On-Site Ponds	Round 1	5/90			3	
Drainage Swales	Round 1	5/90		2	2	
Genesee River	Round 1	5/90		4	4	
Genesee River	Round 2	8/90		4		
TOTAL			43	10	9	52

NOTE:

1. Number of samples per matrix per sampling event.
2. Analytical protocol for each round is shown in Table 7-1.

Contamination in the Genesee Valley Canal Area is characterized by low concentrations of PAHs, which are likely associated with the bedding material of the railroad formerly located in this area.

7.3 ANALYTICAL RESULTS FOR GROUND WATER

For the purpose of discussing the nature and extent of contamination in ground water, the Rochester Fire Academy site has been divided into the following areas:

- North Disposal Area
- Training Grounds Area
- South Disposal Area.

The analytical results for those parameters having at least one occurrence above the analytical detection limit in ground water are summarized in Tables 7-19 to 7-28. Analytical results are discussed separately below for the overburden and bedrock water bearing zones.

As discussed in Section 7.1.3, three (3) rounds of ground water sampling were conducted during the RI. All wells installed during the RI were sampled in Round 1 and Round 2. Round 3 was conducted only to confirm prior sampling results from selected wells, therefore, only MW-6I, MW-7S/7I, MW-8S/8I, MW-11S/11I, MW-12S/12I, and MW-15S were sampled during Round 3.

7.3.1 Overburden Water Bearing Zone

The monitoring interval for each well installed in this zone is summarized as follows:

- At the Water Table
 - North Disposal Area - MW-10S and MW-11S
 - Training Grounds Area - MW-6S, MW-8S, MW-12S, MW-13S, MW-14S, MW-15S
 - South Disposal Area - MW-7S and MW-9S
- Base of the Overburden Water Bearing Zone
 - North Disposal Area - PZ-9.

During the May sampling event, ground water elevations were higher than in the August sampling event, and were either at or above the top of the sand pack of each water table well. Ground water elevations had fallen to within the screened interval of these wells by the August sampling event.

Piezometer PZ-9 was installed to monitor water levels only and, therefore, was not sampled.

Hydrogeologic conditions in the overburden are discussed in Section 5.4.2. Field measurements and field observations recorded during sampling are presented with the summary of remediation assessment parameters results in Tables 7-19 to 7-21. Well locations are shown on Figure 7-2.

Overburden ground water samples are bicarbonate-sulfate water with high to very high hardness (300 to 900 mg/l). This is a regional water quality characteristic imparted to ground water by the dolomitic bedrock.

Oxidation-reduction conditions within the overburden ground water appear to have changed between the May and August sampling events. Relatively oxidized conditions prevailed in May, while relatively reducing conditions prevailed in August. The change is indicated throughout the site by an August decrease in sulfate, an August increase in iron and manganese, and an August increase in the ratio of reduced nitrogen species to oxidized nitrogen species. This trend is especially apparent in certain downgradient wells, but also occurs to a lesser degree in the upgradient wells.

High concentrations of iron are widespread throughout the overburden water bearing zone. The source of dissolved iron is most likely the reduction and dissolution of ferric hydroxides in the aquifer matrix due to changing oxidation-reduction conditions within the aquifer. Overburden ground water at the site may develop a reducing potential due to the oxidation of organic materials. Although alluvial sediment at the site most likely contains naturally occurring organic matter, petroleum hydrocarbons may be an additional source of oxidizable material within the site and at downgradient locations.

7.3.1.1 North Disposal Area

This Area has one (1) upgradient well (MW-10S) and one (1) downgradient well (MW-11S). Analytical results are summarized in Table 7-22.

TABLE 7-19

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY, RI/FS
SUMMARY OF REMEDIATION ASSESSMENT AND FIELD PARAMETERS, NORTH DISPOSAL AREA

PARAMETERS (1) (mg/l)	OVERBURDEN WATER-BEARING ZONE						BEDROCK AQUIFER					
	UPGRADIENT		DOWNGRADIENT		UPGRADIENT		DOWNGRADIENT		UPGRADIENT		DOWNGRADIENT	
	MW-10S	MW-11S	MW-10S	MW-11S	MW-10S	MW-11S	MW-10S	MW-11S	MW-10S	MW-11S	MW-10S	MW-11S
Acidity	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND
Alkalinity	320	470	284	270	338	410	340	370	358	370	358	370
Bicarbonate	320	470	284	270	338	410	340	370	358	370	358	370
Chloride	12	16	15.5	28	44	44	40.9	46	43.1	44	43.1	44
COD			84	78			40		37	34		
Total Hardness	404	740	520	860	480	500	600	580	660	660		
Nitrate	0.22	0.36	0.35		0.22	0.13		0.13		0.1		
Nitrogen Ammonia			0.05	0.3	0.05	0.68	0.05	0.20	0.05	0.08		
Nitrogen Kjeldahl, Total	0.05	0.62	0.11	0.68	0.11	0.22	0.09	0.28	0.11	0.39		
Oil and Grease			1.44				3.13		2.34			
Total Phosphate		0.31		0.11								
Sulfate	140	20	440	280	17	84	311	154	198	84		
Sulfide								0.89				
Total Dissolved Solids	342	428	400	544	420	492	388	536	402	388		
TOC	4.0	3.8	9.2	11.3	4.0	3.4	2.5	3.6		3.3		

FIELD PARAMETERS	MW-10S		MW-11S		MW-10I		MW-11I		MW-16I*	
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND
	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND	THIRD ROUND
pH	7.08	7.44	6.42	6.40	7.09	7.50	7.00	7.40	6.97	7.28
Temperature (2)	16	16	14	15	14.5	18	14	17	13	15
Specific Conductance (3)	893	710	1240	1210	1100	780	1313	910	1215	850
Turbidity (4)	55	9	35	38	11	16	22	20	67	29
Appearance	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	sulfide	sulfide	sulfide	sulfide	sulfide	none

NOTES:

(1) Only those analytes found above detection limits at a minimum of one location are presented.

(2) Degrees centigrade

(3) umhos

(4) NTU

* Well is monitoring ground water North of North Disposal Area.

TABLE 7-20

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY. RI/FS
SUMMARY OF REMEDIATION ASSESSMENT AND FIELD PARAMETERS, TRAINING GROUNDS

PARAMETERS (1) (mg/l)	OVERBURDEN WATER-BEARING ZONE									
	UPGRADIENT		DOWNGRADIENT							
	MW-8S	MW-8S	MW-8S		MW-12S		MW-13S		MW-14S	
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND
Acidity										
Alkalinity	416	400	90	180	186	200	280	330	574	540
Bicarbonate	416	400	90	180	186	200	280	330	574	540
Chloride	48	58	5.5	8	17.7	26	24	28	79.8	76
COD										
Total Hardness	840	900	130	300	268	320	756	920	70	107
Nitrate										
Nitrogen Ammonia	0.06	0.07	0.05	0.14			0.12		0.07	
Nitrogen Kjeldahl, Total	0.16	0.38	0.2	0.50	0.56		0.13	0.32	0.11	1.12
Oil and Grease			1.41						1.20	142
Total Phosphate										0.20
Sulfate	295	460	272	24	21	84	600	250	95	28
Sulfide										
Total Dissolved Solids	752	628	148	152	1860	284	714	568	1805	508
TOC	1.5	3.5	4.0	5.0	3.0	3.8	3.8	4.2	12.5	15.2

FIELD PARAMETERS												
	MW-8S			MW-8S			MW-12S			MW-13S		
	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
pH	7.08	7.22	8.15	6.22	7.01	8.15	6.24	6.50	6.31	7.17	7.5	8.83
Temperature (2)	10	18.6	14	14	17	14	13	16	13	15	18	16
Specific Conductance (3)	1835	1050	252	285	335	252	688	550	530	1540	1200	1825
Turbidity (4)	4	2.5	8	11	24	8	46	20	8	12	11	65
Appearance	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	sulfur	none	none	sulfur	fulfide	none	none	none	none	fuel

NOTES:

(1) Only those analytes found above detection limits at a minimum of one location are presented.

(2) Degrees centigrade

(3) umhos

(4) NTU

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY. RI/FS
SUMMARY OF REMEDIATION ASSESSMENT AND FIELD PARAMETERS, SOUTH DISPOSAL AREA

PARAMETERS (l) (mg/l)	OVERBURDEN WATER-BEARING ZONE				BEDROCK AQUIFER			
	UPGRADIENT		DOWNGRADIENT		UPGRADIENT		DOWNGRADIENT	
	MW-6S FIRST ROUND	SECOND ROUND	MW-7S FIRST ROUND	SECOND ROUND	MW-9I FIRST ROUND	SECOND ROUND	MW-7I FIRST ROUND	SECOND ROUND
Acidity								
Alkalinity	306	310	380	480	340	420	334	400
Bicarbonate	306	310	380	480	340	420	334	400
Chloride	8.0	6.0	74.1	98	24	26	60.7	74
COD			140	140			70	
Total Hardness	332	660	568	680	448	480	552	640
Nitrate	0.22	0.08						
Nitrogen Ammonia		0.08		0.15	0.05	0.05		0.09
Nitrogen Kjeldahl, Total		0.32	0.35	2.68	0.22	0.50		0.68
Oil and Grease		1.0	4.6	3.0				1.12
Total Phosphate		0.47	0.4	0.28				
Sulfate	280	56	22		242	20	974	72
Sulfide								
Total Dissolved Solids	306	424	3000	484	386	402	1895	512
TOC	2.4	2.4	36	50.8	1.2	2.0	11.5	3.6

FIELD PARAMETERS	MW-9S			MW-7S			MW-9I			MW-7I			MW-7D		
	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
pH	6.85	7.40		8.80	7.08	6.91	7.05	7.60		7.26	7.43	7.20	7.00	7.41	
Temperature (2)	14	15		14.5	20	13	14	14		15	18	13	16	20	
Specific Conductance (3)	715	650		1165	1050	795	913	625		1343	900	850	1733	1400	
Turbidity (4)	7	>100		>100	>100	34	67	>100		46	45	16	15	6	
Appearance	clear	turbid		turbid	turbid	clear	clear	turbid		clear	clear	clear	clear	clear	
Odor	none	none		solvent	solvent	solvent	sulfide	none		none	solvent	none	sulfide	sulfide	

NOTES:

- (1) Only those analytes found above detection limits at a minimum of one location are presented.
- (2) Degrees centigrade
- (3) umhos
- (4) NTU

TABLE 7-22

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, NORTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWN GRADIENT		
	MW-10S		MW-11S		
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
<u>Volatiles (mg/l)</u>	ND	ND	ND	ND	
1,2-Dichloroethane					
Trichloroethene					
Methylene Chloride					0.013B
Vinyl Chloride					
1,2-Dichloroethene(total)					
<u>Semi-Volatiles (mg/l)</u>					
Bis(2-ethylhexyl)phthalate		ND	ND	ND	0.013
Di-n-butylphthalate	0.01 B				0.0013B
<u>PCBs (mg/l)</u>					
Aroclor-1254					

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

TABLE 7-22 (cont.)
CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, NORTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWN GRADIENT		
	MW-10S		FIRST ROUND	SECOND ROUND	THIRD ROUND
<u>Inorganic Elements (mg/l)</u>					
Aluminum			12		
Arsenic	0.002 J		0.007	0.005B	
Barium	0.051 J		0.070J		
Beryllium					
Cadmium					
Calcium	87		100		
Chromium			0.017		
Cobalt			0.014 J		
Copper	0.007 B		0.015 J		
Iron	2.69	7.82	18	14.1	
Lead					
Magnesium	48.6		81.2		
Manganese	0.117	0.258	0.633	1.77	
Mercury					
Nickel			0.026 J		
Potassium	0.861		1.01 J		
Selenium					
Sodium	6.63		21.3		
Vanadium			0.018 J		
Zinc	0.012		0.065		

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs; Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

Organic Parameters - A single occurrence of bis(2-ethylhexyl)phthalate (0.013 mg/l) was the only organic contaminant detected in shallow ground water from the North Disposal Area. This result is similar to the sampling results for the soil/fill material in the North Disposal Area, which indicated the presence of only trace concentrations of organic contaminants.

Inorganic Parameters - Aluminum, iron, and manganese exhibit substantially elevated concentrations in downgradient well MW-11S with respect to upgradient well MW-6S. Iron and manganese exceed the 6 NYCRR Part 703 ground water standards in MW-11S and (for iron only) MW-6S.

7.3.1.2 Training Grounds Area

This Area has one (1) upgradient well (MW-6S); three (3) downgradient wells (MW-8S, MW-12S, and MW-15S); and two (2) wells (MW-13S and MW-14S), which are located within the Training Grounds. Analytical results are summarized in Tables 7-23 and 7-24.

Organic Parameters - The upgradient well (MW-6S) exhibited a trace concentration of 1,1 dichloroethene (0.003 mg/l) on one (1) sampling occasion. Organic contamination was not detected in wells in the southern portion of the Training Grounds Area (MW-12S and MW-13S).

A free product, described as a yellow kerosene, was observed at MW-14S during the August sampling event. (Kerosene has been used as a fuel for the burn pits since 1981). A strong organic odor was noted at MW-14S during both the May and August sampling events. However, neither free-product nor dissolved organics were detected during the May sampling event. Water levels at MW-14S were above the sand pack in May; therefore, the product, if present, may have been unable to enter the well. The water and product levels in August were measured with an oil-water interface meter. Depth to product from the top of the riser (TOR) was 6.61 feet; depth to water was 8.15 (TOR), yielding a product thickness in the well of 1.54 feet. Product thickness outside the well would be less than 1.5 feet due to capillary fringe effects. The areal extent of free-product is uncertain.

Third Round - October sampling event; analysis for organic compounds only.

TABLE 7-23 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, TRAINING GROUNDS AREA

PARAMETER (1) (2)	UPGRADIENT			DOWNGRADIENT												
	MW-6S			MW-8S			MW-12S			MW-13S		MW-14S		MW-15S		
	FIRST ROUND	SECOND ROUND		FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
Inorganic Elements (mg/l)																
Aluminum	0.519			1.73	5.33		3.29			31.2		3.22				
Antimony																
Arsenic	0.002 J	0.003B		0.0023 J	0.006B		0.002			0.007			0.011		0.004B	
Barium	0.019 J				0.058 J		0.03 J			0.196 J		0.045 J				
Beryllium										0.001 J						
Cadmium					0.001 J		0.001 J			0.002						
Calcium	160			26.5	51.1		208			182		49.3				
Chromium	0.009				0.008					0.042						
Cobalt										0.030 J		0.009 J				
Copper	0.009			0.007	0.015							0.009 J				
Iron	1.21	0.864		3.10	8.50		3.15			71.1		5.06	4.59			
Lead					0.038J					0.040						
Magnesium	111			13.3	30.9		83.3			92.2		33.6				
Manganese	1.37	1.3		1.28	1.85		0.373			5.04		7.69	7.28			
Mercury										0.522						
Nickel					0.0257 J					0.064						
Potassium	3.83 J			0.531 J	1.16 J		2.59 J			4.7 J		1.03 J				
Selenium																
Silver																
Sodium	71.5			11.8	20		41.6			54.2		21.7				
Thallium																
Vanadium										0.054						
Zinc	0.0589			0.0107 J	0.0322 J		0.016 J			0.223		0.0197 J				

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

TABLE 7-24

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS

SUMMARY OF ANALYTES DETECTED IN FREE-PRODUCT, TRAINING GROUNDS AREA

PARAMETER (1) (2)	MW-14S
<u>Volatiles (mg/l)</u>	
1,2-Dichloroethene (total)	140
1,2-Dichloroethane	
1,1-Dichloroethene (total)	
1,1-Dichloroethane	
Trichloroethane	
Trichloroethene	56
Acetone	
Methylene Chloride	79B
Benzene	
Toluene	390
Ethylbenzene	640
Total Xylene(o,m,p)	2400
Vinyl Chloride	
<u>Semi-Volatiles (mg/l)</u>	
Bis(2-ethylhexyl)phthalate	
Di-n-butylphthalate	
<u>PCBs (mg/l)</u>	
Aroclor-1254	2.9

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

From second round - August sampling event.

TABLE 7-24 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN FREE-PRODUCT, TRAINING GROUNDS AREA

PARAMETER (1) (2)	MW-14S
<u>Inorganic Elements (mg/l)</u>	
Aluminum	1.07
Antimony	
Arsenic	
Barium	20B
Beryllium	
Cadmium	
Calcium	12.5
Chromium	0.006B
Cobalt	
Copper	0.0076B
Iron	2.58
Lead	0.44
Magnesium	5.45
Manganese	5.07
Mercury	
Nickel	
Potassium	0.342B
Selenium	0.036
Silver	
Sodium	3.17B
Thallium	
Vanadium	0.01B
Zinc	0.043

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

From second round - August sampling event.

The organics detected in the ground water at MW-14S were comprised of four (4) chlorinated hydrocarbons, predominantly 1,1 dichloroethene (3.2 mg/l) and vinyl chloride (1.9 mg/l); and four (4) aromatic hydrocarbons, specifically, benzene, toluene, ethylbenzene, and total xylenes at concentrations of less than 0.49 mg/l. A PCB (Aroclor-1254) was present at 0.0049 mg/l.

Based on an analysis presented on Table 7-24, the free-product contains 3626 mg/l of the same (or related) volatile organics found in the ground water. A PCB (2.9 mg/l Aroclor-1254) was also detected in the product. These results indicate that the kerosene has been contaminated with chlorinated hydrocarbons, PCBs and possibly to some degree, with aromatic hydrocarbons (which are a minor component of kerosene). The source of these contaminants may be direct contact with contaminated soil after leakage, or with contaminated fuel or sludge in the storage tanks.

Well MW-8S is approximately 180 feet downgradient from MW-14S. Ground water from MW-8S exhibited low concentrations of 1,1 dichloroethene (0.013 mg/l) and vinyl chloride (0.027 mg/l) during the August sampling round. No organic parameters were detected at MW-8S in May.

Well MW-15S is located downgradient of the central portion of the Training Grounds Area. Trace concentrations of six (6) chlorinated hydrocarbons (0.021 mg/l to 0.037 mg/l TVO) were detected during the three sampling rounds. Benzene was detected at low concentrations during the second and third sampling rounds.

Inorganic Parameters - Iron and manganese concentrations are elevated above background concentrations at upgradient well MW-6S, and in all wells within and downgradient of the Training Grounds Area. Iron concentrations in MW-14S ranged from 29 to 71 mg/l; and manganese from 3.5 to 5.0 mg/l. These values reflect the reduced oxidation state of ground water due to oxidation of the free product at MW-14S. Elevated concentrations of iron and manganese at other locations probably occur at lower concentrations due to relatively less reducing conditions. Inorganic parameters that occur

at elevated concentrations in ground water in this area are summarized as follows:

aluminum	1.7 - 31 mg/l
iron	2.7 - 71 mg/l
manganese	0.37 - 7.7 mg/l
lead	ND - 0.040 mg/l.

7.3.1.3 South Disposal Area

The South Disposal Area has two (2) upgradient wells (MW-9S and PZ-9) and one (1) downgradient well (MW-7S) in the overburden water bearing zone. PZ-9 was monitored for water levels only. Analytical results are summarized on Table 7-25.

Organic Parameters - No organic contaminants were detected in upgradient well MW-9S. However, the same suite of organic contaminants present in the soil/fill of the South Disposal Area (see Section 7.2.4) were also detected in the downgradient well (MW-7S).

Chlorinated hydrocarbons detected at MW-7S include the following:

1,1 dichloroethene	0.12 mg/l
1,1 dichloroethane	0.21 - 0.69 mg/l
1,2 dichloroethene	11 - 30 mg/l
1,2 dichloroethane	ND - 0.021 mg/l
vinyl chloride	ND - 0.084 mg/l
1,1,1 trichloroethane	5.3 - 7.9 mg/l
trichloroethene	0.46 - 0.94 mg/l
tetrachloroethene	ND - 0.088 mg/l

The aromatic hydrocarbons (benzene, toluene, chlorobenzene, ethylbenzene, and total xylenes) were detected at concentrations up to 1.8 mg/l total xylenes and 0.91 mg/l toluene. Toluene and total xylenes were detected during all three (3) sampling events. Acetone, 2-butanone, and 4-methyl-2-pentanone were detected in the first sampling event at concentrations up to 1.5 mg/l (acetone). All volatile organics detected in downgradient overburden ground water were also detected in the soil/fill at the South Disposal Area.

Low concentrations of phenolic compounds were detected during each of the May, August, and October sampling events at MW-7S. The maximum concentration was 0.050 mg/l 4-methylphenol. PCBs were detected in MW-7S on two sampling rounds at

TABLE 7-25

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS

SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, SOUTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT		
	MW-9S		FIRST ROUND	SECOND ROUND	THIRD ROUND
<u>Volatiles (mg/l)</u>					
1,1-Dichloroethene			0.12 J		
1,1-Dichloroethane			0.21 J	0.69	0.28 J
1,2-Dichloroethene (total)			11.0	30	12*
Chloroform			0.008 B		
1,2-Dichloroethane			0.021		
Vinyl Chloride			0.084		
Acetone			1.6		
Methylene Chloride				0.45 B	0.58
2-Butanone			0.15		
1,1,1-Trichloroethane			6.7	7.9	5.3
Bromodichloromethane			0.009		
Trichloroethene			0.94	0.46	
Benzene			0.009		
4-Methyl-2-pentanone			0.16		
Tetrachloroethene			0.088		
Toluene			0.89	0.91	0.62
Chlorobenzene			0.008		
Ethylbenzene			0.17 J		0.34 J
Total Xylenes			0.86 J	2.3	1.81

* cis isomer

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - November sampling event; analysis for organic compounds only.

TABLE 7-25 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, SOUTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT		
	MW-9S		FIRST ROUND	SECOND ROUND	THIRD ROUND
Semi-Volatiles (mg/l)					
Phenol			0.015 J	0.017 J	0.005 J
2-Methylphenol			0.010 J	0.010 J	0.005 J
4-Methylphenol			0.027 J	0.050 J	0.02
2,4-Dimethylphenol			0.004 J	0.014 J	0.012
Pentachlorophenol				0.001 J	
Benzolic Acid				0.012 J	
Naphthalene					
2-Methylnaphthalene					
Diethylphthalate			0.083		0.05
N-nitrosodiphenylamine					
Di-n-butylphthalate			0.01 B		0.002 J B
Bis(2-ethylhexyl)phthalate		0.01 B	0.01 B		0.006 J
PCBs (mg/l)					
Aroclor-1254				0.0026	0.005

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - November sampling event; analysis for organic compounds only.

TABLE 7-25 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN OVERBURDEN WATER-BEARING ZONE, SOUTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT		
	MW-9S		MW-7S		
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
Inorganic Elements (mg/l)					
Aluminum	2.11		3.8		
Arsenic			0.0002	0.010	
Barium	0.059 J		0.148 J		
Beryllium					
Cadmium			0.0023 J		
Calcium	105		124		
Chromium			0.00134		
Cobalt					
Copper	0.0112 J		0.0189 J		
Iron	3.72	8.21	18.3	13.9	
Lead				0.059 J	
Magnesium	25.8		70.1		
Manganese	0.0718	0.407	1.86	1.85	
Mercury					
Nickel					
Potassium	2.92 J		2.28 J		
Selenium			0.0023		
Sodium	4.67 J		18.5		
Vanadium					
Zinc	0.0107 J		0.0819		

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - November sampling event; analysis for organic compounds only.

concentrations of 0.0026 mg/l and 0.005 mg/l Aroclor 1254. PCBs and phenol were also detected in the soil/fill samples collected in this area.

Inorganic Parameters - Several metals were detected in MW-7S at concentrations substantially greater than at the upgradient well MW-9S. These included three (3) metals that exceeded 6 NYCRR Part 703 ground water standards as follows:

Iron	14 - 18 mg/l
Manganese	1.7 - 1.9 mg/l
Lead	ND - 0.059 mg/l

The downgradient increase in iron and other trace metals is consistent with a change in the oxidation-reduction properties of the overburden water bearing zone to more reducing conditions.

7.3.2 Bedrock Water Bearing Zone

The monitoring interval for each bedrock well is as follows:

- **Upper Bedrock**

North Disposal Area - MW-10I, MW-11I, MW-16I

Training Grounds Area - MW-6I, MW-8I, MW-12I

South Disposal Area - MW-9I and MW-7I

- **Deep Bedrock**

Training Grounds Area - MW-6D and MW-8D

South Disposal Area - MW-7D.

Hydrogeologic conditions in the bedrock aquifer are discussed in Section 5.4.3. Field measurements and field observations recorded during sampling are presented in the summaries of the remediation assessment parameters (Tables 7-18 to 7-20). Well locations are shown in Figure 7-2. As discussed in Section 5.4, the bedrock aquifer discharges into the Genesee River, which is most likely a regional ground water discharge zone.

All bedrock ground water samples are bicarbonate-sulfate water with high hardness (400 - 2200 mg/l). These characteristics are consistent with the occurrence of dolomitic bedrock.

An increase in reduced nitrogen species and, locally, a reduction in sulfate concentrations indicate that oxidation-reduction conditions within the bedrock aquifer became relatively more reducing between the May and August sampling events. Based on the detection of hydrogen sulfide or a hydrogen sulfide odor in 10 of 11 bedrock wells during at least one sampling event, the bedrock aquifer appears to be relatively more reducing than the overburden aquifer. Overall, iron concentrations in the bedrock aquifer are less than in the overburden ground water. Dissolved iron content in the bedrock ground water may be controlled by the precipitation of iron sulfides. The highest concentrations of hydrogen sulfide were detected in the deep bedrock wells (30 mg/l in MW-8D, and 15 mg/l in MW-7D), indicating that the bedrock becomes more reducing with depth.

7.3.2.1 North Disposal Area

This area has one (1) upgradient bedrock well (MW-10I), and two (2) downgradient bedrock wells (MW-11I and MW-16I). All bedrock wells are screened in the upper ten feet of bedrock in the upper bedrock zone. Analytical results are summarized on Table 7-26.

Organic Parameters - A trace concentration of 1,2 dichloroethane was detected on one occasion at upgradient well MW-10I. The concentrations of chlorinated hydrocarbons detected at downgradient wells MW-11I and MW-16I are as follows:

1,2-dichloroethane	0.003 - 0.006 mg/l
1,1 dichloroethane	ND - 0.075 mg/l
vinyl chloride	ND - 0.055 mg/l

Since the overburden well at MW-11S exhibited no organic contaminants and the soil/fill in the North Disposal Area exhibits only trace concentrations of volatile organics, these concentrations may be the result of contaminant migration via bedrock flow from the shallow ground water contamination identified within the Training Grounds Area.

TABLE 7-26

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS

SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, NORTH DISPOSAL AREA AND AREA TO NORTH

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT			NORTH OF NORTH DISPOSAL AREA	
	MW-101		MW-111			MW-161	
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND
<u>Volatiles (mg/l)</u>							
1,2-Dichloroethane	0.004					0.006	0.003
Trichloroethene							
Methylene Chloride		0.002B			0.011B		
Vinyl Chloride					0.055		
1,2-Dichloroethene(total)					0.075		
1,1-Dichloroethene(total)							
<u>Semi-Volatiles (mg/l)</u>							
Bis(2-ethylhexyl)phthalate	0.01 B				0.005J		
Di-n-butylphthalate					0.001JB		
<u>PCBs (mg/l)</u>							
Atoclor-1254							

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

TABLE 7-26 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, NORTH DISPOSAL AREA AND AREA TO NORTH

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT			NORTH OF NORTH DISPOSAL AREA	
	MW-101		FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND
<u>Inorganic Elements (mg/l)</u>							
Aluminum	0.133 J						
Arsenic	0.001 J					0.868	
Barium	0.135		0.022 J	0.005B		0.104 B	
Beryllium							
Cadmium	0.0012 J						
Calcium	114		155			146	
Chromium							
Cobalt							
Copper						0.128 J	
Iron	0.116		0.197				
Lead		0.230		14.1		1.37	1.20
Magnesium	51.8		45.4			0.032	
Manganese	0.012	0.012B	0.012	1.77		53.8	
Mercury						0.061	0.053
Nickel							
Potassium	1.83		1.4				
Selenium						2.74 J	
Sodium	25.9		26.2			30.6	
Vanadium							
Zinc			0.006			0.064	

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

Inorganic Parameters - Downgradient wells exhibited elevated concentrations of iron (14 mg/L) and manganese (1.8 mg/L) with respect to the upgradient well. In addition, cobalt (0.128 mg/L) and lead (0.032 mg/L) were detected in MW-16I.

7.3.2.2 Training Grounds Area

This Area has one (1) upgradient upper bedrock well (MW-6I), and two (2) downgradient upper bedrock wells (MW-8I and MW-12I). In addition, the upgradient deep bedrock well (MW-6D), and one (1) downgradient deep bedrock well (MW-8D) are in the Training Grounds Area. Analytical results are summarized on Table 7-27.

Organic Parameters - The upgradient wells in the upper and deep bedrock both exhibit trace concentrations of chlorinated hydrocarbons, as follows:

1,2 dichloroethene	ND - 0.018 mg/l
1,1 dichloroethene	0.009 - 0.023 mg/l
tetrachloroethene	ND - 0.002 mg/l

One or more of these compounds were detected in MW-6I or MW-6D during each sampling round. The persistent occurrence of these chlorinated hydrocarbons in the upgradient well suggests that a source of contamination may be present at a further upgradient location.

Downgradient bedrock wells at MW-8I and MW-12I exhibited one or more of the following chlorinated hydrocarbons:

1,2-dichloroethene	0.020 - 4.7 mg/l
1,1-dichloroethene	0.020 - 0.030 mg/l
tetrachloroethene	ND - 0.001 mg/l
1,1-dichloroethane	ND - 0.003 mg/l
trichloroethene	0.010 - 0.022 mg/l
vinyl chloride	0.17 - 4.5 mg/l

The source of organic contamination at MW-8I (and possibly MW-11I) may be the shallow ground water contamination detected near the storage tanks and burn pits in the Training Grounds Area. This relationship would require that the contaminated ground water within the Training Grounds follows a downward hydraulic gradient in the overburden water-bearing zone and then preferentially follows the highly permeable upper bedrock zone towards the river.

TABLE 7-27

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, TRAINING GROUNDS AREA

PARAMETER (1) (2)	UPGRADIENT						DOWNGRADIENT					
	MW-8I			MW-8D			MW-8I			MW-8D		
	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
<u>Volatiles (mg/l)</u>												
1,2-Dichloroethane (total)	0.01B									4.7		
1,2-Dichloroethane												
1,1-Dichloroethane (total)			0.023	0.009	0.011							
Tetrachloroethane				0.002J								
1,1-Dichloroethane												
Trichloroethane							0.01	0.01	0.022			
Trichloroethane										0.079B		
Acetone								0.003B	0.0031B			
Methylene Chloride										0.001B		0.006B
Benzene												
Toluene												
Ethylbenzene												
Total Xylene(o,m,p)												
Vinyl Chloride							0.17	0.027	0.23	4.5		
<u>Semi-Volatiles (mg/l)</u>												
Benzyl Alcohol												
Nitrobenzene												
Bis(2-chloroethoxy)methane												
2-Methylnaphthalene												
Bis(2-ethoxy)phthalate	0.01B											
Di-n-butylphthalate			0.0011B	0.01B			0.01B		0.01	0.01B		0.004J
<u>PCBs (mg/l)</u>												
Aroclor-1254												

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

TABLE 7-27 (cont.)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, TRAINING GROUNDS AREA

PARAMETER (1) (2)	UPGRADIENT						DOWNGRADIENT					
	MW-8I			MW-8D			MW-8I			MW-8D		
	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND		FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND
<u>Inorganic Elements (mg/l)</u>												
Aluminum	0.393 B			1.39			0.512					
Antimony	0.001 J						0.001 J					
Arsenic	0.107 J			0.118 J			0.070 J					
Beryllium												
Cadmium	99.8			183			137					
Calcium												
Chromium	0.005 J			0.006								
Cobalt	0.418	0.967		2.07	0.266		0.752	0.875		0.05 J	0.167	
Copper												
Iron	37.0			55.9			81.0			99.8		
Magnesium	0.043	0.047		0.101	0.031		0.048	0.046		0.012 J	0.008 B	
Manganese								0.0002				
Mercury												
Nickel	2.53 J			2.68 J			3.76 J			1.53 J		
Potassium												
Selenium												
Silver												
Sodium	30.1			25.1			26.8			17.8		
Thallium												
Vanadium												
Zinc	0.021			0.126			0.022			0.004 J		

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - October sampling event; analysis for organic compounds only.

The source of volatile organic compound (VOC) contamination at MW-12I is questionable. As discussed in Section 7.2, only a low magnitude of contamination was detected in areas that are upgradient of MW-12I (the Firing Range Area and the southern portion of the Training Grounds). Well MW-12I is cross-gradient from both MW-7I and MW-7S, and is not likely to be influenced by contamination originating from the South Disposal Area. Therefore, there is no apparent source for the contamination detected in MW-12I. Furthermore, volatile organics were detected only during the May sampling event. A review of field sampling forms for the May sampling event indicates that well cluster MW-12S/12I was sampled immediately following the collection of samples at well cluster MW-7S/7I/7D in the South Disposal Area, which exhibited high concentrations of VOCs. Therefore, the VOCs detected at MW-12I during the May sampling event may be attributable to cross-contamination which could have occurred during the sampling procedure.

No organic contamination was detected in the deep bedrock well at MW-8D. It should be noted that the upper bedrock is more highly contaminated with volatile organics than is the shallow overburden at the downgradient ground water monitoring locations in this area. This is also true in the North Disposal Area.

Inorganic Parameters - Iron occurs at elevated concentrations in MW-12I (6.9 to 7.6 mg/l) and in MW-6D (2.1 mg/l). Otherwise inorganic contamination is absent in the bedrock aquifer beneath the Training Grounds Area. Iron sulfide precipitation, which is indicated by the local occurrence of iron and hydrogen sulfide in ground water, may be limiting the concentrations of iron and other trace metals in the bedrock aquifer.

7.3.2.3 South Disposal Area

This Area has one (1) upgradient well (MW-9I), and one (1) downgradient well (MW-7I) in the upper bedrock. A downgradient deep bedrock well is located at MW-7D. Analytical results are summarized on Table 7-28.

Organic Parameters - The upgradient ground water exhibits one occurrence of volatile organics (1,1 dichloroethene at 0.047 mg/l). The downgradient upper bedrock well (MW-7I) exhibits a TVO ranging from 1.5 to 13 mg/l. The TVO in the deep bedrock at

TABLE 7-28

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, SOUTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT				
	FIRST ROUND	MW-9I SECOND ROUND	FIRST ROUND	MW-7I SECOND ROUND	THIRD ROUND	FIRST ROUND	MW-7D SECOND ROUND
<u>Volatiles (mg/l)</u>		0.047					
1,1-Dichloroethene			0.077	0.14	0.25		
1,1-Dichloroethane			0.53	0.11	0.59	0.011	0.004
1,2-Dichloroethene (total)							
Chloroform			0.008 B				
1,2-Dichloroethane			0.013		0.008J		
Vinyl Chloride			0.053		0.17		
Acetone			0.13		0.48J	0.024 B	
Methylene Chloride				0.007B	0.041B		
2-Butanone			0.037				
1,1,1-Trichloroethane			2.6	0.56	0.39	0.039	0.004
Bromodichloromethane			0.003 J				
Trichloroethene			2.6	0.70	0.48	0.039	0.010
Benzene							
4-Methyl-2-pentanone			0.03		0.89		
Tetrachloroethene			0.038	0.023			0.003
Toluene			0.035		10J		
Ethylbenzene			0.008				
Total Xylenes			0.038				
<u>Semi-Volatiles (mg/l)</u>							
Diethylphthalate			0.010 J		0.003J		
Di-n-butylphthalate					0.001JB		
Bis(2-ethylhexyl)phthalate			0.01 B		0.022		
<u>PCBs (mg/l)</u>							
Aroclor-1254					0.003		

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - November sampling event; analysis for organic compounds only.

TABLE 7-28 (cont)

CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
SUMMARY OF ANALYTES DETECTED IN BEDROCK AQUIFER, SOUTH DISPOSAL AREA

PARAMETER (1) (2)	UPGRADIENT		DOWNGRADIENT			
	MW-9I		MW-7I		MW-7D	
	FIRST ROUND	SECOND ROUND	FIRST ROUND	SECOND ROUND	THIRD ROUND	FIRST ROUND
Inorganic Elements (mg/l)						
Aluminum	0.789					0.147 J
Arsenic				0.010		0.0052 J
Barium	0.152 J					0.018 J
Beryllium						
Cadmium						
Calcium	142		147			226
Chromium	0.0083 J					
Cobalt						
Copper	0.006 J					
Iron	1.64	3.77	0.474	0.777		0.0073 J
Lead		0.060 J				0.165
Magnesium	50		45.1			59.4
Manganese	0.086	0.123	0.0674	0.092		0.0131 J
Mercury						0.0088
Nickel						
Potassium	1.38 J		2.31 J			1.46 J
Selenium						
Sodium	17.2		47.1			18.4
Vanadium						
Zinc	0.115		0.0248			0.0062 J

NOTE:

(1) - Analytes detected above quantification limits.

(2) - Laboratory qualifiers: B - Estimated detection limit due to blank contamination.

J - Estimated value due to limitations identified during QC review.

First Round - May sampling event.

Second Round - August sampling event; analysis for VOCs, Acid Extractables, PCBs, As, Cd, Fe, Pb, Mn and Hg.

Third Round - November sampling event; analysis for organic compounds only.

MW-7D is substantially less (0.021 to 0.089 mg/l). It should be noted that the TVO in the overburden well (MW-7S) is somewhat higher (21 to 42 mg/l). One or more of the following chlorinated hydrocarbons were detected in the downgradient bedrock wells:

1,1 dichloroethene	0.077 - 0.25 mg/l
1,1 dichloroethane	0.004 - 0.59 mg/l
1,2 dichloroethane	0.008 - 0.013 mg/l
vinyl chloride	0.17 - 0.053 mg/l
1,1,1 trichloroethane	0.004 - 2.6 mg/l
trichloroethene	0.010 - 2.6 mg/l
tetrachloroethene	0.003 - 0.038 mg/l

Toluene, ethylbenzene, and total xylenes occur at concentrations up to 10 mg/l. Acetone, 2-butanone, and 4-methyl-2-pentanone were also detected in the upper bedrock well. All organic contaminants detected in the bedrock ground water were also detected in the overburden ground water at MW-7S, and in the soil/fill in the North Disposal Area.

Inorganic Parameters - Concentrations of iron and lead were detected at the upgradient bedrock well MW-9I in excess of NYCRR Part 703 ground water standards. No inorganic contamination was detected in the downgradient wells.

7.3.3 Summary of Ground Water Results

Ground water sampling and analysis at the Rochester Fire Academy site has demonstrated that organic and, to a lesser extent, inorganic contamination occurs in the overburden and bedrock ground water. Organic contamination in ground water reflects the nature and extent of organic contamination present in the soil/fill material overlying the aquifer.

Organic contaminants have been identified in all upgradient bedrock wells. Therefore, an upgradient source of chlorinated hydrocarbons may be present.

Iron and manganese are the most widespread inorganic contaminants that have been identified in ground water. The source of the metals is most likely the mobilization of naturally occurring iron and manganese from the aquifer matrix due to anaerobic conditions in the ground water. Former waste disposal practices have indirectly influenced metal concentrations in ground water by providing organic material that contributes to the

anaerobic (reducing) conditions. Other trace metals, in particular lead, also occur locally at elevated concentrations.

The frequency of detection, and maximum concentration of all organic and inorganic contaminants that were detected in ground water above analytical detection limits at least once are presented in Table 7-29 for overburden ground water and Table 7-30 for bedrock ground water.

North Disposal Area - Organic contamination is absent in the overburden ground water, but low concentrations of chlorinated hydrocarbons occur in the upper bedrock. Based on ground water flow patterns, the source of these contaminants is probably the northern portion of the Training Grounds Area.

Training Grounds Area - Contaminated soil/fill material near the storage tanks, the burn pits and throughout much of the southern portion of the Training Grounds Area are contributing organic contaminants to the ground water due to the leaching of contaminated soil by infiltrating precipitation during periods of low ground water levels, and by direct contact between ground water and contaminated soils during periods of high ground water levels. Since the upper bedrock ground water is more highly contaminated than the shallow overburden ground water, organic contaminants are most likely migrating to the upper bedrock due to a downward hydraulic gradient at source area locations. Contaminant migration then occurs preferentially through the highly permeable upper bedrock zone. There is also potential for chlorinated and aromatic hydrocarbons to enter the ground water from a free product plume, which may act as a continuous source of dissolved organics.

South Disposal Area - The leaching of organic contaminants from the soil/fill material contributes moderate to high concentrations of chlorinated hydrocarbons and low concentrations of phenolic compounds and PCBs to the overburden and bedrock ground water. In contrast to the vertical distribution of contaminants in the Training Grounds and North Disposal Areas, which increase in concentration with depth, ground water contaminant concentrations decrease in the South Disposal Area with depth. This is probably due to the close proximity of well cluster MW-7S/7I/7D to the source of contamination.

TABLE 7-30 (Cont'd)
CITY OF ROCHESTER, ROCHESTER FIRE ACADEMY RI/FS
FREQUENCY OF ANALYTE DETECTION IN BEDROCK GROUND WATER (1)

PARAMETER	NORTH DISPOSAL AREA (2)			TRAINING GROUNDS AREA (3)			SOUTH DISPOSAL AREA (4)		
	NO. OF DETECT.	MAX CONC.	LOC. OF MAX	NO. OF DETECT.	MAX CONC.	LOC. OF MAX	NO. OF DETECT.	MAX CONC.	LOC. OF MAX
PCBs (mg/l)									
Aroclor-1254							1	0.003	MW-7I
Inorganic Elements (mg/l)									
Aluminum	2	0.87	MW-18I	4	2.25	MW-12I	3	0.79	MW-9I
Antimony									
Arsenic	2	0.001	MW-10I	3	0.003	MW-12I	2	0.010	MW-7I
Barium	3	0.135	MW-10I	5	0.21	MW-12I	3	0.155	MW-7I
Beryllium									
Cadmium	1	0.001	MW-10I	1	0.001	MW-8D			
Calcium	3	155	MW-11I	5	445	MW-8D	3	226	MW-7D
Chromium				1	0.010	MW-12I	1	0.008	MW-9I
Cobalt	1	0.13	MW-18I						
Copper				3	0.007	MW-12I	2	0.007	MW-7D
Iron	6	14.1	MW-11I	10	7.6	MW-12I	6	3.8	MW-9I
Lead	1	0.032	MW-18I				1	0.060	MW-9I
Magnesium	3	53.8	MW-18I	5	97	MW-8D	3	59	MW-7D
Manganese		1.8	MW-11I	10	0.42	MW-12I	6	0.12	MW-9I
Mercury				1	0.0002	MW-8I			
Nickel									
Potassium	3	2.7	MW-18I	5	3.8	MW-8I	3	2.3	MW-7I
Selenium									
Silver									
Sodium	3	31	MW-18I	5	81	MW-12I	3	47	MW-7I
Thallium									
Vanadium									
Zinc	2	0.064	MW-18I	5	0.13	MW-8D	3	0.12	MW-9I

NOTE:

(1) Number of detections above detection limits.

(4) Total number of 7 samples collected.

(2) Total number of 7 samples collected.

(3) Total number of 13 samples collected.

EXHIBIT 2-4

Selected Sections / Information from 1991 Rochester Fire Academy Remedial Investigation Report Appendices

Includes:

- **Consent Order**
- **Historical Borehole Information**

Appendix A

**Rochester Fire Academy Consent Order
(828015)**

Appendix C

**Geology/Hydrogeology - Includes Historical
Borehole Logs, Well Development Information
and Construction Procedures**

NOTES:

1. **A complete copy of the Remedial Investigation (R. I.) Report is on file in the Groundwater Treatment Plant Office.**
2. **A copy of the R. I. Table of Contents has been included for reference.**

Engineering Report

**REMEDIAL INVESTIGATION REPORT
FOR THE
ROCHESTER FIRE ACADEMY SITE
APPENDICES**

**City of Rochester
Rochester, New York**

May 1991

Project No. 8885-04-1

Revised DECEMBER 1991

**MALCOLM
PIRNIE**

ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

**CITY OF ROCHESTER
REMEDIAL INVESTIGATION REPORT - APPENDICES**

ROCHESTER FIRE ACADEMY SITE

**MAY 1991
Revised DECEMBER 1991**

MALCOLM PIRNIE, INC.

**S-3515 Abbott Road
P. O. Box 1938
Buffalo, New York 14219**

Table of Contents

TABLE OF CONTENTS

APPENDICES

Appendix	Description
A	Order on Consent
B	Work Plan Modification Documentation
C	Geology/Hydrogeology
C.1	Borehole Logs
C.2	Well Construction Procedures
C.3	Well Construction Details
C.4	Well Development Data
C.5	Hydraulic Conductivity Testing
C.5.1	Pressure Packer Testing
C.5.2	Slug Testing
C.6	Soil Testing Report
C.7	Test Pit Logs
D	HELP Model Simulations
E	Laboratory Data and Report Documentation Packages
F	Laboratory Data Validation
F.1	First Round
F.2	Second Round
F.3	Third Round
G	Contaminant Loading Calculations
H	Environmental Fate and Transport
I	Toxicological Summaries

Appendix A

Rochester Fire Academy Consent Order (828015)

APPENDIX A
ORDER ON CONSENT



City of Rochester

KLB

Department of
Environmental Services

Office of the Commissioner

City Hall
30 Church Street
Rochester, New York 14614

January 10, 1990

Paul Werthman
Malcolm Pirnie, Inc.
S 3515 Abbott Road
Box 1938
Buffalo, New York 14219

Re: Fire Academy Consent Order (828015)

Dear Paul:

Attached is the copy of the order on consent for the Fire Academy site. I apologize for not sending a copy of the order to you sooner.

Sincerely,

Mark Gregor
Environmental Analyst

MG:K
Encl.

STATE OF NEW YORK: DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of the Development and Implementation of a Remedial Investigation, Feasibility Study and a Remedial Program For an Inactive Hazardous Waste Disposal Site Under Article 27, Title 13, of the Environmental Conservation Law of the State of New York (the "ECL") by:

ORDER
ON
CONSENT

THE CITY OF ROCHESTER

Respondent

INDEX NO. B8-0205-87-09
SITE #828015

WHEREAS:

1. The New York State Department of Environmental Conservation (the "Department") is responsible for the enforcement of Article 27, Title 13 of the Environmental Conservation Law of the State of New York (the "ECL"), entitled "Inactive Hazardous Waste Disposal Sites".

2. The City of Rochester ("Respondent") is a municipality in the State of New York, located within Monroe County.

3. Respondent owns real property located at 1190 Scottsville Road, in the City of Rochester, Monroe County, and operates a facility known as the Rochester Fire Academy at that location (the "Site"). A map of the Site is attached hereto as Appendix "A".

4. The Department alleges that during the course of operations at the Rochester Fire Academy certain hazardous wastes were disposed of at the Site while Respondent was the owner and operator of the Site.

5. The Department has listed the Site in the Registry of Inactive Hazardous Waste Disposal Sites in the State of New York as Site Number 8-28-015, and has classified it pursuant to ECL §27-1305 under Classification 2, a "significant threat to the public health or environment - action required".

6. Initial investigations at the Site have identified areas at the Site which exhibit elevated levels of some metals, other inorganic constituents, and organic constituents.

7. Pursuant to ECL Section 27-1313(3)(a), whenever the Commissioner of Environmental Conservation (the "Commissioner") "finds that hazardous wastes at an inactive hazardous waste disposal site constitute a significant threat to the environment, he may order the owner of such site and/or any person responsible for the disposal of hazardous wastes at such site (i) to develop an inactive hazardous waste disposal site remedial program subject to the approval of the department, at such site, and (ii) to implement such program within reasonable time limits specified in the order."

8. The Department and Respondent acknowledge that the goals of this Order shall be that Respondent shall develop and implement a remedial investigation, feasibility study and remedial program for an inactive hazardous waste disposal site, subject to the approval of the Department, and shall implement such program within the time limits specified

hereinafter. The program shall be developed and implemented to abate and eliminate any significant threat to the public health or environment.

9. Respondent, having waived its right to a hearing herein as provided by law, and having consented to the issuance and entry of this Order without any adjudication of fact or law and without admitting any liability except as may be incurred hereunder, agrees to be bound by the terms and conditions of this Order.

NOW, THEREFORE, having considered this matter and been duly advised, it is ORDERED THAT:

I. Respondent shall retain a third-party professional consultant, contractor and/or laboratory to perform the technical, engineering and analytical obligations required by this Order. The qualifications and professional expertise of any third party so employed shall be subject to the approval of the Department.

II. All submittals made by Respondent pursuant to this Order shall be subject to Departmental review and approval.

If the Department approves a submittal, Respondent shall perform the specified work or continue with Respondent's obligations under the Order in accordance with the terms of the approval and under the Department's supervision. The submittal once approved by the Department shall be appended to and made a part of this Order.

If the Department disapproves a submittal, the Department shall notify Respondent in writing of the reasons for such disapproval. Within 30 days of receipt of such notice, or such greater period as the Department may allow, the Respondent shall revise and resubmit the submittal, addressing each of the Department's objections. If the Department approves the revised submittal, Respondent shall perform the specified work or continue with Respondent's obligations under the Order in accordance with the terms of the approval and under the Department's supervision.

In the event that the approved Remedial Design requires modification during implementation, such modification must receive the prior written approval of the Department before incorporation of such modification into the approved Remedial Design.

If the Department disapproves any revised submittal, Respondent shall be in violation of this Order, not having submitted an approvable document in accordance with the terms of this Order.

III. Respondent shall undertake and complete the Remedial Investigation and Feasibility Study program for the Site in accordance with the plan which has been approved by the Department (the "Approved Proposal"). The Approved Proposal shall be attached hereto as Appendix "B" and shall be incorporated as a part of this Order. Respondent and any consultant, contractor or subcontractor shall conduct all activities in accordance with the procedures and protocols as

specified in the Approved Proposal.

IV. Within 90 days of the date specified for completion of the Remedial Investigation, Respondent shall submit to the Department a Remedial Investigation Report (the "Report"), founded upon its performance of the Remedial Investigation in accordance with the Approved Proposal. The Report shall include a certification by the project manager or supervisor that the work conducted was performed in accordance with the Approved Proposal, a copy of all data generated, and all other information obtained, during the Remedial Investigation and shall provide all assessments and evaluations as set forth in the most current United States Environmental Protection Agency ("EPA") guidance documents for projects pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, 42 U.S.C. §9601 et seq. ("CERCLA") and shall be consistent with the national contingency plan as developed pursuant to that statute.

V. The Department reserves the right to require a modification and/or amplification and expansion of the Remedial Investigation and Report by Respondent to address specific areas if the Department determines that further investigation is necessary, as a result of reviewing data generated by the Remedial Investigation or as a result of reviewing other data or facts. provided that such modification, amplification or expansion is consistent with

the requirements of the Report as specified in Paragraph IV above.

VI. Within the time provided therefor in the Approved Work Plan, but not more than six months after receipt of the Department's approval of the Report, Respondent shall submit to the Department a feasibility study (the "Feasibility Study") evaluating on-Site and off-Site remedial actions to eliminate or mitigate the health and environmental hazards and potential hazards attributable to the Site. The Feasibility Study shall be prepared and certified by a licensed professional engineer registered in the State of New York. The Feasibility Study shall be in accordance with the most current EPA guidance documents for projects pursuant to CERCLA and shall be consistent with the national contingency plan as developed pursuant to that statute.

VII. After submission of the proposed Feasibility Study, the Respondent shall publish a notice prepared by the Department, advising of the availability of this Order and its Appendices and all proposals and reports concerning the Site and shall announce a location where documents are provided for public review and comment. The Department and Respondent will accept written comments from the public for a period of 30 days following the notice. The Respondent shall provide for oral comments at a public hearing during the comment period and shall submit a transcript of these proceedings to the Department.

At the conclusion of the comment period, the Department

will review such documents and comments which it has received. The Department shall then determine whether or not Respondent's proposed Feasibility Study adequately addresses those comments and concerns raised during the comment period and shall provide a written record of such review to Respondent and the public.

If the Department determines that the proposed Feasibility Study adequately addresses remediation of the Site as consistent with CERCLA and in view of the public comments received, then Respondent shall develop and submit a proposal for the construction of the Remedial Design for approval by the Department.

If the Department determines that the Feasibility Study requires modification, expansion or adjustment, the Department shall identify the elements of adjustment determined to be necessary and shall so inform the public and Respondent.

Respondent shall modify the Feasibility Study in accordance with the comments received and shall submit the modified Feasibility Study to the Department for review and approval. The Department shall provide written notice to Respondent of its approval or disapproval of the modified Feasibility Study and its reasons for such determination.

If the Department approves the modified Feasibility Study, Respondent shall submit the Remedial Design. If the Department disapproves the modified Feasibility Study, the Department shall take whatever action the Department deems

appropriate.

VIII. Within 180 days after receipt of the Department's approval of the Feasibility Study, Respondent shall submit to the Department an engineering report, plans and specifications for a remedial program (the "Remedial Design").

The Remedial Design shall include, but not be limited to, the following:

a. A description of the means of effectuating the combination of technologies which has been selected from the alternatives by the approved Feasibility Study, and which collectively constitutes the Remedial Program ("Remedial Program") to include but not be limited to, as necessary or appropriate as determined by the Department:

(1) the disposition of hazardous wastes, constituents and degradation products, and any soil or other materials contaminated thereby;

(2) the collection, treatment, and disposition of any contaminated groundwater, leachate and air;

(3) physical security and posting of the Site;

(4) health and safety of persons living and/or working at or in the vicinity of the areas being remediated;

(5) quality control and quality assurance procedures and protocols to be applied to Remedial Program construction operations;

(6) integrated air monitoring on and off-Site during implementation of the Remedial Program.

b. "Contract-ready" documents for the construction of the elements of the Remedial Program, including plans and specifications prepared and certified by a licensed professional engineer registered in the State of New York, which plans shall satisfy all applicable state and federal laws, rules and regulations;

c. A time schedule for construction of the elements of the Remedial Program and provisions for periodic work-in-progress reports during the implementation of the Remedial Program;

d. The parameters, conditions, procedures and protocols to determine the effectiveness of the Remedial Program, including a schedule for periodic sampling of existing and planned groundwater monitoring wells;

e. A description of the maintenance and monitoring activities, procedures and protocols to be undertaken during the period commencing upon completion of the construction of the elements of the Remedial Program, including a provision for submission to the Department of periodic monitoring reports ("post-closure monitoring");

f. A contingency plan to be implemented in the event that any element of the Remedial Program fails to operate in accordance with the Remedial Design prior to the date 30 years after satisfactory completion of construction pursuant thereto ("Supplemental Remedial Program"); and

g. An evaluation of the need to take measures to provide for the health and safety of human beings working or

residing at and in the vicinity of the Site during a 30-year period following completion of the implementation of the Remedial Program, and a plan for the implementation of such measures.

IX. Within such period as may be allowed by the approved Remedial Design and any modifications thereto which have been approved by the Department or any Supplemental Remedial Program which may be required, Respondent shall complete construction pursuant to the approved Remedial Design and any modifications to the Remedial Design which have been approved by the Department. Within 45 days of completion of construction, Respondent shall submit to the Department record drawings and a certification that construction was completed in accordance with the approved Remedial Design and any approved modifications. Such certification shall be by a licensed professional engineer registered in the State of New York.

X. Within 45 days after receipt of the record drawings and certification, the Department shall review the same and provide comments to Respondent. In the event that the Department is not satisfied with the quality and completeness of construction, the Department may take any action and pursue any remedy to which it may be entitled by law.

If the Department acknowledges that the implementation is complete and in accordance with the Approved Remedial Design, then unless a Supplemental Remedial Program is required hereof, and except for the requirements of

paragraphs XII, XIII and the conditions set forth in paragraph XIV hereof, such acknowledgement shall constitute a full and complete satisfaction and release of each and every claim, demand, remedy or action whatsoever against Respondent, its directors, officers, employees, agents, successors and assigns, which the Department has or may have pursuant to Article 27, Title 13, of the ECL relative to or arising from the disposal of hazardous waste at the Site which caused the Site to be listed in the Registry.

This release shall inure only to the benefit of Respondent, its directors, officers, employees, agents, successors and assigns, with respect to the aforesaid matter.

Nothing herein shall be construed as barring, diminishing, adjudicating or in any way affecting any legal or equitable rights or claims, interests, defenses, actions, suits, causes of action or demands whatsoever that the Department or Respondent may have against anyone other than the parties to this Order.

XI. The right of the Department to enforce the terms of this Order shall not be affected by any release contained herein.

XII. Notwithstanding any provision contained in this Order to the contrary, for a period of 30 years from the date of the Department's written acknowledgement that Respondent has completed the implementation of the construction and other elements in accordance with the approved Remedial Design, or for such other period of time as may be designated

commensurate with Respondent's obligations pursuant to this Order, Respondent shall maintain and monitor the areas at which the elements of the Remedial Program were implemented in accordance with the approved Remedial Design ("Post-Closure Period"). During such Post-Closure Period, respondent shall provide the Department with the periodic monitoring reports, as set forth in the approved Remedial Design and shall provide immediate notice to the Department of any failure of the Remedial Program. In the event of any failure of the Remedial Program or any element thereof during the implementation of the Remedial Program or during the Post Closure Period, Respondent shall develop and submit a Supplemental Remedial Program.

XIII. Nothing contained in this Order shall be construed as barring, diminishing, adjudicating or in any way affecting:

a. any legal or equitable rights or claims, actions, suits, causes of action or demands whatsoever that the Department may have against anyone other other than Respondent, its directors, officers, employees, servants, agents, successors and assigns;

b. the Department's right to enforce at law or in equity the terms and conditions of this Order against Respondent, its directors, officers, employees, servants, agents, successors and assigns in the event that Respondent shall fail to satisfy any of the terms hereof:

c. the Department's right to bring any action at law or

in equity against Respondent, its directors, officers, employees, servants, agents, successors and assigns with respect to areas or resources that may have been affected or contaminated as a result of the disposal of hazardous wastes, including, but not limited to, the release or migration of hazardous or industrial wastes from the Site or from activities related to the Site.

XIV. Notwithstanding any other provision in this Order, the Department reserves the right to institute proceedings in this matter or in any other matter which are (1) seeking to compel the Respondent and/or third parties to perform additional response work at the Site or (2) seeking reimbursement of the Department's response costs if:

a. for proceedings initiated prior to the acknowledgement by the Department that the implementation is complete and in accordance with the Approved Remedial Design, such proceedings shall be founded upon (i) conditions at the Site which were previously unknown to the Department or (ii) information received by the Department after the execution of this Order, and such conditions or information indicates that the Remedial Design will not be sufficiently protective of human health or the environment; or

b. for proceedings initiated subsequent to the acknowledgement by the Department that the implementation is complete and in accordance with the Approved Remedial Design, such proceedings shall be founded upon (i) conditions at the Site which were previously unknown to the Department or, (ii)

information which is received, in whole or in part after such acknowledgement by the Department, and such conditions or information indicates that the Remedial Design is not protective of human health or the environment.

XV. Respondent shall provide notice to the Department of any field work (including, but not limited to, any excavating, drilling or sampling) to be conducted pursuant to the terms of this Order at least five (5) working days in advance of such activities.

XVI. Respondent shall permit any duly designated officer, employee, consultant, contractor or agent of the Department to enter upon the Site or areas in the vicinity of the Site which may be under the control of Respondent, and any areas necessary to gain access thereto, for inspection purposes and for the purpose of making or causing to be made such sampling and tests as the Department deems necessary, and for ascertaining Respondent's compliance with the provisions of this Order.

XVII. The Department shall have the right to obtain "split samples" or "duplicate samples" or both, at the Department's option, of all substances and materials sampled by Respondent pursuant to this Order.

XVIII. Respondent shall obtain whatever permits, easements, rights-of-way, rights-of-entry, approvals or authorizations which are necessary in order to perform Respondent's other obligations pursuant to this Order. However, for any permit administered and issued by the

Department, the Department's approval of plans and specifications as a part of the remedial programs encompassed by this Order shall constitute authorization in lieu of a permit, provided that the affected program, regulations or specific applicable permit are identified and that such plans and specifications are included in the appendices to this Order and incorporated as a part of this Order.

XIX. Within 30 days after the effective date of this Order, Respondent shall have filed a Declaration of Covenants and Restrictions with the Monroe County Clerk's Office for the purpose of providing notice of this Order to all potential future purchasers of any portion or all of the Site. This Declaration must indicate that any successor in title to any portion or all of the Site shall be responsible for implementing the provisions of this Order. A certified copy of this filing shall be provided to the Department.

XX. As used in this Order, "hazardous waste" shall mean a waste which appears on the list, or satisfies the characteristics promulgated by the Commissioner pursuant to Section 27-0903 of the ECL and found at 6 NYCRR Part 371, and any hazardous constituents or hazardous degradation products of a waste or combination of wastes which, because of its quantity, concentration, or physical, chemical or infectious characteristics may pose a substantial present or potential hazard to human health or the environment.

XXI. Respondent shall not suffer any penalty under any of the terms hereof, or be subject to any proceedings or

actions for any remedy or relief, if it cannot comply with any requirements of the terms hereof because of an act of God, war, riot or other condition as to which negligence or willful misconduct on the part of Respondent was not the proximate cause, provided, however, that Respondent shall immediately notify the Department in writing when it obtains knowledge of any such condition and request an appropriate extension or modification of the terms of this Order.

XXII. The failure of Respondent to comply with any terms of this Order shall constitute a default and a failure to perform an obligation under this Order and under the ECL. In the event of default by the Respondent, the Department may initiate any action and pursue any remedy which may be available to it.

XXIII. The terms of this Order shall not be construed to prohibit the Commissioner or his duly authorized representative from exercising any summary abatement powers, either at common law or as granted pursuant to statute or regulation.

XXIV. Respondent shall indemnify and hold the Department, the State of New York, and their representatives and employees harmless for all claims, suits, actions, damages and costs of every name and description arising out of or resulting from the fulfillment or attempted fulfillment of the terms of this Order by Respondent, its directors, officers, employees, servants, agents, successors or assigns.

XXV. Respondent, having conducted a record search to

identify sources of materials utilized at the Site and to identify other parties who have used the Site and having reported thereon to the Department, shall have a continuing obligation to submit to the Department any data or information of which Respondent becomes aware and which may be applicable to identifying other parties who may be held liable for costs of the remedial program.

Respondent shall notify each other party so identified by Respondent or the Department of that party's potential liability and shall provide the Department with a copy of such notification, and copies of any other correspondence related thereto or resulting therefrom.

Respondent shall provide the Department with any information concerning, and provide an accounting of, any contributions, liability, reimbursements or indemnifications by or from any other parties related to expenditures undertaken by Respondent pursuant to this Order. The Department shall not be bound by any cost allocation or contribution agreements among any parties unless the Department has approved such allocations in writing.

XXVI. The effective date of this Order shall be the date this Order is signed by the Commissioner or his designee.

XXVII. If, for any reason, Respondent desires that any terms of this Order be changed, Respondent shall make timely written application therefor to the Commissioner setting forth reasonable grounds for the relief sought.

XXVIII. A. All communication required hereby to be made between the Department and Respondent shall be made in writing and transmitted by United States Postal Service return receipt requested, or hand delivered or delivered via a similar carrier service which records delivery, to each of the addresses listed below.

B. Submissions to be made by Respondent to the Department shall be submitted in two copies to each of the following addresses:

1. New York State Department of
Environmental Conservation
Division of Hazardous Waste Remediation
Region 8
6274 E. Avon-Lima Road
Avon, New York 14414
2. New York State Department of
Environmental Conservation
Division of Environmental Enforcement
600 Delaware Avenue
Buffalo, New York 14202-1073
3. New York State Department of
Environmental Conservation
Division of Hazardous Waste Remediation
Bureau of Eastern Remediation
50 Wolf Road
Albany, New York 12233
4. New York State Department of Health
Bureau of Environmental Exposure
Investigation
2nd Floor
2 University Place
Albany, New York 12237

C. Communication to be made from the Department to Respondent shall be made in duplicate as follows:

Edward J. Doherty
Commissioner of Environmental Services
Room 300 B
City Hall
30 Church Street
Rochester, New York 14614

Johanna F. Brennan, Esq.
4th Floor - Law Department
City Hall
30 Church Street
Rochester, New York 14614

D. The Department and Respondent respectively reserve the right to designate other or different addresses on notice to the other.

XXIX. The terms of this Order shall be deemed to bind Respondent, its officers, directors, agents, servants, employees, successors and assigns.

XXX. Nothing herein shall be construed to bind any entity not specifically bound by the terms of this Order.

XXXI. The terms hereof shall constitute the complete and entire Order between Respondent and the Department concerning the Site. No terms, conditions, understandings or agreements purporting to modify or vary the terms hereof shall be binding unless made in writing and subscribed by the party to be bound. No informal advice, guidance, suggestions or comments by the Department regarding reports, proposals, plans, specifications, schedules or any other writing

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of the foregoing Order, waives its right to a hearing herein as provided by law, and agrees to be bound by the provisions, terms and conditions contained herein.

THE CITY OF ROCHESTER

BY: *Louis Kash*

TITLE: *Corporation Counsel*

DATE: *5/5/89*

State of New York)
County of) s.s.:

On this *5th* day of *May*, 1989,
before me personally came *Louis Kash*
to me known, who, being by me duly sworn, did depose
and say that he resides in *Rochester*; that he
is the *Corp. Counsel* of the City of Rochester, the
municipality described in and which executed the foregoing
instrument; that he knew the seal of said municipality; that
the seal affixed to said instrument was such seal; that it
was so affixed by the appropriate order in accordance with
the Charter of the municipality, and that he signed his name
thereto by like order.

Brenda A. Teachout (Patryalek)
NOTARY PUBLIC

BRENDA A. TEACHOUT (*Patryalek*)
Notary Public in the State of New York
MONROE COUNTY
Commission Expires July 31, 1989

Appendix C

Geology/Hydrogeology

**Includes Historical Borehole Logs, Well Development
Information, and Construction Procedures**

APPENDIX C
GEOLOGY/HYDROGEOLOGY

APPENDIX C.1
BOREHOLE LOGS

BOREHOLE LOG MW-6D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1171.90, E1987.59
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/6/90-4/9/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: RHF
 SURFACE ELEVATION: 526.30 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in. ID)
 ST Shelby Tube (2.8in. ID)
 NR Weight of Rods
 NH Weight of Hammer
 NA No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE 0 100	COMMENTS
1	525.3	FILL Black, gravelly ballast, loose, moist		1 SS	3 2 3 4	12	5	x	JHS=0.1
2	524.3	Red brown silty clay, trace fine sand, occasional silt varve and subangular gravel, firm, moist		2 SS	5 6 7 8	8	13	x	JHS=0
3	523.3	4.0 ft							
4	522.3	BROWN CLAYEY SILT Red brown silty clay, trace fine sand, occasional silt varve, subangular fine gravel, and vegetative matter, very plastic, moist becoming wet		3 SS	4 3 5 7	11	8	x	JHS=0
5	521.3	Red brown silty sandy clay with occasional silt and fine to medium sand varves, moderately to very plastic, moist, wet at varves		4 SS	6 9 7 8	16	16	x	JHS=0
6	520.3	Red brown sandy silt, trace coarse sand and clay, moderately plastic, wet		5 SS	3 7 11 14	15	18	x	JHS=0
7	519.3	Red brown sandy clay, moist to wet		6 SS	3 11 16 21	19	27	x	JHS=0
8	518.3	Red brown silt, little clay, trace fine sand, occasional coarse sand and fine gravel, firm, moist		7 SS	16 22 29 40	20	51	x	JHS=0
9	517.3	Red brown clayey silt, occasional fine subrounded gravel, moderately plastic, moist		8 SS	9 11 14 14	16	25	x	JHS=0
10	516.3	Red brown silt, little clay, trace fine sand, occasional coarse sand and fine gravel, firm, moist		9 SS	3 3 2 3	24	5	x	JHS=0
11	515.3	Red brown clay, little silt, very plastic, moist to wet							
12	514.3								
13	513.3								
14	512.3								
15	511.3								
16	510.3								
17	509.3								
18	508.3								

BOREHOLE LOG MW-6D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1171.90, E1987.59
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/6/90-4/9/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: RHF
 SURFACE ELEVATION: 526.30 ft.AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 WH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft.BGS)	ELEVATION (ft.AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6" RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
19	507.3	GRAY CLAYEY SILT Gray clay, little silt, very plastic, peanut butter like texture		10 SS	WH 2 1 2	24	3	
20	506.3							
21	505.3			11 SS	WH WH WH	24	0	
22	504.3							
23	503.3	Gray fine sand, some silt, little clay, moderately loose, wet		12 SS	NR NR 2 2	24	2	
24	502.3	Gray silt, little clay and very fine sand, plastic, wet						
25	501.3			13 SS	WH WH WH WH	24	0	
26	500.3							
27	499.3			14 SS	NR NR NR WH	24	0	
28	498.3	Same, except grading to very plastic clay with little silt						
29	497.3			15 SS	NR NR WH 3	24	0	
30	496.3							
31	495.3			16 SS	WH 10 4 3	19	14	
32	494.3	GRAY SAND AND GRAVEL Gray fine sand and silt, some fine to medium subrounded gravel, trace clay, wet						
33	493.3	Gray fine sand and silt, some fine subrounded gravel, loose, wet		17 SS	WH WH 2 100	7	2	
34	492.3	TOP OF BEDROCK AT 34.0 FT BGS						
35	491.3			18 SS	50 - -	0	0	
36	490.3							

100 blow counts/4"
 50 blow counts/0"

BOREHOLE LOG MW-6D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
PROJECT NO.: 0965-04-1
LOCATION: ROCHESTER, N.Y.
SURVEY COORDINATES: N1171.90, E1987.59
SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
DRILLING DATES: 4/6/90-4/9/90
DRILLING METHOD: 6.25-inch ID HSA
LOGGED/CHECKED BY: RHF
SURFACE ELEVATION: 526.30 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
ST Shelby Tube (2.8in.ID)
NR Height of Rods
NH Height of Hammer
NR No Recovery
- Sampler Refusal

JHS Total VOC Detected in the Sample
Head Space (ppm)
GSD Grain Size Dist.
ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
37	489.3	Hard gray to dark gray, coarse grained laminated dolostone, upper 2' broken to moderately broken, rest massive, calcite and chalcopryite mineralization occurring along some fractures, slightly weathered, several 1/4 to 1' vugs. some mineralized, stylolites present							
38	488.3								
39	487.3								
40	486.3								
		BOREHOLE COMPLETED TO 54.4 FT BGS							
41	485.3								
42	484.3								
43	483.3								
44	482.3								
45	481.3								
46	480.3								
47	479.3								
48	478.3								
49	477.3								
50	476.3								
51	475.3								
52	474.3								
53	473.3								
54	472.3								

PRELIMINARY STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PAGE 1 OF 1

PROJECT NAME: Rochester Fire Academy RE/ES GROUND ELEVATION: _____

HOLE DESIGNATION: MW-6D

PROJECT NO.: 0965-04-1

REFERENCE ELEVATION: _____

DATE LOGGED: 4/11/80

CLIENT: City of Rochester

SUPERVISOR: C. Funk

LOCATION: _____

GEOLOGIST: R. F. Capper / M. R. Kohnstein

FROM	AT	TO	R U N	I N T	DESCRIPTION AND REMARKS	H ₂ O	REC. FT	%	ROD FT	%
34'	34'	44'	1	10'	Hard Gray to Dk Gray laminated Dolostone ^{broken to} moderately ^{moderately} massive	0%	9.5	95	6.1	64
					Broken (upper 2') Calcite & Chalcopryite mineralization					
					occuring along some fractures slightly weathered					
					Several 1/4" to 1" vugs (some mineralized)					
44'	44	54'	2	10'	Same as previous except massive, vugs generally mineralized	0%	10	100	9.1	91
36.6	36.6	44.6	1	8'	Hard Gray to dark gray coarse grained, laminated dolostone, moderately broken, weathered & fractured		8	100	6.1	80
					(unbed) some vugs, ore'l mineralized					
44.6	44.6	45.1	2	.5'	same as above, but not fractured		.5	100	.5	100

61
4/11/80

BOREHOLE LOG MW-7D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1019.44, E1042.33
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/19/90-4/20/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: RHF
 SURFACE ELEVATION: 517.30 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 NH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSO Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' 8blows/6in)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
1	516.3	FILL Black, loose, organic-rich silt, abundant rootlets, occasional cinders		1 SS	3 50	19	55		JHS=0.4 50 blow counts/5"
2	515.3	BROWN SILTY SAND (ALLUVIUM) Black organic-rich silt with abundant roots grading to dark brown to medium brown silty fine sand, little clay, moderately plastic, moist		2 SS	2 2 3 16	20	5		JHS=100 Strong sweet odor noted
3	514.3	Brown fine sand and silt mottled with gray fine sand, trace clay, some black staining, wet		3 SS	11 33 30 18	17	63		JHS=170
4	513.3	MOTTLED BROWN/GRAY SILTY SAND (ALLUVIUM) Gray medium sand, some silt, little medium to coarse subangular gravel, moderately loose, wet		4 SS	13 36 14 19	10	50		JHS=14
5	512.3	Gray brown silty fine to medium sand, little subrounded fine to coarse gravel, moderately dense, wet		5 SS	14	16	45		JHS=15
6	511.3	Gray fine sand and silt, mottled with orange brown, some fine to coarse subangular gravel, dense, wet		6 SS	5 7 11 16	20	18		JHS=20
7	510.3	Gray sand and gravel		7 SS	8 10 12 10	8	22		JHS=20
8	509.3	Gray fine to medium sand, some fine to coarse subangular gravel, dense, wet		8 SS	6 25 15 15	20	40		JHS=350
9	508.3	Gray fine to coarse subangular gravel in a fine sand matrix, moderately dense, wet		9 SS	8 13 35 50	12	48		JHS=40 50 blow counts/1"
10	507.3	Same, except moderately loose							
11	506.3								
12	505.3								
13	504.3								
14	503.3								
15	502.3								
16	501.3								
17	500.3								
18	499.3								

BOREHOLE LOG MW-7D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1019.44, E1042.33
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/19/90-4/20/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: RHF
 SURFACE ELEVATION: 517.30 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 NH Weight of Hammer
 NA No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
19	498.3	Gray silty fine to medium sand and fine to coarse gravel, moderately dense, wet		10 SS	7 12 15 13	18	27		JHS=50
20	497.3			11 SS	13 25 50 -	16	75		JHS=30 50 blow counts/5"
21	496.3								
22	495.3			12 SS	8 10 14 26	18	24		JHS=15
23	494.3								
24	493.3	Gray fine sand and silt, some fine to coarse subrounded gravel, dense, moist		13 SS	20 28 44 50	17	62		JHS=10 50 blow counts/4"
25	492.3								
26	491.3			14 SS	36 35 42 44	16	76		JHS=5
27	490.3								
28	489.3			15 SS	9 14 28 39	19	42		JHS=5
29	488.3								
30	487.3	TOP OF BEDROCK AT 30.2 FT BGS.		16 SS	50 - -	0	50		50 blow counts/2" No recovery
31	486.3								
32	485.3	Hard, gray, slightly weathered dolostone, laminated, moderately broken 31.5 to 33 feet, very broken from 33 to 34 feet, rest moderately broken to massive, some dolomite gravel from solution cavity, slight diesel fuel odor noted							Strong oily sheen on rods Black grease-like blebs on return water with oily sheen halos
33	484.3								
34	483.3								
35	482.3								
36	481.3	BOREHOLE COMPLETED TO 50.2 FT BGS.							

PRELIMINARY STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME:

PAGE _____ OF _____

GROUND ELEVATION:

PROJECT NO.:

HOLE DESIGNATION: MW-7I

REFERENCE ELEVATION:

DATE LOGGED:

CLIENT:

LOCATION:

SUPERVISOR: G. Funk

NY COR 3

GEOLOGIST: R. Frappa

[illegible]

PRELIMINARY STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Fire Academy RI/ES GROUND ELEVATION: HOLE DESIGNATION: MW-7D
 PROJECT NO.: 0965-04-1 REFERENCE ELEVATION: DATE LOGGED:
 CLIENT: City of Rochester SUPERVISOR: G. Funk
 LOCATION: Rochester, NY GEOLOGIST: R. Engpa

7/24/90 Drilling

FROM	AT	TO	R U N	I N T	DESCRIPTION AND REMARKS	H ₂ O	REC. FT	%	ROD FT	%
HQ 37.5	36.5	34.0	1	25	* Hard Gray Slightly weathered Dolostone, coarse grained, laminated	Return 75%	2.9	110	2.1	75
					36.5 - 33 Mod. Broken 33-34 V. Broken - some subrounded					
					dolomite gravel from solution cavity? - Slight layered fuel					
					odor - strong oily sheen on rods - Black grease-like					
					Blebs on return water w/ oil sheen Halos					
NK 34		41	2	7		Return 50%				
	37				Solution cavity - 6" Void in Rock	Return 0%				
41		50	3	9		Return 0%	8.0	89	6.8	84

* Top of Rock 30.2'

BOREHOLE LOG MW-8D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
PROJECT NO.: 0965-04-1
LOCATION: ROCHESTER, N.Y.
SURVEY COORDINATES: N819.00, E2299.75
SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
DRILLING DATES: 4/12/90
DRILLING METHOD: 6.25-inch ID HSA
LOGGED/CHECKED BY: RMF
SURFACE ELEVATION: 517.20 ft. AMSL

SYMBOLS AND DEFINITIONS

SS	Split Spoon (2in.ID)
ST	Shelby Tube (2.8in.ID)
NR	Height of Rods
HH	Height of Hammer
NR	No Recovery
-	Sampler Refusal

JHS Total VOC Detected in the Sample
Head Space (ppm)
GSD Grain Size Dist.
ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
1	515.2	BROWN SILTY SAND (ALLUVIUM) Brown fine sand and silt, with vegetative matter, upper 6' organic-rich, moist		1 SS	2 2 5 5	16	7	x	JHS=0
2	515.2	Brown silty fine sand, occasional roots, moderately loose, moist becoming wet		2 SS	1 1 2 1	17	3		x
3	514.2	MOTTLED BROWN/GRAY SILTY SAND (ALLUVIUM) Brown silty fine sand, occasional mottling with gray fine sand, moderately loose, wet			3 SS	2 2 2 2	8	4	x
4	513.2								
5	512.2	Same, grading to silt, trace clay		4 SS	NH 1 5 5	24	6	x	JHS=0
6	511.2								
7	510.2	Brown silty fine sand, trace clay, slightly mottled with gray silt. moderately dense, wet		5 SS	4 7 9 9	16	16	x	JHS=0
8	509.2								
9	508.2	GRAY SAND AND GRAVEL Gray fine sand, little silt, loose, wet		6 SS	3 4 4 4	24	8	x	JHS=0
10	507.2								
11	506.2	Gray silty fine sand, some medium sand, trace clay and vegetative material, wet		7 SS	NH NH 2 2	24	2	x	JHS=0
12	505.2								
13	504.2	Same, with increasing amounts of sand		8 SS	1 2 2 2	24	4	x	JHS=0.1
14	503.2								
15	502.2			9 SS	NR NR NR 3	24	0	x	JHS=0
16	501.2								
17	500.2								
18	499.2								

BOREHOLE LOG MW-8D

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
PROJECT NO.: 0965-04-1
LOCATION: ROCHESTER, N.Y.
SURVEY COORDINATES: N819.00, E2299.75
SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
DRILLING DATES: 4/12/90
DRILLING METHOD: 6.25-inch ID HSA
LOGGED/CHECKED BY: RHF
SURFACE ELEVATION: 517.20 ft.AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
ST Shelby Tube (2.8in.ID)
NR Weight of Rods
NH Weight of Hammer
NR No Recovery
- Sampler Refusal

JHS Total VOC Detected in the Sample
Head Space (ppm)
GSD Grain Size Dist.
ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft.BGS)	ELEVATION (ft.AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6" RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
19	498.2	Gray medium sand, loose, wet		10 SS	NR NR NR NR	24	0	JHS=0
20	497.2	Gray medium sand, some fine subrounded gravel, moderately loose						
21	496.2	Gray medium to coarse sand and fine to coarse subangular gravel		11 SS	24 54 47 27	24	101	JHS=0
22	495.2							
23	494.2							
24	493.2	Gray silty fine sand, some fine to medium subrounded gravel, slightly plastic, wet						
25	492.2			12 SS	2 4 5 3	16	9	JHS=0
26	491.2	Gray silt and fine sand, some medium sand and fine to coarse subangular gravel, slightly plastic, wet						
27	490.2			13 SS	11 9 10 12	8	19	JHS=0
28	489.2							
29	488.2			14 SS	12 24 34 100	10	58	JHS=0
30	487.2	TOP OF BEDROCK AT 30.0 FT BGS						
31	486.2	Hard gray, coarse grained, laminated, dolostone, moderately broken, vuggy in areas with gypsum mineralization, fractures occur along bedding planes		15 SS	100 - - -		100	100 blow counts/3' 100 blow counts/1'
32	485.2							
33	484.2							
34	483.2	BOREHOLE COMPLETED TO 50.0 FT BGS.						
35	482.2							
36	481.2							

BOREHOLE LOG MW-9I

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1242.68, E1034.92
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/5/90-4/6/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 526.50 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in. ID)
 ST Shelby Tube (2.8in. ID)
 NR Weight of Rods
 MH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	B' / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE 0 100	COMMENTS
1	525.5	FILL Black, coarse sand and slag, trace vegetation, moist		1 SS	2 2 2 2	6	4	x	
2	524.5	Same, except moist to wet, trace brick							
3	523.5			2 SS	3 3 4 4	8	7	x	
4	522.5	Same, except trace coal and silt, wet							
5	521.5			3 SS	3 4 16 5	5	20	x	
6	520.5	6.0							
7	519.5	BROWN CLAYEY SILT Gray fine to coarse sand, some silt and clay, trace shell fragments and subangular gravel, wet		4 SS	3 5 4 6	13	9	x	
8	518.5	Red brown fine sand, some silt, wet							
9	517.5	Red brown silty clay, stiff, dry to moist							
10	516.5	Varved red brown and gray silty clay, stiff, dry to moist		5 SS	5 8 13 11	11	21	x	
11	515.5	Same except not varved							
12	514.5	Red brown sandy clay, moist to wet		6 SS	3 5 6 8	24	11	x	
13	513.5	Red brown silty clay, stiff, dry to moist							
14	512.5	Red brown sandy clay, trace fine subrounded gravel, wet		7 SS	2 2 5 4	24	7	x	
15	511.5	Red brown silty clay, some fine sand, plastic, moist to wet							
16	510.5	Red brown fine sand, some silt, wet		8 SS	3 1 2 3	20	3	x	
17	509.5	Red brown silty clay, some fine sand, plastic, moist to wet							
18	508.5			9 SS	3 2 3 3	23	5	x	

BOREHOLE LOG MW-9I

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1242.68, E1034.92
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/5/90-4/6/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 526.50 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 NH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JMS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE	COMMENTS
19	507.5	Brown silty fine sand, some fine to coarse sand seams, wet			2				
20	506.5	BROWN SAND AND GRAVEL Brown fine to coarse sand, some fine to coarse subangular gravel, trace silt and clay, wet		10 SS	10 22 20	20	32		
21	505.5			11 SS	NR 6 10 7	20	16		
22	504.5	Brown silty fine sand, some subangular gravel, moderately loose, wet							
23	503.5			12 SS	9 9 15 6	8	24		
24	502.5	Same, except moderately dense							
25	501.5			13 SS	8 17 18 22	20	35		
26	500.5								
27	499.5			14 SS	13 17 18 15	13	35		
28	498.5								
29	497.5			15 SS	6 14 23 21	14	37		
30	496.5								
31	495.5			16 SS	8 12 22 18	7	34		
32	494.5								
33	493.5			17 SS	15 34 28 40	12	62		
34	492.5	Brown fine to coarse sand and fine to coarse angular gravel, trace silt, wet							
35	491.5			18 SS	25 20 13 50	15	33		
36	490.5								

BOREHOLE LOG MW-9I

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1242.68, E1034.92
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/5/90-4/6/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 526.50 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 NH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

(ft. AMSL) DEPTH (ft. BGS)	ELEVATION	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
37-489.5				19 SS	57 50	6	50		50 blow counts/3"
38-488.5		BEDROCK AT 38.1							
39-487.5		Hard, massive, gray dolostone, moderately broken, weathered along fractures, occasional vertical fractures and mud seams, mineralization along some fractures, with calcite crystals 1/4", occasional vugs, some mineralized.		20 SS	75	0	75		75 blow counts/0"
40-486.5									
41-485.5									
42-484.5		BOREHOLE COMPLETED TO 49.6 ft BGS							
43-483.5									
44-482.5									
45-481.5									
46-480.5									
47-479.5									
48-478.5									
49-477.5									
50-476.5									
51-475.5									
52-474.5									
53-473.5									
54-472.5									

BOREHOLE LOG MW-101

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1220.31, E2549.44
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/18/90-4/19/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 523.90 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in. ID)
 ST Shelby Tube (2.8in. ID)
 WR Weight of Rods
 WH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Jar Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE 0 100	COMMENTS
1	522.9	FILL Black, coarse sand and fine cinders, loose, coffee grounds texture, dry		1 SS	2 3 3 1	12	6	*	
2	521.9	Grey fine sand, some fine to coarse subangular gravel, wet							
3	520.9	Black coarse sand and fine subangular gravel, dry 2.3 ft		2 SS	2 3 5 6	12	8	*	
4	519.9	BROWN CLAYEY SILT Red brown clayey silt, moderately dense, stiff, dry to moist, occasional roots, native							
5	518.9	Same, except occasional fine sand, no roots, stiff, moist		3 SS	2 3 6 8	14	9	*	
6	517.9								
7	516.9			4 SS	4 5 6 8	20	11	*	
8	515.9	Same, except occasional fine subangular gravel							
9	514.9			5 SS	3 3 4 5	24	7	*	
10	513.9	Same, except some plasticity, trace fine sand							
11	512.9			6 SS	2 3 3 2	24	6	*	
12	511.9								
13	510.9	Red brown fine sand, some silt, wet Red brown clayey silt, moderately dense, moderately stiff, moist		7 SS	2 4 4 4	24	8	*	
14	509.9	Red brown clayey, sandy, silt, loose, wet							
15	508.9	Same, except moderately stiff		8 SS	WR 1 1 1	24	2	*	
16	507.9	GRAY CLAYEY SILT Grey and red brown silty clay, soft, plastic, wet							
17	506.9	Same, except with occasional fine subangular gravel, wet		9 SS	WR WH 5 3	24	5	*	
18	505.9								

BOREHOLE LOG MW-101

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1220.31, E2549.44
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/18/90-4/19/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 523.90 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in. ID)
 ST Shelby Tube (2.8in. ID)
 WH Weight of Rods
 WH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 JHS Jar Head Space (ppm)
 GSO Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft. BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6" WH	RECOVERY (in)	'N'-VALUE	'N'-VALUE 0 100	COMMENTS
19	504.9	GRAY SAND AND GRAVEL Gray fine sand, some fine to coarse subangular gravel, trace silt, loose, wet		10 SS	3 4 11	12	7		
20	503.9								
21	502.9			11 SS	2 3 4 12	11	7		
22	501.9								
23	500.9			12 SS	100 - -	4	100		
24	499.9	Boulder or dolostone bedrock shelf encountered from 24.0 to 27.5 ft. BGS							
25	498.9								
26	497.9								
27	496.9								
28	495.9	Highly fractured gray dolostone and red brown coarse subrounded very coarse gravel							
29	494.9								
30	493.9	Basal fluvial coarse subrounded gravel, multicolored and multicompositional, some fine white to clear quartz gravel							
31	492.9	TOP OF BEDROCK AT 31.0 FT BGS							
32	491.9	Hard, gray to dark gray coarse grained, laminated, dolostone, moderately broken, weathered along fractures, one gypsum layer, occasional vugs, most mineralized							
33	490.9								
34	489.9								
35	488.9	BOREHOLE COMPLETED TO 43.0 FT BGS.							
36	487.9								

PAGE 1 OF 1

HOLE DESIGNATION: MW-101

DATE LOGGED: 4/23/90

SUPERVISOR: G. FUNK

GEOLOGIST: M. Rohstein

FROM	AT	TO	R U N	I N T	DESCRIPTION AND REMARKS	H ₂ O	REC. FT	%	REC. FT	%	ROD FT	%
24.5	24.5	27.5	1	3'	Hard, Gray to dark gray coarse grained laminated dolostone, moderately broken, weathered along fracture very weathered at bottom.		1.1	33	.55	50		
27.5	27.5	29	2	1.7	Same rock as above, except highly fractured - in pieces. Several fragments are a brown-maroon color and generally weathered. Maroon fragments react vigorously to HCl. Dark grey show mild reaction.		1.7	18	0	0		
31.8	31.8	33.3	3	1.5	Hard dk. Gray to gray coarse grained, laminated dolostone, top 1' very broken in fragments. The rest is moderately broken fractured along bedding planes.		1.5	100	.45	30		
33.3	33.3	34.3	4	10	Hard, Gray to dark gray coarse grained, laminated dolostone, moderately broken, weathered along fractures, one gypsum layer, sec'd vugs, most mineral filled		9.65	97	8.7	90		
					top 1' highly fractured							

BOREHOLE LOG MW-11I

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N916.14, E2564.54
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/23/90-4/24/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 517.40 ft. AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 WH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Jar Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft.BGS)	ELEVATION (ft. AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	0 100 'N'-VALUE	COMMENTS
1	516.4	BROWN SILTY SAND (ALLUVIUM) Dark brown sandy silt, organic-rich, roots, moist		1 SS	2 3 3	12	5	x	JHS=0
2	515.4	Yellow brown silty fine sand, wet							
3	514.4	Ochre fine sandy silt, moderately plastic grading to fine sand, little silt, becoming less plastic, moist		2 SS	2 3 3 4	12	6	x	JHS=0
4	513.4	MOTTLED BROWN/GRAY SILTY SAND (ALLUVIUM) Ochre and gray mottled fine sand, occasional roots, moist to very moist at bottom		3 SS	3 5 5 5	18	10	x	JHS=0
5	512.4								
6	511.4	Same, except trace clay, no roots, moist to wet		4 SS	2 3 4 5	14	7	x	JHS=0
7	510.4								
8	509.4	Ochre and gray mottled fine sandy silt, trace clay, orange iron staining, black blebs or concretions 1-2 mm, moderately stiff, wet		5 SS	2 3 2 3	21	5	x	JHS=0
9	508.4								
10	507.4								
11	506.4	GRAY SAND AND GRAVEL Dark gray fine sand, trace silt and clay, uniform, wet		6 SS	1 NR 2 1	22	2	x	JHS=0
12	505.4								
13	504.4	Same, with tree parts up to 0.15' long		7 SS	WH WH 1 2	20	1	x	JHS=0
14	503.4	Same, with occasional tree parts and subrounded fine gravel							
15	502.4			8 SS	1 1 2 2	15	3	x	
16	501.4	Dark gray silty fine to coarse sand, some fine to coarse subrounded gravel, loose, wet		9 SS	10 12 11 10	18	23	x	JHS=0
17	500.4								
18	499.4								

BOREHOLE LOG MW-11I

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 ROCHESTER, N.Y.
 SURVEY COORDINATES: N916.14. E2564.54
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 4/23/90-4/24/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 517.40 ft.AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 WR Weight of Rods
 WH Weight of Hammer
 NR No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 Jar Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg Limit

x---x Penetration Resistance ('N' Blows/6in)

DEPTH (ft.BGS)	ELEVATION (ft.AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE	COMMENTS
19	498.4			10 SS	4 15 10 3	12	25		JHS=3
20	497.4								
21	496.4			11 SS	WR 2 5 5	10	7		JHS=0
22	495.4								
23	494.4			12 SS	WR 5 6 50	12	11		JHS=0 50 blow counts/4"
24	493.4	TOP OF BEDROCK AT 24.1 FT BGS							100 blow counts/1"
25	492.4	Dark gray to gray coarse grained dolostone, moderately fractured, slight weathering along fractures, occasional vugs up to 1" in diameter, many mineralized		13 SS	100 - -	1	100		
26	491.4								
27	490.4								
28	489.4	BOREHOLE COMPLETED TO 35.2 FT BGS							
29	488.4								
30	487.4								
31	486.4								
32	485.4								
33	484.4								
34	483.4								
35	482.4								
36	481.4								

PAGE _____ OF _____

GROUND ELEVATION:

HOLE DESIGNATION: MW - 11 I

REFERENCE ELEVATION:

DATE LOGGED:

SUPERVISOR: G. Funk

GEOLOGIST: M. Rothstein

[illegible]

BOREHOLE LOG MW-15S (Overburden)

PROJECT: ROCHESTER FIRE ACADEMY RI/FS
 PROJECT NO.: 0965-04-1
 LOCATION: ROCHESTER, N.Y.
 SURVEY COORDINATES: N1432.44, E1861.81
 SURVEY DATUM: TBM1, TBM2

CLIENT: CITY OF ROCHESTER
 DRILLING DATES: 5/1/90
 DRILLING METHOD: 6.25-inch ID HSA
 LOGGED/CHECKED BY: MKR
 SURFACE ELEVATION: 517.70 ft.AMSL

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
 ST Shelby Tube (2.8in.ID)
 NR Weight of Rods
 NH Weight of Hammer
 NA No Recovery
 - Sampler Refusal

JHS Total VOC Detected in the Sample
 JHS Jar Head Space (ppm)
 GSD Grain Size Dist.
 ATT Atterberg

x---x Penetration Resistance ('N' Blows/6in)
 o---o Moisture Content ('W' %)

DEPTH (ft.BGS)	ELEVATION (ft.AMSL)	SOIL DESCRIPTION	GRAPHIC LOG	SAMPLE NO. & SAMPLE TYPE	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	'N'-VALUE	COMMENTS
1	516.7	BROWN SILTY SAND (ALLUVIUM) Brown organic-rich fine to medium sand, some fine to coarse gravel, occasional roots, dry		1 SS	11 31 33 19	17	64		JHS=1.8
2	515.7	Olive gray fine sand, trace silt and clay, occasional roots, moist							
3	514.7			2 SS	4 4 3 4	9	7		JHS=1.2
4	513.7	MOTTLED BROWN/GRAY SILTY SAND (ALLUVIUM) Brown fine to medium sand, occasional gray mottling and roots, wet							
5	512.7			3 SS	1 2 1 1	21	3		JHS=1.2
6	511.7								
7	510.7	Ochre and gray mottled fine sandy silt, iron staining- orange and dark brown, moderately dense, moderately stiff, wet		4 SS	NR 2 2 3	18	4		JHS=2.2
8	509.7	Ochre and gray mottled fine sand, iron staining, wet							
9	508.7	Same, with more silt and moderately stiff		5 SS	2 2 3 4	18	5		JHS=3.5
10	507.7	Same, with occasional small roots							
11	506.7			6 SS	NH 2 2 3	21	4		JHS=12
12	505.7	GRAY SAND AND GRAVEL Dark grey fine sand, uniform, wet							
13	504.7			7 SS	NR 2 2 2	22	4		JHS=17
14	503.7	BOREHOLE COMPLETED TO 14.0 FT BGS.							
15	502.7								
16	501.7								
17	500.7								
18	499.7								

APPENDIX C.2
WELL CONSTRUCTION PROCEDURES

UPGRADIENT WELLS

Deep and Intermediate Bedrock Wells (9I, 6I, 6D, 10I):

Borings were advanced by 6½" hollow stem augers to the top of bedrock. The deepest well at each location (MW-6D, MW-10I, and MW-9I) was continuously sampled through the overburden to the top of bedrock. Four (4)-inch I.D. temporary steel casing was inserted into the borehole and advanced two feet into bedrock to minimize the potential for down-hole contamination during bedrock drilling. The boring was then advanced through the temporary steel casing by means of an HQ core (3 7/8" diameter hole) to a depth of 12 feet below the top of bedrock for the intermediate wells or 20 feet below the top of bedrock for the deep wells.

Upon completion of the borehole, the screen and riser were installed within the 4-inch casing. The 4-inch casing was removed as the sandpack was emplaced. The screen, riser and sandpack were used in accordance with Work Plan specifications. Above the sandpack, a 4-foot bentonite seal was emplaced and allowed to hydrate before a cement-bentonite grout was tremied to the surface. In many of the wells several inches of fine sand was placed above the bentonite seal before grout emplacement to prevent grout invasion. A lockable 4" steel protective casing was installed at each well site.

SHALLOW WELLS (9S, 6S, 10S AND PZ-9):

All shallow boreholes were drilled using 6½-inch hollow stem augers to a depth where the screen would straddle the water table based on saturated conditions in adjacent deep or intermediate wells. All wells were installed using 10 foot lengths of 2-inch I.D. 0.010-inch PVC screens, and 2-inch I.D. PVC riser as stated in the Interim Report. The sand pack consists of #20ROK sand to a maximum depth of two feet above the top of the screen. A one to three foot thick bentonite pellet seal was placed above the sandpack and allowed to hydrate. The borehole was then grouted to the surface using a bentonite-cement. Protective casing was installed as described in the Work Plan.

A piezometer (PZ-9) was added to the scope of project (documentation presented in Appendix B) to determine if hydraulic communication exists between the lower overburden and upper bedrock (MW-9I). This piezometer was constructed as described above except that a five foot screen was used to better define the zone to be monitored.

DOWN GRADIENT WELLS

Deep and Intermediate Bedrock Wells (7I, 7D, 8I, 8D, 11I, 12I, 16I)

Borings were advanced by 6½" hollow stem augers to the top of bedrock. The deepest well at each site (MW-7D, MW-8D, MW-11I, and MW-16I) were continuously sampled through the overburden to the top of bedrock. Four (4)-inch I.D. permanent steel casing was inserted into the borehole and advanced two feet into bedrock to minimize the potential for downhole contamination during bedrock drilling. The casing was then grouted in place and allowed to set overnight. The boring was then advanced through the permanent steel casing by means of an HQ core barrel (3 7/8-inch diameter hole) to a depth of 12 feet below the top of rock for the intermediate wells or 20 feet below the top of bedrock for the deep wells. Frequent borehole collapse during bedrock coring required the use of temporary 3-inch diameter steel casing to prevent further collapse of the borehole. At those locations, (MW-8I, MW-7D, and MW-12I), an Nx core barrel (2 7/8-inch diameter) was used to advance the borehole through the 3-inch casing. Upon borehole completion, the screen, riser and sandpack were installed within the temporary 3-inch casing (as documented in Appendix B).

Upon completion of the borehole, the well screen and riser were installed as specified in the Work Plan. Five foot screen lengths were placed in the deep wells. All intermediate wells have ten foot screens except MW-12I which has a five foot screen due to collapse of the borehole. This change is documented in Appendix B.

For the intermediate wells, the top of the screen is at the bottom of the 4-inch permanent casing. The sand pack (#4QROK as specified) extends to a maximum of two feet above the top of the screen, inside the casing. In the deep wells, the sand extends to a maximum of two feet above the screen. A four foot bentonite pellet seal was emplaced in all wells, allowed to hydrate and then the well was grouted to the surface except for M-7D. Due to the problems of borehole collapse and the use of temporary 3-inch casing, a 5 foot bentonite slurry was tremied in MW-7D. Locking 6-inch protective steel casing was installed at each well.

SHALLOW WELLS

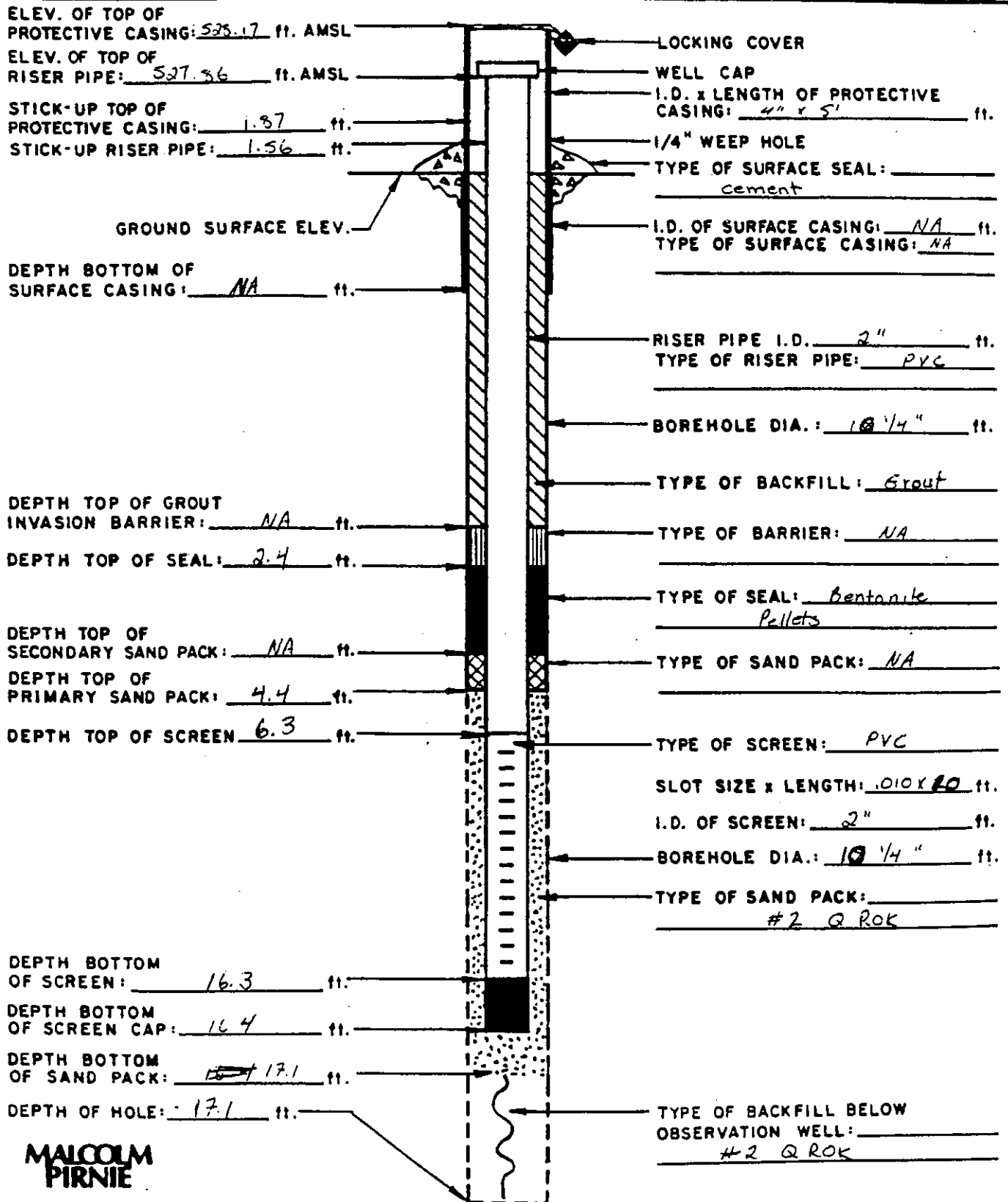
These wells were installed following the same procedure described for upgradient shallow wells. Since MW-13S, MW-14S, and MW-15S are single wells at different locations, each was continuously sampled in accordance with the Work Plan.

APPENDIX C3
MONITORING WELL CONSTRUCTION DETAILS

MONITORING WELL CONSTRUCTION LOG

PROJECT: Roch. Fire Academy RIIS LOCATION: Rochester, NY
 PROJECT NO.: 0965 041 BORING: MW-65
 GROUND ELEV.: 526.3 DATE: 4/17/90
 FIELD GEOLOGIST: MKR

DRILLER: Buffalo Drilling Co
 DRILLING
 METHOD: 6 1/4 HSA
 DEVELOPMENT
 METHOD: Bailing



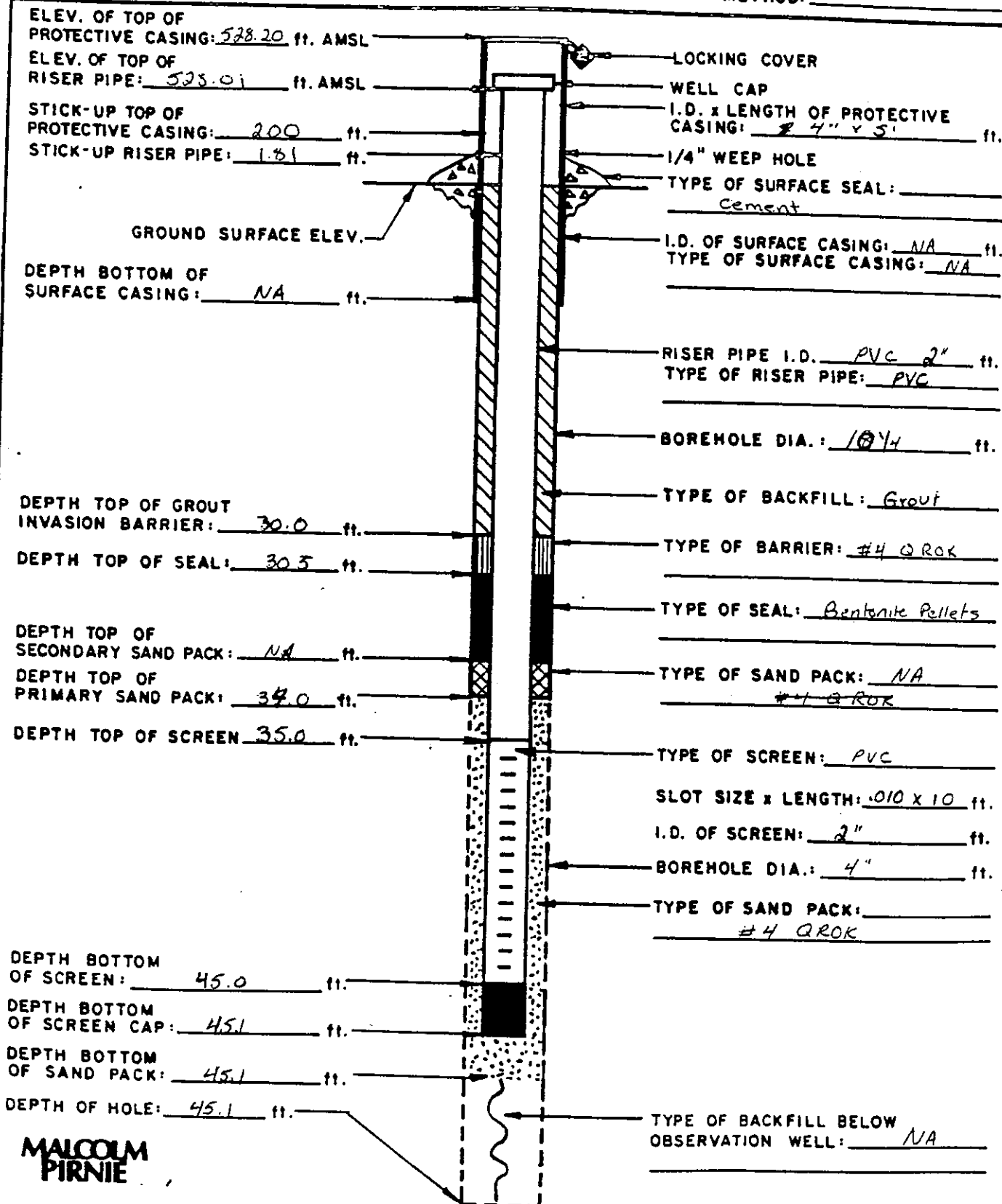
**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Roch Five Academy
 PROJECT NO.: 0945-04-1 RIFB
 GROUND ELEV.: 526.2
 FIELD GEOLOGIST: mkr

LOCATION: Rochester NY
 BORING: MW6I
 DATE: 4/17/90

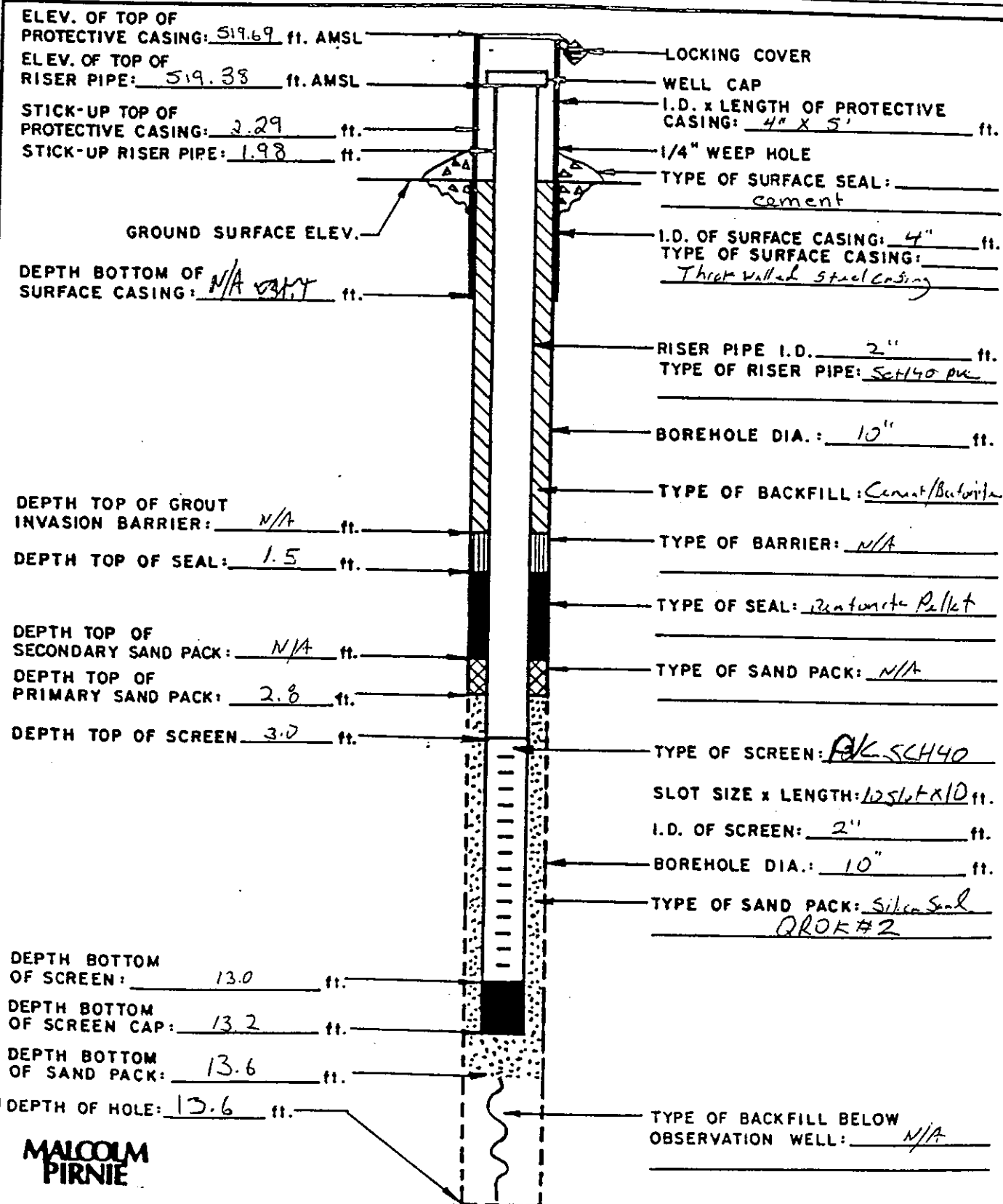
DRILLER: Buffalo Drilling
 DRILLING: 6 1/4 HSA/
 METHOD: NO Case
 DEVELOPMENT
 METHOD:



**MALCOLM
 PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Fire Academy R1/FS LOCATION: City of Rochester DRILLER: Buffalo Drilling
 PROJECT NO.: 0965 041 BORING: MW-~~88~~ 75 DRILLING
 GROUND ELEV.: 517.4 DATE: 4/20/10 METHOD: 6 1/4" HSA
 FIELD GEOLOGIST: R. Fugge DEVELOPMENT
 METHOD:

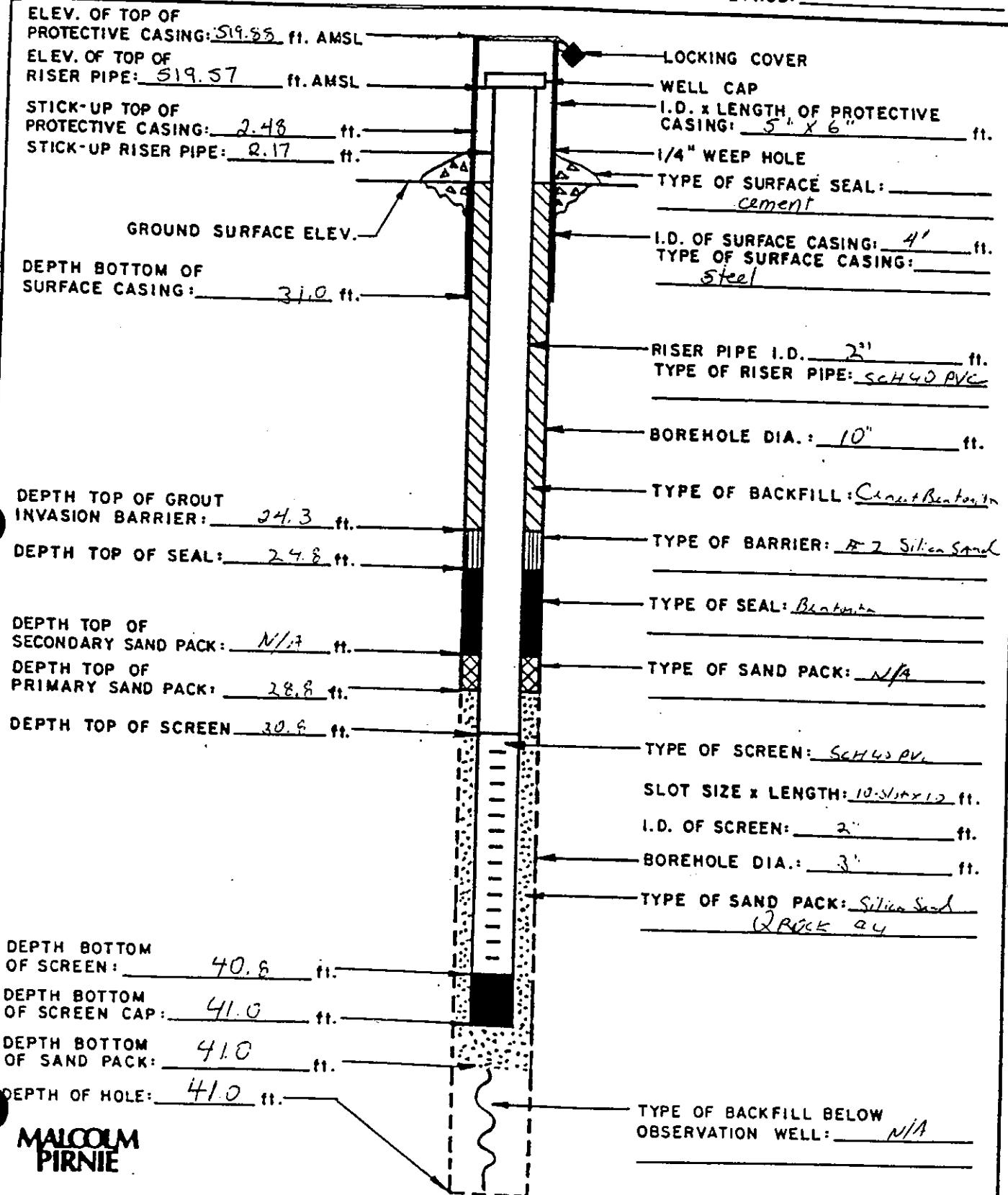


MONITORING WELL CONSTRUCTION LOG

PROJECT: Rochester Fire Academy, R/FB
 PROJECT NO.: 0965-041-1
 GROUND ELEV.: 517.4
 FIELD GEOLOGIST: R. Flapp

LOCATION: _____
 BORING: MW-7E
 DATE: 5/1/90

DRILLER: Buff. L. Dilling
 DRILLING
 METHOD: 6 1/2" HSA, 10" x 6"
 DEVELOPMENT
 METHOD: _____



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Fri Academy, RE/ES

PROJECT NO.: 0565-04-1

GROUND ELEV.: 517.3

FIELD GEOLOGIST: R. F. Cropp

LOCATION: Rochester, NY

BORING: MW-7D

DATE: 4/30/90

DRILLER: Bolted Dorking

DRILLING

METHOD: 6 1/2" LISA 3" Flt Joint

DEVELOPMENT NX CORE

METHOD:

ELEV. OF TOP OF PROTECTIVE CASING: 520.31 ft. AMSL

ELEV. OF TOP OF RISER PIPE: 519.54 ft. AMSL

STICK-UP TOP OF PROTECTIVE CASING: 3.01 ft.

STICK-UP RISER PIPE: 2.24 ft.

GROUND SURFACE ELEV.:

DEPTH BOTTOM OF SURFACE CASING: 31 ft.

LOCKING COVER

WELL CAP

I.D. x LENGTH OF PROTECTIVE CASING: 6" x 5' ft.

1/4" WEEP HOLE

TYPE OF SURFACE SEAL: cement

I.D. OF SURFACE CASING: 4" ft.

TYPE OF SURFACE CASING: 4" steel

RISER PIPE I.D.: 2" ft.

TYPE OF RISER PIPE: PVC

BOREHOLE DIA.: 10" ft.

TYPE OF BACKFILL: grout

TYPE OF BARRIER: N/A

TYPE OF SEAL: Bentonite Shurry
45% Bentonite Powder 15% cement

TYPE OF SAND PACK: Silica Sand
2-Rok #1

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 10 slot x 5' ft.

I.D. OF SCREEN: 2" ft.

BOREHOLE DIA.: 3" ft.

TYPE OF SAND PACK: Silica Sand
2-Rok #4

DEPTH TOP OF GROUT INVASION BARRIER: 37.0 ft.

DEPTH TOP OF SEAL: 37.5 ft.
5' shurry

DEPTH TOP OF SECONDARY SAND PACK: 42.5 ft.

DEPTH TOP OF PRIMARY SAND PACK: 43.0 ft.

DEPTH TOP OF SCREEN: 45.0 ft.

DEPTH BOTTOM OF SCREEN: 49.250.2 ft.

DEPTH BOTTOM OF SCREEN CAP: 49.250.2 ft.

DEPTH BOTTOM OF SAND PACK: 49.250.2 ft.

DEPTH OF HOLE: 50.2 ft.

TYPE OF BACKFILL BELOW OBSERVATION WELL: cuttings

MALCOLM
PIRNIE

MONITORING WELL CONSTRUCTION LOG

PROJECT: Fire Academy
 PROJECT NO.: 0965-04-1
 GROUND ELEV.: 517.5
 FIELD GEOLOGIST: R. Flappa

LOCATION: City of Rochester
 BORING: M-W-85
 DATE: 4-18-90

DRILLER: Buffalo Drilling
 DRILLING METHOD: 6 1/4" HSA
 DEVELOPMENT METHOD: _____

ELEV. OF TOP OF PROTECTIVE CASING: 519.95 ft. AMSL

ELEV. OF TOP OF RISER PIPE: 519.73 ft. AMSL

STICK-UP TOP OF PROTECTIVE CASING: 2.55 ft.

STICK-UP RISER PIPE: 2.23 ft.

GROUND SURFACE ELEV. _____

DEPTH BOTTOM OF SURFACE CASING: N/A ft.

DEPTH TOP OF GROUT INVASION BARRIER: 1.4 ft.

DEPTH TOP OF SEAL: 1.5 ft.

DEPTH TOP OF SECONDARY SAND PACK: N/A ft.

DEPTH TOP OF PRIMARY SAND PACK: 3.0 ft.

DEPTH TOP OF SCREEN: 4.0 ft.

DEPTH BOTTOM OF SCREEN: 14.0 ft.

DEPTH BOTTOM OF SCREEN CAP: 14.0 ft.

DEPTH BOTTOM OF SAND PACK: 14.2 ft.

DEPTH OF HOLE: 14.2 ft.

LOCKING COVER

WELL CAP

I.D. x LENGTH OF PROTECTIVE CASING: 4" x 5 ft.

1/4" WEEP HOLE

TYPE OF SURFACE SEAL: Cement

I.D. OF SURFACE CASING: N/A ft.
 TYPE OF SURFACE CASING: _____

RISER PIPE I.D.: 2" ft.
 TYPE OF RISER PIPE: SCH40 PVC

BOREHOLE DIA.: 10" ft.

TYPE OF BACKFILL: Cement/Bentonite

TYPE OF BARRIER: #2 Silica Sand

TYPE OF SEAL: Bentonite Pellet

TYPE OF SAND PACK: N/A

TYPE OF SCREEN: SCH40 PVC

SLOT SIZE x LENGTH: 10 slot x 10 ft.

I.D. OF SCREEN: 2" ft.

BOREHOLE DIA.: 10" ft.

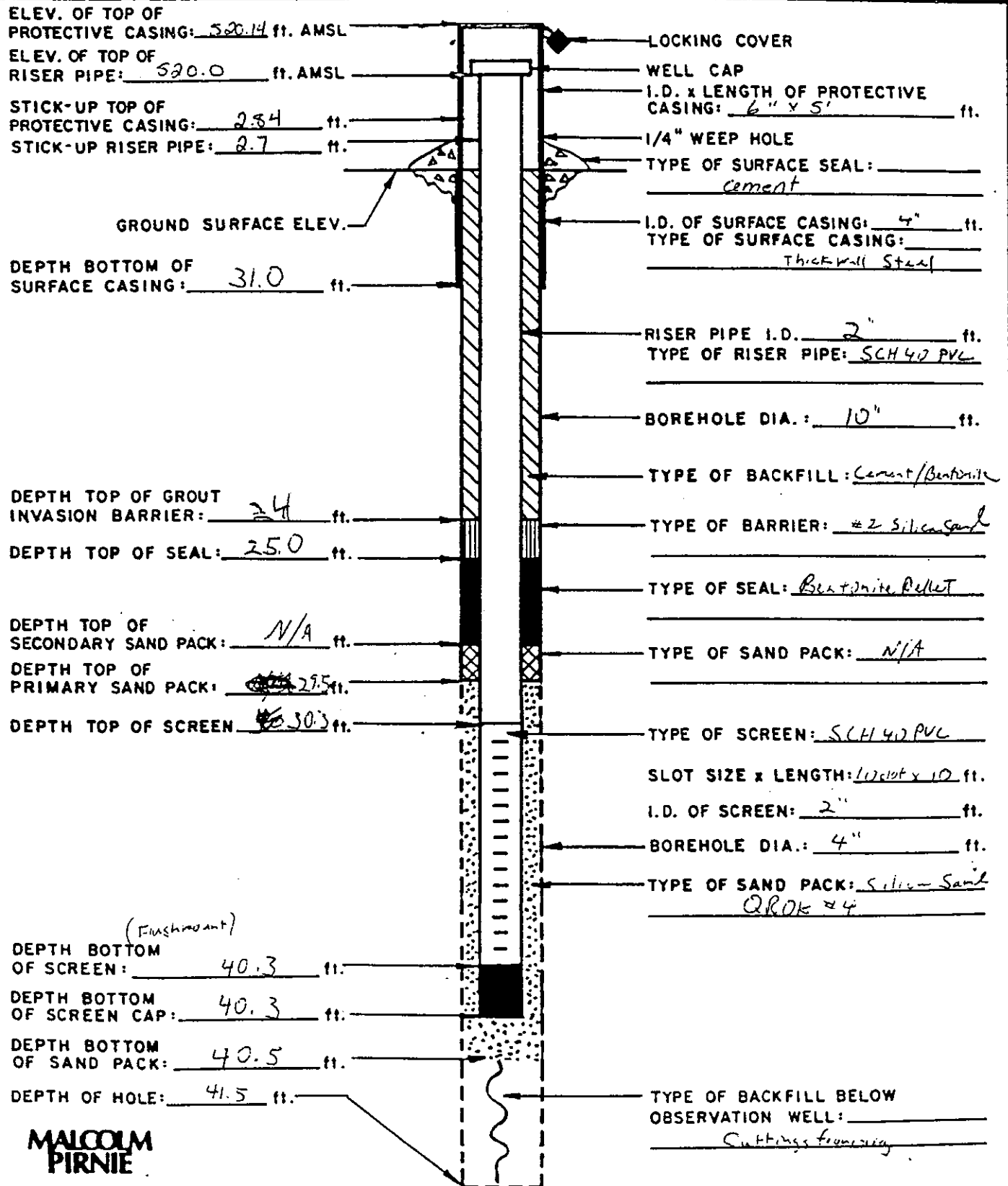
TYPE OF SAND PACK: #2 GRK Silica Sand

TYPE OF BACKFILL BELOW OBSERVATION WELL: N/A

**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Fire Academy RT/ES LOCATION: City of Rochester DRILLER: Buffalo Drilling Co.
 PROJECT NO.: 0965-347 BORING: MW-RT DRILLING
 GROUND ELEV.: 517.3 DATE: 7/18/92 METHOD: 6 1/2" HSA; 4" Rock core
 FIELD GEOLOGIST: R. Frappa DEVELOPMENT
 METHOD:



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Fire Academy RI/ES
 PROJECT NO.: 0965-04-1
 GROUND ELEV.: 517.2
 FIELD GEOLOGIST: R. Frappa

LOCATION: Rochester N.Y.
 BORING: MW-80
 DATE: 4/17/90

DRILLER: Buffalo Drilling
 DRILLING
 METHOD: 6 1/4" HSA
 DEVELOPMENT
 METHOD:

ELEV. OF TOP OF
 PROTECTIVE CASING: 520.17 ft. AMSL

ELEV. OF TOP OF
 RISER PIPE: 519.77 ft. AMSL

STICK-UP TOP OF
 PROTECTIVE CASING: 2.97 ft.

STICK-UP RISER PIPE: 2.57 ft.

GROUND SURFACE ELEV.

DEPTH BOTTOM OF
 SURFACE CASING: 31 ft.

DEPTH TOP OF GROUT
 INVASION BARRIER: 31 ft.

DEPTH TOP OF SEAL: 38.5 ft.

DEPTH TOP OF
 SECONDARY SAND PACK: N/A ft.

DEPTH TOP OF
 PRIMARY SAND PACK: 42.5 ft.

DEPTH TOP OF SCREEN: 48.8 ft.

DEPTH BOTTOM
 OF SCREEN: 48.8 ft.

DEPTH BOTTOM
 OF SCREEN CAP: 49 ft.

DEPTH BOTTOM
 OF SAND PACK: 49 ft.

DEPTH OF HOLE: 50 ft.

LOCKING COVER

WELL CAP

I.D. x LENGTH OF PROTECTIVE
 CASING: 6" x 5' ft.

1/4" WEEP HOLE

TYPE OF SURFACE SEAL: cement

I.D. OF SURFACE CASING: 6" ft.
 TYPE OF SURFACE CASING: Threaded Steel

RISER PIPE I.D.: 2" ft.
 TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIA.: 10" ft.

TYPE OF BACKFILL: Cement/Bentonite

TYPE OF BARRIER: Silica Sand
GRK #2

TYPE OF SEAL: Bentonite Pellets

TYPE OF SAND PACK: N/A

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 10/32" x 5' ft.

I.D. OF SCREEN: 2" ft.

BOREHOLE DIA.: 4" ft.

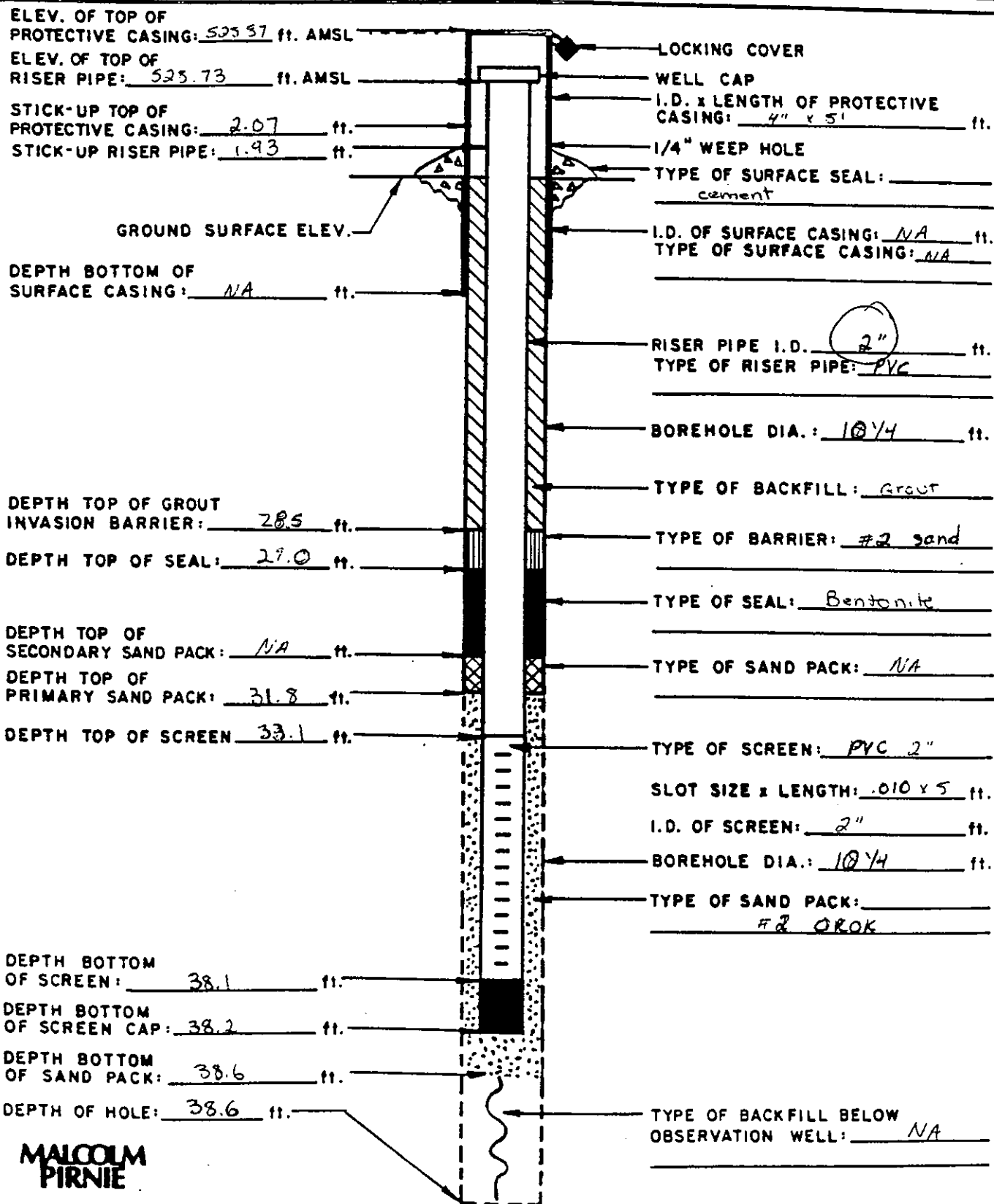
TYPE OF SAND PACK: Silica
GRK #4

TYPE OF BACKFILL BELOW
 OBSERVATION WELL: Cuttings

**MALCOLM
 PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Rochester Fire Academy LOCATION: Rochester, NY DRILLER: Buffalo Drilling
 PROJECT NO.: 0965-04-1 R11P5 BORING: B2-9 DRILLING
 GROUND ELEV.: 526.5 DATE: 4/12/9 METHOD: 6 1/4 HSA 4" casing
 FIELD GEOLOGIST: MLR / RHO DEVELOPMENT
 METHOD:



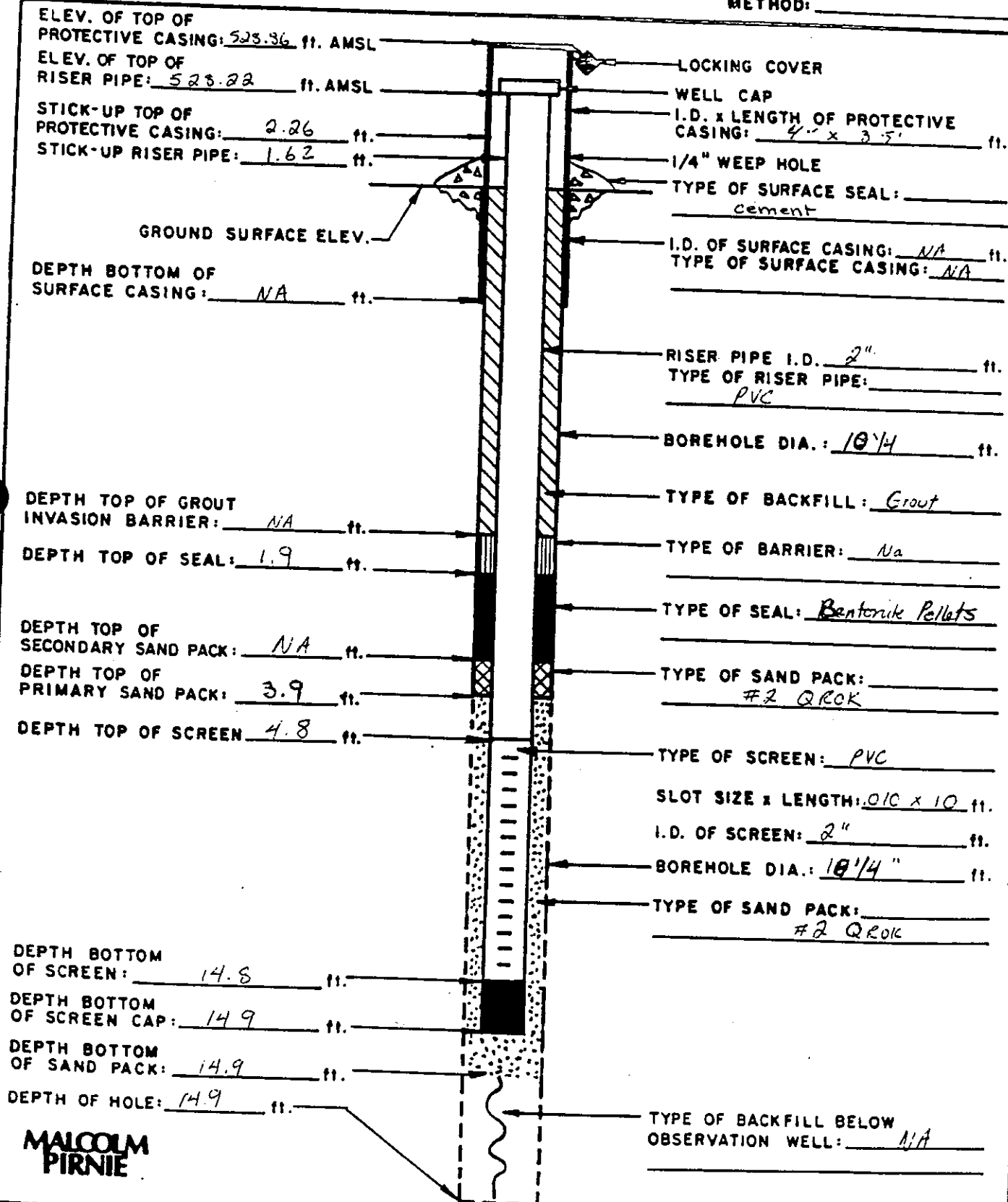
**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Rock Fire Academy Rises
 PROJECT NO.: 0065-04-1
 GROUND ELEV.: 526.6
 FIELD GEOLOGIST: M. Berthel

LOCATION: Rockster, NY
 BORING: 95
 DATE: 4/10/90

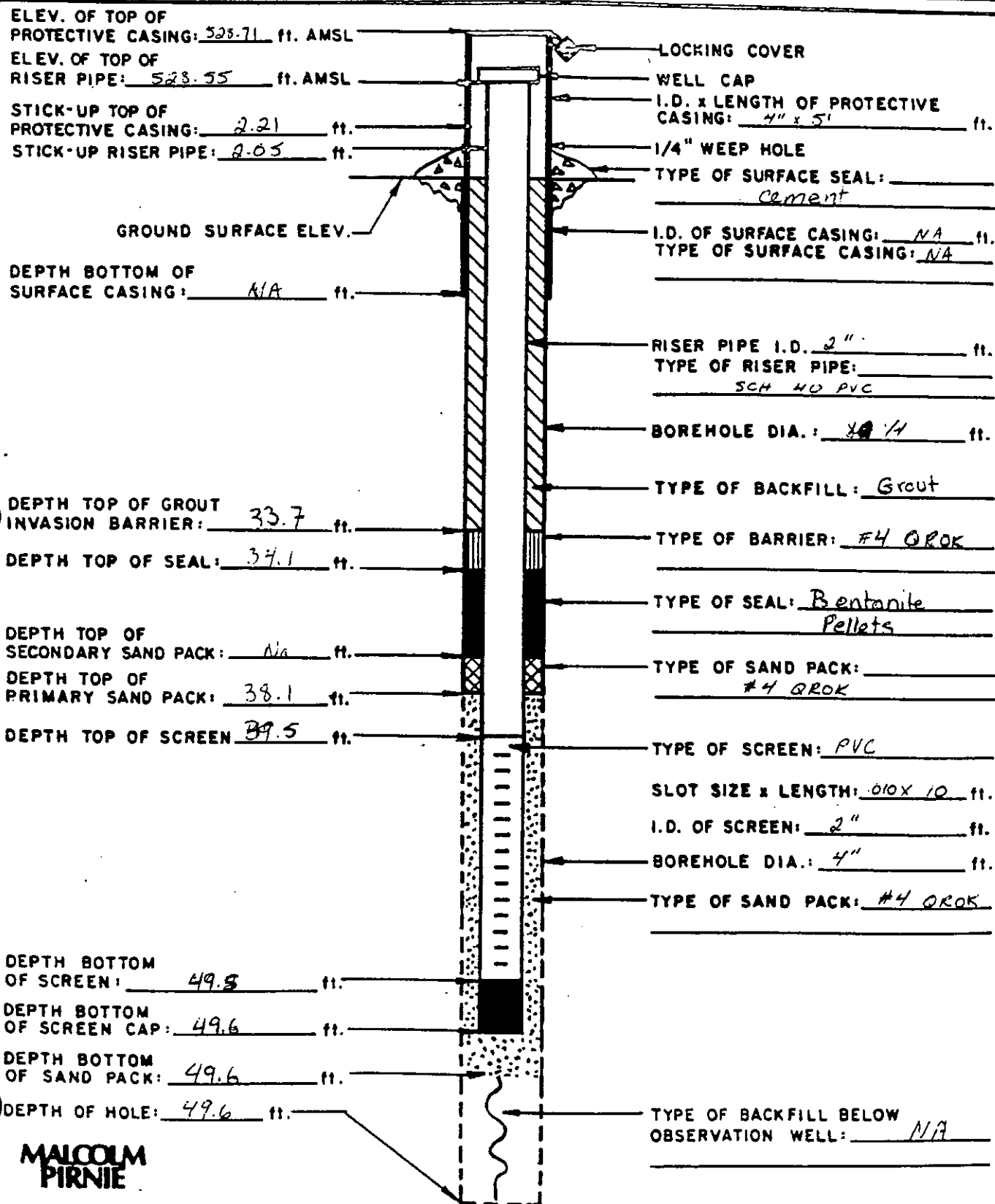
DRILLER: Buffalo Drilling
 DRILLING
 METHOD: 6 1/4 HSA
 DEVELOPMENT
 METHOD:



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Rich. Fire Academy B/Fs LOCATION: _____
 PROJECT NO.: 0965-04-1 BORING: MW-9T
 GROUND ELEV.: 526.5 DATE: 4/10/90
 FIELD GEOLOGIST: M. Rothstein DRILLER: Buffalo Drilling
 DRILLING METHOD: 5 1/4 HSA/NO CORE
 DEVELOPMENT METHOD: _____



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Rock Fire Academy RIFES LOCATION: _____
 PROJECT NO.: 0965 041 BORING: MW-105
 GROUND ELEV.: 523.9 DATE: 4/23/90
 FIELD GEOLOGIST: M. Rothstein

DRILLER: Buffalo Drilling Co
 DRILLING
 METHOD: 6 1/4 HSA
 DEVELOPMENT
 METHOD: _____

ELEV. OF TOP OF
 PROTECTIVE CASING: 525.75 ft. AMSL
 ELEV. OF TOP OF
 RISER PIPE: 525.62 ft. AMSL
 STICK-UP TOP OF
 PROTECTIVE CASING: 1.07 ft.
 STICK-UP RISER PIPE: 1.72 ft.

GROUND SURFACE ELEV. _____

DEPTH BOTTOM OF
 SURFACE CASING: NA ft.

DEPTH TOP OF GROUT
 INVASION BARRIER: 4.8 ft.

DEPTH TOP OF SEAL: 5.1 ft.

DEPTH TOP OF
 SECONDARY SAND PACK: NA ft.

DEPTH TOP OF
 PRIMARY SAND PACK: 7.9 ft.

DEPTH TOP OF SCREEN 9.8 ft.

DEPTH BOTTOM
 OF SCREEN: 19.8 ft.

DEPTH BOTTOM
 OF SCREEN CAP: 20.0 ft.

DEPTH BOTTOM
 OF SAND PACK: 20.0 ft.

DEPTH OF HOLE: 200 ft.

LOCKING COVER
 WELL CAP
 I.D. x LENGTH OF PROTECTIVE
 CASING: 4" x 5' ft.

1/4" WEEP HOLE
 TYPE OF SURFACE SEAL: _____
Cement

I.D. OF SURFACE CASING: NA ft.
 TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 2" ft.
 TYPE OF RISER PIPE: PVC

BOREHOLE DIA.: 10 1/4 ft.

TYPE OF BACKFILL: grout

TYPE OF BARRIER: _____
#2 sand

TYPE OF SEAL: _____
Bentonite Pellets

TYPE OF SAND PACK: NA

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.010 x 10 ft.

I.D. OF SCREEN: 2" ft.

BOREHOLE DIA.: 10 1/4 ft.

TYPE OF SAND PACK: _____
#2 G ROK

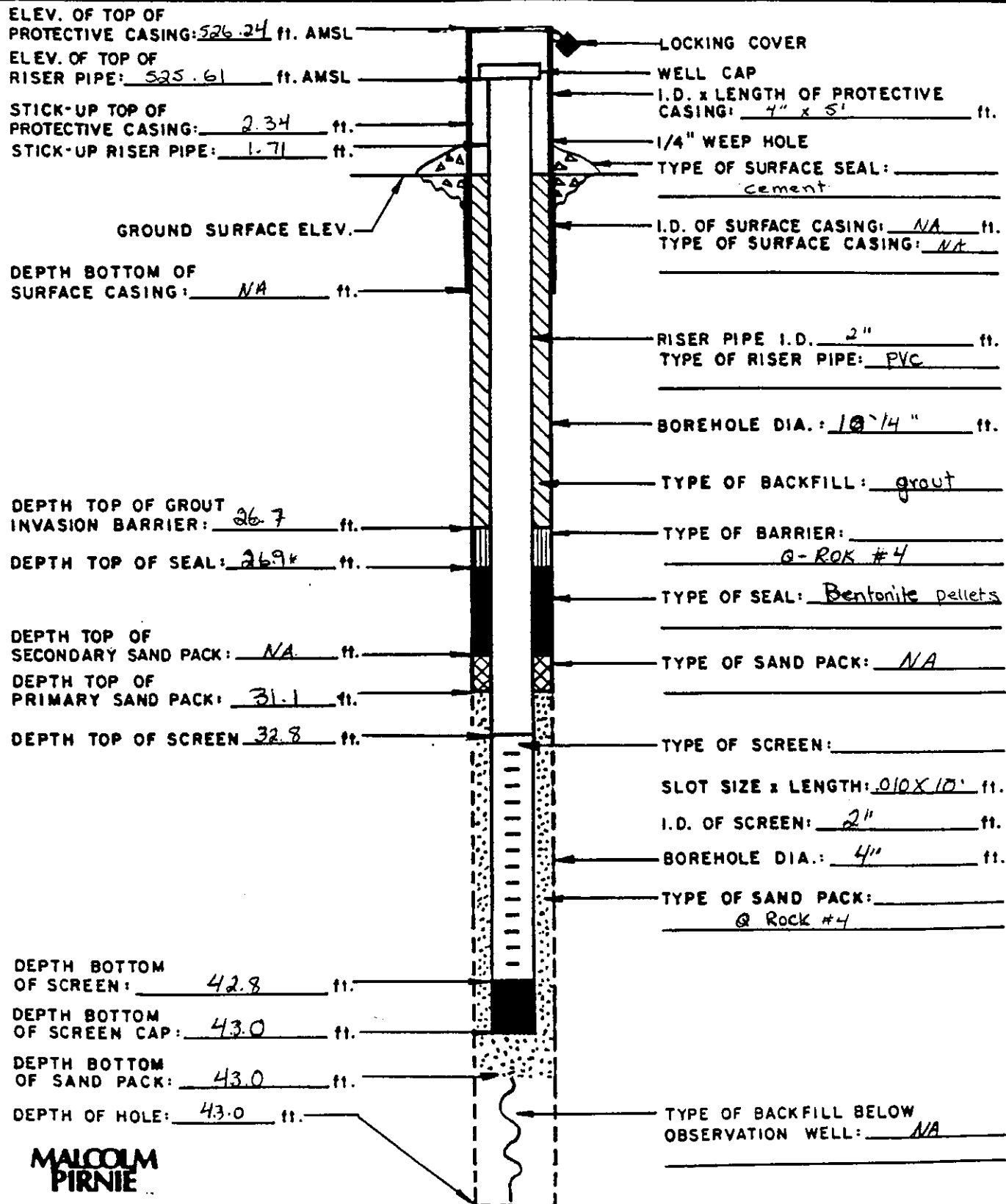
TYPE OF BACKFILL BELOW
 OBSERVATION WELL: NA

**MALCOLM
 PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Roch Fire Academy R/ES LOCATION: Rochester, N.Y.
 PROJECT NO.: 0965 041 BORING: MUG-10T
 GROUND ELEV.: 523.9 DATE: 4/20/90
 FIELD GEOLOGIST: M. Rothstein

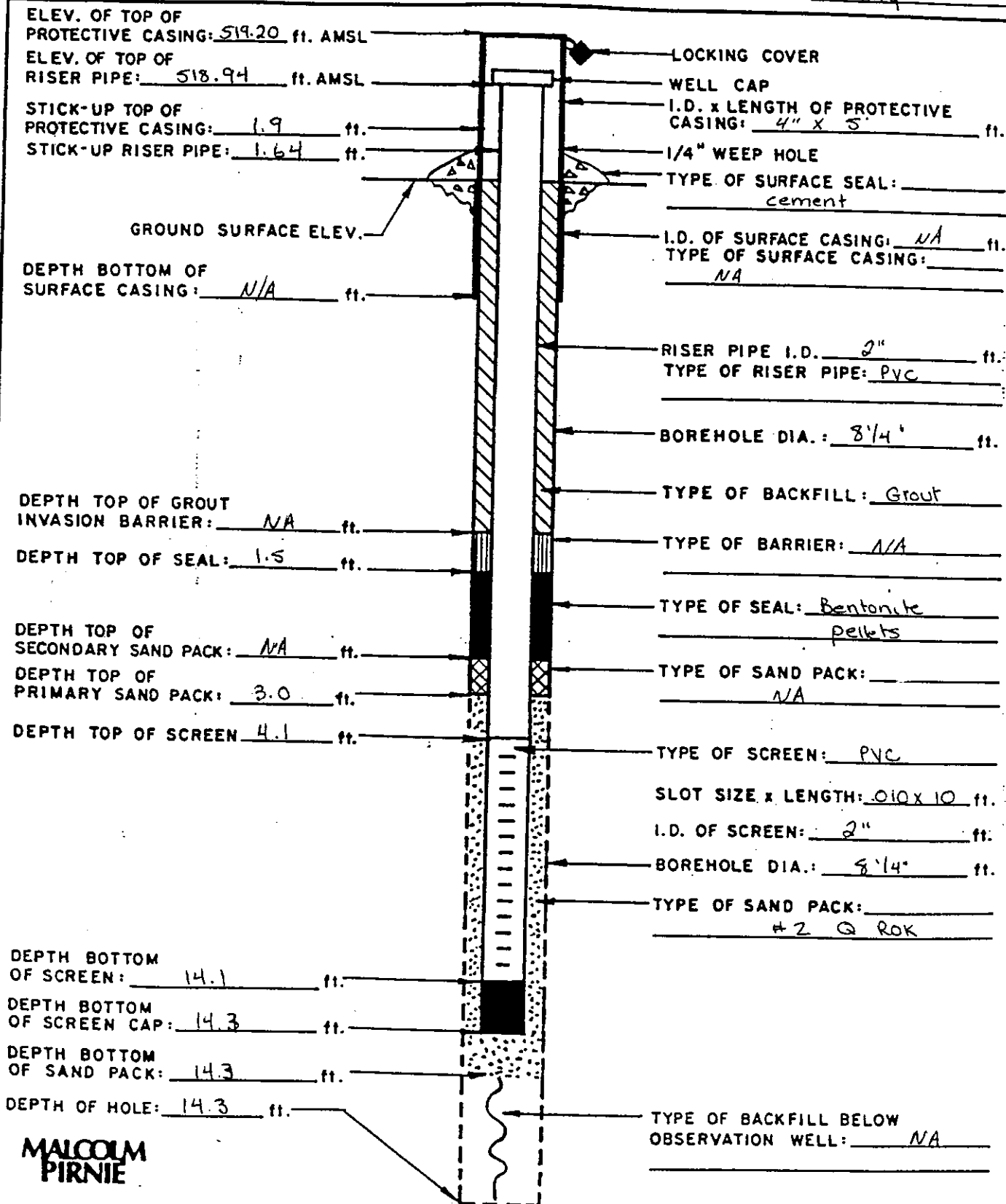
DRILLER: Buffalo Drilling Co.
 DRILLING: 6 1/4 HSA
 METHOD: HQ CORE
 DEVELOPMENT
 METHOD: _____



**MALCOLM
 PIRNIE**

MONITORING WELL CONSTRUCTION LOG

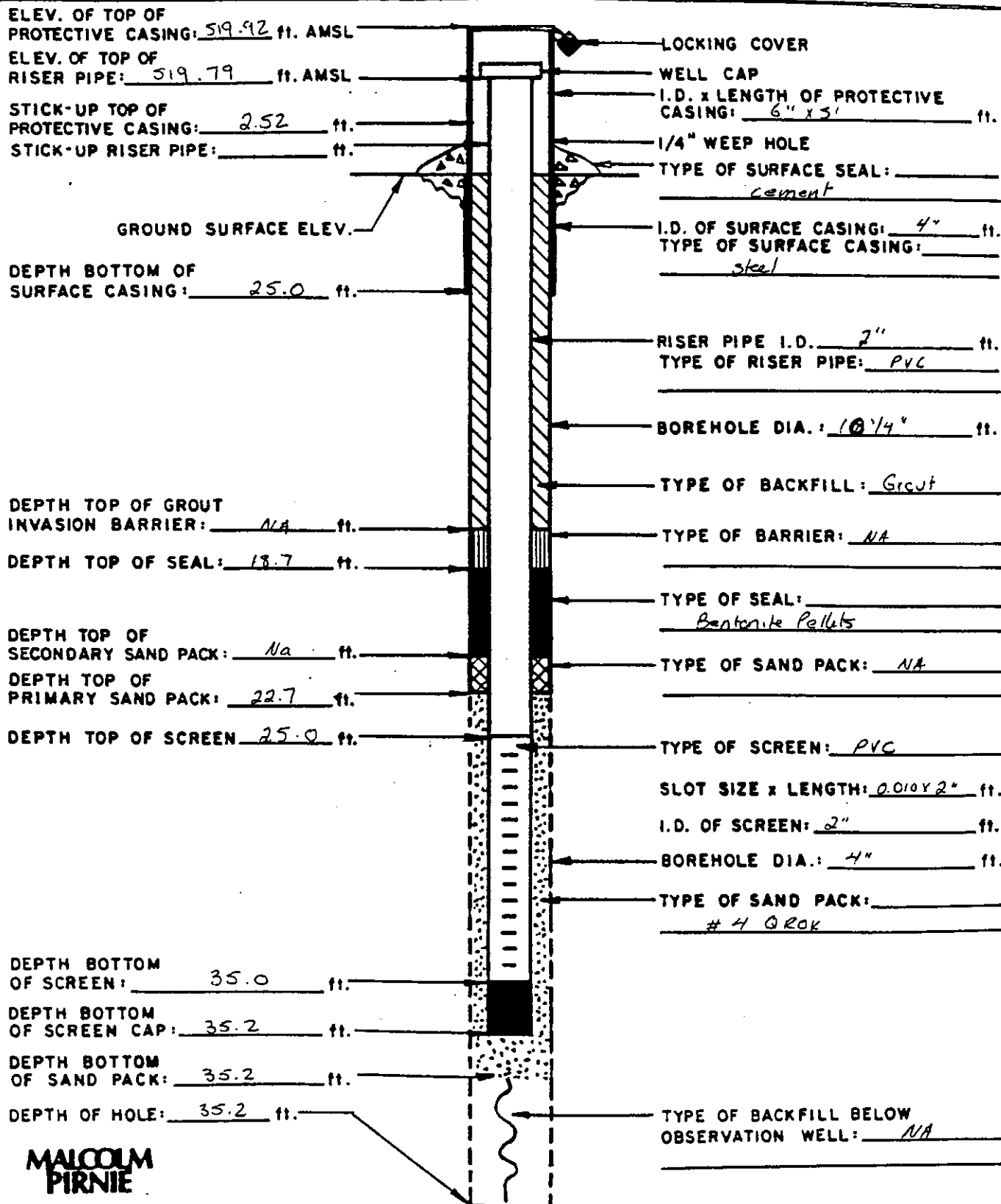
PROJECT: Roch Fire Academy RI/FS LOCATION: Rochester, N.Y. DRILLER: Buffalo Drilling
 PROJECT NO.: 0965-04-1 BORING: MW-115 DRILLING
 GROUND ELEV.: 517.3 DATE: 4/24/90 METHOD: 6'1/4 HSA
 FIELD GEOLOGIST: M. Rothstein DEVELOPMENT
 METHOD: Bailing



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

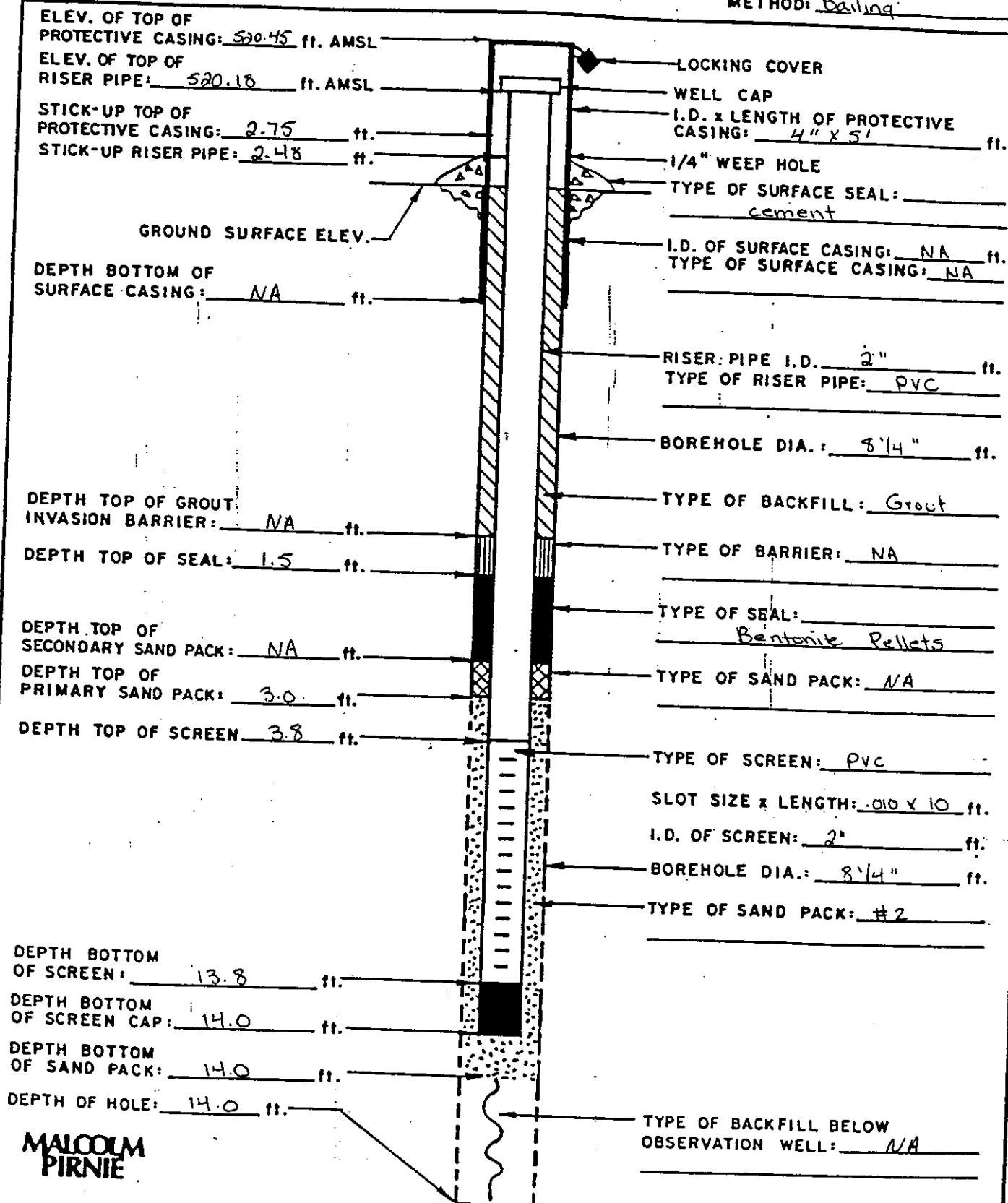
PROJECT: Rock Fire Academy R1/F5 LOCATION: _____ DRILLER: Buffalo Drilling Co
 PROJECT NO.: 0965-04-1 BORING: MW-115 DRILLING 6 1/4 HSA
 GROUND ELEV.: 517.4 DATE: 4/26/90 METHOD: HQ core
 FIELD GEOLOGIST: M. Rothstein DEVELOPMENT METHOD: _____



**MALCOLM
PIRNIE**

MONITORING WELL CONSTRUCTION LOG

PROJECT: Roch. Fire Academy LOCATION: Rochester, NY DRILLER: Buffalo Drilling
 PROJECT NO.: 0965-04-1 BORING: MW-155 DRILLING
 GROUND ELEV.: 517.7 DATE: 5/11/90 METHOD: 6'14" HSA
 FIELD GEOLOGIST: M. Rothstein DEVELOPMENT
 METHOD: Bailing



**MALCOLM
PIRNIE**

APPENDIX C.4
WELL DEVELOPMENT DATA

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy

PROJECT NO.: 0965-04-1

STAFF: B. Dubisz, S. McConaghay

DATE: 5-2-90 5-4-90

WELL NO.: MW 6-S

WELL I.D. VOL.
GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.): 17.80

1" 0.04

② CASING INTERNAL DIAMETER (in.): 2

2" 0.17

③ WATER LEVEL BELOW TOP OF CASING (FT.) 12.05

3" 0.38

④ VOLUME OF WATER IN CASING (GAL.) 1.0

4" 0.66

5" 1.04

6" 1.50

8" 2.60

$$V = 0.0408 (\textcircled{2})^2 \times (\textcircled{1} - \textcircled{3}) = \text{_____ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	Int	1.0	2.0	3.0	4.25	5.00	5.25			
pH	6.74 ~~7.02~~	6.73	6.87	6.85	6.92	6.97	7.02 ~~6.99~~			
conductivity	2000 ~~775~~	2000	2000	1950	1850	1850	1850			
Temp	10.0 ~~10.2~~	9.6	9.8	9.8	10.1	10.1	10.4			
Appearance	cloudy ~~cloudy~~ ~~GRAY~~	cloudy	less turbid	cloudy	clear	clear	clear			
Turbidity	>100 ~~>100~~	>100	47	67	50	45	48			

COMMENTS: purged with PVC 12" dia

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz, S. McCannagh
 DATE: 5-2-90

WELL NO.: MW-6I

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 45.60

② CASING INTERNAL DIAMETER (in.): 2

③ WATER LEVEL BELOW TOP OF CASING (FT.) 13.56

④ VOLUME OF WATER IN CASING (GAL.) 5.50

$$V = 0.0408 (\textcircled{2})^2 \times (\textcircled{1} - \textcircled{3}) = \text{_____ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	10.50	20.50	30.50							
PH	8.66	7.96	7.95	7.76							
Conductivity	940	1100	1100	1150							
Temp	11.5	14.0	14.9	16.7							
Appearance	milky gray	less turbid	less turbid slightly cloudy	clear							
Turbidity	>100	71	52	25							

COMMENTS:

* Well purged with Honda WB-15 pump

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0985-041
 STAFF: R. Debiez, S. McConnaughey
 DATE: 5-9-90

WELL NO.: MW-7S

WELL I.D. VOL. GAL./FT.

- ① TOTAL CASING AND SCREEN LENGTH (FT.): _____
 ② CASING INTERNAL DIAMETER (in.): 2"
 ③ WATER LEVEL BELOW TOP OF CASING (FT.) 3.11
 ④ VOLUME OF WATER IN CASING (GAL.) 2.00

1" 0.04
 2" 0.17
 3" 0.38
 4" 0.66
 5" 1.04
 6" 1.50
 8" 2.60

$$V = 0.0408 (2)^2 \times (1 - 3) = \text{_____ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	* ENT	2	5	7	13	17	19	21			
pH	6.66	6.77	6.61	6.89	6.92	6.85	6.91	6.53			
Conductivity	1000	1000	990	990	1075	1050	1150	990 1050			
Temp	13.0	13.9	15.0	13.1	12.1	11.5	10.9	12.2			
Appearance	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown	Clear			
Turbidity	>100	>100	>100	>100	>100	>100	175	53			

COMMENTS: Slight odor of solvents or oil.

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Cubisz, S. McConnally
 DATE: 5-4-90

WELL NO.: MW-7I

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 43.10

② CASING INTERNAL DIAMETER (in.): 2

③ WATER LEVEL BELOW TOP OF CASING (FT.): 4.75
~~4.80~~

④ VOLUME OF WATER IN CASING (GAL.): 6.50

$$V = 0.0408 (2)^2 \times (43.10 - 4.75) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	6.50	13	53	58	53					
PH	11.27	9.31	7.58	7.69	7.56					
conductivity	875	850	1150	1450	1150					
Temp	14.8	14.0	14.0	11.9	12.5					
Appearance	CLAY GRAY	GRAY	clear	clear	clear					
Turbidity	>100	>100	25	52	20					

COMMENTS: *OIL From the Measurement Sample

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Davis S. McConnaughey
 DATE: 5-4-90

WELL NO.: <u>mw-7D</u>	WELL I.D.	VOL. GAL./FT.
① TOTAL CASING AND SCREEN LENGTH (FT.): <u>51.75</u>	1"	0.04
② CASING INTERNAL DIAMETER (in.): <u>2</u>	2"	0.17
③ WATER LEVEL BELOW TOP OF CASING (FT.) <u>4.80</u>	3"	0.38
④ VOLUME OF WATER IN CASING (GAL.) <u>8.00</u>	4"	0.66
	5"	1.04
	6"	1.50
	8"	2.60

$$V = 0.0408 (2)^2 \times (51.75 - 4.80) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	Int	23	33	45						
pH	4.74	7.50	7.52	7.50						
conductivity	400	1600	1550	1500						
Temp	20.2	18.2	17.3	16.7						
Appearance	clear	black	clear	clear						
Specific Gravity	62	7100	60	32						

COMMENTS: sample for (analysis)
purged with Honda MB-15 pump

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Cubisz / R. Finner
 DATE: 5-4-90 , 5-8-90

WELL NO.: MW 85

- ① TOTAL CASING AND SCREEN LENGTH (FT.): 16.3
 ② CASING INTERNAL DIAMETER (in.): 2
 ③ WATER LEVEL BELOW TOP OF CASING (FT.): 6.90
 ④ VOLUME OF WATER IN CASING (GAL.): 1.60

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$$V = 0.0408 (2)^2 \times (16.3 - 6.90) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Int	1.60	4.80	9.00	12.00	13.60	16.9	31.8	39.4	45.5	
pH	6.54	6.31	6.08	6.08	6.19	6.19	6.15	6.14	6.13	6.11	
conductivity	325	350	350	340	350	300	310	300	300	300	
Temp	10.1	9.6	9.4	9.3	9.0	9.7	9.5	11.0	10.3	11.1	
Appearance	Turbid thick gray	Turbid cloudy gray	less turbid light gray	less turbid light gray	more turbid cloudy gray	light gray	light gray	slightly cloudy	lt. gray	lt. gray	
Turbidity	>100	>100	>100	>100	>100	7100	7100	79	<100	30	

COMMENTS: Purged with fire water

Development discontinued
 pH & Conductivity stable
 Turbidity below 50 NTU

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy

PROJECT NO.: 0965-04-1

STAFF: S-4-90 R. Dabie R. Grogan

DATE: 5-4-90 5-8-90

WELL NO.: MW-81

WELL I.D. VOL.
GAL./FT.

- ① TOTAL CASING AND SCREEN LENGTH (FT.): 42' 10' screen 1" 0.04
32' 2" 0.17
3" 0.38
4" 0.66
5" 1.04
6" 1.50
8" 2.60
- ② CASING INTERNAL DIAMETER (in.): 2
- ③ WATER LEVEL BELOW TOP OF CASING (FT.) 8.00
- ④ VOLUME OF WATER IN CASING (GAL.) 6.00

$$V = 0.0408 (2)^2 \times (42 - 8) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	12.0	18.0	38.0	53.0	68	83				
pH	8.51	7.91	7.63	7.15	7.17	7.11	7.11				
conductivity	950	1075	1050	1130	1060	1100	1150				
Temp	12.3	11.4	11.2	12.5	12.2	12.2	12.7				
Appearance	DARK GRAY	TURBID GRAY	TURBID GRAY	lt gray	lt gray	lt gray	lt gray				
Turbidity	>100	>100	>100	>100	>100	>100	>100				

COMMENTS: H₂S odor

Development suspend after 83 gal purged 5/8/90
and stabilization of parameters (pH + conductivity)

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Five Academy

PROJECT NO.: 0965-04-1

STAFF: S. McConaghay

DATE: 9/5/90

WELL NO.: MW-8D

WELL I.D.

VOL.
GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.):	<u>52' - 5' screen</u> <u>47'</u>	1"	0.04
② CASING INTERNAL DIAMETER (in.):	<u>2"</u>	2"	0.17
		3"	0.38
③ WATER LEVEL BELOW TOP OF CASING (FT.)	<u>6.90</u>	4"	0.66
		5"	1.04
④ VOLUME OF WATER IN CASING (GAL.)	<u>6.8</u>	6"	1.50
		8"	2.60

$$V = 0.0408 (2')^2 \times (1 - 3) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	INT	5.8	15.5	25.5	32	38					
gallons											
pH	11.34	10.19	7.23	7.37	7.3	7.28					
conductivity	6010	930	2500	2100	2080	2200					
Temp	11.6	11.5	11.7	12.7	12.5	12.9					
Appearance	LT Brown	LT	dk gray	LT gray	1" silt	clear					
turbidity	>100	>100	>100	>100	50	19					

COMMENTS: strong H_2S odor

Development discontinued after 38 gal purged

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz S. McConaghly
 DATE: 5-1-90, 5-2-90

WELL NO.: PZ-9

WELL I.D. VOL.
GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.): 40.00'

1" 0.04

② CASING INTERNAL DIAMETER (in.): 2"

2" 0.17

③ WATER LEVEL BELOW TOP OF CASING (FT.) 9.56

3" 0.38

④ VOLUME OF WATER IN CASING (GAL.) 5.17

4" 0.66

5" 1.04

6" 1.50

8" 2.60

$$V = 0.0408 (2)^2 \times (1 - 3) = \text{_____ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	1st	5.17	15.50	20.50	30.50	40.50	50.50			
pH	9.54	7.19	7.16	7.23	7.07	7.04	7.11			
conductivity	525	850	850	1000	950	1000	1050			
Temp	13.0	12.1	11.6	10.3	13.6	13.8	14.6			
Appearance	Turbid Brown	Turbid Brown	Turbid Brown	Turbid Light Brown	Less turbid cloudy	clear	clear			
Turbidity	>100	>100	>100	>100	>100	29	24			

COMMENTS:

X - WATER LEVEL ON 5-2-90 - 13.09'

First three volumes purged with Bailer.

Remaining volumes purged with Honda WBIS pump.

Water level after 50 gal - 14.60'

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz, S. McConnaghy
 DATE: _____

WELL NO.: MW-95

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 16.35

② CASING INTERNAL DIAMETER (in.): 2"

③ WATER LEVEL BELOW TOP OF CASING (FT.) 5.80

④ VOLUME OF WATER IN CASING (GAL.) 1.78

$$V = 0.0408 (2)^2 \times (16.35 - 5.80) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Int	1.78	2.56	6.56	8.56	10.81					
PH	7.22	7.15	7.06	7.10	7.23	7.06					
conductivity	750	750	710	675	600	600					
Temperature	13.3	8.6	8.9	9.0	8.7	8.7					
Appearance	Light Brown	Brown	Brown	Brown	Less turbid cloudy	clear					
Turbidity	>100	>100	>100	>100	52	47					

COMMENTS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz, S. McConaughy
 DATE: 5-1-90

WELL NO.: MW-9I

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 50.8

② CASING INTERNAL DIAMETER (in.): 3"

③ WATER LEVEL BELOW TOP OF CASING (FT.) 13.89

④ VOLUME OF WATER IN CASING (GAL.) 6.28

$$V = 0.0408 (2)^2 \times (1 - 3) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)											
	~~1~~	6.28	12.46	18.74	30.74	42.74	48.94	68.95	*118.95	165.95	185.00	
pH	7.40	7.42	7.27	7.32	7.03	7.01	7.01	7.29	7.15	7.18	7.19	
conductivity	975	1140	1100	1150	1350	950	925	1050	1100	1100	1100	
Temp	12	12.2	12.0	11.4	15.4	20.7	18.3	11.6	12.0	13.5	12.5	
Appearance	Turbid Light Brown	Turbid Light Brown	Turbid Light Brown	Turbid Light Brown	Less Turbid	Less Turbid	Less Turbid	Cloudy Turbid	Cloudy Turbid	Turbid Less cloudy	Clear	
Turbidity	>100	>100	>100	>100	>100	>100	>100	>100	>100	76 ~~76~~	46	

COMMENTS: * Sulfur odor

Purging rate - 5 gal/min - with Honda WB15 pump

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz
 DATE: 5-3-90 5-4-90

WELL NO.: mw-105

WELL I.D. VOL.
GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.): 21.6

1" 0.04

② CASING INTERNAL DIAMETER (in.): 2

2" 0.17

③ WATER LEVEL BELOW TOP OF CASING (FT.) 7.25

3" 0.38

④ VOLUME OF WATER IN CASING (GAL.) 2.4

4" 0.66

5" 1.04

6" 1.50

8" 2.60

$$V = 0.0408 (2)^2 \times (1 - 3) = \text{_____ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	Int	2.4	4.8	7.2	* 9.95					
pH	7.02	7.20	7.11	7.10	7.08					
conductivity	775	750	825	875	800					
Temp	10.2	4.9	11.6	12.7	9.8					
Appearance	cloudy GRAY	cloudy	TURBID cloudy	more TURBID Brown	clear					
Turbidity	>100	>100	>100	>100	15					

COMMENTS: purged with PVC Bailer
 SLOW recharge

* Final measurements taken on 5-4-90, due to slow Recharge

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy
 PROJECT NO.: 0965-04-1
 STAFF: R. Dubisz
 DATE: 5/3/90

WELL NO.: MW-101

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 44.40

② CASING INTERNAL DIAMETER (in.): 2

③ WATER LEVEL BELOW TOP OF CASING (FT.) 12.75

④ VOLUME OF WATER IN CASING (GAL.) 5.4

$$V = 0.0408 (2)^2 \times (44.40 - 12.75) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	* Int	5.4	15.4	25.4							
pH	7.20	7.00	7.13	7.14							
conductivity	1275	1000	1025	1050							
Temp	10.8	10.9	12.3	13.3							
Appearance	cloudy dark gray	less turbid	less turbid light gray	clear							
Turbidity	>100	700	83	46							

COMMENTS:

* SULFIDE odor DETECTED

* PVC Shavings Found in water. ~~from~~

purged with PVC Bailer

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy RT/FS

PROJECT NO.: 0965-04-1

STAFF: R. FRAIPA / M. Rotstein

DATE: 5/8/93

WELL NO.: MW-115

WELL I.D. VOL. GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.): 16.15

② CASING INTERNAL DIAMETER (in.): 2"

③ WATER LEVEL BELOW TOP OF CASING (FT.) 4.14

④ VOLUME OF WATER IN CASING (GAL.) 2 gal

1" 0.04
2" 0.17
3" 0.38
4" 0.66
5" 1.04
6" 1.50
8" 2.60

$$V = 0.0408 (2)^2 \times (16.15 - 4.14) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	INT	6	12	14	18						
Gallons											
pH	6.6	6.47	6.58	6.57	6.74						
conductivity	1160	1250	1325	1375	1350						
Temp	10.7	11.3	9.7	9.6	9.2						
Appearance	v. turbid yellow-brown	v. turbid yellow-brown	slightly brown	slightly brown	lt brown						
Turbidity	>100	>100	>100	>100	>100						

COMMENTS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Rochester Fire Academy RI/F.S.
 PROJECT NO.: 0965-04-1
 STAFF: R. Frappa / M. Rishin
 DATE: 5/8/10

WELL NO.: MW-11E

WELL I.D. VOL. GAL./FT.

① TOTAL CASING AND SCREEN LENGTH (FT.):	<u>37.80</u>	1"	0.04
② CASING INTERNAL DIAMETER (in.):	<u>2"</u>	2"	0.17
③ WATER LEVEL BELOW TOP OF CASING (FT.):	<u>7.89</u>	3"	0.38
		4"	0.66
		5"	1.04
④ VOLUME OF WATER IN CASING (GAL.)	<u>5.1</u>	6"	1.50
		8"	2.60

$V = 0.0408 (2)^2 \times (1 - 3) = \underline{\hspace{2cm}} \text{ GAL.}$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	Initial	8.5	17	25.5	33	41.5	49	55		
pH	7.18	7.04	6.90	6.96	6.96	7.14	7.16	7.15		
Conductivity	1430	1175	1350	1325	1310	1260	1290	1300		
Temp	13.1	12.3	12.2	12.4	12.4	11.5	11.5	11		
Turbidity	2100	>100	>100	>100	2100	84	54	52		
Appearance	DK gray v. turbid	DK gray v. turbid	H. gray	lt gray	lt gray	lt gray	lt gray (cloudy)	Slightly cloudy		

COMMENTS: Slight H₂S odor B, W

Development Dis continued after stabilization of pH + Conductivity + Turbidity below 50 NTU

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Roxbury Fire Academy
 PROJECT NO.: 0963-04-1
 STAFF: R. RUBISZ, S. MFCOMMAH
 DATE: 5-10-95

WELL NO.: 15S

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

① TOTAL CASING AND SCREEN LENGTH (FT.): 16.88

② CASING INTERNAL DIAMETER (in.): 2

③ WATER LEVEL BELOW TOP OF CASING (FT.) 5.82

④ VOLUME OF WATER IN CASING (GAL.) 1.80

$$V = 0.0408 (2)^2 \times (16.88 - 5.82) = \underline{\hspace{2cm}} \text{ GAL.}$$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	1.7	9.40	11.40	12.20	13						
pH	6.30	6.17	5.29	6.35	6.60						
Conductivity	640	725	700	750	750						
Temp	11.4	11.6	12.5	12.4	12.5						
Appearance	Brown	GRAY	GRAY	light GRAY	clear						
Turbidity	>100	>100	>100	>100	41						

COMMENTS:

APPENDIX C.5
HYDRAULIC CONDUCTIVITY TESTING

APPENDIX C.5.1
PRESSURE PACKER TESTING

Borehole No. MW-6D

Test Interval: 44.0 - 54.4

Single Packer test
Bottom of Hole @ 54.4

Conversion from: 1 gpm/ft² = 0.0679 cm/sec

$$K = \frac{Q}{2\pi L H} \ln \frac{L}{r} (0.0679 \text{ cm/sec})$$

K = Hydraulic Conductivity

Q = Flow rate

L = Length of test section

H = differential Head

r = radius of Borehole

H = height of gauge + W.L. + (water press x 2.31)

2.31 x psi = ft of water

Q = 0.37 gpm

L = 10.4'

r = 0.167' - 4" dia

H = 4' + 9.7' + (27 x 2.31) = 75.97'

$$K = \frac{0.37}{2\pi \times 10.4 \times 75.97} \times \ln \frac{10.4}{0.167} (0.0679 \text{ cm/sec})$$

$$7.45 \times 10^{-5} \times 4.13 (0.0679)$$

Test Interval: 44' - 54.4' K = 2.09 x 10⁻⁵ cm/sec

Test Interval: 34 - 44'

$$K = \frac{Q}{2\pi L H} \times \ln \frac{L}{r} (0.0679 \text{ cm/sec})$$

Q = 15.3

L = 10'

r = 0.167'

H = 4' + 9.7' + (27 x 2.31) = 75.97'

$$K = \frac{15.3}{2\pi \times 10 \times 75.97} \times \ln \left(\frac{10}{0.167} \right) \times 0.0679 \text{ cm/sec}$$

$$.0032 \times 4.092 \times 0.0679$$

Test Interval: 34 - 44' K = > 8.8 x 10⁻⁴ cm/sec

05-1418

PROJECT Rochester Fire Academy R.F./Es SITE Fire Academy DATE 4-11-90 BORING No. MW-6D
LOCATION City of Rochester GROUND ELEV. _____ TOTAL DEPTH 54.4 TOP OF ROCK, DEPTH 37.0
CONTRACTOR Buffalo Drilling DRILLER Ken Krueger INSPECTOR R. Frappa CHECK'D BY _____
WATER LEVEL; DEPTH 9.7 ELEV. _____ WATER PIPE LENGTH 40 WATER PIPE I.D. 1/2
FLOW METER No. 026820 Huskey PRESSURE GAUGE No. _____ TEST INTERVAL; DEPTH 34-44 ELEV. _____

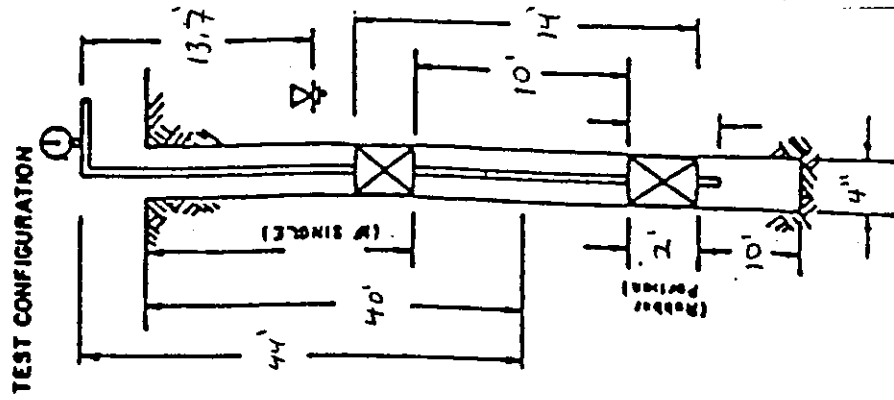
[illegible]

AKK:

REF ID: A64543

REVISION.

SECRET



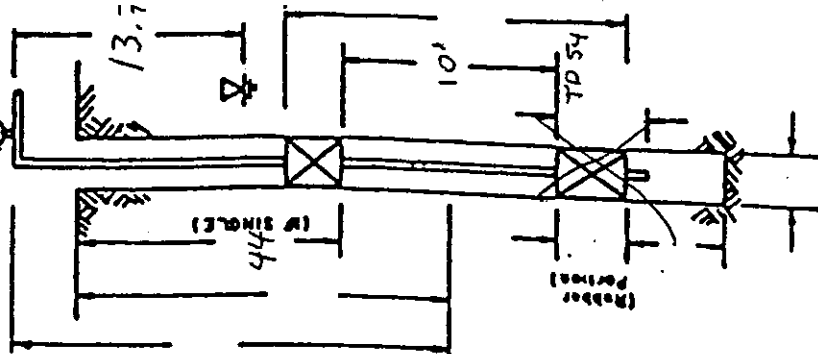
☒ 378000
☐ SINGLE 0

$$Q = 15.3 \text{ gpm}$$

- Could not increase gauge pressure
- Flow rate is in excess of 153 gpm

UNITED STATES OF AMERICA

PROJECT Rochester Fire Academy RI/ES SITE Fire Training Academy DATE 4-11-90 BORING NO. MW-6D
LOCATION City of Rochester GROUND ELEV. _____ TOTAL DEPTH 54.4 TOP OF ROCK, DEPTH 34.0
CONTRACTOR Buffalo Drilling DRILLER Ken Krieger INSPECTOR R. Frappa CHECK'D BY _____
WATER LEVEL; DEPTH 9.7 ELEV. _____ WATER PIPE LENGTH 50 WATER PIPE I.D. 1/2"
FLOW METER NO. 006820 HURLEY PRESSURE GAUGE NO. _____ TEST INTERVAL; DEPTH 44.4-54.7 FEET

[illegible]
$$Q = 0.125 \text{ gpm}$$
$$Q = 0.38 \text{ gpm}$$


☒ SINGLE ☐ DOUBLE

BY MKF DATE 6-5-90 SHEET NO. OF
 CHKD. BY QMF DATE 8/10/90 JOB NO.
 SUBJECT Pressure Packer Testing Sales

BOREHOLE MW-7D

Interval 43-50.2

$$K = \frac{Q}{2\pi L H} \ln \frac{L}{r} (0.0679 \text{ cmls})$$

$$Q = 5.59 \text{ gpm}$$

$$L = 7.2$$

$$r = 0.125$$

$$H = (4' + 4.3 + (19 \times 2.31)) = 52.19 \quad (\text{ht gauge} + \text{w.L} + (\text{psi} \times 2.31))$$

$$K = \frac{5.59}{2\pi (7.2)(52.19)} \ln \frac{7.2}{0.125} (0.0679 \text{ cmls})$$

$$K = 6.52 \times 10^{-4}$$

PRESSURE TEST REPORT

SHT _____ OF _____

PROJECT Rochester Fire Academy RIFs SITE Fire Academy DATE 4/25/90 BORING NO. MW-7D
 LOCATION City of Rochester GROUND ELEV. _____ TOTAL DEPTH 50.2 TOP OF ROCK, DEPTH 30.2
 CONTRACTOR Buffalo Drilling DRILLER Ken Knieger INSPECTOR R. Frappa CHECK'D BY _____
 WATER LEVEL, DEPTH 4.3 ELEV. _____ WATER PIPE LENGTH _____ WATER PIPE I.D. 1/2"
 FLOW METER NO. 006820 Hershey PRESSURE GAUGE NO. _____ TEST INTERVAL, DEPTH 43-50 ELEV. _____

GAUGE PRESS. _____ Packer Infl't'n Press. _____				GAUGE PRESS. _____ Packer Infl't'n Press. _____				GAUGE PRESS. _____ Packer Infl't'n Press. _____				TEST CONFIGURATION			
ELAPSED TIME Mins.	FLOW READING GpL	Δ FLOW		ELAPSED TIME Mins.	FLOW READING GpL	Δ FLOW		ELAPSED TIME Mins.	FLOW READING GpL	Δ FLOW					
0	1	3		0	4.5	2.0									
0.5	4	2.3		0.5	6.5	2.9									
1	6.3	2.6		1	9.4	2.8									
1.5	9.4	2.6		1.5	12.2	3.0									
2	12.0	2.5		2	15.2	2.8									
2.5	14.5	2.7		2.5	18.0	2.8									
3	17.2	2.2		3	20.8	2.9									
3.5	19.4	3.2		3.5	23.7	2.9									
4	22.6			4	26.6	3.0									
4.5				4.5	29.6	2.8									
				5	32.4	2.7									
				5.5	35.1	2.9									
				6	38.0	2.8									
				6.5	40.8	2.8									
				7	43.6	2.8									

MARKS: Q = 4.8 gpm

REMARKS: 5.59 gpm

REMARKS:

REMARKS:

SINGLE ☒ DOUBLE ☐

Borehole mw-80

Test Interval 43-50'

Single Packer Test

Bottom of hole @ 50.0

Conversion $1 \text{ gpm}/\text{ft}^2 = 0.0679 \text{ cm/sec}$

$$K = \frac{Q}{2\pi L H} \ln \frac{L}{r} (0.0679 \text{ cm/sec})$$

$Q = 1.15$

$L = 7$

$d = 3" \approx 1.5$ $r = 0.125$

$H = \text{height of gauge} + \text{W.L.} + (\text{water pressure} \times 2.31)$

$4' + 4.6' + (30 \times 2.31) = 77.9$

$$K = \frac{1.15}{2\pi(7)(77.9)} \ln \frac{7}{.125} (0.0679 \text{ cm/sec}) = \boxed{9.17 \times 10^{-5} \text{ cm/s}}$$

TEST INTERVAL 31-41

Double Packer

$$K = \frac{Q}{2\pi L H} \ln \frac{L}{r} (0.0679 \text{ cm/s})$$

$Q = 12.82 \text{ gpm}$

$L = 10$

$\text{diam} = 3" \quad r = 0.125$

$H = 4' + 12.7 + (15 \times 2.31) = 51.35$

$$K = \frac{12.82}{2\pi(10)(51.35)} \ln \frac{10}{0.125} (0.0679 \text{ cm/s})$$

$$\boxed{K = 1.18 \times 10^{-3} \text{ cm/s}}$$

247

PROJECT Rochester Fire Academy RUES SITE Fire Academy DATE 4/16/90 BORING No. MW-8D
LOCATION City of Rochester GROUND ELEV. _____ TOTAL DEPTH 50.0 TOP OF ROCK, DEPTH 30'
CONTRACTOR Buffalo Drilling DRILLER Ken Krieger INSPECTOR R. Frappa CHECK'D BY _____
WATER LEVEL; DEPTH 4.6' ELEV. _____ WATER PIPE LENGTH 45' WATER PIPE I.D. 1/2"
FLOW METER No. 006820 Hershey PRESSURE GAUGE No. _____ TEST INTERVAL; DEPTH 43-50

[illegible]

☐ 376000
☒ SINGLE 376000

PRESSURE TEST REPORT

SHT _____ OF _____

PROJECT Rochester Fire Academy Site Fire Academy DATE 4/16/90 BORING No. MW-30

LOCATION City of Rochester GROUND ELEV. _____ TOTAL DEPTH 50' TOP OF ROCK, DEPTH 30'

CONTRACTOR Buffalo Drilling DRILLER Ken Krieger INSPECTOR R. Frazer CHECK'D BY _____

WATER LEVEL, DEPTH 12.7 ELEV. _____ WATER PIPE LENGTH _____

FLOW METER No. 006320 Hershey PRESSURE GAUGE No. _____ WATER PIPE I.D. 1/2

TEST INTERVAL, DEPTH 31-41 ELEV. _____

GAUGE PRESS. _____				GAUGE PRESS. _____				GAUGE PRESS. _____				GAUGE PRESS. _____			
PACKER INFL'TN PRESS. <u>150</u>				PACKER INFL'TN PRESS. _____				PACKER INFL'TN PRESS. _____				PACKER INFL'TN PRESS. _____			
ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW		ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW		ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW		ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW	
0	2.0	1.8													
0.5	3.5	2.2													
1.0	6.0	5.0													
1.5	11.0														
max pressure at 15.05															
2	20	12													
2.5	26	7.5													
3	33.5	7.5													
3.5	41.0	7.5													
4	48.5	8.0													
4.5	56.5	7.0													
5	63.5	7.5													
5.5	71.0	7.9													
6	78.9														

REMARKS:

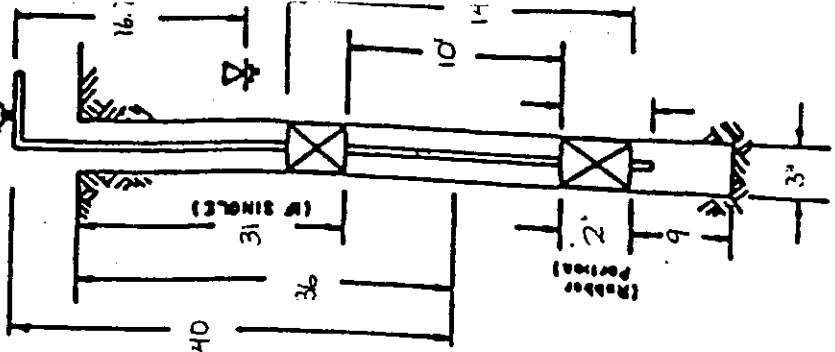
Q=12.82 gpm

REMARKS:

REMARKS:

REMARKS:

TEST CONFIGURATION



SINGLE ☐ DOUBLE ☒

APPENDIX C.5.2

SLUG TESTING

FIELD SLUG TEST LOG

CLIENT:

JOB NO.:

WELL/BOREHOLE NO.: MW-65

COMPLETED BY:

WELL/BOREHOLE DETAILS:

Installation Date:

Reference Point (RP):

Ground Elevation: _____ ft. AMSL

RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored:

Hydrostratigraphic Unit Monitored:

Slug Test Method: no slug, monitored water level recovery after development

Riser Length: _____ ft. Riser I.D.: .167 ft.

Riser Material: PVC

Screen Length: 10 ft. Screen I.D.: .167 ft.

Screen Material: PVC

Slot: 0.010

L (Length of Sand Pack) 12.7 ft.

 r_s (Radius of Borehole at Screen) ~~0.417~~ ^{0.417} ft.

r_c (Radius of Screen) .083 ft.

Slug Dimensions or Volume

LESI:

Start Date: 5/7/90

Static Level (H): 7.58 ft. BRP

Start Time (To):

Initial Pressure Head (H₀): 14.32 ft. BRP

Will Water Level Remain Above the Screen During the Test?

(Yes) _____ (No) ☒

[illegible]

Recharge rate after development

**MALCOLM
PIRNIE**

FIELD SLUG TEST LOG

PROJECT: Firm Academy RT/FS

CLIENT: City of Rochester

JOB NO. :

WELL/BOREHOLE NO.: MW-6E

COMPLETED BY: R. Frank

WELL/BOREHOLE DETAILS:

Installation Date:

Ground Elevation: _____ ft. AMSL

Reference Point (RP): TOR

RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored: Vapor Bedrock

Hydrostratigraphic Unit Monitored: Redbank

Slug Test Method: Rising Head w/ 5" slug & Pressure Transducer / data logger

Riser Length: 40 ft. Riser I.D.: .167 ft.

Riser Material: *mc*

Screen Length: 10 ft. Screen I.O.: .167 ft.

Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 111 ft. r_s (Radius of Borehole at Screen) .167 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/7/90

Static Level (H): 13.0 舊 7 ft. BRP

Start Time (To): 14:28

Initial Pressure Head (H₀): 15.26 ft. BRP

Will Water Level Remain Above the Screen During the Test?

(Yes) X (No)

[illegible]

COMMENTS:

Test # ① slug out

**MALCOLM
PIRNIE**

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____ WELL/BOREHOLE NO.: mw-6D
 JOB NO.: _____ COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored: _____

Hydrostratigraphic Unit Monitored: _____

Slug Test Method: 5' slug out

Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC

Screen Length: 10' ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11.4 ft. r_s (Radius of Borehole at Screen) .167 ft. r_c (Radius of Screen) .083 ft.

Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 05/09/90 Static Level (H): 13.93 ft. BRP

Start Time (To): 14:43 Initial Pressure Head (Ho): 15.99 ft. BRP

Will Water Level Remain Above the Screen During the Test? (Yes) X (No) _____

CLOCK TIME	ELAPSED TIME (h-m-s)	DEPTH H(ft. BRP)	H-h (ft.)	H-h H-Ho	CLOCK TIME	ELAPSED TIME (h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-Ho
	0	15.99	.	1			<u>13.99</u>		
	.0167	15.87		.94					
	.0333	15.76		.89					
	.05	15.65		.83					
	.0667	15.57		.80					
	.0833	15.49		.76					
	.1167	15.33		.68					
	.15	15.20		.62					
	.1833	15.09		.56					
	.2333	14.94		.49					
	.3334	14.71		.38					
	.5	14.43		.24					
	.75	14.21		.14					
	1.0834	14.07		.07					
	1.9167	13.99		.03					

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____ WELL/BOREHOLE NO.: 75
 JOB NO.: _____ COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 2' slug in
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 10' ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010
 L (Length of Sand Pack) 10.8 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume .85' displacement

TEST:

Start Date: 5/11/90 Static Level (H): 3.26 ft. BRP
 Start Time (To): _____ Initial Pressure Head (Ho): 2.70 ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) X

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-Ho	CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-Ho
	0	2.70	.56						
	.25	2.78	.48						
	.5	2.81	.45						
	.75	2.83	.43						
	1.0	2.85	.41						
	1.5	2.89	.37						
	2.0	2.91	.35						
	2.5	2.94	.32						
	3.0	2.95	.31						
	4.0	2.98	.28						
	5.0	3.01	.25						
	6.0	3.03	.23						
	8.0	3.07	.19						
	10.0	3.09	.17						
	15.0	3.14	.12						

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____
 JOB NO.: _____ WELL/BOREHOLE NO.: 71
 COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 5' slug out
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010
 L (Length of Sand Pack) 12.2 ft. r_s (Radius of Borehole at Screen) .125 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/10/90 Static Level (H): 4.70 ft. BRP
 Start Time (To): 17:23 Initial Pressure Head (Ho): 6.89 ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) X (No) _____

CLOCK TIME	ELAPSED TIME $t(h=ms)$	DEPTH H(ft. BRP)	H-h (ft.)	H-h H-Ho	CLOCK TIME	ELAPSED TIME $t(h=ms)$	DEPTH H(ft. BRP)	H-h (ft.)	H-h H-Ho
	0	6.89		1.0					
	.0333	6.55		.84					
	.05	6.22		.69					
	.0666	5.95		.57					
	.0833	5.73		.47					
	.10	5.54		.38					
	.1166	5.39		.32					
	.1333	5.28		.26					
	.15	5.17		.21					
	.1666	5.09		.18					
	.20	4.99		.13					
	.2333	4.93		.11					
	.40	4.84		.07					
	.65	4.81		.05					
	1.15	4.81		.05					

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____ WELL/BOREHOLE NO.: 7D
 JOB NO.: _____ COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 5' slug out
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 5 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010
 L (Length of Sand Pack) 7.7 ft. r_s (Radius of Borehole at Screen) .125 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/6/90 Static Level (H): 4.71 ft. BRP
 Start Time (To): 17:06 Initial Pressure Head (H₀): _____ ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) X (No) _____

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-H ₀	CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-H ₀
	0 min	6.91		1		2.917	4.78		.03
	.0167	6.86		.98					
	.0333	6.78		.94					
	.05	6.72		.91					
	.0667	6.66		.89					
	.10	6.56		.84					
	.1333	6.47		.80					
	.1667	6.39		.76					
	.2167	6.26		.70					
	.3334	6.01		.59					
	.5834	5.62		.41					
	.75	5.44		.33					
	1.0	5.22		.23					
	1.25	5.08		.17					
	1.667	4.94		.10					

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____ WELL/BOREHOLE NO.: 85
JOB NO.: _____ COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
Reference Point (RP): _____ RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored: _____

Hydrostratigraphic Unit Monitored: _____

Slug Test Method: 2' slug cut

Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC

Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11.2 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 0.85' displacement

IESI:

Start Date: 5/10/90 Static Level (H): 6.51 ft. BRP

Start Time (To): 12:23 Initial Pressure Head (Ho): 7.36 ft. BRP

Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) X

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____ WELL/BOREHOLE NO.: 81
JOB NO.: _____ COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
Reference Point (RP): _____ RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored:

Hydrostratigraphic Unit Monitored:

Slug Test Method: 5' slug out

Riser Length: ft. Riser I.D.: .167 ft. Riser Material: PVC

Screen Length: 10 ft. Screen I.D.: 167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11 ft. r_s (Radius of Borehole at Screen) .167 ft. r_w (Radius of Screen) .083 ft.

Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/10/90 Static Level (H): ~~7.52~~ 7.32 ft. BPP

Start Time (To): 12:37 Initial Pressure Head (Ho): 9.51

Will Water Level Remain Above the Screen During the Test? (Yes) X (No)

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____
JOB NO.: _____

WELL/BOREHOLE NO.: 80
COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
Reference Point (RP): _____ RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored:

Hydrostratigraphic Unit Monitored:

Slug Test Method: 21 slug out

Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PyC

Screen Length: 5 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 6.5 ft. r (Radius of Borehole at Screen) .167 ft.

Slug Dimensions or Volume 0.85' displacement

TEST:

Start Date: ~~1989~~ 05/10/90 Static Level (H): 7.1 ft. BPP

Start Time (To): 13:54

Will Water Level Remain Above the Screen During the Test? (Yes) X (No) 7.5

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT:

CLIENT:

JOB NO.:

WELL/BOREHOLE NO.: PZ-9

COMPLETED BY:

WELL/BOREHOLE DETAILS:

Installation Date:

Ground Elevation:

ft. AMSL

Reference Point (RP):

RP Elevation:

ft. AMSL

Stratigraphic Unit Monitored:

Hydrostratigraphic Unit Monitored:

Slug Test Method: slug out 2' slug

Riser Length: _____ ft.

Riser I.D.: .167 ft.

Riser Material: Pvc

Screen Length: 5 ft.

Screen I.D.: .167 ft.

Screen Material: PVC

Slot: 0.010

L (Length of Sand Pack) 6.8 ft.

 r_s (Radius of Borehole at Screen) .417 ft. r_s (Radius of Screen) = .053 ft.

Slug Dimensions or Volume 0.85' displacement

TEST:

Start Date:

519190

Static Level (H): 11.73

ft. BRP

Start Time (To): 15:26

Initial Pressure Head (H_0): 12.61

ft. 88P

Will Water Level Remain Above the Screen During the Test?

(Yes)

(No)

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____
JOB NO.: _____

WELL/BOREHOLE NO.: 105 MW-95
COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
Stratigraphic Unit Monitored: _____
Hydrostratigraphic Unit Monitored: _____
Slug Test Method: 2' slug out
Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010
 L (Length of Sand Pack) 5.11 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.
Slug Dimensions or Volume 0.85' displacement

TEST:

Start Date: 5/9/90 Static Level (H): 5.68 ft. BRP
Start Time (To): 14:07 Initial Pressure Head (Ho): 6.62 ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) X

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____
JOB NO.: _____

WELL/BOREHOLE NO.: 9I
COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____

Reference Point (RP): _____

Stratigraphic Unit Monitored: _____

Hydrostratigraphic Unit Monitored: _____

Slug Test Method: 5' plug out

Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC

Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11.5 ft. r_s (Radius of Borehole at Screen) .167 ft. r_c (Radius of Screen) .083 ft.

Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/19/90 Static Level (H): 13.70 ft. BRP
Start Time (To): 15:16 Initial Pressure Head (Ho): 15.89 ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) _____

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____
 JOB NO.: _____

WELL/BOREHOLE NO.: 105
 COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 2' slug out
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: .010
 L (Length of Sand Pack) 12.1 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 0.85' displacement

TEST:

Start Date: 5/10/90 Static Level (H): 7.15 ft. BRP
 Start Time (To): 9:33 Initial Pressure Head (Ho): 7.54 ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) X (No) NO

CLOCK TIME	ELAPSED TIME (h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-Ho	CLOCK TIME	ELAPSED TIME (h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-Ho
	0	7.84	.69			14.9167	7.38	.23	
	.05	7.71	.56			18.9167	7.35	.20	
	.0667	7.66	.51						
	.1167	7.65	.50						
	.1667	7.63	.48						
	.3334	7.60	.45						
	.5	7.57	.42						
	.8334	7.55	.40						
	1.33	7.54	.39						
	2.4167	7.51	.36						
	4.4167	7.48	.33						
	4.9167	7.46	.31						
	5.9167	7.44	.29						
	7.9167	7.43	.28						

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____
 JOB NO.: _____ WELL/BOREHOLE NO.: 101
 COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 5' slug out
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010
 L (Length of Sand Pack) 11.9 ft. r_s (Radius of Borehole at Screen) .167 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/10/90 Static Level (H): 12.62 ft. BRP
 Start Time (To): 9:18 Initial Pressure Head (H₀): 14.31 ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) X (No) _____

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH H(ft. BRP)	H-h (ft.)	H-h H-H ₀	CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH H(ft. BRP)	H-h (ft.)	H-h H-H ₀
	0	14.81		1					
	.0017	14.39		.81					
	.0383	13.97		.62					
	.055	13.70		.49					
	.0717	13.45		.38					
	.0883	13.28		.30					
	.105	13.17		.25					
	.1217	13.07		.21					
	.1717	12.95		.15					
	.2217	12.88		.12					
	.2717	12.85		.11					
	.3884	12.77		.07					
	1.1384	12.73		.05					
	1.305	12.69		.03					

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
 CLIENT: _____
 JOB NO.: _____

WELL/BOREHOLE NO.: 115
 COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____ Ground Elevation: _____ ft. AMSL
 Reference Point (RP): _____ RP Elevation: _____ ft. AMSL
 Stratigraphic Unit Monitored: _____
 Hydrostratigraphic Unit Monitored: _____
 Slug Test Method: 2' slug out
 Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC
 Screen Length: 10 ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11.3 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.
 Slug Dimensions or Volume 2' slug out 0.85' displacement

TEST:

Start Date: 5/14/90 Static Level (H): 2.94 ft. BRP
 Start Time (To): 9:10 am Initial Pressure Head (H₀): 3.54 ft. BRP
 Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) _____

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-H ₀	CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	H-h (ft.)	H-h H-H ₀
	<u>0</u>	<u>3.54</u>	<u>.6</u>						
	<u>.25 min</u>	<u>3.53</u>	<u>.59</u>						
	<u>.50</u>	<u>3.50</u>	<u>.56</u>						
	<u>.75</u>	<u>3.48</u>	<u>.54</u>						
	<u>1.00</u>	<u>3.46</u>	<u>.52</u>						
	<u>1.5</u>	<u>3.43</u>	<u>.49</u>						
	<u>2.0</u>	<u>3.40</u>	<u>.46</u>						
	<u>3.0</u>	<u>3.35</u>	<u>.41</u>						
	<u>4.0</u>	<u>3.31</u>	<u>.37</u>						
	<u>6.0</u>	<u>3.25</u>	<u>.31</u>						
	<u>8.0</u>	<u>3.20</u>	<u>.26</u>						
	<u>13.0</u>	<u>3.12</u>	<u>.18</u>						
	<u>18.0</u>	<u>3.08</u>	<u>.14</u>						
	<u>27.0</u>	<u>3.05</u>	<u>.11</u>						

COMMENTS:

FIELD SLUG TEST LOG

PROJECT:

CLIENT:

JOB NO. :

WELL/BOREHOLE NO.: 11 I

COMPLETED BY:

WELL/BOREHOLE DETAILS:

Installation Date:

Ground Elevation: _____ ft. AMSL

Reference Point (RP):

RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored:

Hydrostratigraphic Unit Monitored:

Slug Test Method: 5' slug out

Riser Length: _____ ft. Riser I.D.: .167 ft.

Riser Material: PVC

Screen Length: 10 ft. Screen I.D.: 167 ft.

Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 12.5 ft. r_s (Radius of Borehole at Screen) .167 ft. r_e (Radius of Screen) .683 ft.

Slug Dimensions or Volume 2.19' displacement

TEST:

Start Date: 5/10/90

Static Level (H): 7.48 ft. BRP

Start Time (To): 14:30

Initial Pressure Head (H₀): 9.67 ft. BRP

Will Water Level Remain Above the Screen During the Test?

(Yes) x (No)

[illegible]

COMMENTS:

FIELD SLUG TEST LOG

PROJECT: _____
CLIENT: _____
JOB NO.: _____ WELL/BOREHOLE NO.: 155
COMPLETED BY: _____

WELL/BOREHOLE DETAILS:

Installation Date: _____

Reference Point (RP): _____ Ground Elevation: _____ ft. AMSL

RP Elevation: _____ ft. AMSL

Stratigraphic Unit Monitored: _____

Hydrostratigraphic Unit Monitored: _____

Slug Test Method: 2' slug in

Riser Length: _____ ft. Riser I.D.: .167 ft. Riser Material: PVC

Screen Length: 10' ft. Screen I.D.: .167 ft. Screen Material: PVC Slot: 0.010

L (Length of Sand Pack) 11 ft. r_s (Radius of Borehole at Screen) .417 ft. r_c (Radius of Screen) .083 ft.

Slug Dimensions or Volume .85' displacement

TEST:

Start Date: 5/11/90
Start Time (To): _____
Will Water Level Remain Above the Screen During the Test?
Static Level (H): 6.06 ft. BRP
Initial Pressure Head (Ho): 5.67 ft. BRP
(Yes) ✓ (No) _____

[illegible]

COMMENTS:

**MALCOLM
PIRNIE**

Ready

6D

SE1000B
Environmental Logger
05/09 14:46

Unit# 00554 Test# 3

INPUT 1: Level (F) TOC

Reference 13.93
Scale factor 49.99
Offset 0.00

Step# 0 05/09 14:43

Elapsed Time	Value
0.0000	13.93
0.0033	13.93
0.0066	13.93
0.0099	13.94
0.0133	13.94
0.0166	13.94
0.0200	13.94
0.0233	13.93
0.0266	14.00
0.0300	14.24
0.0333	14.62
0.0366	15.56
0.0400	15.95
0.0433	15.99
0.0466	15.87
0.0500	15.76
0.0533	15.65
0.0566	15.57
0.0600	15.49
0.0633	15.39
0.0666	15.33
0.0700	15.27
0.0733	15.20
0.0766	15.14
0.0800	15.09
0.0833	15.05
0.0866	14.98
0.0900	14.94
0.0933	14.90
0.0966	14.71
0.1000	14.56
0.1033	14.43
0.1066	14.35
0.1100	14.27
0.1133	14.21
0.1166	14.16
0.1200	14.13
0.1233	14.10
0.1266	14.07
0.1300	14.05
0.1333	14.04
0.1366	14.04
0.1400	14.02
0.1433	14.02
0.1466	14.00
0.1500	14.00
0.1533	14.00
0.1566	14.00
0.1600	13.99

Ready

6I

SE1000B
Environmental Logger
05/07 14:34

Unit# 00554 Test# 0

INPUT 1: Level (F) TOC

Reference 13.07
Scale factor 49.82
Offset 0.00

Step# 0 05/07 14:23

Elapsed Time	Value
0.0000	13.00
0.0033	13.00
0.0066	13.00
0.0099	13.02
0.0133	13.02
0.0166	13.91
0.0200	14.07
0.0233	14.26
0.0266	14.17
0.0300	13.96
0.0333	14.54
0.0366	14.59
0.0400	14.18
0.0433	13.76
0.0466	13.49
0.0500	13.32
0.0533	13.21
0.0566	13.14
0.0600	13.11
0.0633	13.10
0.0666	13.08
0.0700	13.08
0.0733	13.08
0.0766	13.08
0.0800	13.07
0.0833	13.07
0.0866	13.05
0.0900	13.05
0.0933	13.05
0.0966	13.05
0.1000	13.05
0.1033	13.05
0.1066	13.00
0.1100	13.00
0.1133	12.99
0.1166	12.99
0.1200	12.99
0.1233	12.99
0.1266	12.99
0.1300	12.99

END

mw

SE1000B
Environmental Logger
05/10 16:09

Unit# 00554 Test# 6

INPUT 1: Level (F) T00

Reference 4.71
Scale factor 49.82
Offset 0.00

Site# 0 05/10 16:06

Elapsed Time	Value
0.0000	4.71
0.0033	4.72
0.0066	4.74
0.0099	4.74
0.0133	4.74
0.0166	4.75
0.0200	4.75
0.0233	4.75
0.0266	4.75
0.0300	4.75
0.0333	4.75
0.0366	4.82
0.0400	5.96
0.0433	6.91
0.0466	6.96
0.0500	6.78
0.0533	6.72
0.0566	6.66
0.0600	6.62
0.0633	6.56
0.0666	6.51
0.0700	6.47
0.0733	6.42
0.0766	6.39
0.0800	6.34
0.0833	6.31
0.0866	6.26
0.0900	6.23
0.0933	6.20
0.0966	6.01
0.1000	5.85
0.1033	5.73
0.1066	5.62
0.1100	5.52
0.1133	5.44
0.1166	5.37
0.1200	5.29
0.1233	5.22
0.1266	5.18
0.1300	5.13
0.1333	5.08
0.1366	5.05
0.1400	5.02
0.1433	4.99
0.1466	4.97
0.1500	4.94
0.1533	4.93
0.1566	4.91
0.1600	4.89
0.1633	4.82
0.1666	4.78

mw-II

SE1000B
Environmental Logger
05/10 16:25

Unit# 00554 Test# 6

INPUT 1: Level (F) T00

Reference 4.70
Scale factor 49.82
Offset 0.00

Site# 0 05/10 16:23

Elapsed Time	Value
0.0000	4.70
0.0033	4.71
0.0066	4.73
0.0099	4.73
0.0133	4.73
0.0166	4.73
0.0200	4.73
0.0233	4.74
0.0266	4.74
0.0300	4.74
0.0333	4.74
0.0366	4.74
0.0400	4.73
0.0433	4.73
0.0466	4.73
0.0500	4.82
0.0533	5.86
0.0566	6.55
0.0600	6.22
0.0633	5.95
0.0666	5.73
0.0700	5.54
0.0733	5.39
0.0766	5.28
0.0800	5.17
0.0833	5.09
0.0866	5.04
0.0900	4.99
0.0933	4.95
0.0966	4.93
0.1000	4.85
0.1033	4.84
0.1066	4.82
0.1100	4.82
0.1133	4.81
0.1166	4.81
0.1200	4.81
0.1233	4.81
0.1266	4.81
0.1300	4.81
0.1333	4.81
0.1366	4.81
0.1400	4.81

END

00-100000-1
JAN 1968

2-2# 2

29. 700

4.51

15. 25

9.99

12:23

[illegible]

1960-01-01	...	...	...	...	...	...
1960-01-02	...	...	...	...	...	...
1960-01-03	...	...	...	...	...	...
1960-01-04	...	...	...	...	...	...
1960-01-05	...	...	...	...	...	...
1960-01-06	...	...	...	...	...	...
1960-01-07	...	...	...	...	...	...
1960-01-08	...	...	...	...	...	...
1960-01-09	...	...	...	...	...	...
1960-01-10	...	...	...	...	...	...
1960-01-11	...	...	...	...	...	...
1960-01-12	...	...	...	...	...	...
1960-01-13	...	...	...	...	...	...
1960-01-14	...	...	...	...	...	...
1960-01-15	...	...	...	...	...	...
1960-01-16	...	...	...	...	...	...
1960-01-17	...	...	...	...	...	...
1960-01-18	...	...	...	...	...	...
1960-01-19	...	...	...	...	...	...
1960-01-20	...	...	...	...	...	...
1960-01-21	...	...	...	...	...	...
1960-01-22	...	...	...	...	...	...
1960-01-23	...	...	...	...	...	...
1960-01-24	...	...	...	...	...	...
1960-01-25	...	...	...	...	...	...
1960-01-26	...	...	...	...	...	...
1960-01-27	...	...	...	...	...	...
1960-01-28	...	...	...	...	...	...
1960-01-29	...	...	...	...	...	...
1960-01-30	...	...	...	...	...	...
1960-01-31	...	...	...	...	...	...
1960-02-01	...	...	...	...	...	...
1960-02-02	...	...	...	...	...	...
1960-02-03	...	...	...	...	...	...
1960-02-04	...	...	...	...	...	...
1960-02-05	...	...	...	...	...	...
1960-02-06	...	...	...	...	...	...
1960-02-07	...	...	...	...	...	...
1960-02-08	...	...	...	...	...	...
1960-02-09	...	...	...	...	...	...
1960-02-10	...	...	...	...	...	...
1960-02-11	...	...	...	...	...	...
1960-02-12	...	...	...	...	...	...
1960-02-13	...	...	...	...	...	...
1960-02-14	...	...	...	...	...	...
1960-02-15	...	...	...	...	...	...
1960-02-16	...	...	...	...	...	...
1960-02-17	...	...	...	...	...	...
1960-02-18	...	...	...	...	...	...
1960-02-19	...	...	...	...	...	...
1960-02-20	...	...	...	...	...	...
1960-02-21	...	...	...	...	...	...
1960-02-22	...	...	...	...	...	...
1960-02-23	...	...	...	...	...	...
1960-02-24	...	...	...	...	...	...
1960-02-25	...	...	...	...	...	...
1960-02-26	...	...	...	...	...	...
1960-02-27	...	...	...	...	...	...
1960-02-28	...	...	...	...	...	...
1960-02-29	...	...	...	...	...	...
1960-03-01	...	...	...	...	...	...
1960-03-02	...	...	...	...	...	...
1960-03-03	...	...	...	...	...	...
1960-03-04	...	...	...	...	...	...
1960-03-05	...	...	...	...	...	...
1960-03-06	...	...	...	...	...	...
1960-03-07	...	...	...	...	...	...
1960-03-08	...	...	...	...	...	...
1960						

gD

ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED

Page# 255, Cont# 4

2007-11-14 14:10:00

7-11

1990-1991	1.11
1991-1992	1.32

Order#:	9.00

Step= 2 25 11 13:54

Elapsed Time value

3.0000	7.09
3.0000	7.11
3.0000	7.12
3.0000	7.12
3.0100	7.12
3.0100	7.15
3.0200	7.14
3.0200	7.14
3.0200	7.17
3.0300	7.17
3.0300	7.06
3.0500	7.14
3.0600	7.09
3.0800	7.15
3.1000	7.17
3.1100	7.40
3.1300	8.06
3.1500	8.05
3.1600	8.05
3.1600	8.02
3.1600	8.00
3.1600	7.99
3.1600	7.97
3.1600	7.95
3.1600	7.95
3.1600	7.94
3.1600	7.92
3.1600	7.91
3.1600	7.91
3.1600	7.93
3.1600	7.78
3.1600	7.75
3.1600	7.70
3.1600	7.67
3.1600	7.64
3.1600	7.61
3.1600	7.58
3.1600	7.55
3.1600	7.51
3.1600	7.48
3.1600	7.47
3.1600	7.44
3.1600	7.42
3.1600	7.40
3.1600	7.37
3.1600	7.36
3.1600	7.34
3.1600	7.33
3.1600	7.31
3.1600	7.23
3.1600	7.18
3.1600	7.15
3.1600	7.14

mm-8I

[illegible]

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99

1. *Journal of the American Medical Association*, 1997; 278: 1039-1044.

— 20 —

Figure 1

Sales	100.00

0-1341 6. 119

Page 6 of 25

Elapsed Time: 0.000000

1.0000	7.75
0.9975	7.75
0.9950	7.75
0.9925	7.75
0.9900	7.75
0.9875	7.75
0.9850	7.75
0.9825	7.75
0.9800	7.75
0.9775	7.75
0.9750	7.75
0.9725	7.75
0.9700	7.75
0.9675	7.75
0.9650	7.75
0.9625	7.75
0.9600	7.75
0.9575	7.75
0.9550	7.75
0.9525	7.75
0.9500	7.75
0.9475	7.75
0.9450	7.75
0.9425	7.75
0.9400	7.75
0.9375	7.75
0.9350	7.75
0.9325	7.75
0.9300	7.75
0.9275	7.75
0.9250	7.75
0.9225	7.75
0.9200	7.75
0.9175	7.75
0.9150	7.75
0.9125	7.75
0.9100	7.75
0.9075	7.75
0.9050	7.75
0.9025	7.75
0.9000	7.75
0.8975	7.75
0.8950	7.75
0.8925	7.75
0.8900	7.75
0.8875	7.75
0.8850	7.75
0.8825	7.75
0.8800	7.75
0.8775	7.75
0.8750	7.75
0.8725	7.75
0.8700	7.75
0.8675	7.75
0.8650	7.75
0.8625	7.75
0.8600	7.75
0.8575	7.75
0.8550	7.75
0.8525	7.75
0.8500	7.75
0.8475	7.75
0.8450	7.75
0.8425	7.75
0.8400	7.75
0.8375	7.75
0.8350	7.75
0.8325	7.75
0.8300	7.75
0.8275	7.75
0.8250	7.75
0.8225	7.75
0.8200	7.75
0.8175	7.75
0.8150	7.75
0.8125	7.75
0.8100	7.75
0.8075	7.75
0.8050	7.75
0.8025	7.75
0.8000	7.75
0.7975	7.75
0.7950	7.75
0.7925	7.75
0.7900	7.75
0.7875	7.75
0.7850	7.75
0.7825	7.75
0.7800	7.75
0.7775	7.75
0.7750	7.75
0.7725	7.75
0.7700	7.75
0.7675	7.75
0.7650	7.75
0.7625	7.75
0.7600	7.75
0.7575	7.75
0.7550	7.75
0.7525	7.75
0.7500	7.75
0.7475	7.75
0.7450	7.75
0.7425	7.75
0.7400	7.75
0.7375	7.75
0.7350	7.75
0.7325	7.75
0.7300	7.75
0.7275	7.75
0.7250	7.75
0.7225	7.75
0.7200	7.75
0.7175	7.75
0.7150	7.75
0.7125	7.75
0.7100	7.75
0.7075	7.75
0.7050	7.75
0.7025	7.75
0.7000	7.75
0.6975	7.75
0.6950	7.75
0.6925	7.75
0.6900	7.75
0.6875	7.75
0.6850	7.75
0.6825	7.75
0.6800	7.75
0.6775	7.75
0.6750	7.75
0.6725	7.75
0.6700	7.75
0.6675	7.75
0.6650	7.75
0.6625	7.75
0.6600	7.75
0.6575	7.75
0.6550	7.75
0.6525	7.75
0.6500	7.75
0.6475	7.75
0.6450	7.75
0.6425	7.75
0.6400	7.75
0.6375	7.75
0.6350	7.75
0.6325	7.75
0.6300	7.75
0.6275	7.75
0.6250	7.75
0.6225	7.75
0.6200	7.75
0.6175	7.75
0.6150	7.75
0.6125	7.75
0.6100	7.75
0.6075	7.75
0.6050	7.75
0.6025	7.75
0.6000	7.75
0.5975	7.75
0.5950	7.75
0.5925	

P2-9

SE1000B
Environmental Logger
05/09 14:28

Unit# 00554 Test# 2

INPUT 1: Level (F) TOC

Reference 11.73
Scale factor 49.99
Offset 0.00

Step# 0 05/09 14:26

Elapsed Time	Value
0.0000	11.74
0.0033	11.76
0.0066	11.69
0.0099	11.73
0.0133	11.77
0.0166	11.73
0.0200	11.76
0.0233	11.77
0.0266	11.69
0.0300	11.74
0.0333	11.71
0.0366	12.53
0.0400	12.61
0.0433	12.51
0.0466	12.45
0.0500	12.42
0.0533	12.37
0.0566	12.32
0.0600	12.29
0.0633	12.26
0.0666	12.23
0.0700	12.20
0.0733	12.17
0.0766	12.15
0.0800	12.14
0.0833	12.12
0.0866	12.09
0.0900	12.07
0.0933	12.06
0.0966	11.99
0.1000	11.95
0.1033	11.91
0.1066	11.88
0.1100	11.87
0.1133	11.85
0.1166	11.84
0.1200	11.82
0.1233	11.80
0.1266	11.79
0.1300	11.79
0.1333	11.79
0.1366	11.79
0.1400	11.77
0.1433	11.77
0.1466	11.77
0.1500	11.77
0.1533	11.77
0.1566	11.77
0.1600	11.77
0.1633	11.77
0.1666	11.77
0.1700	11.77
0.1733	11.77
0.1766	11.77
0.1800	11.77
0.1833	11.77
0.1866	11.77
0.1900	11.77
0.1933	11.77
0.1966	11.77
0.2000	11.77
0.2033	11.77
0.2066	11.77
0.2100	11.77
0.2133	11.77
0.2166	11.77
0.2200	11.77
0.2233	11.77
0.2266	11.77
0.2300	11.77
0.2333	11.77
0.2366	11.77
0.2400	11.77
0.2433	11.77
0.2466	11.77
0.2500	11.77
0.2533	11.77
0.2566	11.77
0.2600	11.77
0.2633	11.77
0.2666	11.77
0.2700	11.77
0.2733	11.77
0.2766	11.77
0.2800	11.77
0.2833	11.77
0.2866	11.77
0.2900	11.77
0.2933	11.77
0.2966	11.77
0.3000	11.77
0.3033	11.77
0.3066	11.77
0.3100	11.77
0.3133	11.77
0.3166	11.77
0.3200	11.77
0.3233	11.77
0.3266	11.77
0.3300	11.77
0.3333	11.77
0.3366	11.77
0.3400	11.77
0.3433	11.77
0.3466	11.77
0.3500	11.77
0.3533	11.77
0.3566	11.77
0.3600	11.77
0.3633	11.77
0.3666	11.77
0.3700	11.77
0.3733	11.77
0.3766	11.77
0.3800	11.77
0.3833	11.77
0.3866	11.77
0.3900	11.77
0.3933	11.77
0.3966	11.77
0.4000	11.77
0.4033	11.77
0.4066	11.77
0.4100	11.77
0.4133	11.77
0.4166	11.77
0.4200	11.77
0.4233	11.77
0.4266	11.77
0.4300	11.77
0.4333	11.77
0.4366	11.77
0.4400	11.77
0.4433	11.77
0.4466	11.77
0.4500	11.77
0.4533	11.77
0.4566	11.77
0.4600	11.77
0.4633	11.77
0.4666	11.77
0.4700	11.77
0.4733	11.77
0.4766	11.77
0.4800	11.77
0.4833	11.77
0.4866	11.77
0.4900	11.77
0.4933	11.77
0.4966	11.77
0.5000	11.77

Reeds

9I

SE1000B
Environmental Logger
05/09 14:28

Unit# 00554 Test# 1

INPUT 1: Level (F) TOC

Reference 13.70
Scale factor 49.82
Offset 0.00

Step# 0 05/09 14:16

Elapsed Time	Value
0.0000	13.70
0.0033	13.71
0.0066	13.71
0.0099	13.74
0.0133	13.81
0.0166	13.88
0.0200	13.92
0.0233	14.04
0.0266	14.28
0.0300	14.51
0.0333	14.32
0.0366	15.28
0.0400	14.75
0.0433	14.34
0.0466	14.06
0.0500	13.90
0.0533	13.81
0.0566	13.77
0.0600	13.77
0.0633	13.77
0.0666	13.77
0.0700	13.77
0.0733	13.77
0.0766	13.77
0.0800	13.77
0.0833	13.77
0.0866	13.77
0.0900	13.77
0.0933	13.76
0.0966	13.76
0.1000	13.74
0.1033	13.73
0.1066	13.73
0.1100	13.73
0.1133	13.73
0.1166	13.73
0.1200	13.73
0.1233	13.71
0.1266	13.71
0.1300	13.71
0.1333	13.71
0.1366	13.71
0.1400	13.71
0.1433	13.71
0.1466	13.71
0.1500	13.71
0.1533	13.71
0.1566	13.71
0.1600	13.71
0.1633	13.71
0.1666	13.71
0.1700	13.71
0.1733	13.71
0.1766	13.71
0.1800	13.71
0.1833	13.71
0.1866	13.71
0.1900	13.71
0.1933	13.71
0.1966	13.71
0.2000	13.71
0.2033	13.71
0.2066	13.71
0.2100	13.71
0.2133	13.71
0.2166	13.71
0.2200	13.71
0.2233	13.71
0.2266	13.71
0.2300	13.71
0.2333	13.71
0.2366	13.71
0.2400	13.71
0.2433	13.71
0.2466	13.71
0.2500	13.71
0.2533	13.71
0.2566	13.71
0.2600	13.71
0.2633	13.71
0.2666	13.71
0.2700	13.71
0.2733	13.71
0.2766	13.71
0.2800	13.71
0.2833	13.71
0.2866	13.71
0.2900	13.71
0.2933	13.71
0.2966	13.71
0.3000	13.71
0.3033	13.71
0.3066	13.71
0.3100	13.71
0.3133	13.71
0.3166	13.71
0.3200	13.71
0.3233	13.71
0.3266	13.71
0.3300	13.71
0.3333	13.71
0.3366	13.71
0.3400	13.71
0.3433	13.71
0.3466	13.71
0.3500	13.71
0.3533	13.71
0.3566	13.71
0.3600	13.71
0.3633	13.71
0.3666	13.71
0.3700	13.71
0.3733	13.71
0.3766	13.71
0.3800	13.71
0.3833	13.71
0.3866	13.71
0.3900	13.71
0.3933	13.71
0.3966	13.71
0.4000	13.71
0.4033	13.71
0.4066	13.71
0.4100	13.71
0.4133	13.71
0.4166	13.71
0.4200	13.71
0.4233	13.71
0.4266	13.71
0.4300	13.71
0.4333	13.71
0.4366	13.71
0.4400	13.71
0.4433	13.71
0.4466	13.71
0.4500	13.71
0.4533	13.71
0.4566	13.71
0.4600	13.71
0.4633	13.71
0.4666	13.71
0.4700	13.71
0.4733	13.71
0.4766	13.71
0.4800	13.71
0.4833	13.71
0.4866	13.71
0.4900	13.71
0.4933	13.71
0.4966	13.71
0.5000	13.71

END

95

SE1000B
Environmental Logger
05/09 14:08

Unit# 00554 Test# 0

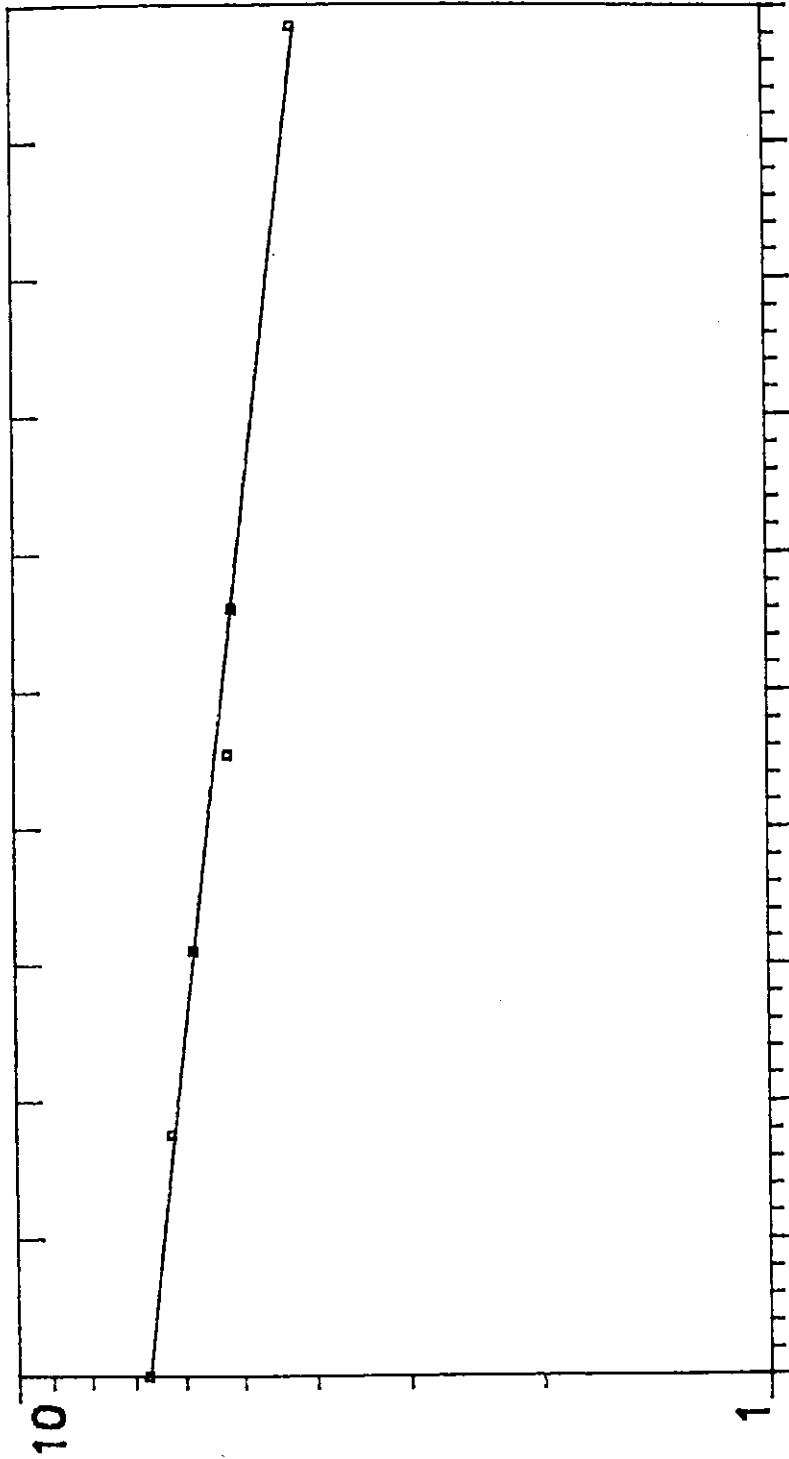
INPUT 1: Level (F) TOC

Reference 5.68
Scale factor 49.82
Offset 0.00

Step# 0 05/09 14:07

Elapsed Time	Value
0.0000	5.74
0.0033	5.75
0.0066	5.75
0.0099	5.75
0.0133	5.75
0.0166	5.75
0.0200	5.75
0.0233	5.75
0.0266	5.75
0.0300	5.75
0.0333	5.77
0.0366	5.75
0.0400	5.75
0.0433	5.75
0.0466	5.75
0.0500	5.75
0.0533	5.75
0.0566	5.75
0.0600	5.75
0.0633	5.75
0.0666	5.75
0.0700	5.75
0.0733	5.75
0.0766	5.75
0.0800	5.75
0.0833	5.75
0.0866	5.75
0.0900	5.75
0.0933	5.75
0.0966	5.75
0.1000	5.75
0.1033	5.75
0.1066	5.75
0.1100	5.75
0.1133	5.75
0.1166	5.75
0.1200	5.75
0.1233	5.75
0.1266	5.75
0.1300	5.75
0.1333	5.75
0.1366	5.75
0.1400	5.75
0.1433	5.75
0.1466	5.75
0.1500	5.75
0.1533	5.75
0.1566	5.75
0.1600	5.75
0.1633	5.75
0.1666	5.75
0.1700	5.75
0.1733	5.75
0.1766	5.75
0.1800	5.75
0.1833	5.75
0.1866	5.75
0.1900	5.75
0.1933	5.75
0.1966	5.75
0.2000	5.75
0.2033	5.75
0.2066	5.75
0.2100	5.75
0.2133	5.75
0.2166	5.75
0.2200	5.75
0.2233	5.75
0.2266	5.75
0.2300	5.75
0.2333	5.75
0.2366	5.75
0.2400	5.75
0.2433	5.75
0.2466	5.75
0.2500	5.75
0.2533	5.75
0.2566	5.75
0.2600	5.75
0.2633	5.75
0.2666	5.75
0.2700	5.75
0.2733	5.75
0.2766	5.75
0.2800	5.75
0.2833	5.75
0.2866	5.75
0.2900	5.75
0.2933	5.75
0.2966	5.75
0.3000	5.75
0.3033	5.75
0.3066	5.75
0.3100	5.75
0.3133	5.75
0.3166	5.75
0.3200	5.75
0.3233	5.75
0.3266	5.75
0.3300	5.75
0.3333	5.75
0.3366	5.75
0.3400	5.75
0.3433	5.75
0.3466	5.75
0.3500	5.75
0.3533	5.75
0.3566	5.75
0.3600	5.75
0.3633	5.75
0.3666	5.75
0.3700	5.75
0.3733	5.75
0.3766	5.75
0.3800	5.75
0.3833	5.75
0.3866	5.75
0.3900	5.75
0.3933	5.75
0.3966	5.75
0.4000	5.75
0.4033	5.75
0.4066	5.75
0.4100	5.75
0.4133	5.75
0.4166	5.75
0.4200	5.75
0.4233	5.75
0.4266	5.75
0.4300	5.75
0.4333	5.75
0.4366	5.75
0.4400	5.75
0.4433	5.75
0.4466	5.75
0.4500	5.75
0.4533	5.75
0.4566	5.75

Head (feet)



0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

Time (minutes)

Well Slug Test Data

Well: MW-6S
Rochester, N.Y.
Monroe Co.

for: City of Rochester

by: Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 12.70

SCREEN: top: 8.300 base: 18.30

DIAMETER: casing: .1860 Intake: .8340

DEPTH: Water Table: 7.380 TD: 19.10

MODEL TYPE: BOUWER and RICE

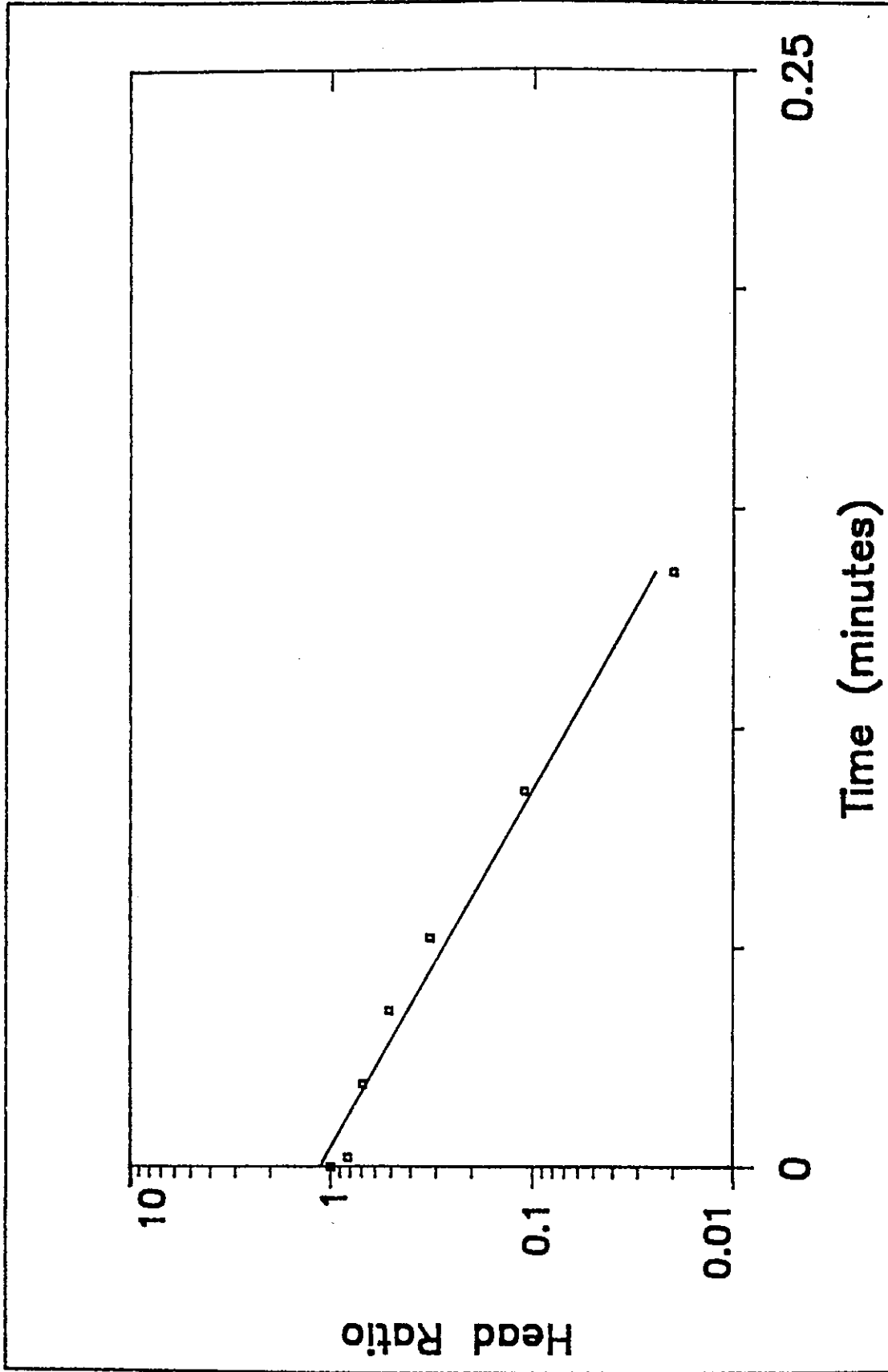
CONDUCTIVITY: 4.834E-8 cm/sec

TRANSMISSIVITY: 1.871E-5 sq. cm/sec

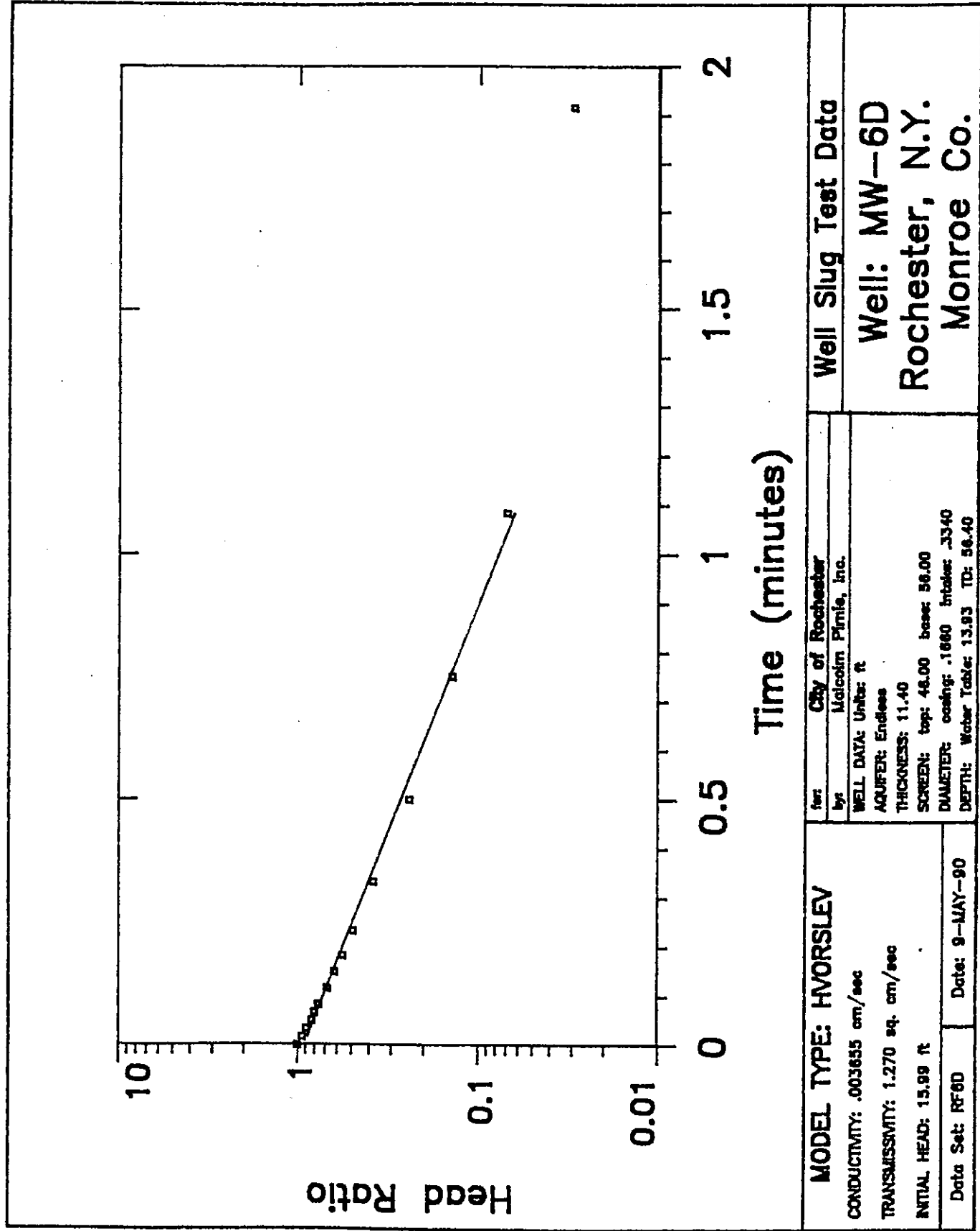
INITIAL HEAD: 14.32 ft

Date Set: RF6S

Date: 7-MAY-90



MODEL TYPE: HVORSLEV		City of Rochester	Well Slug Test Data
CONDUCTIVITY: .03399 cm/sec		by: Malcolm Pirnie, Inc.	Well: MW-61 Rochester, N.Y. Monroe Co.
TRANSMISSIVITY: 11.50 sq. cm/sec			
INITIAL HEAD: 15.26 ft			
		WELL DATA: Units: ft	
		AQUIFER: Endless	
		THICKNESS: 11.10	
		SCREEN: top: 37.00 base: 47.00	
		DIAMETER: casing: .1680 Intakes: .3340	
		DEPTH: Water Table: 13.07 TD: 47.10	
Data Set: RFB1	Date: 7-MAY-90		



MODEL TYPE: HVORSLEV

CONDUCTIVITY: .003655 cm/sec

TRANSMISSIVITY: 1.270 sq. cm/sec

INITIAL HEAD: 15.99 ft

Data Set: RF8D

Date: 9-MAY-90

for: City of Rochester

by: Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 11.40

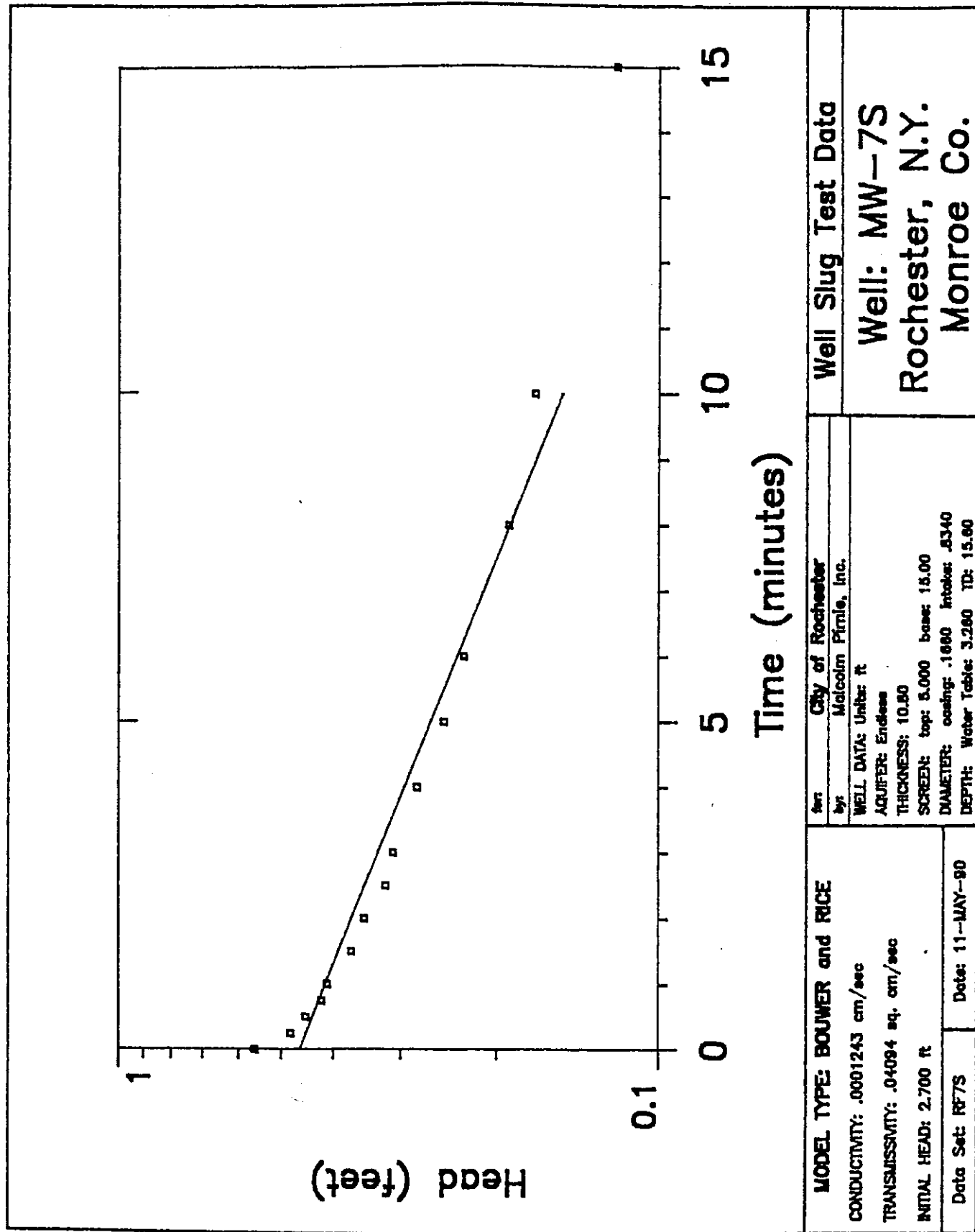
SCREEN: top: 48.00 base: 58.00

DIAMETER: casing: .1660 Intakes: .3340

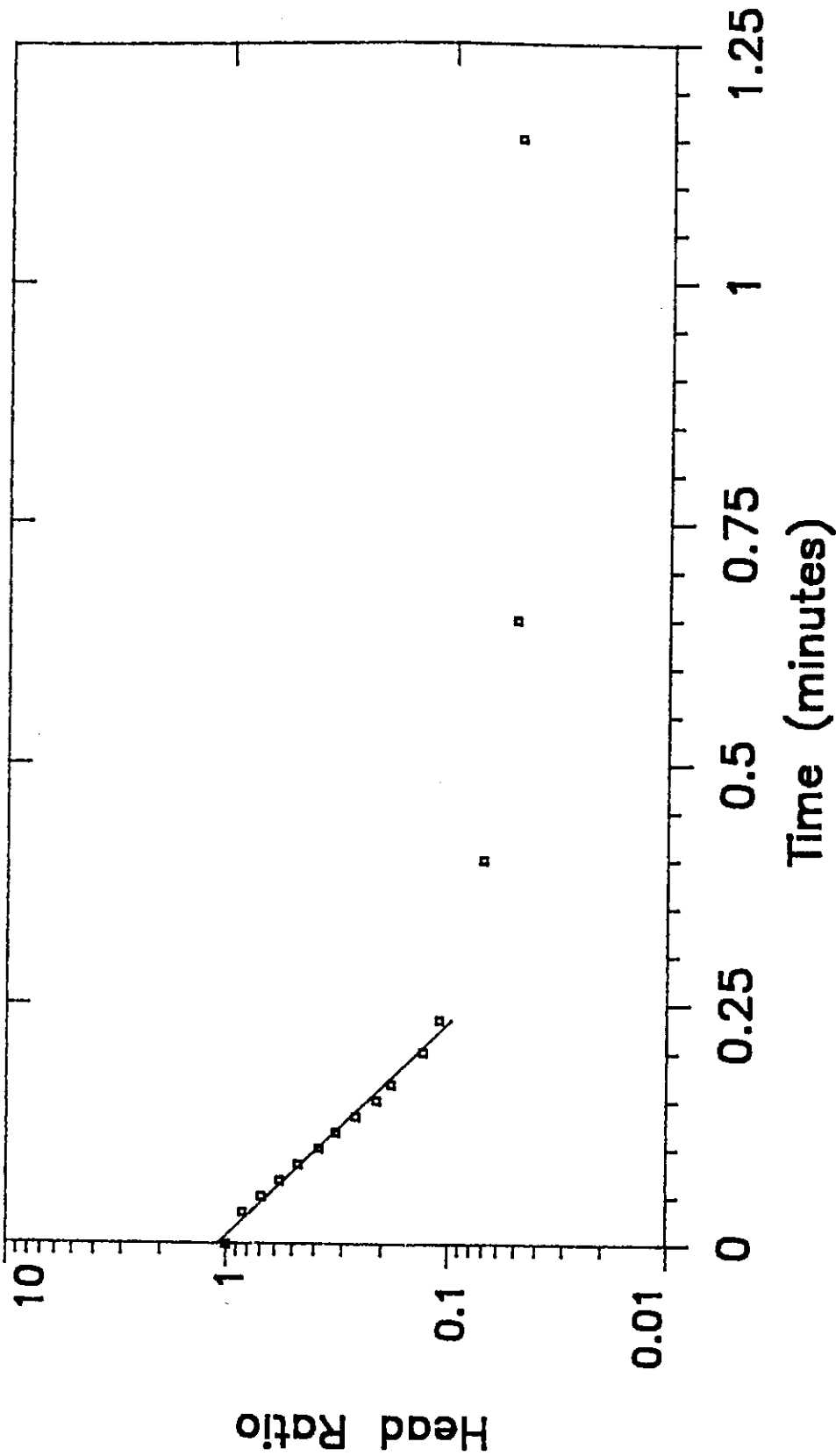
DEPTH: Water Table: 13.93 TD: 56.40

Well Slug Test Data

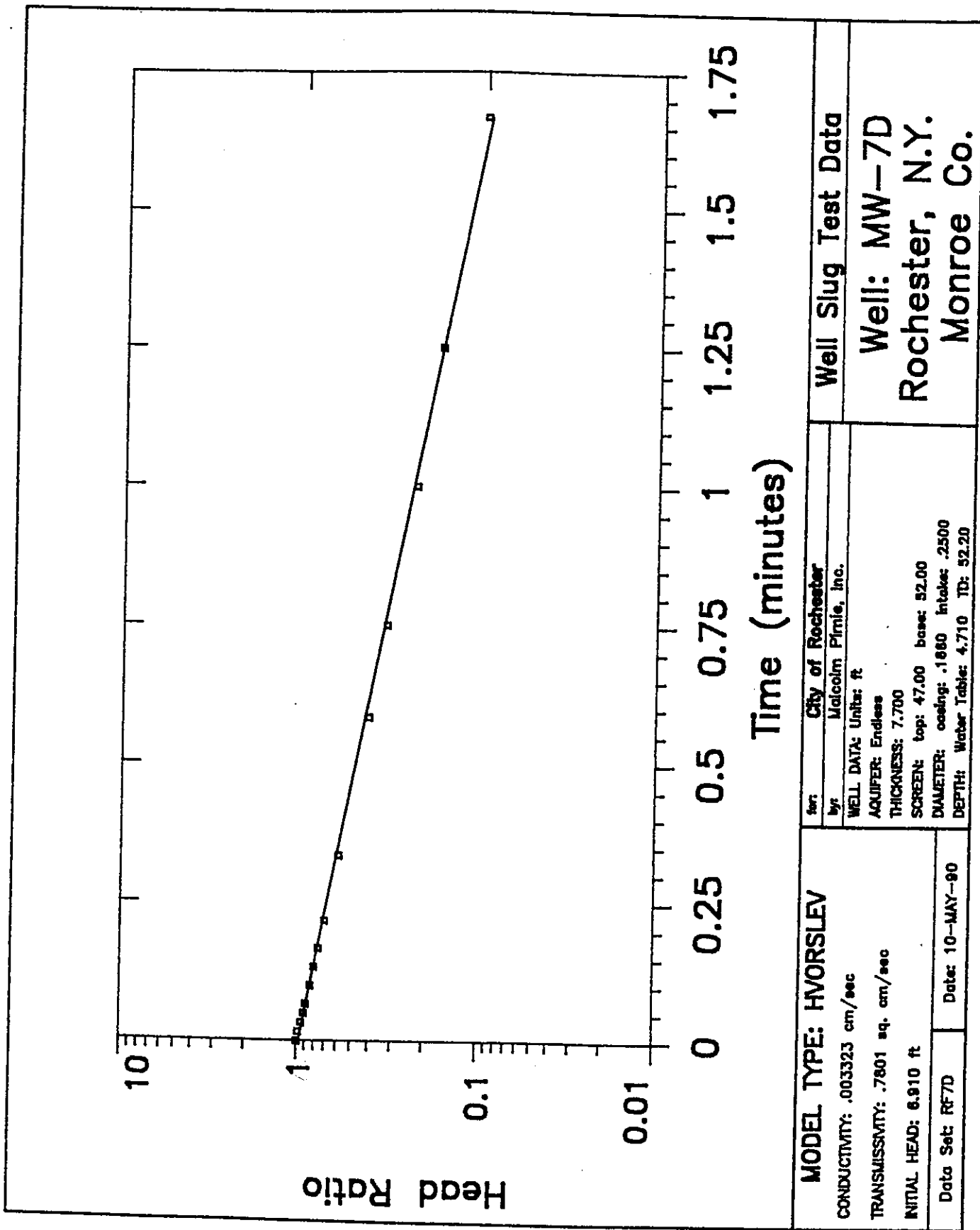
**Well: MW-6D
Rochester, N.Y.
Monroe Co.**



Well Slug Test Data	
MODEL TYPE: BOUWER and RICE CONDUCTIVITY: .0001243 cm/sec TRANSMISSIVITY: .04094 sq. cm/sec INITIAL HEAD: 2.700 ft	City of Rochester by: Malcolm Pirnie, Inc. WELL DATA: Units: ft ACQUIFER: Endless THICKNESS: 10.00 SCREEN: top: 8.000 base: 15.00 DIAMETER: casing: .1880 Intakes: .8340 DEPTH: Water Table: 3.280 TD: 15.60
Well: MW-7S Rochester, N.Y. Monroe Co.	
Data Set: RF7S Date: 11-MAY-90	



MODEL TYPE: HVORSLEV		City of Rochester		Well Slug Test Data
CONDUCTIVITY: .01403 cm/sec		by: Malcolm Pirnie, Inc.		
TRANSMISSIVITY: 5.219 sq. cm/sec		WELL DATA: Units: ft		
INITIAL HEAD: 6.890 ft		AQUIFER: Endless		
		THICKNESS: 12.20		
		SCREEN: top: 32.80 base: 42.80		Well: MW-71 Rochester, N.Y. Monroe Co.
		DIAMETER: casing: .1860 Intake: .2500		
		DEPTH: Water Table: 4.700 TD: 43.00		
Data Set: RF71		Date: 10-MAY-80		



MODEL TYPE: HVORSLEV

CONDUCTIVITY: .003323 cm/sec

TRANSMISSIVITY: .7801 sq. cm/sec

INITIAL HEAD: 6.910 ft

Data Set: RF7D

Date: 10-MAY-90

for: City of Rochester

by: Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 7.700

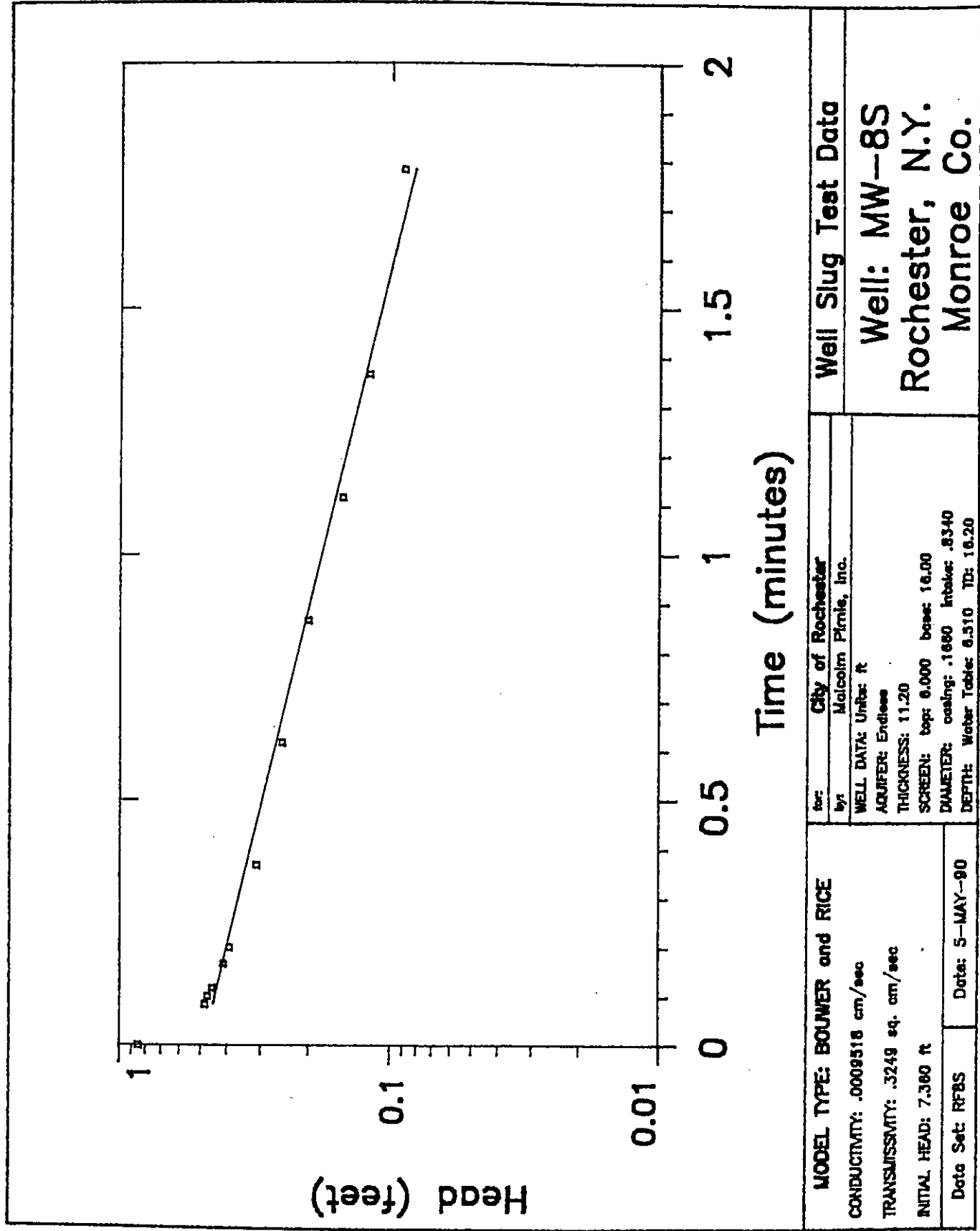
SCREEN: top: 47.00 base: 52.00

DIAMETER: casing: .1680 Intakes: .2500

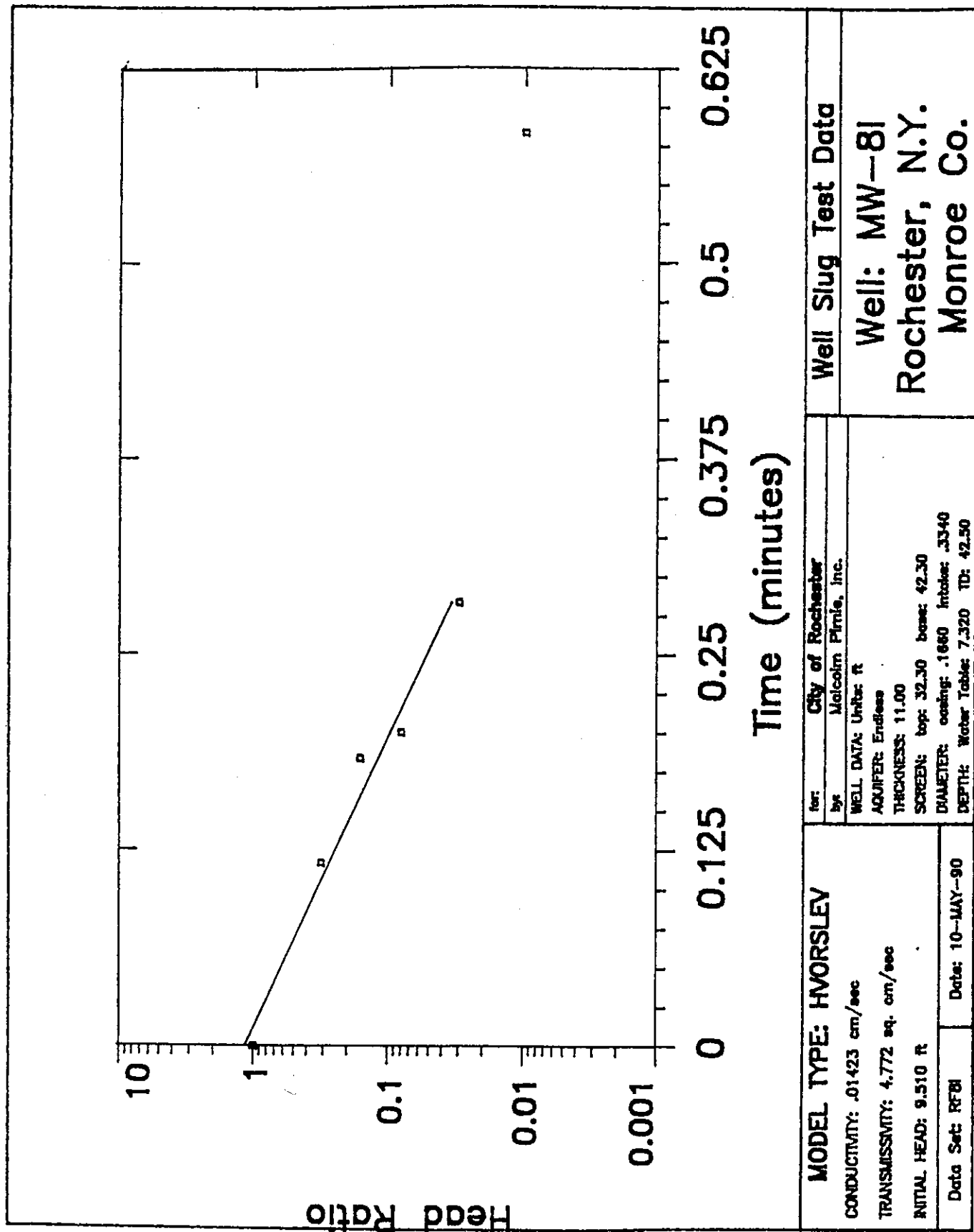
DEPTH: Water Table: 4.710 TD: 52.20

Well Slug Test Data

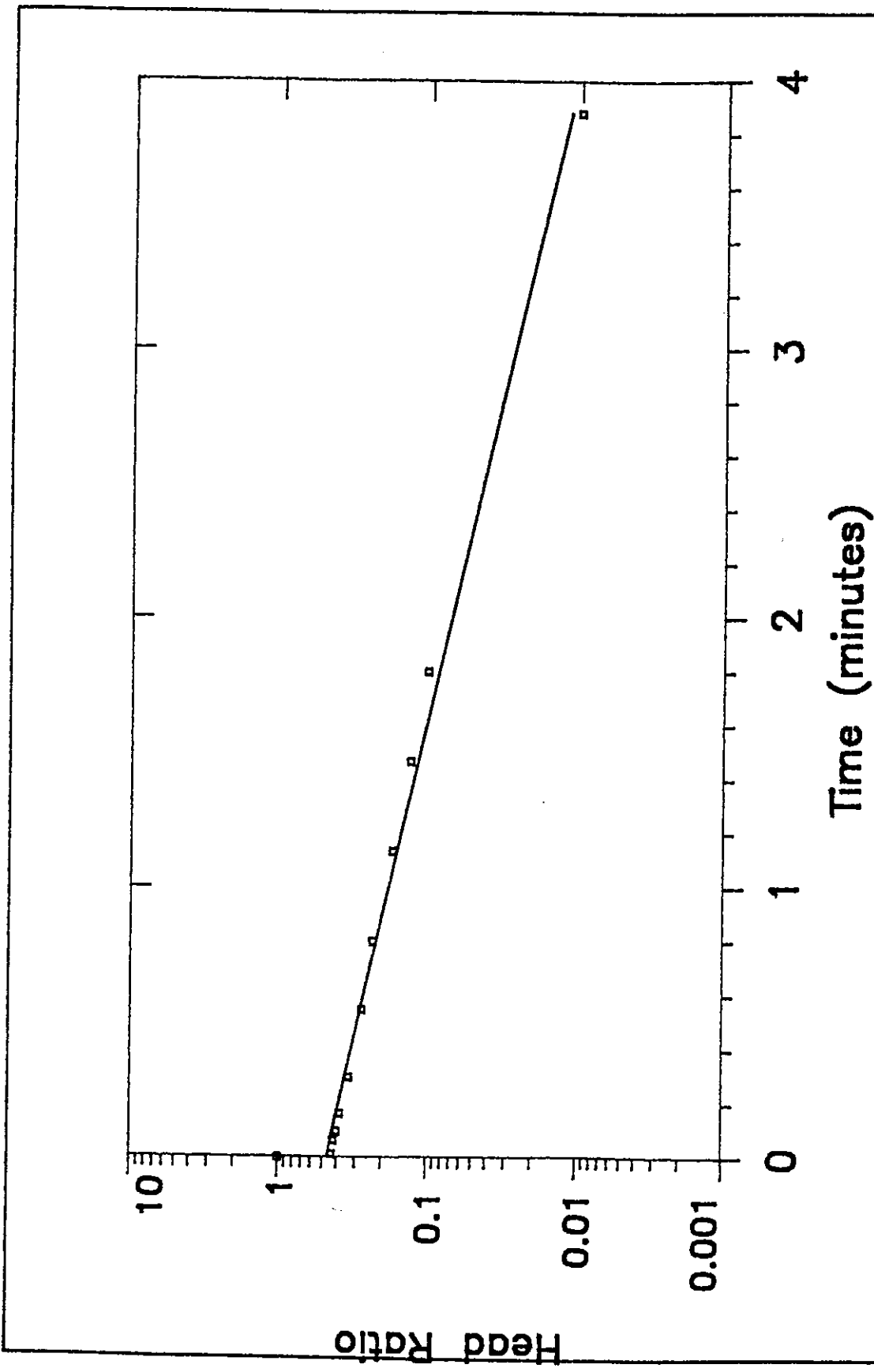
Well: MW-7D
Rochester, N.Y.
Monroe Co.



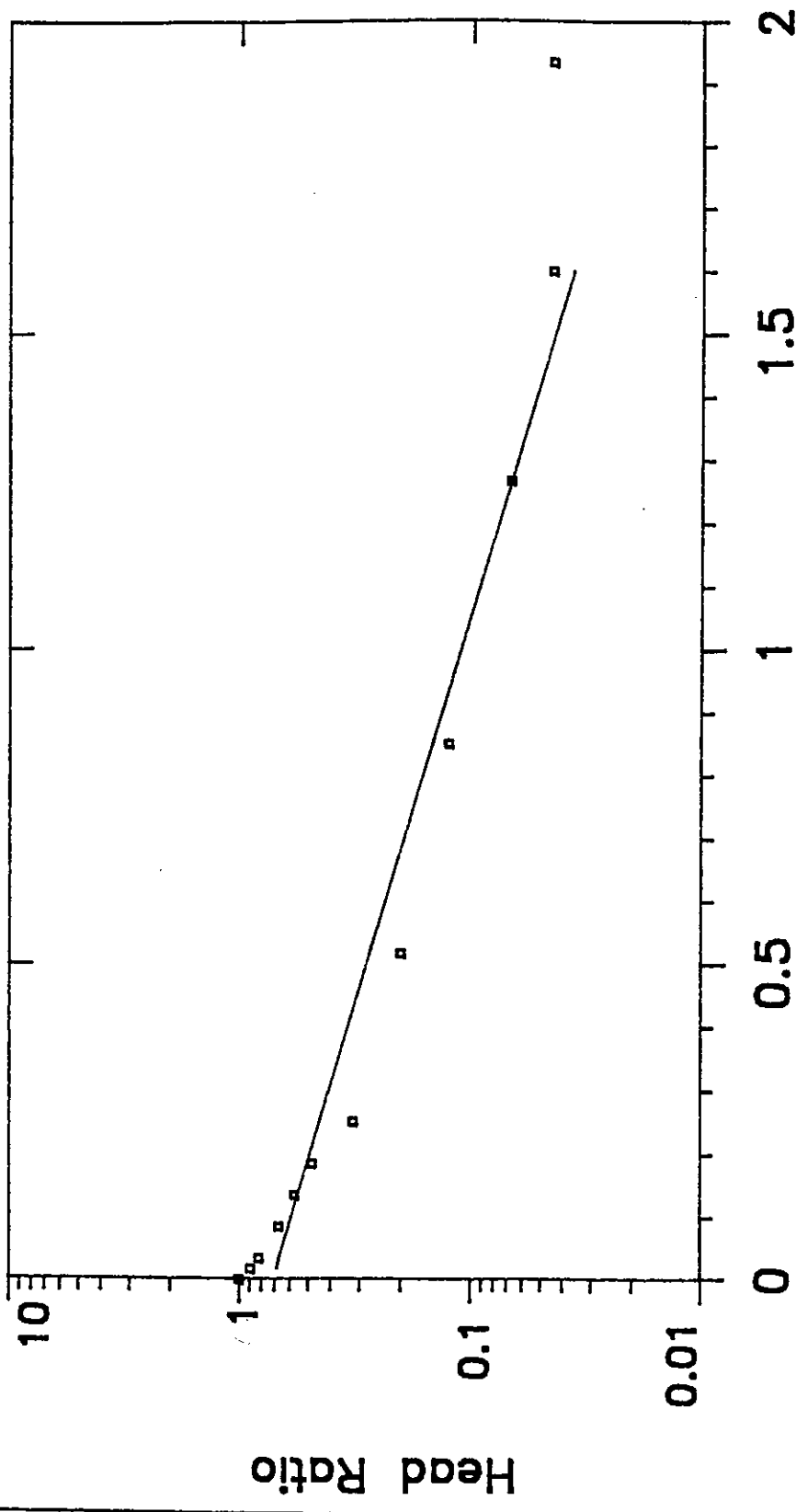
Well Slug Test Data	
MODEL TYPE: BOUNNER and RICE CONDUCTIVITY: .0009518 cm/sec TRANSMISSIVITY: .3249 sq. cm/sec INITIAL HEAD: 7.360 ft	for: City of Rochester by: Malcolm Pirnie, Inc.
WELL DATA: Unbr: ft AQUIFER: Endless THICKNESS: 11.20 SCREEN: top: 6.000 base: 16.00 DIAMETER: casing: .1680 Intake: .8340 DEPTH: Water Table: 6.310 TD: 16.20	Well: MW-8S Rochester, N.Y. Monroe Co.
Date Set: RFBS	Date: 5-MAY-90



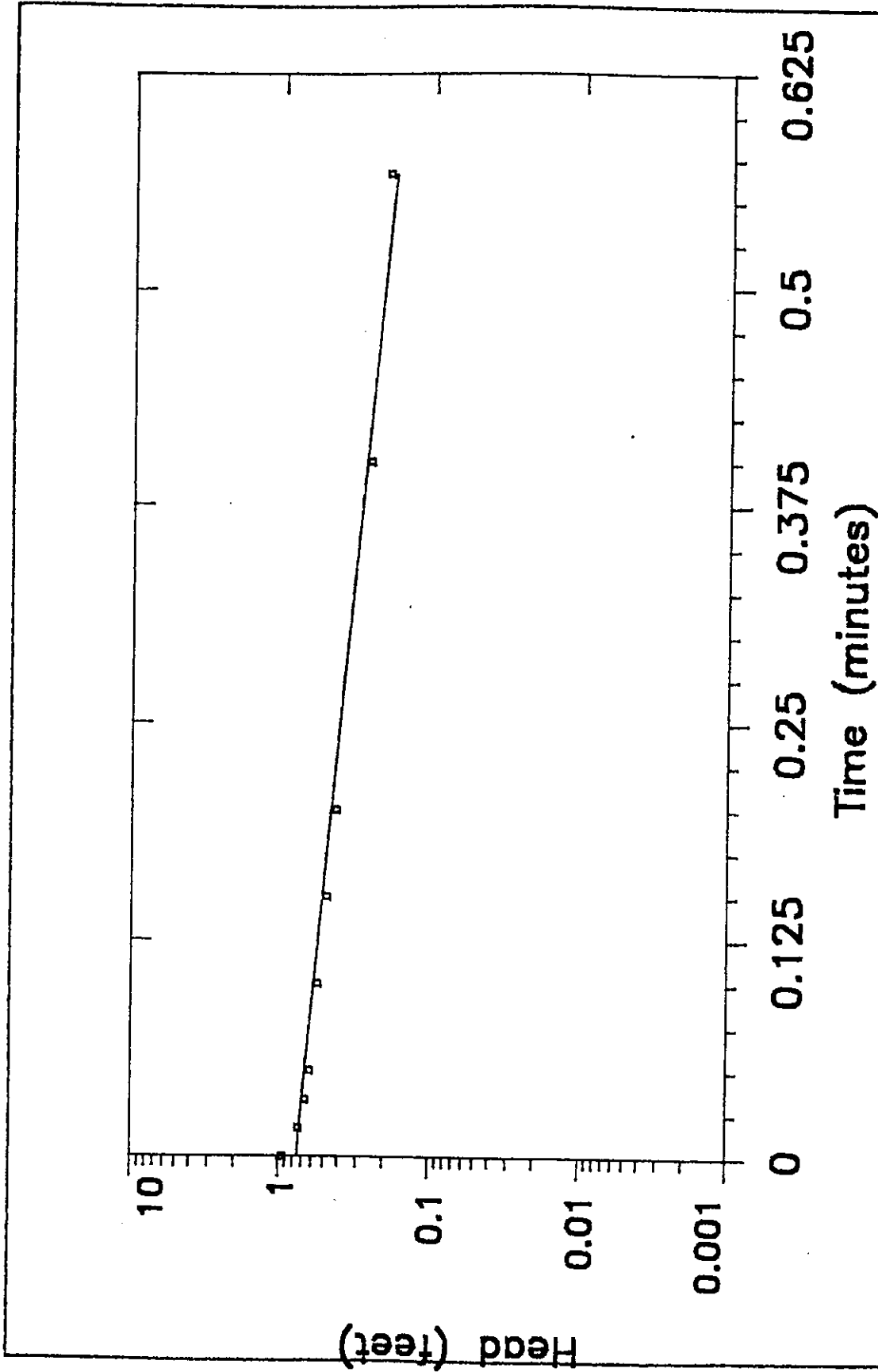
MODEL TYPE: HVORSLEV		Well Slug Test Data	
CONDUCTIVITY: .01423 cm/sec		for: City of Rochester	Well: MW-81 Rochester, N.Y. Monroe Co.
TRANSMISSIVITY: 4.772 sq. cm/sec		by: Malcolm Pirnie, Inc.	
INITIAL HEAD: 9.510 ft		WELL DATA: Units: ft	
		AQUIFER: Endless	
		THICKNESS: 11.00	
		SCREEN: top: 32.30 base: 42.30	
		DIALECTER: casing: .1660 Inches .3340	
		DEPTH: Water Table: 7.320 TD: 42.50	
Data Set: RFB1	Date: 10-MAY-90		



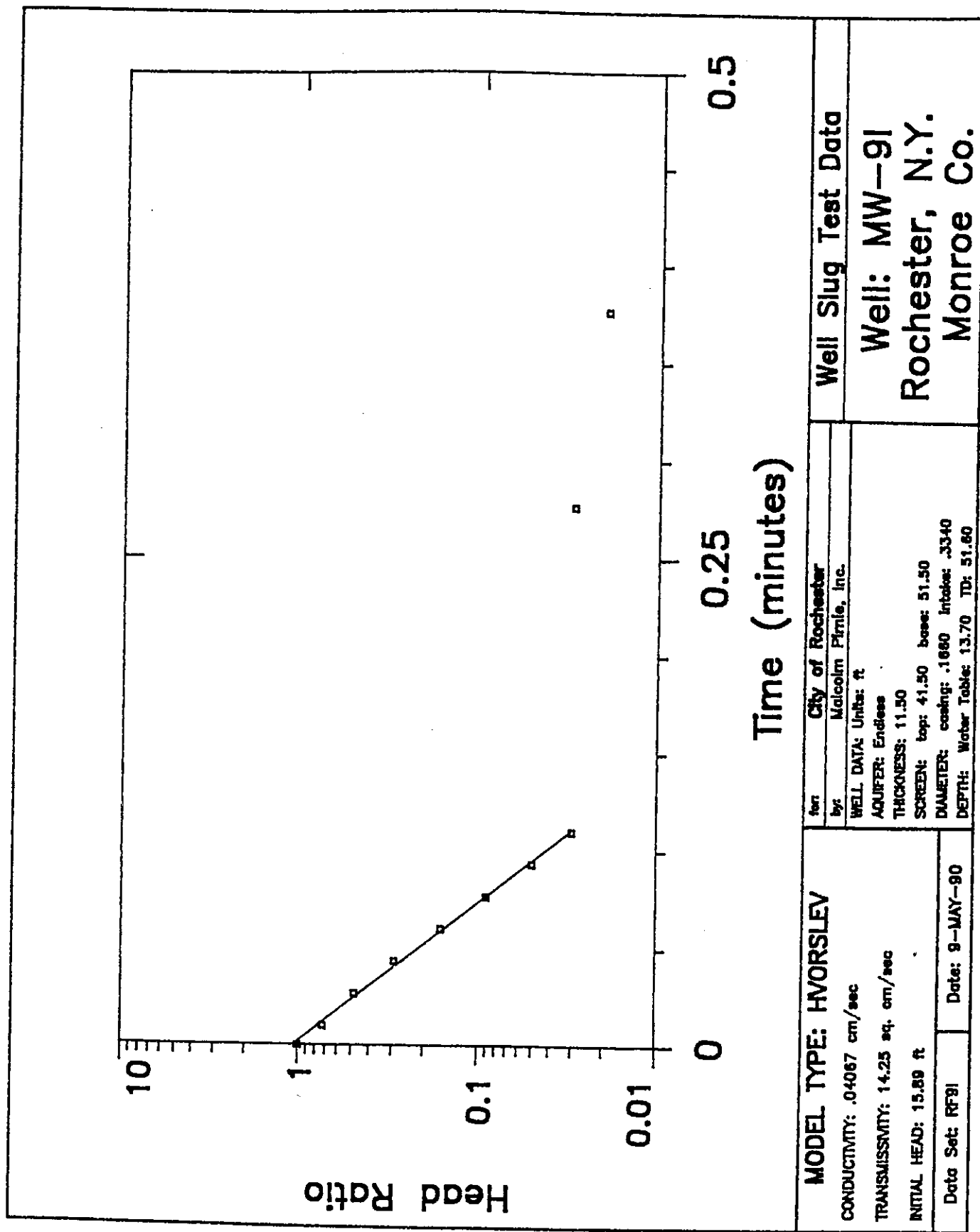
MODEL TYPE: HVORSLEV		City of Rochester	Well Slug Test Data
CONDUCTIVITY: .002050 cm/sec			
TRANSMISSIVITY: .4062 sq. cm/sec			
INITIAL HEAD: 9.300 ft			
Date Set: RF80	Date: 10-MAY-90		
		for:	Well: MW-8D Rochester, N.Y. Monroe Co.
		by: Malcolm Pirnie, Inc.	
		WELL DATA: Units: ft	
		AQUIFER: Endless	
		THICKNESS: 8.500	
		SCREEN: top: 45.80 base: 50.60	
		DIAMETER: casing: .1080 Intakes: .3340	
		DEPTH: Water Table: 7.110 TD: 52.00	



MODEL TYPE: HVORSLEV		City of Rochester	Well Slug Test Data
CONDUCTIVITY: .003178 cm/sec		by: Malcolm Pirnie, Inc.	Well: PZ-9 Rochester, N.Y. Monroe Co.
TRANSMISSIVITY: .6588 sq. cm/sec			
INITIAL HEAD: 12.61 ft		WELL DATA: Units: ft	
		AQUIFER: Endless	
		THICKNESS: 0.800	
		SCREEN: top: 35.10 base: 40.10	
		DIAETER: casing: .1860 Intakes: .8340	
		DEPTH: Water Table: 11.73 TD: 40.80	
Date Set: RFP29	Date: 9-MAY-90		



MODEL TYPE: BOUWER and RICE CONDUCTIVITY: .002702 cm/sec TRANSMISSIVITY: .9062 sq. cm/sec INITIAL HEAD: 6.020 ft		City of Rochester by: Malcolm Pirnie, Inc. WELL DATA: Units: ft AQUIFER: Endless THICKNESS: 11.00 SCREEN: top: 6.800 base: 16.80 DIAMETER: casing: .1860 intake: .8340 DEPTH: Water Table: 5.690 TD: 16.90		Well Slug Test Data
Data Set: RF-9S Date: 9-MAY-90		Well: MW-9S Rochester, N.Y. Monroe Co.		



MODEL TYPE: HVORSLEV

CONDUCTIVITY: .04067 cm/sec

TRANSMISSIVITY: 14.25 sq. cm/sec

INITIAL HEAD: 15.89 ft

Data Set: RF91

Date: 9-MAY-90

for City of Rochester

by Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 11.50

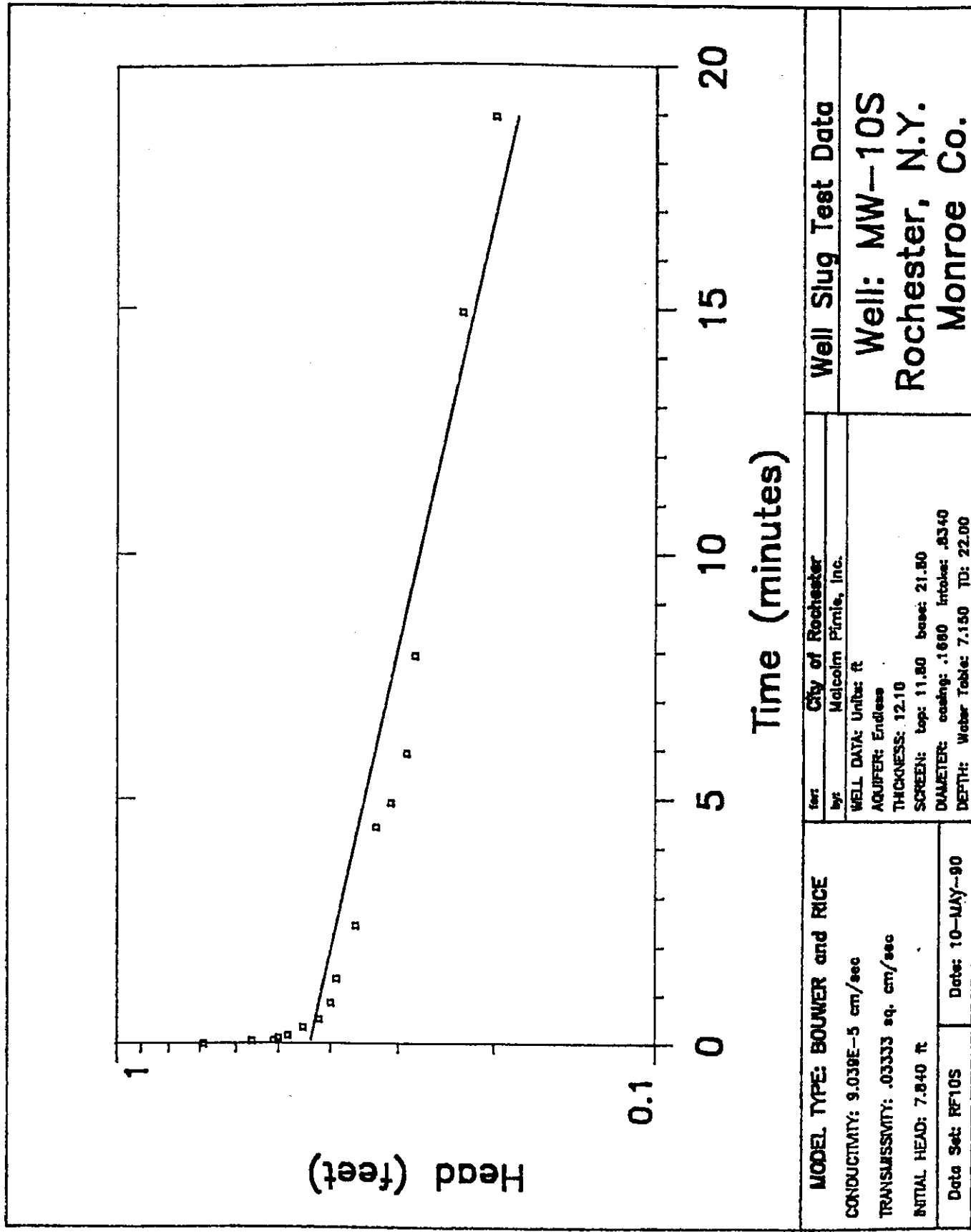
SCREEN: top: 41.50 base: 51.50

DIAMETER: casing: .1060 Intake: .3340

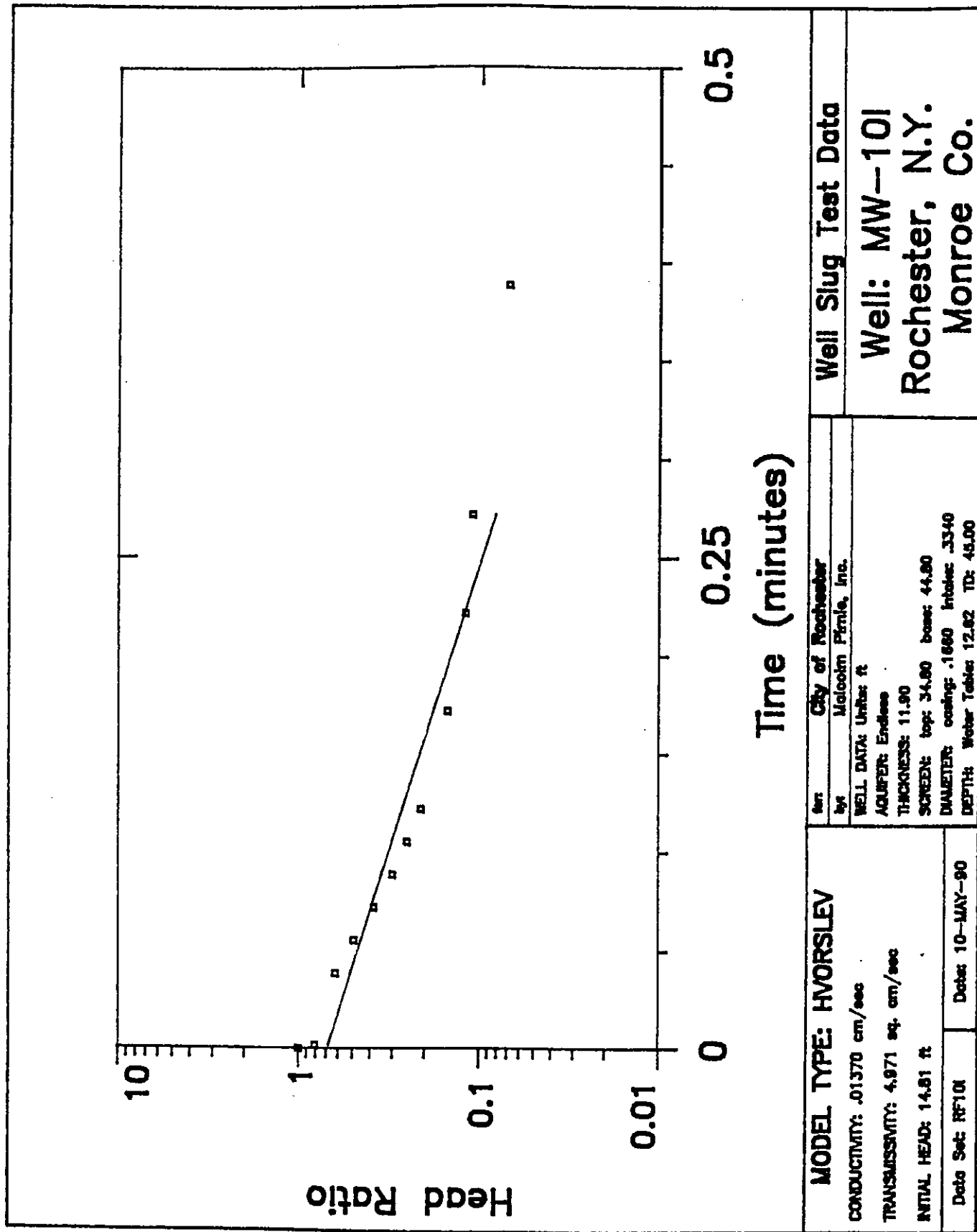
DEPTH: Water Table: 13.70 TD: 51.80

Well Slug Test Data

Well: MW-91
Rochester, N.Y.
Monroe Co.



Well Slug Test Data	
Well: MW-10S Rochester, N.Y. Monroe Co.	
for: City of Rochester	
by: Malcolm Pirnie, Inc.	
WELL DATA: Unbr: ft	
AQUIFER: Endless	
THICKNESS: 12.10	
SCREEN: top: 11.80 base: 21.80	
DIAMETER: casing: .1680 Intakes: .8340	
DEPTH: Water Table: 7.150 TD: 22.00	
MODEL TYPE: BOWEN and RICE	
CONDUCTIVITY: 9.038E-5 cm/sec	
TRANSMISSIVITY: .03333 sq. cm/sec	
INITIAL HEAD: 7.840 ft	
Date Set: RF10S	Date: 10-MAY-90



MODEL TYPE: HVORSLEV

CONDUCTIVITY: .01370 cm/sec

TRANSMISSIVITY: 4.971 sq. cm/sec

INITIAL HEAD: 14.81 ft

Date: Feb 10/01

Date: 10-MAY-90

City of Rochester

Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 11.90

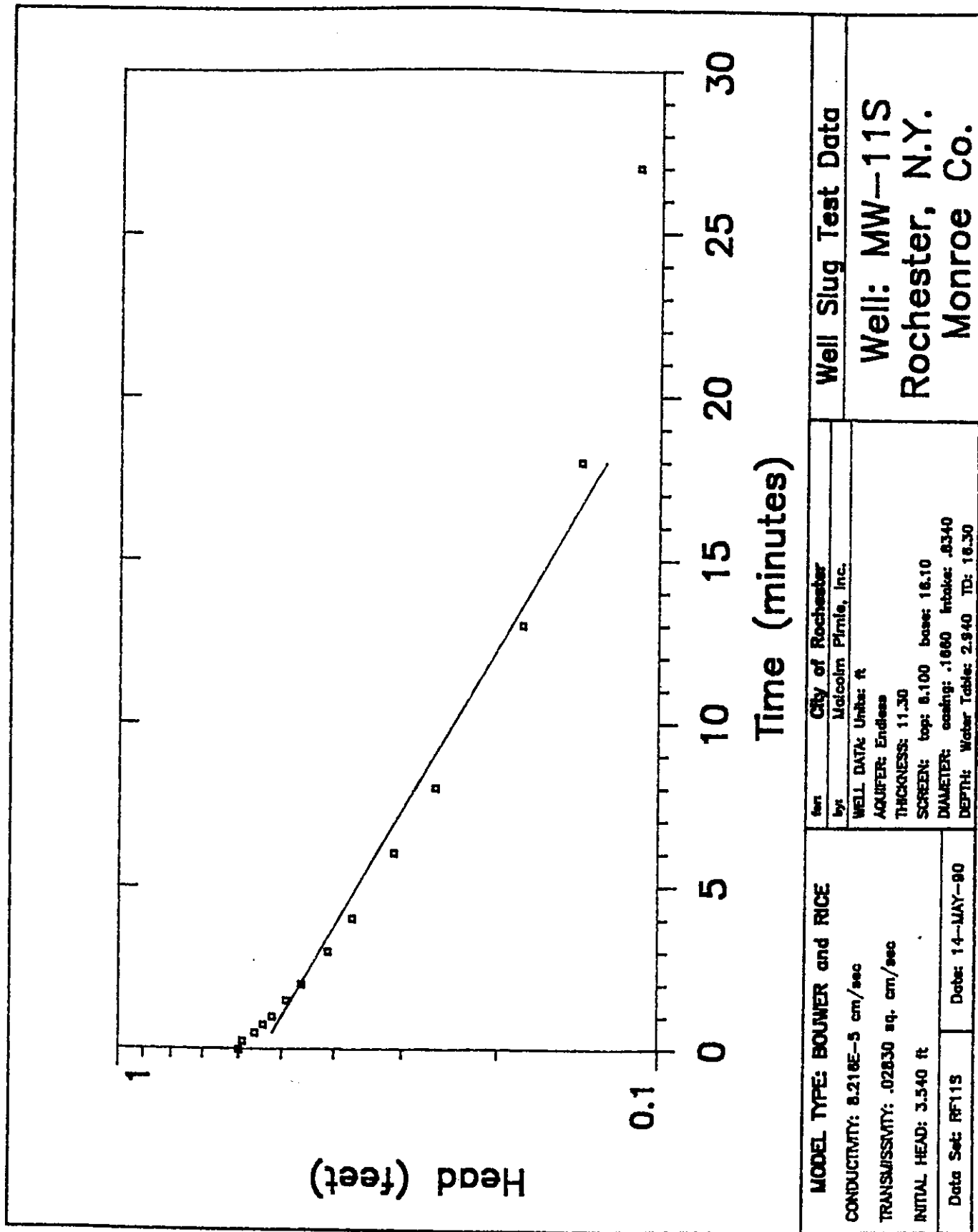
SCREEN: top: 34.80 base: 44.80

DIALECT: casing: .1860 Inches .3340

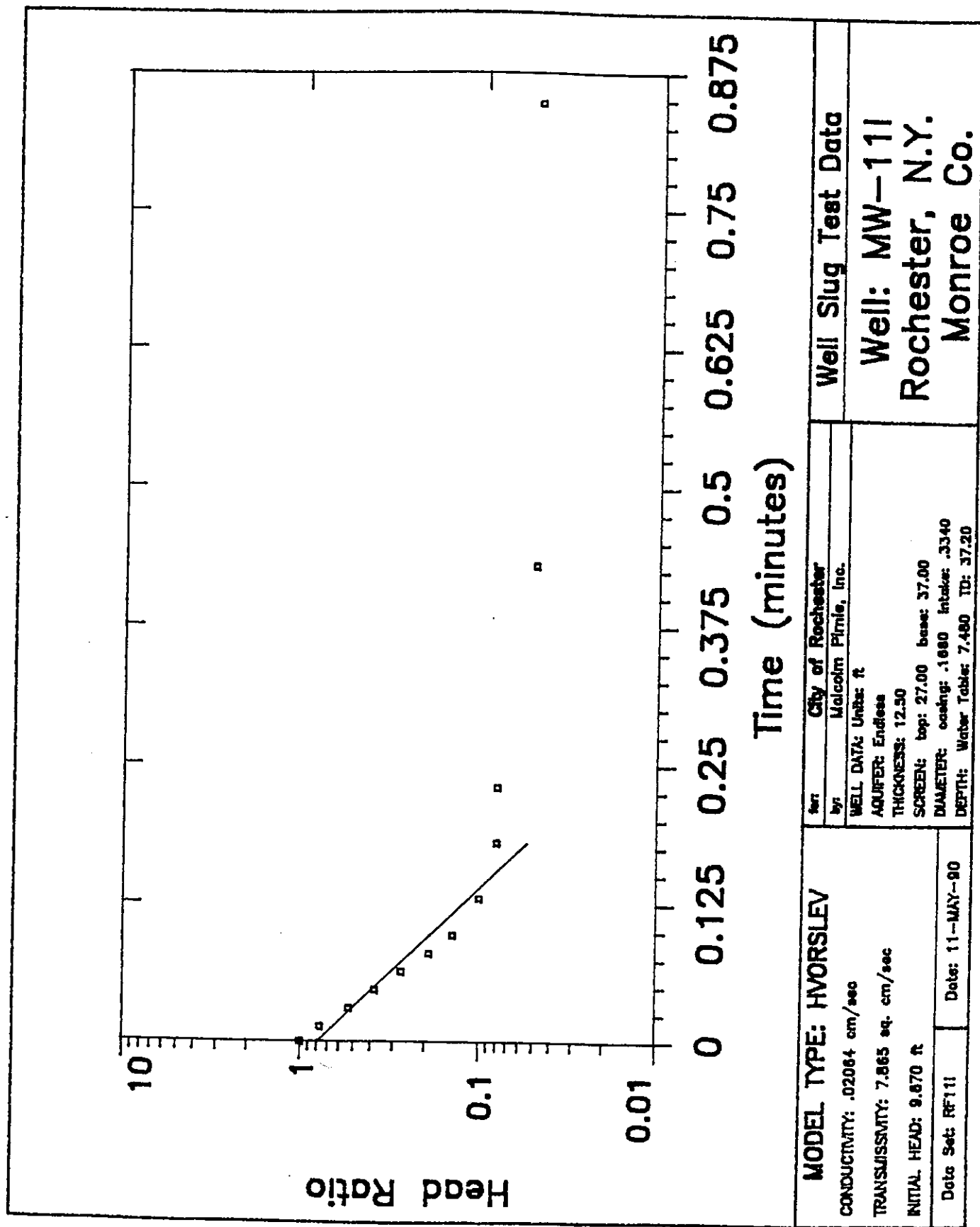
DEPTH: Weber Tables 12.82 TD: 48.00

Well Slug Test Data

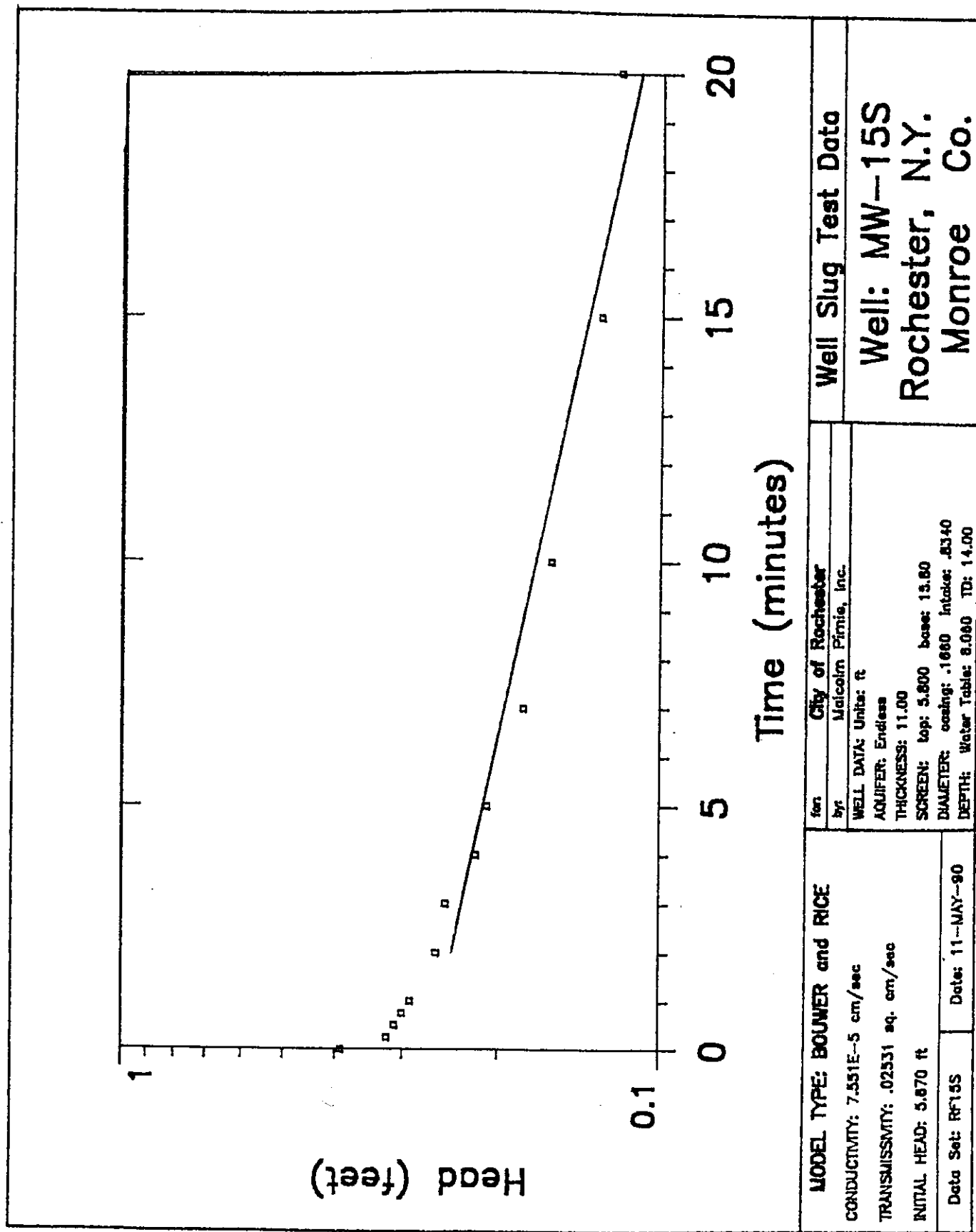
Well: MW-101
Rochester, N.Y.
Monroe Co.



MODEL TYPE: BOUNER and RICE		Well Slug Test Data	
CONDUCTIVITY: 8.218E-5 cm/sec		Well: MW-11S	
TRANSMISSIVITY: .02830 sq. cm/sec		Rochester, N.Y.	
INITIAL HEAD: 3.540 ft		Monroe Co.	
Data Set: RF11S	Date: 14-MAY-90	for: City of Rochester	
		by: Malcolm Pirnie, Inc.	
		WELL DATA: Uniba: ft	
		AQUIFER: Endless	
		THICKNESS: 11.30	
		SCREEN: top: 8.100 base: 18.10	
		DIAMETER: casing: .1660 Intakes: .8340	
		DEPTH: Water Table: 2.940 TD: 18.30	



MODEL TYPE: HVORSLEV		City of Rochester	Well Slug Test Data
CONDUCTIVITY: .02064 cm/sec			
TRANSMISSIVITY: 7.865 sq. cm/sec		by: Malcolm Pirnie, Inc.	Well: MW-111 Rochester, N.Y. Monroe Co.
INITIAL HEAD: 9.870 ft		WELL DATA: Unbr: ft	
		AQUIFER: Endless	
		THICKNESS: 12.50	
		SCREEN: top: 27.00 base: 37.00	
		DIAMETER: casing: .1680 Intake: .3340	
		DEPTH: Water Table: 7.480 TD: 37.20	
Date Set: RF111	Date: 11-MAY-90		



MODEL TYPE: BOUNER and RICE

CONDUCTIVITY: 7.551E-5 cm/sec

TRANSMISSIVITY: .02531 sq. cm/sec

INITIAL HEAD: 5.870 ft

Data Set: RF15S

Date: 11-MAY-90

for City of Rochester
by Malcolm Pirnie, Inc.

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 11.00

SCREEN: top: 5.800 base: 13.80

DIALECTER: casing: .1660 Intake: .8340

DEPTH: Water Table: 8.060 TD: 14.00

Well Slug Test Data

Well: MW--15S
Rochester, N.Y.
Monroe Co.

APPENDIX C.6
SOIL TESTING REPORT

MALCOLM PIRNIE, INC.

Project..... Rochester Fire Academy
Project Number.. 0965-04-1
Location..... Rochester Fire Academy

Sample Number	permeability cm/sec
MW 9S,12	2.0 E-7
MW 6I,12	4.7 E-8
MW-6I,32	Unable to test

NOTE: There currently is no approved ASTM method for permeability testing,
therefore NVLAP accreditation cannot extend to these data.

MALCOLM PIRNIE, INC.

Project..... Rochester Fire Academy
Project Number.. 0965-04-1
Location..... Rochester Fire Academy, MW 9S,12-14'

PERMEABILITY TEST RESULTS

SAMPLE PARAMETERS	INITIAL	FINAL	TEST PARAMETERS
Height.....(in)	4.67	4.42	Test Type..... UNDISTURBED
Diameter.....(in)	2.72	2.74	FALLING HEAD
Wet Density.....(pcf)	138.9	143.4	Head Pressure.....(psi) 55
Moisture Content.....(%)	24.9	23.5	Back Pressure.....(psi) 50
Optimum Moisture Content..(%)	NA	NA	Chamber Pressure..(psi) 60
Dry Density.....(pcf)	111.2	116.1	Fluid..... DEAIRED WATER
			Permeation Time..(days) 7

TEST RESULTS

Coefficient of Permeability, K..(cm/sec) 2.0 E-7

NOTE: There currently is no approved ASTM method for permeability testing, therefore NVLAP accreditation cannot extend to these data.

MALCOLM PIRNIE, INC.

Project..... Rochester Fire Academy
 Project Number.. 0965-04-1
 Location..... Rochester Fire Academy, MW 6I,12-14'

PERMEABILITY TEST RESULTS

SAMPLE PARAMETERS	INITIAL	FINAL	TEST PARAMETERS
Height.....(in)	4.78	4.88	Test Type.....
Diameter.....(in)	2.83	2.78	UNDISTURBED
Wet Density.....(pcf)	139.7	143.6	FALLING HEAD
Moisture Content.....(%)	16.0	17.5	55
Optimum Moisture Content..(%)	NA	NA	50
Dry Density.....(pcf)	120.4	122.2	60
			DEAIRED WATER
			7
			Permeation Time...(days)

TEST RESULTS

Coefficient of Permeability, K..(cm/sec) 4.7 E-8

NOTE: There currently is no approved ASTM method for permeability testing, therefore NVLAP accreditation cannot extend to these data.

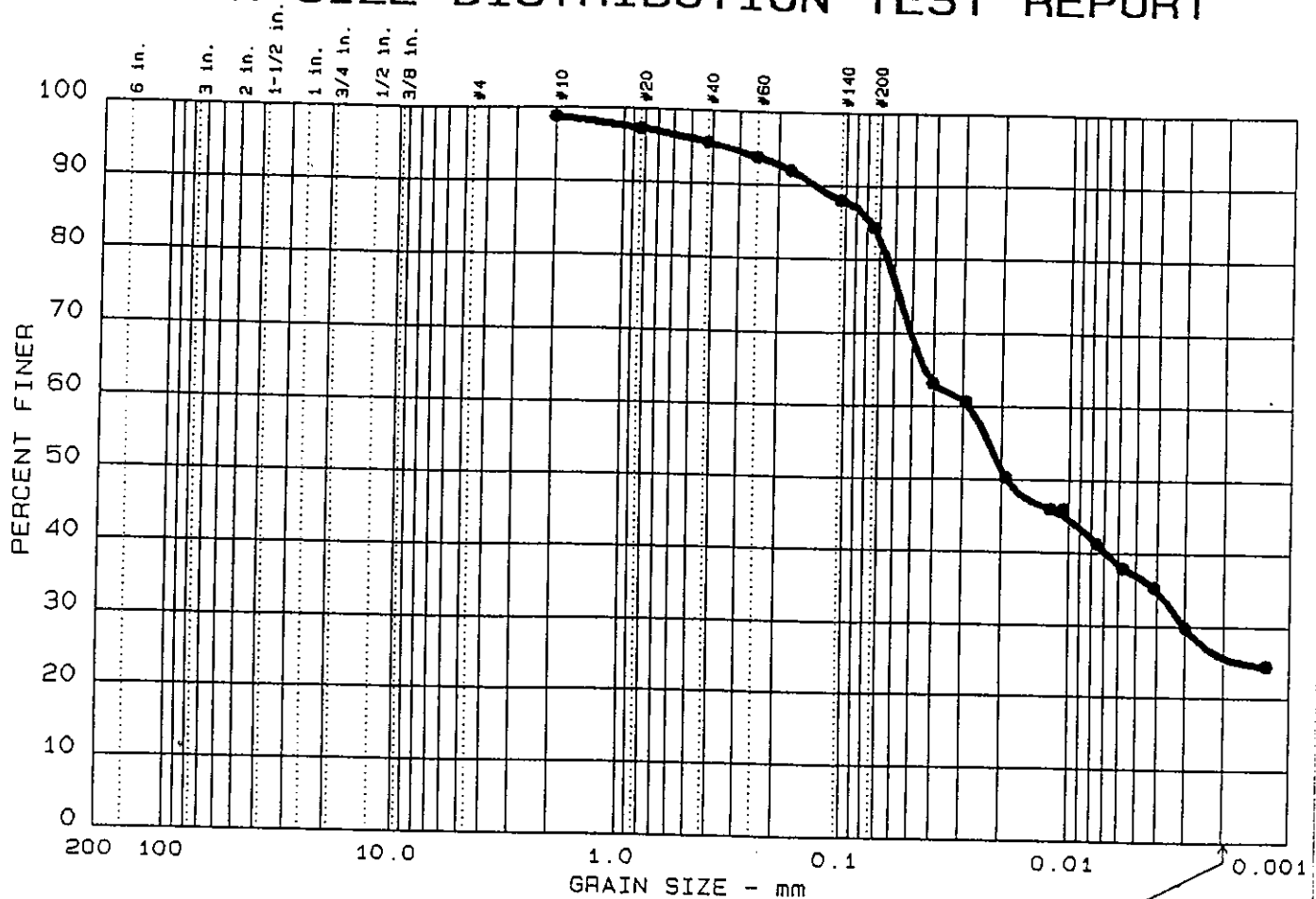
MALCOLM PIRNIE, INC.

Project..... Rochester Fire Academy
Project Number.. 0965-04-1
Location..... Rochester Fire Academy

Sample Number	gravel %	sand %	silt %	clay %
MW-6S, 4-10'	0.0	15.7	58.8	25.5
MW-6S, 10-16'	1.3	11.2	53.6	33.9
MW-9S, 4-8'	6.8	39.4	45.3	8.5
PZ-9, 32-38'	38.3	37.6	21.8	2.3
MW-10S, 16-20'	19.5	27.7	37.4	15.4

NOTE: The Atterberg Limits Analysis was not performed on these
samples due to lack of material.

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	0.0	15.7	58.8	25.5

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.08		0.02	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
• BROWN MOSTLY SILT WITH LITTLE CLAY AND SAND		

Project No.: 0965-04-1
 Project: ROCHESTER FIRE ACADEMY
 • Location: MW-6S, 4-10'

Date: 5-22-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

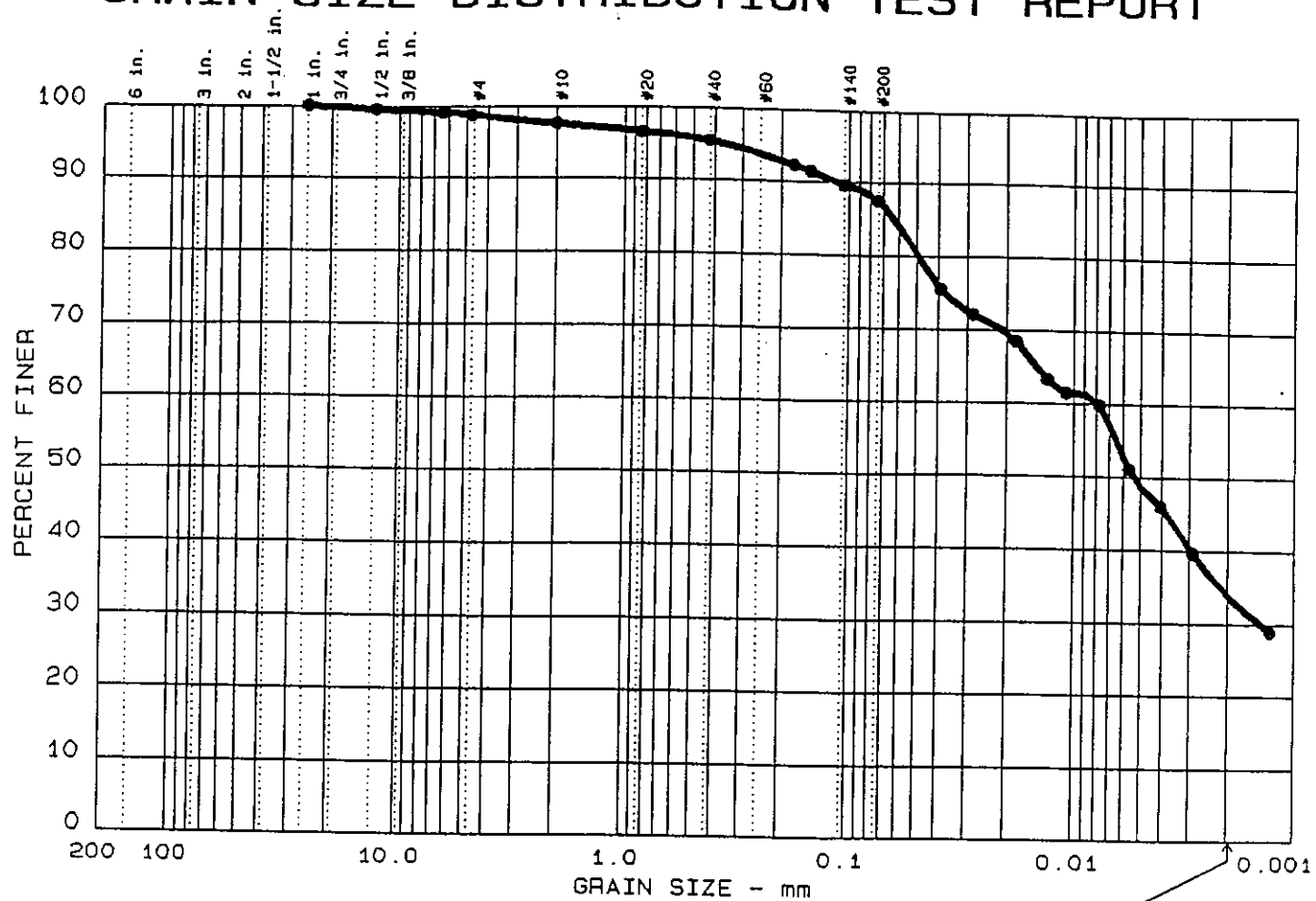
Remarks:

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Figure No.

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 4	0.0	1.3	11.2	53.6	33.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•				0.01	0.001				

MATERIAL DESCRIPTION	USCS	AASHTO
• REDDISH BROWN CLAYEY SILT WITH LITTLE SAND		

Project No.: 0965-04-1
 Project: ROCHESTER FIRE ACADEMY
 • Location: MW 5S, 10-15'
 Date: 5-21-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

Remarks:

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NVLAQ

Figure No.

Grain size distribution curve for a soil sample. The graph plots Percent Finer (0 to 100) against Grain Size in mm (logarithmic scale from 200 to 0.001). The curve shows a well-graded soil with a peak at approximately 0.075 mm (No. 20 sieve) and a sharp drop-off around 0.075 mm.

Grain Size (mm)	Percent Finer (%)
200	100
100	100
60	100
40	100
20	100
10	100
7.5	95
5	90
3	85
2	80
1.5	75
1.0	70
0.75	65
0.6	60
0.425	55
0.3	50
0.25	45
0.2	40
0.15	35
0.125	30
0.106	25
0.085	20
0.075	18
0.063	15
0.05	12
0.04	10
0.03	8
0.025	7
0.02	6
0.015	5
0.0125	4
0.0106	3
0.0085	2
0.0075	1
0.0063	1
0.005	1
0.00425	1
0.003	1
0.0025	1
0.002	1
0.0015	1
0.00125	1
0.00106	1
0.00085	1
0.00075	1
0.00063	1
0.0005	1
0.000425	1
0.0003	1
0.00025	1
0.0002	1
0.00015	1
0.000125	1
0.000106	1
0.000085	1
0.000075	1
0.000063	1
0.00005	1
0.0000425	1
0.00003	1
0.000025	1
0.00002	1
0.000015	1
0.0000125	1
0.0000106	1
0.0000085	1
0.0000075	1
0.0000063	1
0.000005	1
0.00000425	1
0.000003	1
0.0000025	1
0.000002	1
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0.00000125	1
0.00000106	1
0.00000085	1
0.00000075	1
0.00000063	1
0.0000005	1
0.000000425	1
0.0000003	1
0.00000025	1
0.0000002	1
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0.000000075	1
0.000000063	1
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0.00000000025	1
0.0000000002	1
0.00000000015	1
0.000000000125	1
0.000000000106	1
0.000000000085	1
0.000000000075	1
0.000000000063	1
0.00000000005	1
0.0000000000425	1
0.00000000003	1
0.000000000025	1
0.00000000002	1
0.000000000015	1
0.0000000000125	1
0.0000000000106	1
0.0000000000085	1
0.0000000000075	1
0.0000000000063	1

[illegible]

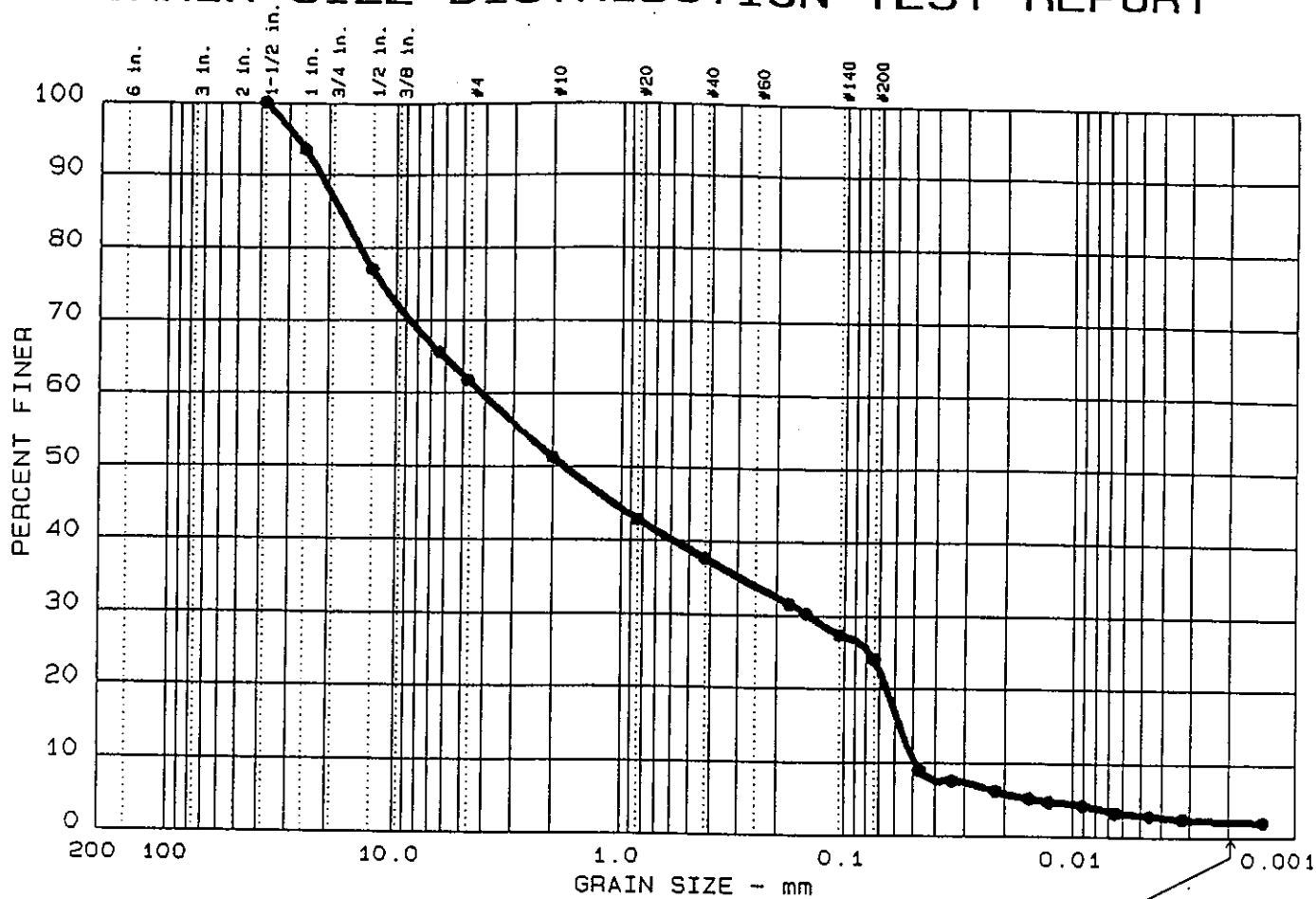
Project No.: 0965-04-1
Project: ROCHESTER FIRE ACADEMY
◆ Location: MW-9S, 4-8'

Date: 5-18-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

Figure No.

GRAIN SIZE DISTRIBUTION TEST REPORT



GRAIN SIZE DISTRIBUTION TEST REPORT

Grain Size (mm)	Percent Finer (%)
200	100
100	100
60	100
40	100
30	100
20	100
15	100
12.5	100
10	100
7.5	95
6	90
4.75	85
3.75	80
3.0	75
2.5	70
2.0	65
1.5	60
1.18	55
0.85	50
0.75	45
0.6	35
0.425	25
0.3	20
0.25	18
0.2	17
0.15	16
0.125	15
0.106	14
0.085	13
0.075	12
0.063	11
0.053	10

[illegible]

Project No.: 0965-04-1
Project: ROCHESTER FIRE ACADEMY
◆ Location: MW-10S, 16-20'

Date: 5-21-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

NVLAP

Figure No.

MALCOLM PIRNIE, INC.

Project..... Rochester Fire Academy
 Project Number.. 0965-04-1
 Location..... Rochester Fire Academy

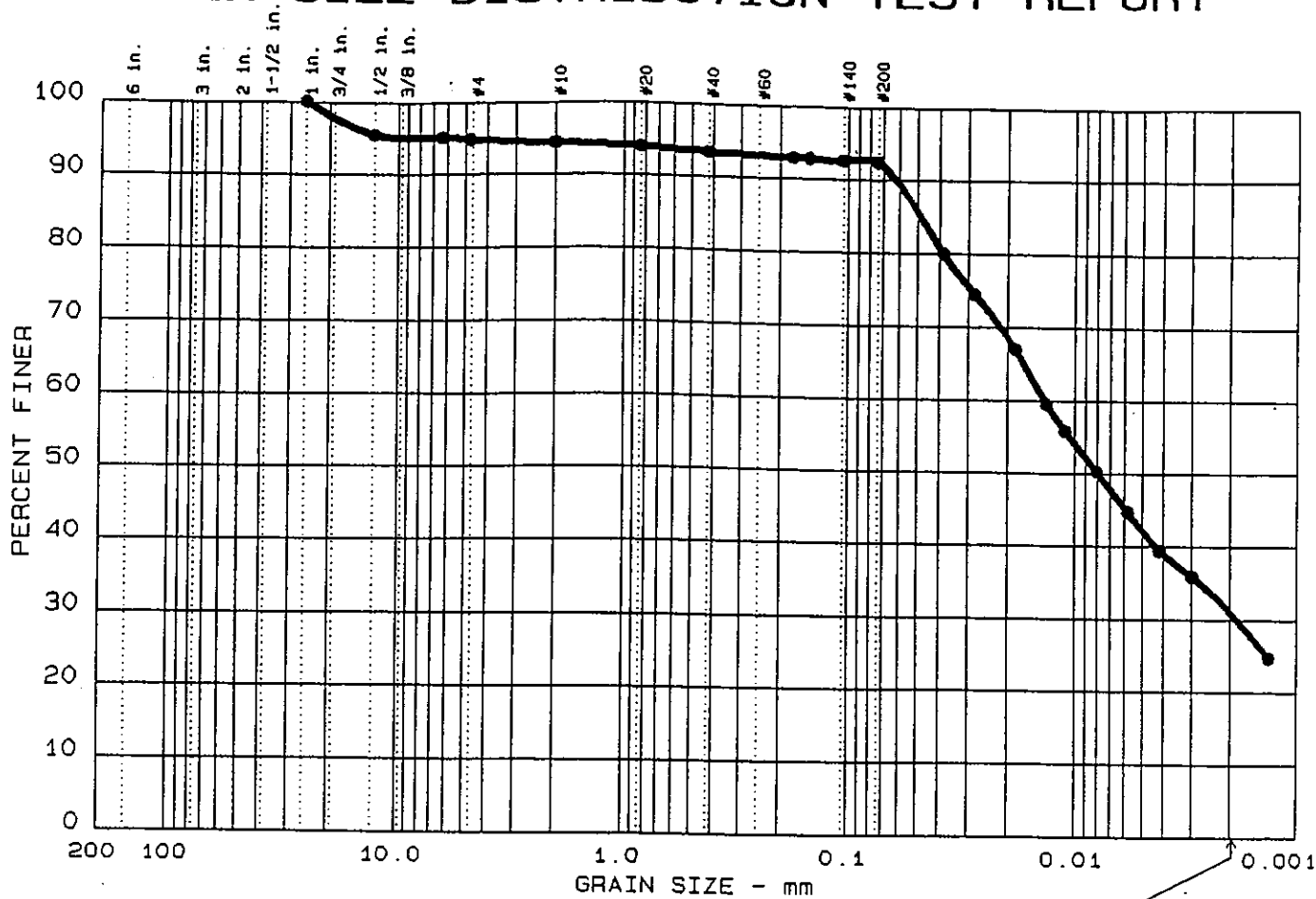
Sample Number	Gravel %	Sand %	Silt %	Clay %	Classification	Liquid Limit %
MW-9S,8-16'	5.2	2.4	61.5	30.9	CL	26
MW-10S,8-16'	0.0	1.4	83.4	15.2	ML	21

Sample Number	Plasticity Index
MW-9S,8-16'	11
MW-10S,8-16'	3

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GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	5.2	2.4	61.5	30.9

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 26	11			0.01	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
• BROWN LEAN CLAY	CL	

Project No.: 0965-04-1
 Project: ROCHESTER FIRE ACADEMY
 • Location: MW 9S, 8-16'

Date: 5-21-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

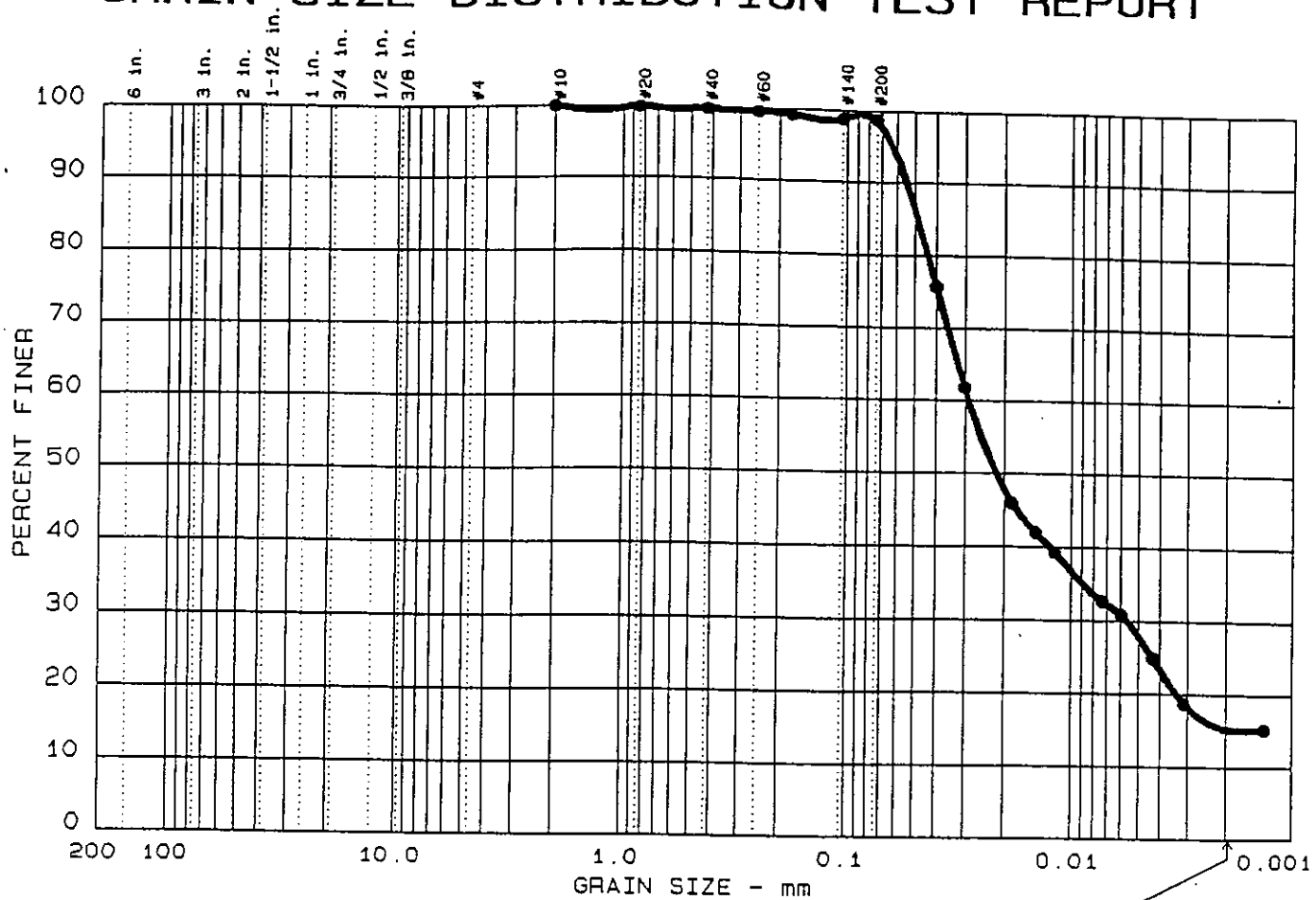
Remarks:

ACCREDITED BY THE
 NATIONAL INSTITUTE OF STANDARDS
 AND TECHNOLOGY THROUGH

NVLAP

Figure No.

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	0.0	1.4	83.4	15.2

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
21	3			0.02	0.006				

MATERIAL DESCRIPTION	USCS	AASHTO
BROWN SILT	ML	

Project No.: 0965-04-1
 Project: ROCHESTER FIRE ACADEMY
 Location: MW-10S, 8-16'

Date: 5-22-90

GRAIN SIZE DISTRIBUTION TEST REPORT
MALCOLM PIRNIE, INC.

Remarks:

ACCREDITED BY THE
 NATIONAL INSTITUTE OF STANDARDS
 AND TECHNOLOGY THROUGH

NVLAP

Figure No.

EXHIBIT 2-5

Quarterly Inspection and Maintenance Manual December 1998

NOTES:

- 1. Report summarizes and compiles sampling and monitoring requirements from O&M Manual.**
- 2. Includes checklists and schedules from O&M Manual.**
- 3. Unbound copy on file in Groundwater Treatment Plant Office for use as template.**

DRAFT

QUARTERLY INSPECTION AND MAINTENANCE MANUAL

**ROCHESTER FIRE TRAINING ACADEMY
ADDENDUM TO THE OPERATIONS AND MAINTENANCE MANUAL**

**CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF ENVIRONMENTAL SERVICES**

DECEMBER 1998

0965-087

MALCOLM PIRNIE, INC.

**1000 Pittsford - Victor Road
Pittsford, New York 14534**

TABLE OF CONTENTS

1.0	INSPECTION AND MAINTANCE	1
1.1	GENERAL	1
1.2	PROCEDURE	2
2.0	QUARTERLY SAMPLING.....	2
2.1	GENERAL	2
3.0	COVER SYSTEM INSPECTION	3
3.1	GENERAL	3
4.0	STORM WATER COLLECTION SYSTEM INSPECTION.....	3
4.1	GENERAL	3
5.0	EQUIPMENT MAINTENACE	3
5.1	GENERAL	3
5.2	SECURITY AND MONITORING PANELS	4
6.0	RECORDS.....	4
6.1	GENERAL	4

APPENDIX A - Quarterly Inspection Checklist And Data Sheets

APPENDIX B - Data Sheets And Tables From Rochester Fire Training Academy O&M Manual

1.0 INSPECTION AND MAINTENANCE

1.1 General

1. The Quarterly Inspection and Maintenance Manual is an addendum to the Rochester Fire Academy Operations and Maintenance Manual (O&M Manual). The purpose of this manual is to facilitate required quarterly inspections by summarizing required inspection and maintenance activities, referenced in the O&M Manual. Appendix A presents the Quarterly Inspection and Maintenance Schedule Checklist and other applicable checklists from the O&M Manual. Appendix B includes other pertinent data sheets and tables from the O&M Manual.
2. The purpose of the quarterly inspection is to insure that the Groundwater Treatment Plant (GWTP) plant and other major components at the site are functioning properly and will continue to function properly through the next three (3) months. The inspection includes all necessary maintenance listed on the check lists in Appendix A. The inspection and maintenance should not be limited only to that included in the check list or in the Operation and Maintenance Manual (O&M), but should also include maintenance and/or repair of equipment and other items in the GWTP or other site components, that are noted to be a problem or potential problem during the inspection. The primary components of the Quarterly Inspection include:
 - Treatment System Performance GWTP (water sampling raw and treated water).
 - Inspection/Maintenance of GWTP Components.
 - North Disposal Landfill Cover System (North Disposal Area (NDA)).
 - Stormwater Collection System (Training Grounds Area (TGA)).
3. This quarterly review should be performed in conjunction with other inspection and maintenance that is required at the GWTP and other site components. If scheduled, properly annual and semi-annual maintenance can be performed at the same time as this inspection. Inspections and maintenance outlined in other documents that are required at other time intervals (i.e., monthly) should still be performed as stated in the O&M Manual or manufacturers specifications. Use of this quarterly inspection manual and the O&M Manual in conjunction with manufacturers O&M Manuals will provide the most complete and through inspection and maintenance of the GWTP and other site components.

1.2 Procedure

1. The inspection should be performed by at least two persons. A representative of the plant operation staff should be included in this inspection team. Others may include, representatives from, Malcolm Pirnie, the City of Rochester, New York Department of Environmental Conservation (NYSDEC), and/or the Rochester Fire Department.
2. Required maintenance should be performed on the day of the inspection or just prior to the inspection. All maintenance should be performed by a qualified person.
3. The inspection will be considered complete when each item of the check lists provided in Appendix A has been inspected, all required maintenance has been completed and checked, and all the appropriate data sheets completed.
4. Results from the inspection should be documented in the quarterly report and a minimum of one copy should remain at the GWTP. One copy of the quarterly report should be forwarded to the City of Rochester, Department of Environment Services. Water sample laboratory analysis reports should be attached to the quarterly report. Water sample laboratory analysis reports should also be forwarded to the Monroe County Department of Pure Waters.
5. Potential problems or current problems encountered during the inspection should be documented in the quarterly report. The City of Rochester should be notified of any problems identified, so corrective action can be taken to resolve or prevent the problem as quickly as possible to allow for continuous operation of the GWTP and other site components i.e., NDA Cover System, Stormwater Collection System. Problem resolution and corrective actions should be recorded in the daily logs at the GWTP.

2.0 QUARTERLY SAMPLING

2.1 General

1. Sampling methods and procedures should be performed as outlined in Section 3 of the Rochester Fire Training Academy O&M manual. Specifically for the quarterly inspection, the following samples should be taken:
 - a. GWTS Influent
 - b. Air Stripper Effluent
 - c. Between Primary and Secondary Carbon Vessels
 - d. GWTP Effluent (monthly)
 - e. Groundwater monitoring wells (semi-annually)

2. Sampling locations, types, frequencies and analysis parameters are presented on Table 3-1 of Section 3 in the Rochester Fire Training Academy O&M manual. A copy of Table 3-1 is included in Appendix A.

3.0 COVER SYSTEM INSPECTION

3.1 General

1. The cover of the North Disposal Area, South Disposal Area, and Training Grounds Area shall be inspected routinely (at least quarterly).
2. Cover system inspection and maintenance procedures are stated in section 5.0 of the Rochester Fire Academy O&M Manual.
3. The inspection checklist can be found in appendix F.1 of the Rochester Fire Training Academy O&M manual. A copy of Appendix F.1 is also included in Appendix A.

4.0 STORM WATER COLLECTION SYSTEM INSPECTION

4.1 General

1. The storm water collection system, including drainage structures, will be inspected quarterly.
2. The storm water collection system inspection and maintenance guidelines are provided in Section 6.0 of the Rochester Fire Training Academy O&M Manual.
3. The inspection checklist can be found in appendix F.2 of the Rochester Fire Training O&M manual. A copy of this checklist is also included in Appendix A.

5.0 EQUIPMENT MAINTENANCE

5.1 General

1. Maintain and inspect equipment per, the Rochester Fire Training Academy O&M Manual and any manufacture's O&M Manuals.

2. Appendix A.10 of the Rochester Fire Training Academy O&M Manual provides an equipment maintenance schedule. A copy of this schedule is included in Appendix B.

5.2 Security and Monitoring Panels

1. Test the security and monitoring panels will be tested each quarter, per manufacturer's recommendations.
2. Update the programmed alarm codes and phone number lists of the cellular interface as required.

6.0 RECORDS

6.1 General

1. Operations and maintenance records, sampling records, laboratory analysis reports, and environmental records should be checked for completeness (over the last 3 to 6 months).
2. All records should be maintained on site and be available for inspection and copying by the City of Rochester, Monroe County Pure Waters, or any other party approved by the City of Rochester. Files should be indexed and include a Table of Contents for quick reference and access.

APPENDIX A
QUARTERLY INSPECTION DATA SHEETS

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: Groundwater Collection Trench

Date: _____

Inspected By: _____

Inspection			
Item	Action	Action Result	Notes
1) Piezometers	Check with water level indicator to ensure drawdown to desired elevation	Working NOT Working	
2) up in manholes	Visually inspect manholes and pump station for sediment and obstructions.	Present NOT Present	
3) groundsurface	Visually inspect ground surface along collection trench	Settling NO Settling	
4) Covers	Visually inspect manhole and pump station covers	Present NOT Present	
5) Pumps	Refer to Manufacturer's O&M manuals for inspection procedure	Checked NOT Checked	
6) Additional Item Inspected			
Maintenance			
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed
1) Pumps	Refer to Manufacturer's O&M manuals for maintenance	Yes NO	
2) Additional Maintenance Performed			
3) Additional Maintenance Performed			

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: *Sequestering Agent Feed System*

Date: _____
Inspected By: _____

Inspection			Notes
Item	Action	Action Result	
1) Feed Pump	Visually inspect feed pump and its in-feed and out-feed lines.	Acceptable NOT Acceptable	
2) Calibration	Check calibration chamber to verify pumping rate.	Calibrated NOT Calibrated	
3) Sequestering Agent	Visually inspect sequestering agent, holding area and drums.	Acceptable NOT Acceptable	
4) Additional Item Inspected			
5) Additional Item Inspected			
6) Additional Item Inspected			
<i>Maintenance</i>			
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed
1) Calibrate Pumps	Calibrate pumps during every other (6 months) quarterly inspection.	Yes NO	
2) Additional Maintenance Performed			
3) Additional Maintenance Performed			

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: *Filter Bag Unit*

Date: _____
Inspected By: _____

Inspection			Notes	
Item	Action	Action Result		
1) Filter Bag Unit	Visually inspect overall system.	Acceptable NOT Acceptable		
2) Filter Bags	Check pressure differential. Refer to O&M manual.	Checked NOT Checked		
Additional Item 3) Inspected				
Additional Item 4) Inspected				
Additional Item 5) Inspected				
Additional Item 6) Inspected				
<i>Maintenance</i>				
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed	
1) Swing Davit Additional Maintenance Performed	Apply a small amount of grease to the swing davit every other (6 months) quarterly inspection.	Yes NO		
2) Additional Maintenance Performed				
3) Additional Maintenance Performed				

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: **Feed Tank**

Date: _____
 Inspected By: _____

<i>Inspection</i>		<i>Action</i>	<i>Action Result</i>	<i>Notes</i>
1) Feed Tank		Visually inspect tank for solids build up.	Solids Present NOT Present	
2) Feed Tank		Visually inspect overall system.	Acceptable NOT Acceptable	
Additional Item 3) Inspected				
Additional Item 4) Inspected				
Additional Item 5) Inspected				
Additional Item 6) Inspected				
Maintenance				
<i>Item</i>	<i>Maintenance Activity</i>	<i>Maintenance Performed</i>	<i>Description of Maintenance Performed or Reason Not Performed</i>	
1) Feed Tank	If solids build up refer to O&M manual for procedure.	Yes NO		
Additional Maintenance 2) Performed				
Additional Maintenance 3) Performed				
Additional Maintenance 4) Performed				

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: Air Stripper and Feed Pumps

Date: _____
Inspected By: _____

Inspection			Action Result		Notes
Item	Action		Acceptable	NOT Acceptable	
1) Air Stripper	Visually inspect overall system.		Acceptable	NOT Acceptable	
2) Stripper Trays	Visually inspect trays and check air pressure		Acceptable	NOT Acceptable	
3) Feed Pumps	Visually inspect feed pumps and all lines.		Acceptable	NOT Acceptable	
Additional Item					
4) Inspected					
Additional Item					
5) Inspected					
Additional Item					
6) Inspected					
Maintenance					
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed		
1) Feed Pumps	Refer to Manufacturer's O&M manuals for maintenance	Yes NO			
2) Stripper Trays	Clean trays every other (6 months) quarterly inspection, or when pressure is greater than 18" water.	Yes NO			
Additional Maintenance Performed					
3) Performed					
Additional Maintenance Performed					
4) Performed					

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: *Activated Carbon System*

Date: _____
Inspected By: _____

Inspection			
Item	Action	Action Result	Notes
1) System	Visually inspect system.	Acceptable	
2) Carbon Drums	Test for PCB breakthrough.	NOT Acceptable Present NOT Present	
Additional Item 3) Inspected			
Additional Item 4) Inspected			
Additional Item 5) Inspected			
Additional Item 6) Inspected			
<i>Maintenance</i>			
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed
1) Carbon Drums Additional Maintenance 2) Performed	As part of routine maintenance check pressure drop.	Yes NO	
Additional Maintenance 3) Performed			
Additional Maintenance 4) Performed			

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: *Instrumentation*

Date: _____

Inspected By: _____

Inspection			Action		Action Result		Notes	
Item			Visually inspect overall system.	Visually inspect each instrument.	Acceptable NOT Acceptable	Acceptable NOT Acceptable		
1) Instrumentation								
2) Instrumentation								
Additional Item								
3) Inspected								
Additional Item								
4) Inspected								
Additional Item								
5) Inspected								
Additional Item								
6) Inspected								
<i>Maintenance</i>								
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed					
1) Instrumentation	Refer to each instrumentation manufacturer's O&M manual.	Yes NO						
Additional Maintenance								
2) Performed								
Additional Maintenance								
3) Performed								
Additional Maintenance								
4) Performed								

Rochester Fire Academy

Quarterly Inspection and Maintenance Schedule Checklist

Location: *Building Sump Pit and Pumps*

Date: _____
Inspected By: _____

Inspection			
Item	Action	Action Result	Notes
1) Pump	Visually inspect overall system (pump and lines).	Acceptable NOT Acceptable	
2) Pump	Visually inspect shaft seal and motor.	Acceptable NOT Acceptable	
3) Sump Pit	Visually inspect pit for defects and obstructions.	Acceptable NOT Acceptable	
4) Floats	Visually inspect automatic floats.	Acceptable NOT Acceptable	
Additional Item 5) Inspected			
Additional Item 6) Inspected			
<i>Maintenance</i>			
Item	Maintenance Activity	Maintenance Performed	Description of Maintenance Performed or Reason Not Performed
1) Pumps	Refer to Manufacturer's O&M manuals for maintenance	Yes NO	
Additional Maintenance 2) Performed			
Additional Maintenance 3) Performed			
Additional Maintenance 4) Performed			

APPENDIX F.1
ROCHESTER FIRE TRAINING ACADEMY
COVER SYSTEM INSPECTION CHECKLIST

Date: _____
Inspected By: _____

VISUAL EVALUATION ITEMS	CONDITION (Check)				Remarks
	Acceptable	Not Acceptable	Present	Not Present	
1. North Disposal Area a. Vegetative Cover Integrity b. Erosion c. Settling d. Slope Loss e. Pooling/ponding f. Undesirable species	_____	_____	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	
2. South Disposal Area a. Vegetative Cover Integrity b. Erosion c. Settling d. Slope Loss e. Pooling/ponding f. Undesirable species	_____	_____	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	
3. Training Grounds Area a. Surface Coarse Integrity b. Cracking c. Potholes d. Pooling/ponding e. Undesirable species	_____	_____	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	
4. Other Comments/Problems:					

APPENDIX A.10
ROCHESTER FIRE ACADEMY
GROUNDWATER COLLECTION AND TREATMENT SYSTEM
EQUIPMENT MAINTENANCE SCHEDULE CHECKLIST

Item	Maintenance Activity	Recommended Frequency	Date Performed	Notes
Sequestering Agent Feed Pumps	Replace seal rings	Annually		
	Replace check valve balls	Annually		
	Replace check valve springs	Annually		
Bag Filter Unit	Replace bags	When diff pressure exceeds 10 PSI		
	Lubricate swing davit	Annually		
Feed Tank	Clean solids	As necessary		
Air Stripper	Examine trays	Bi-weekly		
	Clean/de-scale	Semi-annually*		
Activated Carbon Vessels	Backflush	When diff pressure exceeds 5 PSI above clean con. or 10 PSI total		
	Replace	Based on analytical results		
Discharge Tank	Clean solids	As necessary		
* Frequency may need to be adjusted based on field observations.				

**APPENDIX F.2
ROCHESTER FIRE ACADEMY**

STORM WATER COLLECTION SYSTEM INSPECTION CHECKLIST

Date: _____
Inspected By: _____

VISUAL EVALUATION ITEMS	CONDITION (Check)		Remarks
	Present	Not Present	
1. Drainage Channels a. Sediment build-up b. Pooling/ponding c. Severe cracking d. Erosion e. Slope loss	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	
2. Storm Sewers / Grates a. Sediment build-up b. Pooling/ponding c. Broken pipe d. Slope loss e. Grate clogging	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	
3. Drainage Structures #1, #2, #3 a. Flapper valve functioning b. Broken/cracked pipe c. Cracked headwall structure	_____ _____ _____	_____ _____ _____	
4. Other Comments/Problems:			

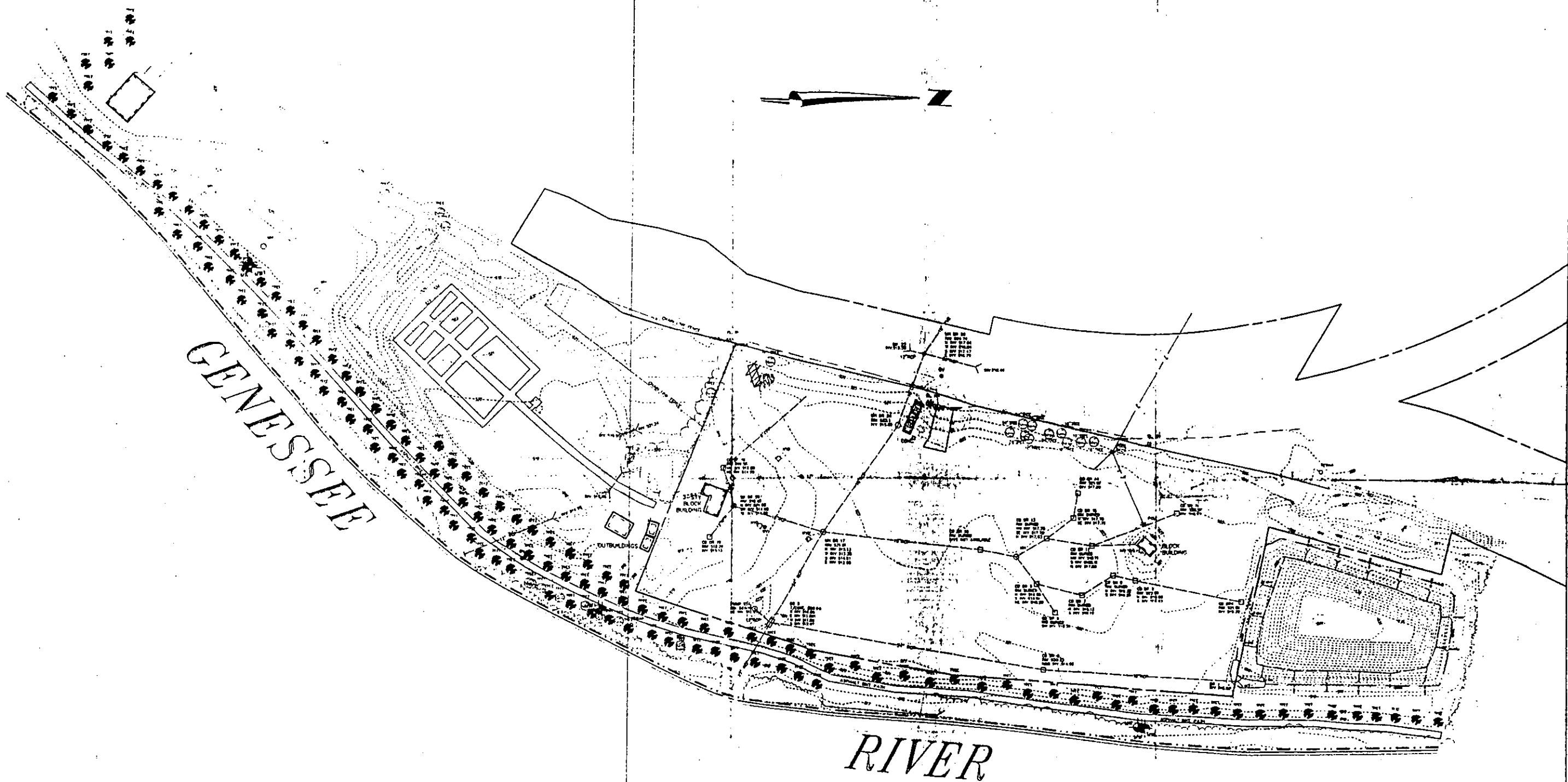
APPENDIX B
DATA SHEETS AND TABLES FROM GWTP O&M MANUAL

TABLE 3-1
ROCHESTER FIRE TRAINING ACADEMY
SUMMARY OF ROUTINE GROUNDWATER TREATMENT SYSTEM AND MONITORING WELL SAMPLING

Location	Purpose	Sample Type	Sample Frequency	Parameters
GWTS Influent ⁽¹⁾	GWTS performance monitoring/estimate air emission rates	Grab	Quarterly	VOCs (601, 602), PCBs, Metals ⁽²⁾ , pH, temperature, turbidity, hardness, alkalinity
Air Stripper Effluent ⁽³⁾	GWTS performance monitoring/estimate air emission rates	Grab	Quarterly	VOCs, pH, temperature, turbidity
Between Primary & Secondary Carbon Vessels ⁽⁴⁾	GWTS performance monitoring	Grab	Quarterly ⁽⁵⁾	VOCs, PCBs
GWTS Effluent	GWTS performance monitoring/discharge compliance monitoring	Grab	Monthly ⁽⁶⁾	VOCs (8015), total toxic organics ⁽⁷⁾ , pH, temperature, turbidity, flow rate
		Composite	Monthly ⁽⁶⁾	Phosphorus, metals ⁽²⁾
MW-6S, 6I, 7S, 7I, 7D, 8S, 8I, 9S, 9I, 10S, 10I, 11S, 11I, 15S	Monitor groundwater quality	Grab ⁽⁸⁾	Semi-Annually	pH, Eh, temperature, turbidity, specific conductivity, TCL volatiles, PCBs, arsenic, cadmium, lead
Notes: (1) Collected prior to bag filter unit at Sample Part BV-1. (2) Metals (total) include: arsenic, iron, cadmium, chromium, copper, lead, manganese, nickel, selenium and zinc. Collect from BV-29. (3) Sample between primary and secondary vessel on each active train (4 possible samples). (4) Sample frequency may need to be increased depending on breakthrough time. (5) Compliance sampling shall be conducted weekly for the first month of sampling, monthly thereafter. Collect grab from BV-68, composites from effluent tank. (6) Total toxic organics (TTO) includes analyses for VOCs (601, 602), semi-volatiles (625) and pesticides/PCBs (608). (7) Follow procedures in Appendix E. Also measure water level in each well and collection trench piezometers.				

EXHIBIT 2-6

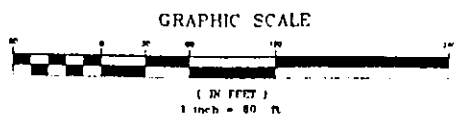
Half-Sized Rochester Fire Academy As-Build Drawings



GENESSEE

RIVER

PRELIMINARY *For Information Only*



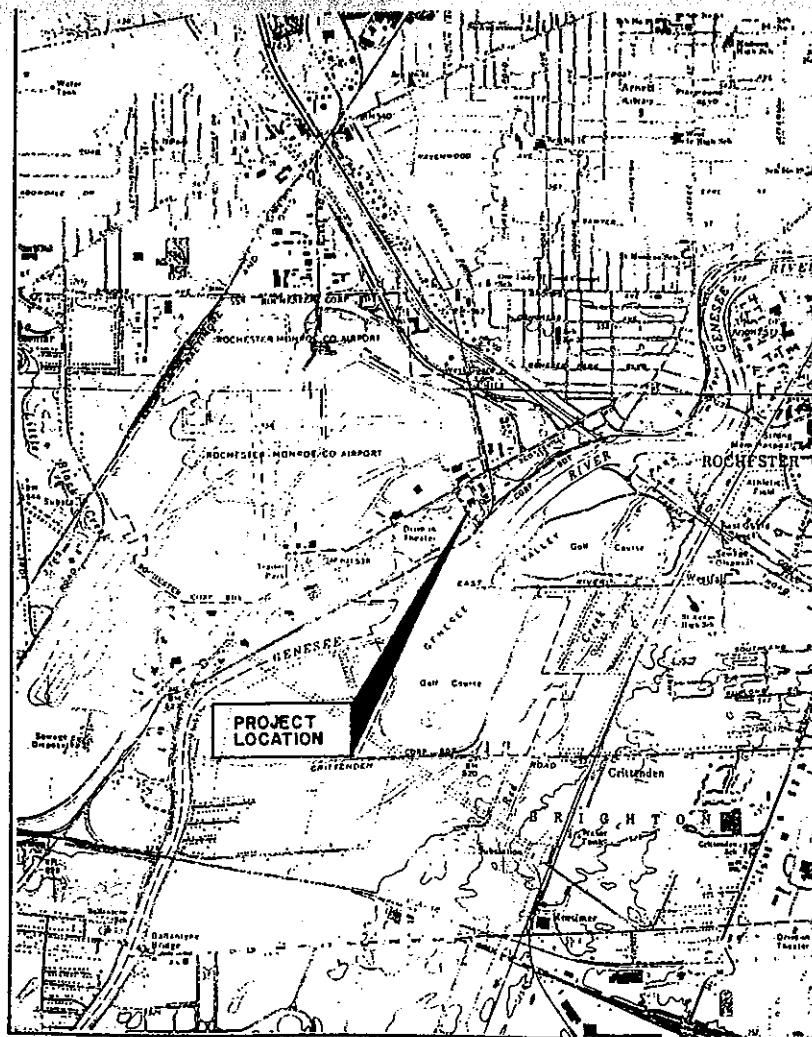
NOTES:

1. BASE MAPPING PREPARED BY CLOUGH, HARBOUR & ASSOCIATES LLP FROM AN OCTOBER - DECEMBER 1997 FIELD SURVEY.
2. BENCHMARK AND CONTOURS ARE BASED ON CONSTRUCTION PLANS.
3. NORTH ORIENTATION BASED ON CONSTRUCTION PLANS.
4. UNDERGROUND UTILITIES ARE SHOWN FROM FIELD LOCATION IF POSSIBLE, OTHERS ARE SHOWN FROM RECORD DATA. THEIR EXACT LOCATION MAY DIFFER FROM THAT AS SHOWN AND OTHERS MAY EXIST.

DATE	BY	REVISION	DATE	BY	REVISION

EXISTING CONDITIONS
RECORD PLAN
OF THE
**TRAINING GROUNDS
AREA**
MONROE COUNTY ART FACILITY
PREPARED FOR THERMOCOR-KIMMINS

CHA CLOUGH, HARBOUR & ASSOCIATES LLP
ENGINEERS, SURVEYORS, PLANNERS
& LANDSCAPE ARCHITECTS
15 SOUTH PITTSBURGH STREET ROCHESTER, NEW YORK 14620



LOCATION PLAN

SCALE: 1"=3000'



CITY OF ROCHESTER
DIVISION OF ENVIRONMENTAL QUALITY
DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

AS-built

FIRE TRAINING ACADEMY
REMEDIAL CONSTRUCTION

PROJECT NO. 93046
BID NO. NOT APPLICABLE

INDEX TO SHEETS

SHEET NO.	DESCRIPTION	SHEET NO.	DESCRIPTION
G-1	EXISTING SITE PLAN	M-1	GROUNDWATER TREATMENT SYSTEM - PROCESS DIAGRAM
G-2	PROPOSED SITE PLAN	M-2	GROUNDWATER TREATMENT SYSTEM - PLAN
G-3	PROPOSED DEMOLITION PLAN - TRAINING GROUNDS & NORTH DISPOSAL AREAS	M-3	GROUNDWATER TREATMENT SYSTEM - SECTIONS AND DETAILS
G-4	PROPOSED ACCESS ROAD & UTILITIES PIPING PLAN	A-1	GROUNDWATER TREATMENT BUILDING - PLANS, SECTIONS, AND DETAILS
G-5	UTILITIES PIPING - PROFILE, PLAN AND DETAILS	A-2	GROUNDWATER TREATMENT BUILDING - ELEVATIONS AND DETAILS
G-6	EXCAVATION PLAN - SOUTH DISPOSAL AND GENESEE VALLEY PARK AREAS	S-1	GROUNDWATER TREATMENT BUILDING - PLANS, SECTIONS & DETAILS
G-7	PROPOSED SITE PLAN - SOUTH DISPOSAL AND GENESEE VALLEY PARK AREAS	S-2	TRAINING GROUNDS FOUNDATIONS - PLANS SECTIONS & DETAILS
G-8	EXCAVATION PLAN - TRAINING GROUNDS AREA	S-3	TYPICAL STRUCTURAL DETAILS
G-9	PROPOSED SITE PLAN - TRAINING GROUNDS AREA	I-1	INSTRUMENTATION - LEGEND
G-10	PROPOSED PLAN & DETAILS - NORTH DISPOSAL AREA	I-2	GROUNDWATER TREATMENT SYSTEM - PROCESS DIAGRAM
G-11	SECTIONS AND DETAILS - NORTH DISPOSAL AREA	E-1	ELECTRICAL LEGEND, PLANS, DETAILS
G-12	GROUNDWATER COLLECTION SYSTEM - SOUTH DISPOSAL AREA	E-2	ONE LINE DIAGRAM AND PANEL SCHEDULES
G-13	DRAINAGE STRUCTURES #1 & #2 - PLANS & SECTIONS	E-3	TREATMENT BUILDING POWER PLAN
G-14	DRAINAGE STRUCTURE #3 - PLAN, SECTIONS & DETAILS	E-4	TREATMENT BUILDING LIGHTING PLAN
G-15	TYPICAL FENCE & SITE DETAILS	E-5	SCHEMATICS
G-16	TYPICAL PIPING DETAILS	E-6	TRAINING GROUNDS AREA - LIGHTING/POWER
G-17	MISCELLANEOUS SITE DETAILS	H-1	GROUNDWATER TREATMENT BUILDING - HVAC
		P-1	GROUNDWATER TREATMENT BUILDING - PLUMBING



SECTION NUMBER

SHEET ON WHICH
SECTION IS SHOWN

Edward J. Doherty
EDWARD J. DOHERTY
COMMISSIONER OF D.E.S.

12/9/94
DATE

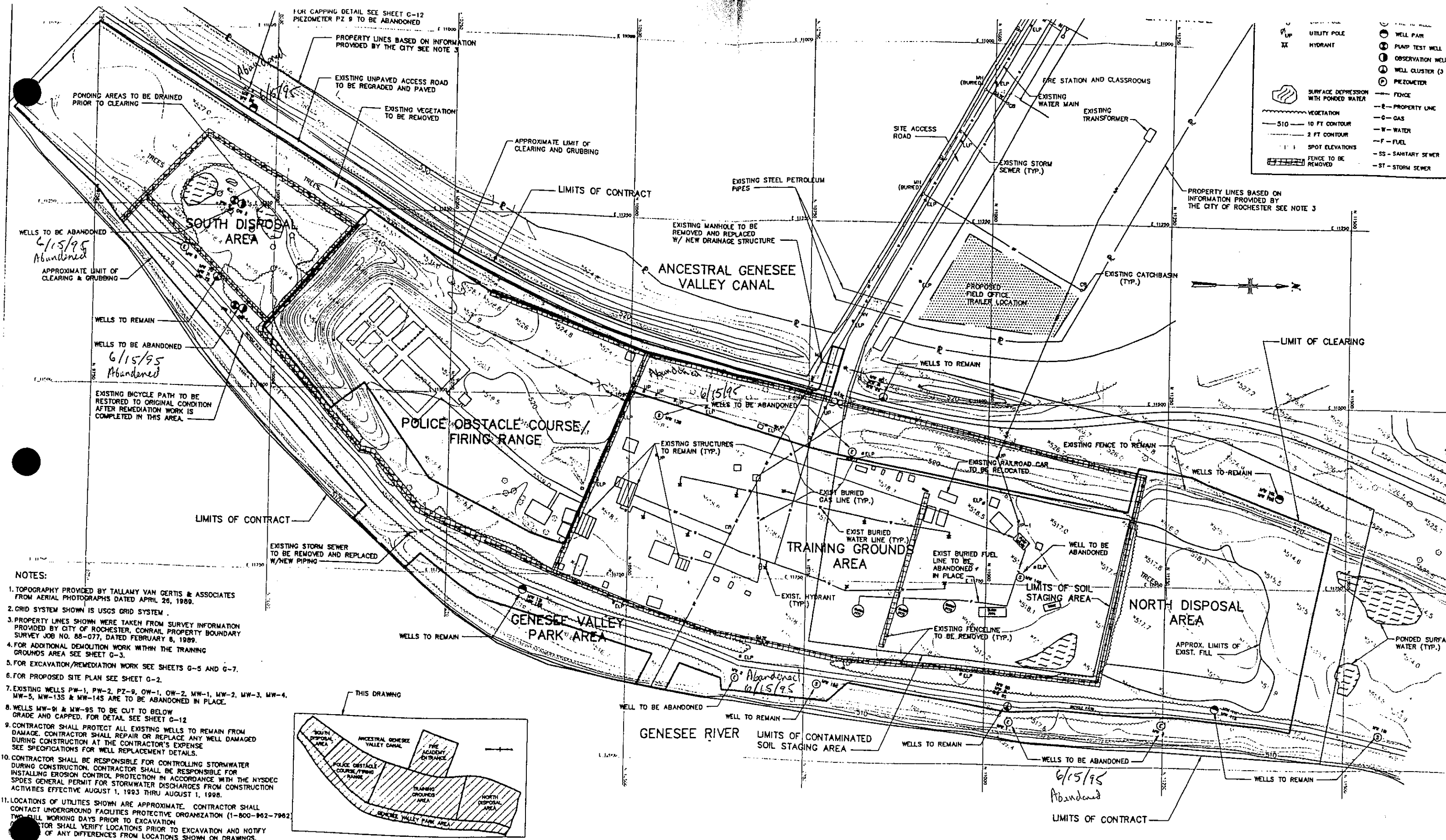
Not Required

GEORGE H. STAM, P.E.

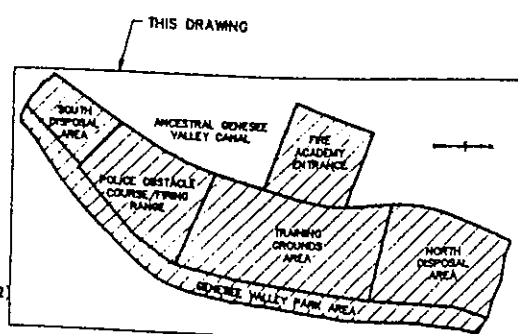
DATE

Donald L. Nawor
DONALD L. NAWOR

12/9/94
DATE



- NOTES:
1. TOPOGRAPHY PROVIDED BY TALLAMY VAN CERTIS & ASSOCIATES FROM AERIAL PHOTOGRAPHS DATED APRIL 26, 1989.
 2. GRID SYSTEM SHOWN IS USGS GRID SYSTEM.
 3. PROPERTY LINES SHOWN WERE TAKEN FROM SURVEY INFORMATION PROVIDED BY CITY OF ROCHESTER, CONRAIL PROPERTY BOUNDARY SURVEY JOB NO. 88-077, DATED FEBRUARY 8, 1989.
 4. FOR ADDITIONAL DEMOLITION WORK WITHIN THE TRAINING GROUNDS AREA SEE SHEET G-3.
 5. FOR EXCAVATION/REMEDIAL WORK SEE SHEETS G-5 AND G-7.
 6. FOR PROPOSED SITE PLAN SEE SHEET G-2.
 7. EXISTING WELLS PW-1, PW-2, PZ-9, OW-1, OW-2, MW-1, MW-2, MW-3, MW-4, MW-5, MW-13S & MW-14S ARE TO BE ABANDONED IN PLACE.
 8. WELLS MW-91 & MW-95 TO BE CUT TO BELOW GRADE AND CAPPED. FOR DETAIL SEE SHEET G-12.
 9. CONTRACTOR SHALL PROTECT ALL EXISTING WELLS TO REMAIN FROM DAMAGE. CONTRACTOR SHALL REPAIR OR REPLACE ANY WELL DAMAGED DURING CONSTRUCTION AT THE CONTRACTOR'S EXPENSE. SEE SPECIFICATIONS FOR WELL REPLACEMENT DETAILS.
 10. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING STORMWATER DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING EROSION CONTROL PROTECTION IN ACCORDANCE WITH THE NYSDEC SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES EFFECTIVE AUGUST 1, 1993 THRU AUGUST 1, 1998.
 11. LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL CONTACT UNDERGROUND FACILITIES PROTECTIVE ORGANIZATION (1-800-962-7962) TWO FULL WORKING DAYS PRIOR TO EXCAVATION. CONTRACTOR SHALL VERIFY LOCATIONS PRIOR TO EXCAVATION AND NOTIFY OF ANY DIFFERENCES FROM LOCATIONS SHOWN ON DRAWINGS.
 12. LIMITS OF CONTAMINATION ARE SHOWN ON EXCAVATION PLANS.



SHEET KEY PLAN

DATE: _____
BY: _____
CHECKED: _____
APPROVED: _____

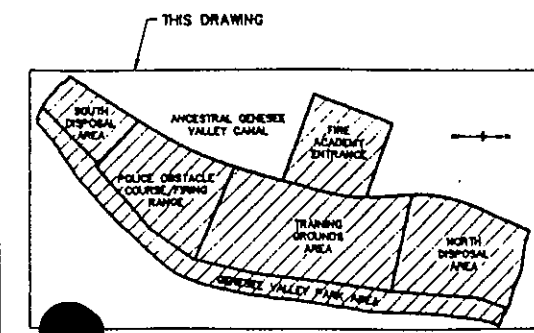
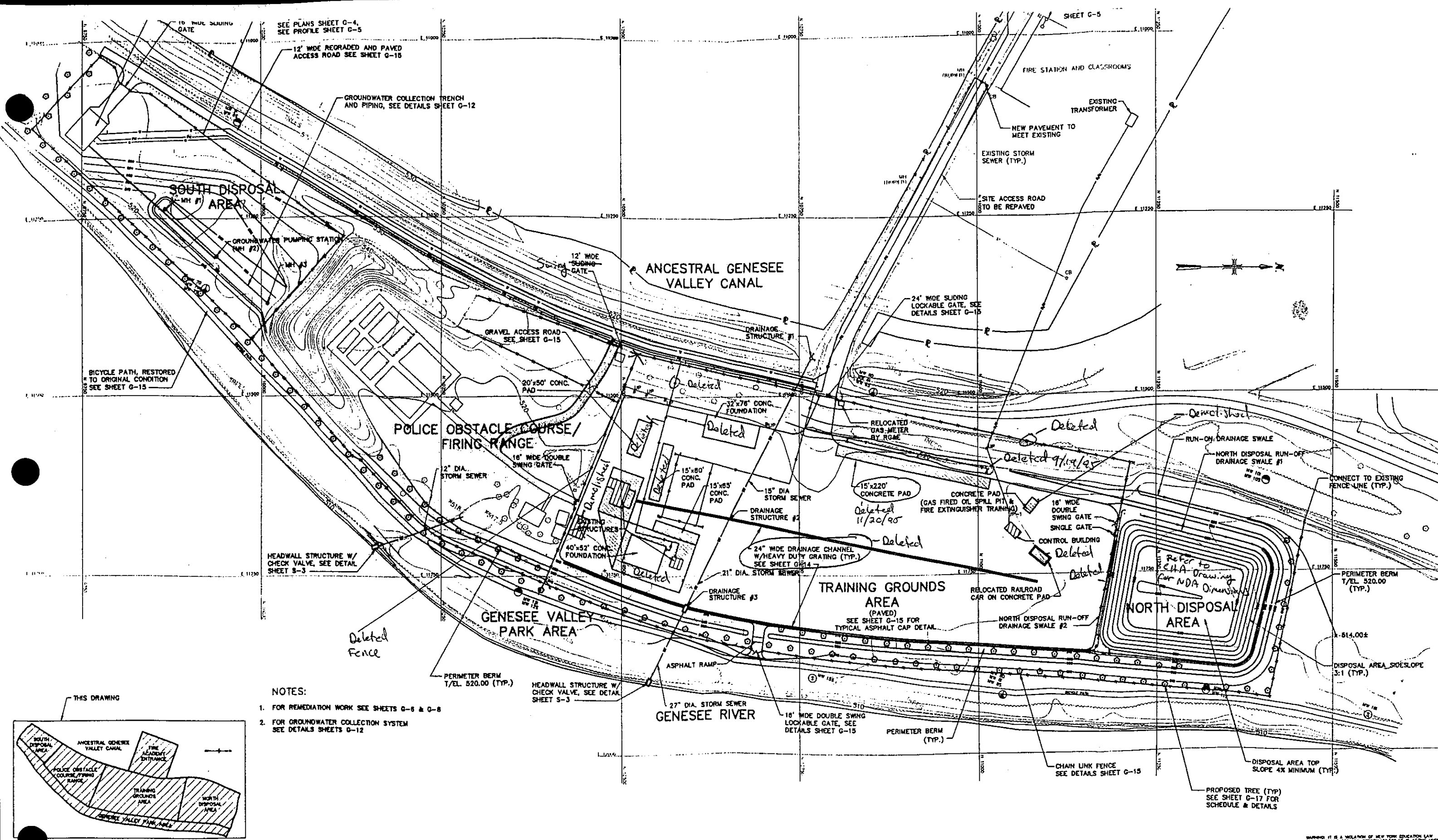
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK
REMEDIAL CONSTRUCTION

FIRE TRAINING ACADEMY
EXISTING SITE PLAN

MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2204.3 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO MAKE THIS DOCUMENT IN ANY WAY IF HE KNOWS THE ALTERNATE PERSON SHALL COMPLY WITH THE REQUIREMENTS NEW YORK EDUCATION LAW SECTION 2204.3.



- NOTES:
1. FOR REMEDIATION WORK SEE SHEETS G-8 & G-9
 2. FOR GROUNDWATER COLLECTION SYSTEM SEE DETAILS SHEETS G-12

MALCOLM PIRNIE

NO.	BY	DATE	REVISIONS
1	JRP/DA	10/19/94	ISSUED FOR PERMIT
2	SA	10/19/94	REVISED FOR REMEDIATION WORK

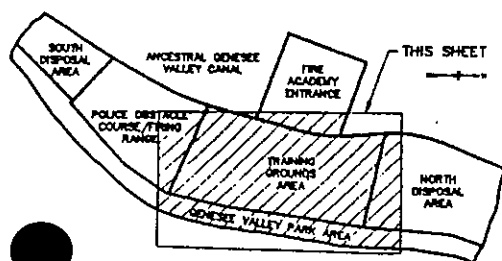
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIATION CONSTRUCTION

**FIRE TRAINING ACADEMY
PROPOSED SITE PLAN**

MALCOLM PIRNIE, INC.
DATE OCTOBER 1994

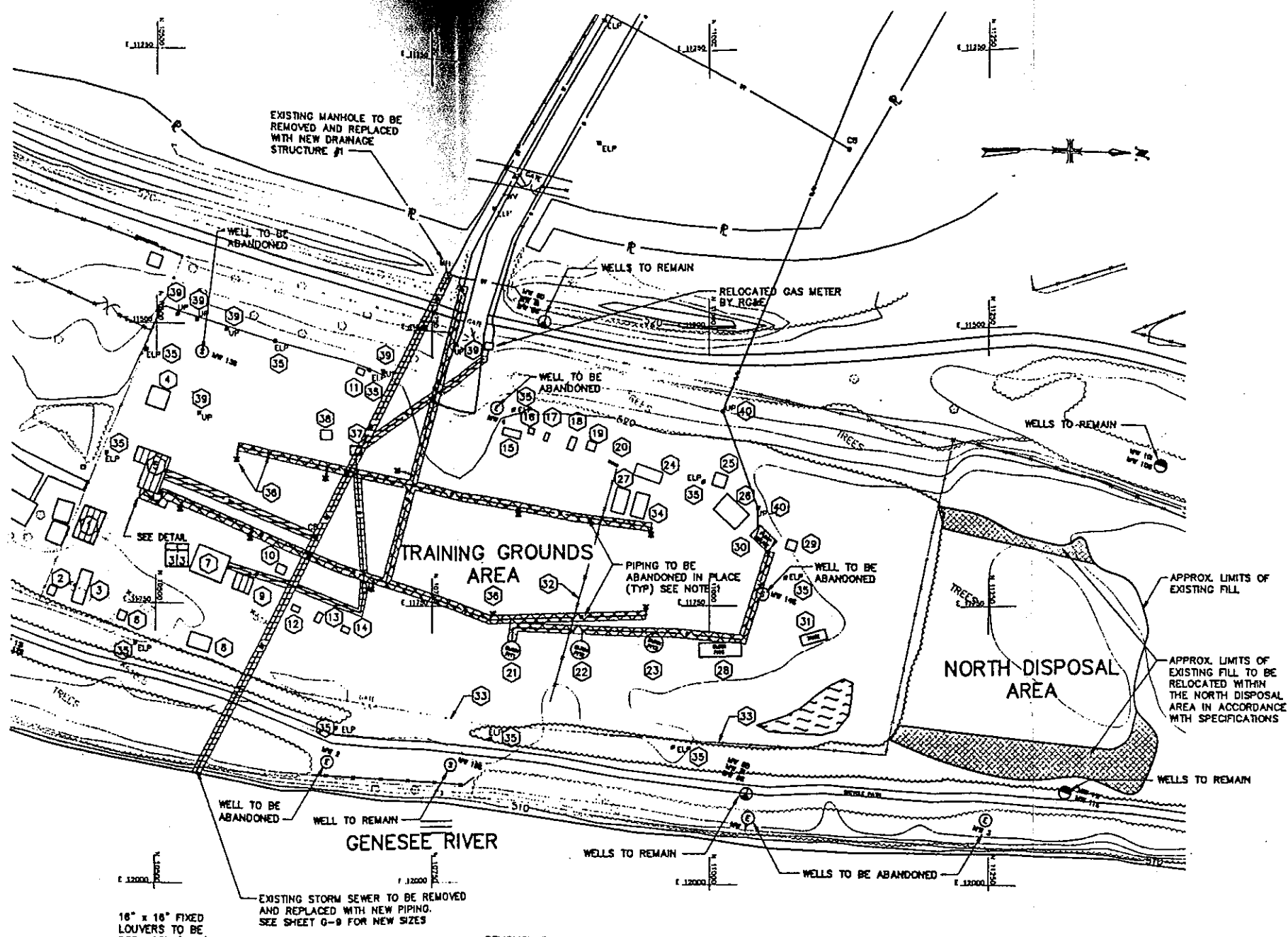
(1)	STORAGE SHED	GOOD CONDITION	REMAINS
(2)	BRICK GRILL	2' x 23' x 42' HIGH	REMOVE
(3)	DUMPSTER	FLATBED STYLE	REMOVE
(4)	STEEL TANK, MISC STRUCTURAL STEEL	HALF BURIED	REPLACE W/ AUTO FIRE SIMUL
(5)	FIRE TRAINING TOWER	BLOCK CONSTRUCTION	REMAINS SEE DETAIL THIS SHEET
(6)	ABANDONED CONCRETE PAD	6' x 8' x 10' HIGH	REMOVE
(7)	SMOKE HOUSE <i>Removed</i>	BLOCK CONSTRUCTION 3 STORIES	REPLACE
(8)	STORAGE GARAGE ON CONCRETE PAD <i>Building removed</i>	WOOD CONSTRUCTION	REMOVE
(9)	STORAGE BUILDING	BLOCK CONSTRUCTION FILLED WITH HAY	REMAINS
(10)	SCAFFOLDING <i>Move to Grass Area</i>		RELOCATE **
(11)	SCAFFOLDING <i>11 11 11</i>		REMOVE
(12)	MAGNESIUM BURN PIT <i>Removed</i>	5' x 6'-7" x 8'-2" HIGH	RELOCATE **
(13)	ABANDONED STEEL VESSEL <i>Grass Area</i>	3' DIA. x 8' LONG	RELOCATE **
(14)	SPRAYED GASOLINE PIT	3/8" STEEL CONSTRUCTION W/ HARD PIPING	RELOCATE **
(15)	STRUCTURAL STEEL W/ WIRE ROPE	HALF BURIED	REMOVE
(16)	ABANDONED STEPS	WOOD CONSTRUCTION	REMOVE
(17)	ABANDONED STEEL TANK	40" DIA. x 8' LONG	RELOCATE **
(18)	ABANDONED STEEL OIL TANK	5' DIA. x 13'-3" LONG	RELOCATE **
(19)	PROPANE TANKS	(4) ASSUMED EMPTY	RELOCATE **
(20)	PROPANE TANK ON BLOCKS	500 GALLON APPROX.	RELOCATE **
(21)	KEROSENE BURN PIT	18" DIA. W/ STEEL LINER AND 18" HIGH CONCRETE PAD	REMOVE
(22)	GASOLINE BURN PIT	6" DIA. W/ 30" HIGH STEEL LINER AND 22" HIGH CONCRETE PAD	REMOVE
(23)	OIL BURN PIT	22" DIA. W/ STEEL LINER AND 12" HIGH CONCRETE PAD	REMOVE
(24)	RAILROAD CAR	TANKER TYPE	RELOCATE *
(25)	STEEL STORAGE DRUMS	(28) 50 GALLON	REMOVE
(26)	ABANDONED CONCRETE TANK PAD	18' x 28'	REMOVE
(27)	STEEL STORAGE DRUMS	(38) 50 GALLON	REMOVE
(28)	BURN PIT	20" HIGH CONCRETE	REMOVE
(29)	REFRACTORY BRICK	20' x 8' x 5' HIGH	REMOVE
(30)	PUMP HOUSE W/ MISC STEEL DRUMS	BLOCK CONSTRUCTION	REMAINS SEE DETAIL THIS SHEET
(31)	ABANDONED TRUCK TANKER	8' x 28' x 7' HIGH	REMOVE
(32)	SNOW FENCING	DAMAGED	REMOVE
(33)	CHAIN LINK FENCING W/ BARBED WIRE		SEE NOTE 5
(34)	DECONTAMINATION PAD	21' x 27' x 1' HIGH	REMOVE
(35)	LIGHT POLE	8' x 8' x 10' HIGH	REPLACE
(36)	FIRE HYDRANT W/ PIPING	(10)	REMOVE SEE NOTE 6
(37)	GAS METER AND PIPE ASSEMBLY		RELOCATED BY RGE
(38)	ABANDONED FUEL PIPE ASSEMBLY		REMOVE
(39)	UTILITY POLE/UTILITY POLE W/ BOX		REMOVE
(40)	UTILITY POLE		TO REMAIN



SHEET KEY PLAN

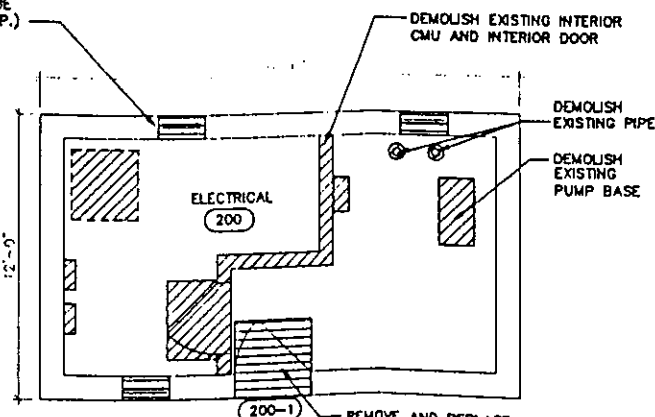
NOTES:

- BURIED PIPING SHALL BE ABANDONED IN PLACE UNLESS ENCOUNTERED DURING REMEDIATION OR UTILITY EXCAVATION. PIPING ENCOUNTERED TO BE REMOVED AND DISPOSED OF IN NORTH DISPOSAL AREA.
- * INDICATES TO BE RELOCATED AS SHOWN ON THE CONTRACT DRAWINGS.
- ** INDICATES TO BE RELOCATED ON SITE AS DIRECTED BY OWNER OR THEIR REPRESENTATIVE.
- CONTRACTOR SHALL PROTECT ALL EXISTING WELLS TO REMAIN FROM DAMAGE. REPAIR OR REPLACE DAMAGED WELLS DURING CONSTRUCTION AT CONTRACTOR'S EXPENSE. SEE SPECIFICATIONS FOR WELL REPLACEMENT DETAILS.
- FOR LIMITS OF FENCE REMOVAL SEE SHEET G-1, FOR LIMITS OF NEW FENCING SEE SHEET G-2.
- EXISTING HYDRANTS SHALL BE REMOVED AND RETURNED TO THE WATER BUREAU MATERIALS AND EQUIPMENT BUILDING, NO.3, 401 DEWEY AVE. BY THE CONTRACTOR.



DEMOLITION LEGEND:

- REPLACE
- ABANDON
- DEMOLISH

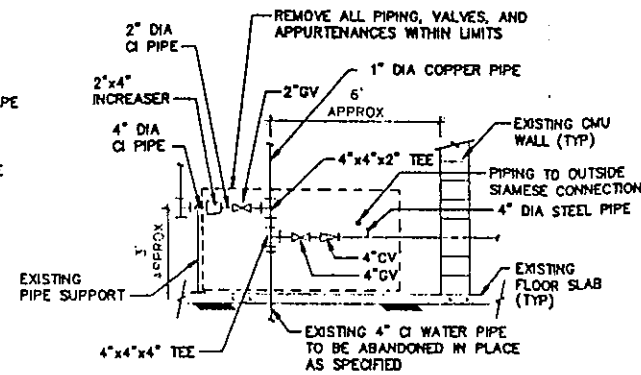


NOTES:

- DEMOLISH ALL MECHANICAL DEVICES AND DISPOSE OF MASONRY, GLASS AND CONCRETE MATERIALS IN THE NORTH DISPOSAL AREA IN ACCORDANCE WITH SPECIFICATIONS
- BRUSH BLAST AND PAINT ALL WALLS, FLOORS, AND CEILINGS

MODIFICATIONS AT PUMP HOUSE

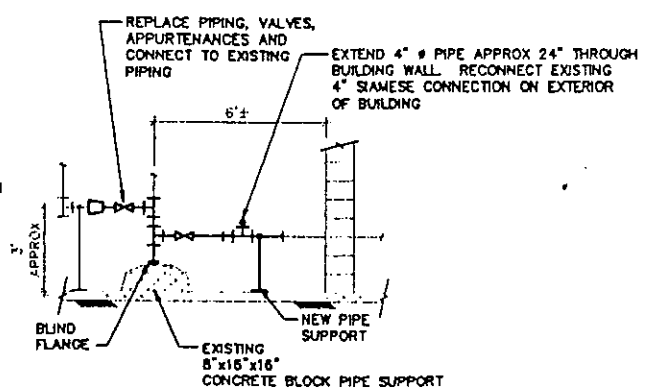
NOT TO SCALE



EXISTING WATER PIPING

FIRE TRAINING TOWER WATER PIPING DETAIL

NOT TO SCALE



NEW WATER PIPING

1/3

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 202(1) FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED THE ALTERING PERSON SHALL COMPLY WITH THE REQUIREMENTS NEW YORK EDUCATION LAW SECTION 202(1).

MALCOLM PIRNIE



REV	BY	DATE	REVISIONS
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2	JPR	10/10/94	REVISED FOR PERMIT

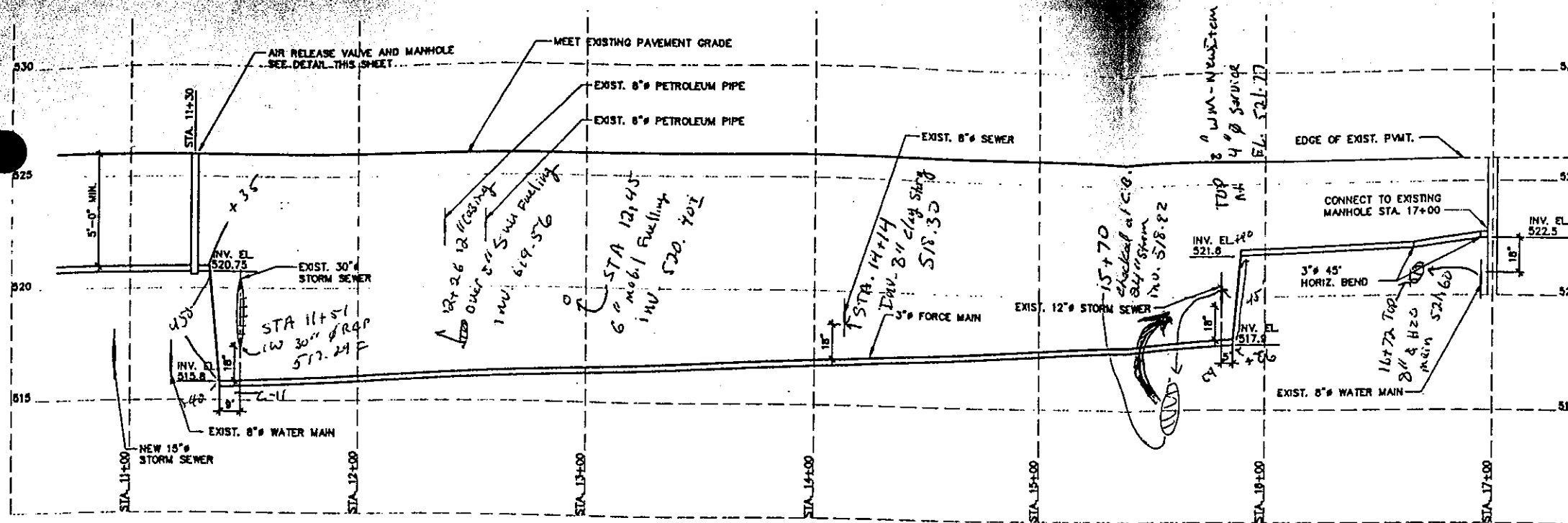
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIATION CONSTRUCTION

FIRE TRAINING ACADEMY
PROPOSED DEMOLITION PLAN—TRAINING
GROUNDS & NORTH DISPOSAL AREA

MALCOLM PIRNIE, INC.

DATE OCTOBER 1994

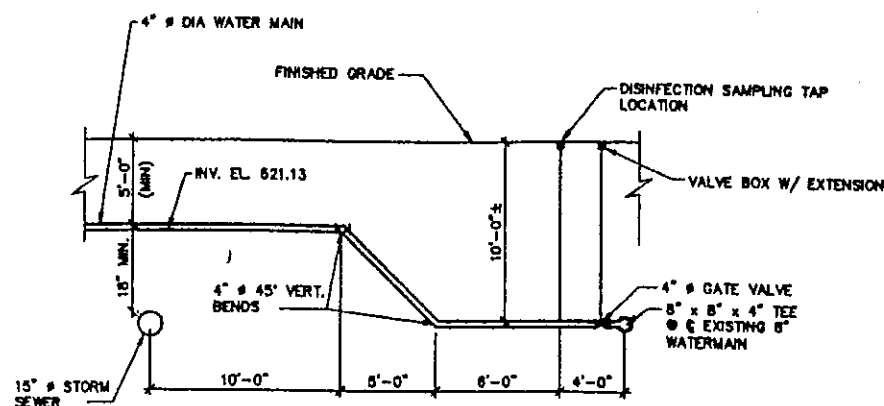


PARTIAL FORCEMAIN PIPING PROFILE

SCALE: HORIZ. 1"=30'
VERT. 1"=3'

NOTES:

1. LOCATIONS OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY LOCATIONS AND DO TEST PITS TO VERIFY LOCATIONS PRIOR TO EXCAVATION. CONTRACTOR SHALL NOTIFY ENGINEER IF LOCATIONS VARY FROM THAT SHOWN.
2. CONTRACTOR SHALL CONTACT UPDO (1-800-982-7982) AT LEAST TWO FULL WORKING DAYS PRIOR TO EXCAVATION.
3. CONNECTION TO EXISTING MANHOLE INCLUDES CORE DRILLING AND GROUTING OF PIPE IN MANHOLE WALL USING NON-SHRINK GROUT.

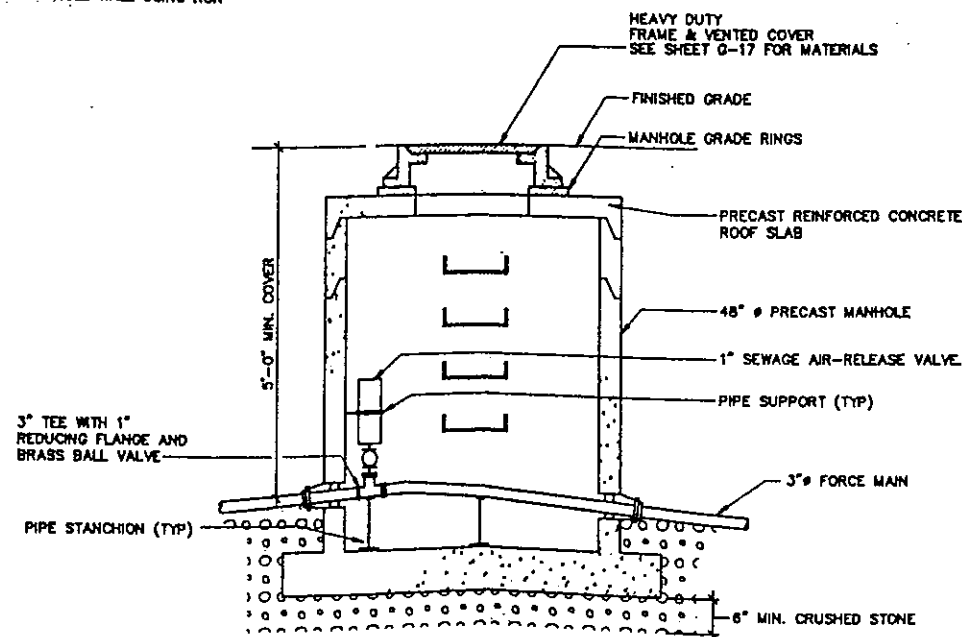


ENLARGED PIPING DETAIL

SECTION 1/4

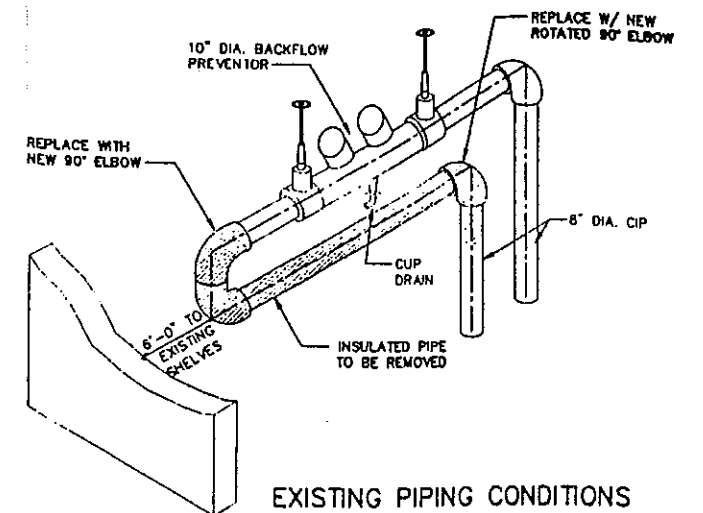
SCALE: 1" = 5'

NOTE: ALL DIMENSIONS ARE APPROXIMATE.



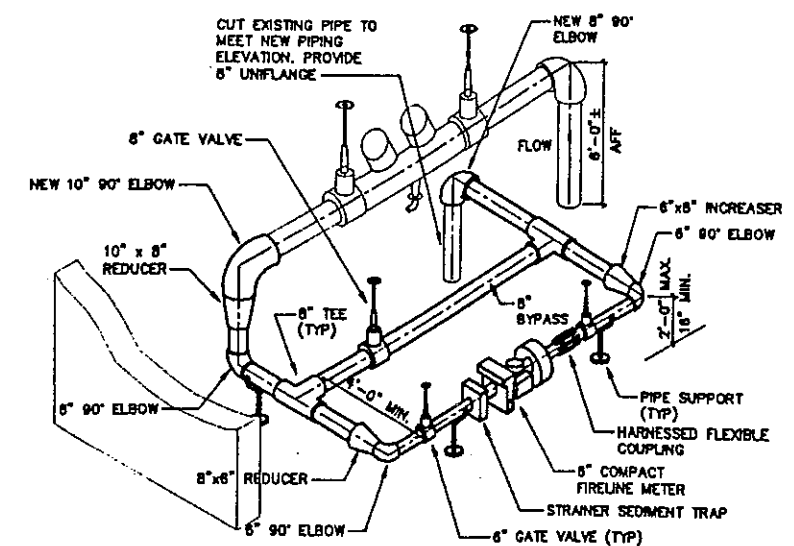
TYPICAL AIR RELEASE VALVE & MANHOLE DETAIL

NOT TO SCALE



EXISTING PIPING CONDITIONS

NOT TO SCALE



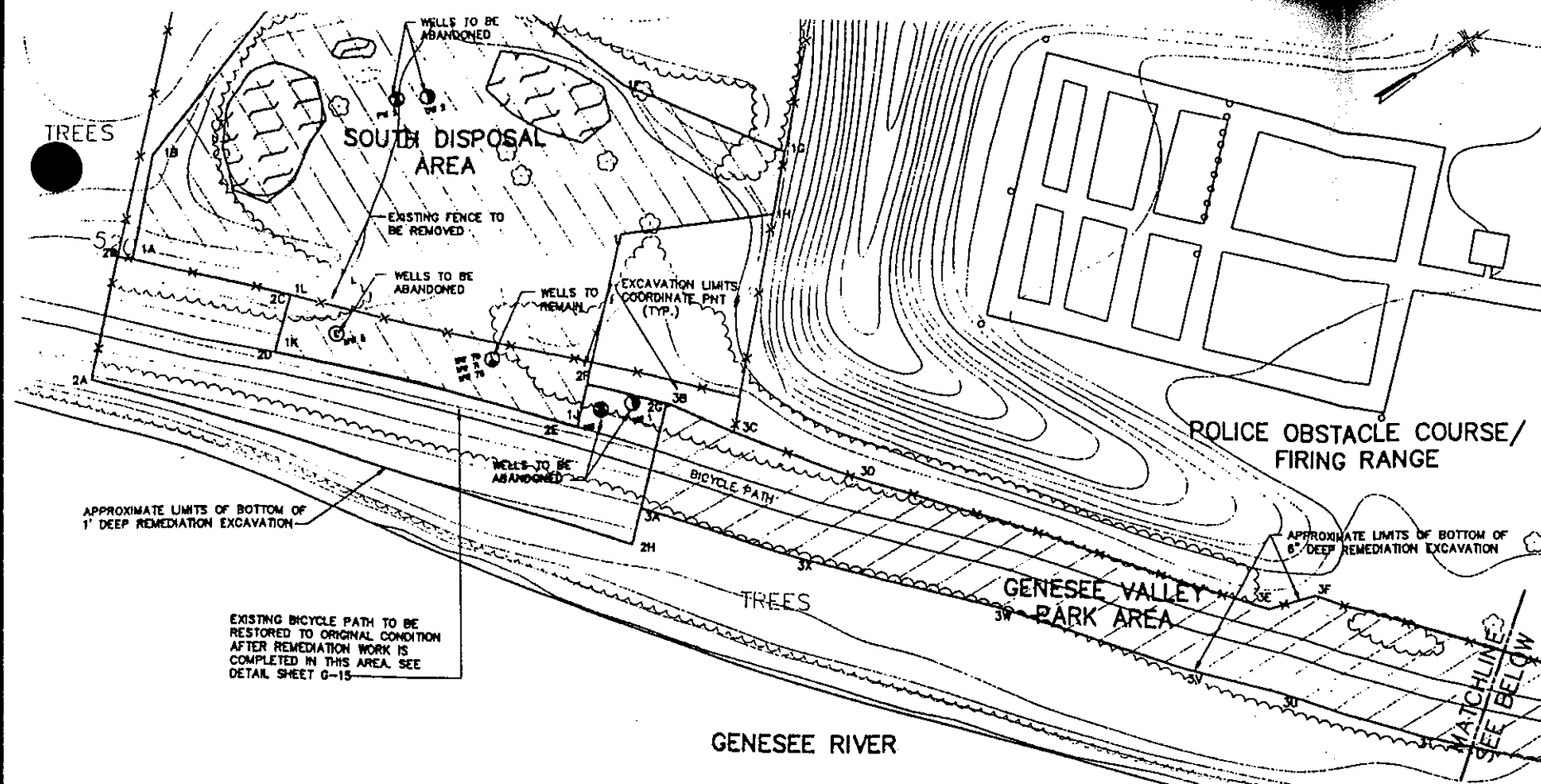
FIRELINE WATER METER
INSTALLATION DETAIL

NOT TO SCALE

NOTES:

1. EXISTING PIPE IS CAST IRON.
2. NEW PIPE AND FITTINGS TO BE FLANGED DUCTILE IRON.
3. NEW METER TO BE PURCHASED BY CONTRACTOR FROM CITY OF ROCHESTER WATER BUREAU.
4. SUPPORT METER INDEPENDENT FROM PIPING SYSTEM.
5. ALL PIPING VALVES AND FITTINGS TO BE INSULATED AT COMPLETION. PROVIDE PVC INSULATION JACKET.
6. ALL GATE VALVES TO BE RISING STEM DRILLED FOR SEAL WIRE (OPEN LEFT).

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 1703(2) FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERED PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 1703(2).



1A	9824	11244
1B	9854	11214
1C	9917	11189
1D	9957	11203
1E	9998	11234
1F	10018	11289
1G	10058	11339
1H	10042	11357
1I	9983	11332
1J	9932	11384
1K	9852	11303
1L	9868	11268

GENESEE VALLEY PARK AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

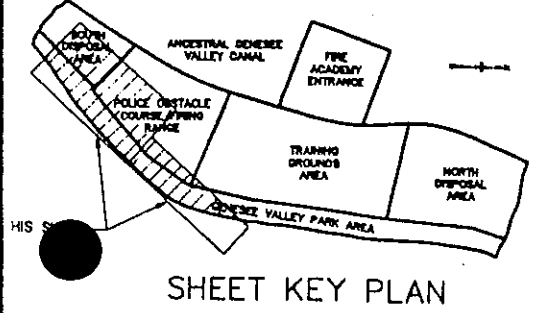
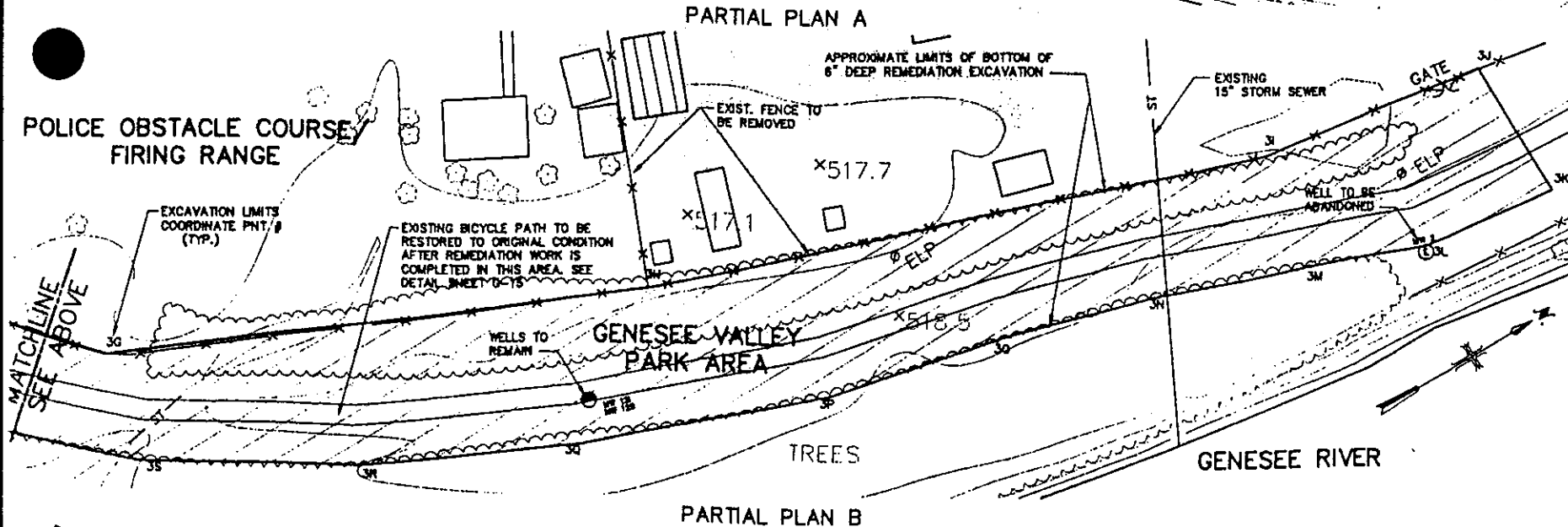
PNT #	NORTHING	EASTING
2A	9787	11274
2B	9820	11240
2C	9868	11288
2D	9852	11303
2E	9932	11384
2F	9943	11372
2G	9969	11398
2H	9930	11437

GENESEE VALLEY PARK AREA
6' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
3A	9940	11427
3B	9969	11398
3C	9986	11420
3D	10018	11458
3E	10128	11583
3F	10145	11588
3G	10211	11683
3H	10398	11748
3I	10822	11828
3J	10707	11841
3K	10707	11894
3L	10855	11887
3M	10611	11870
3N	10558	11849
3O	10502	11833
3P	10435	11818
3Q	10345	11784
3R	10289	11747
3S	10201	11703
3T	10151	11856
3U	10113	11813
3V	10088	11586
3W	10038	11530
3X	9982	11474

NOTES:

1. CONTRACTOR SHALL TREAT AND/OR DISPOSE OF ALL EXCAVATED MATERIALS IN ACCORDANCE W/ SPECIFICATIONS.
2. CONTRACTOR SHALL PROTECT ALL EXISTING WELLS TO REMAIN FROM DAMAGE. CONTRACTOR SHALL REPAIR OR REPLACE ANY WELL DAMAGED AS DIRECTED BY OWNER OR THEIR REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL MAKE REASONABLE PROVISIONS TO PROTECT MATURE TREES.
4. DEPTH OF EXCAVATION AS MEASURED FROM EXISTING GRADE.
5. CONTRACTOR SHALL REMOVE PONDED WATER IN SOUTH DISPOSAL AREA PRIOR TO CLEARING.
6. CONTRACTOR SHALL ESTABLISH COORDINATES IN FIELD PRIOR TO BEGINNING OF EXCAVATION.



MALCOLM PIRNIE

STATE OF NEW YORK

DESIGN: KOL/MS

DRAWN: JES/IT

REVISIONS

NO.	BY	DATE	REVISIONS

CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

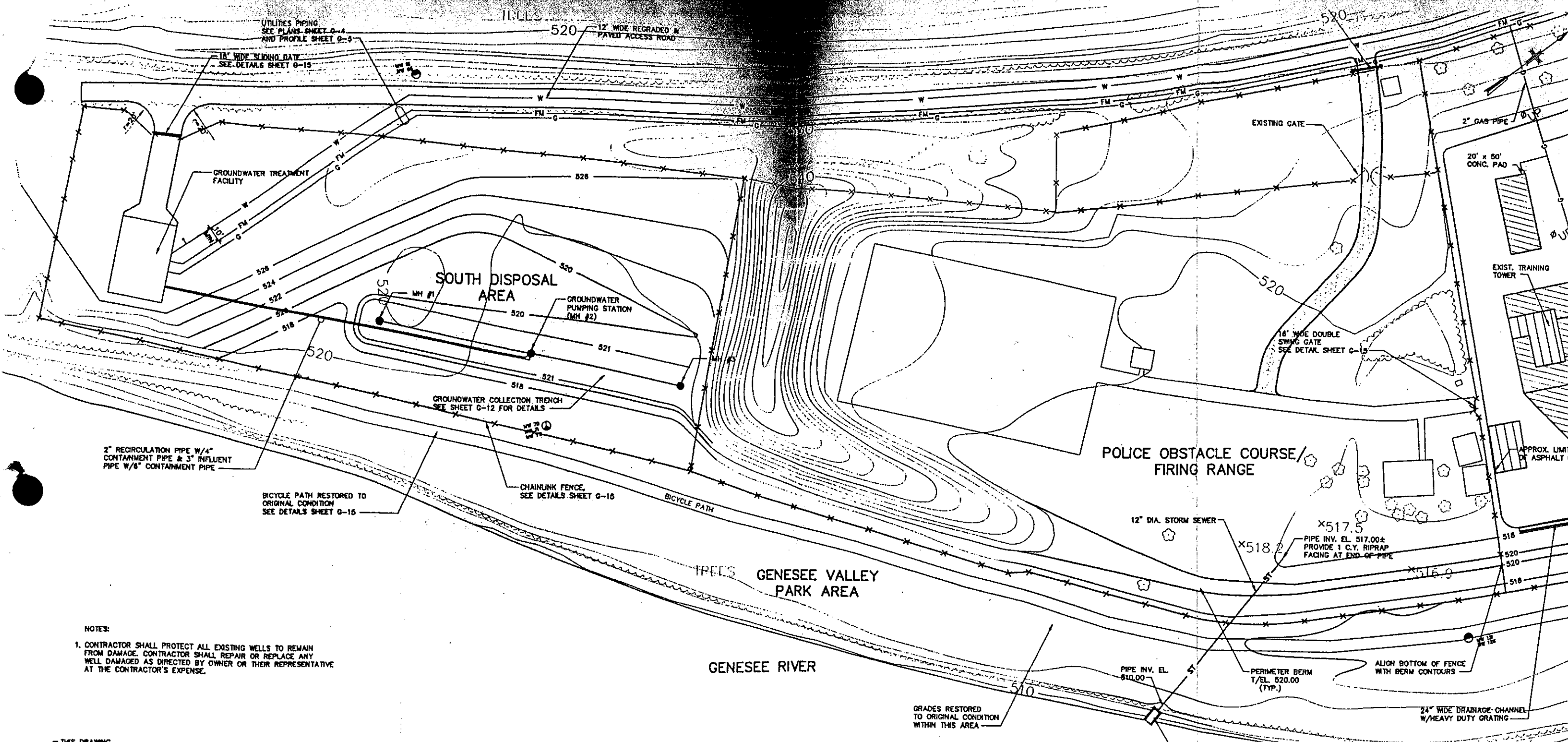
REMEDIAL CONSTRUCTION

**FIRE TRAINING ACADEMY
EXCAVATION PLAN— SOUTH DISPOSAL
& GENESEE VALLEY PARK AREAS**

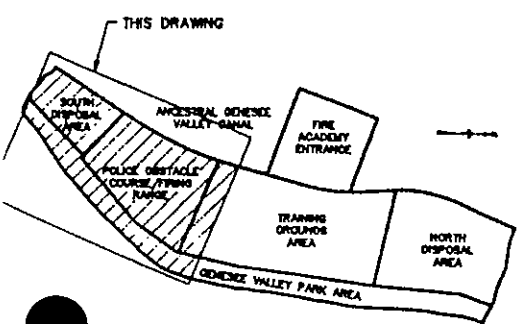
WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 7002.2 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER THIS DOCUMENT IN ANY MANNER. IF ALTERED THE ALTERING PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 7002.2.

MALCOLM PIRNIE, INC.

DATE: OCTOBER 1994



NOTES:
 1. CONTRACTOR SHALL PROTECT ALL EXISTING WELLS TO REMAIN FROM DAMAGE. CONTRACTOR SHALL REPAIR OR REPLACE ANY WELL DAMAGED AS DIRECTED BY OWNER OR THEIR REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.



SHEET KEY PLAN



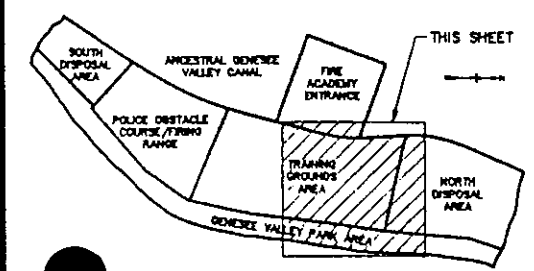
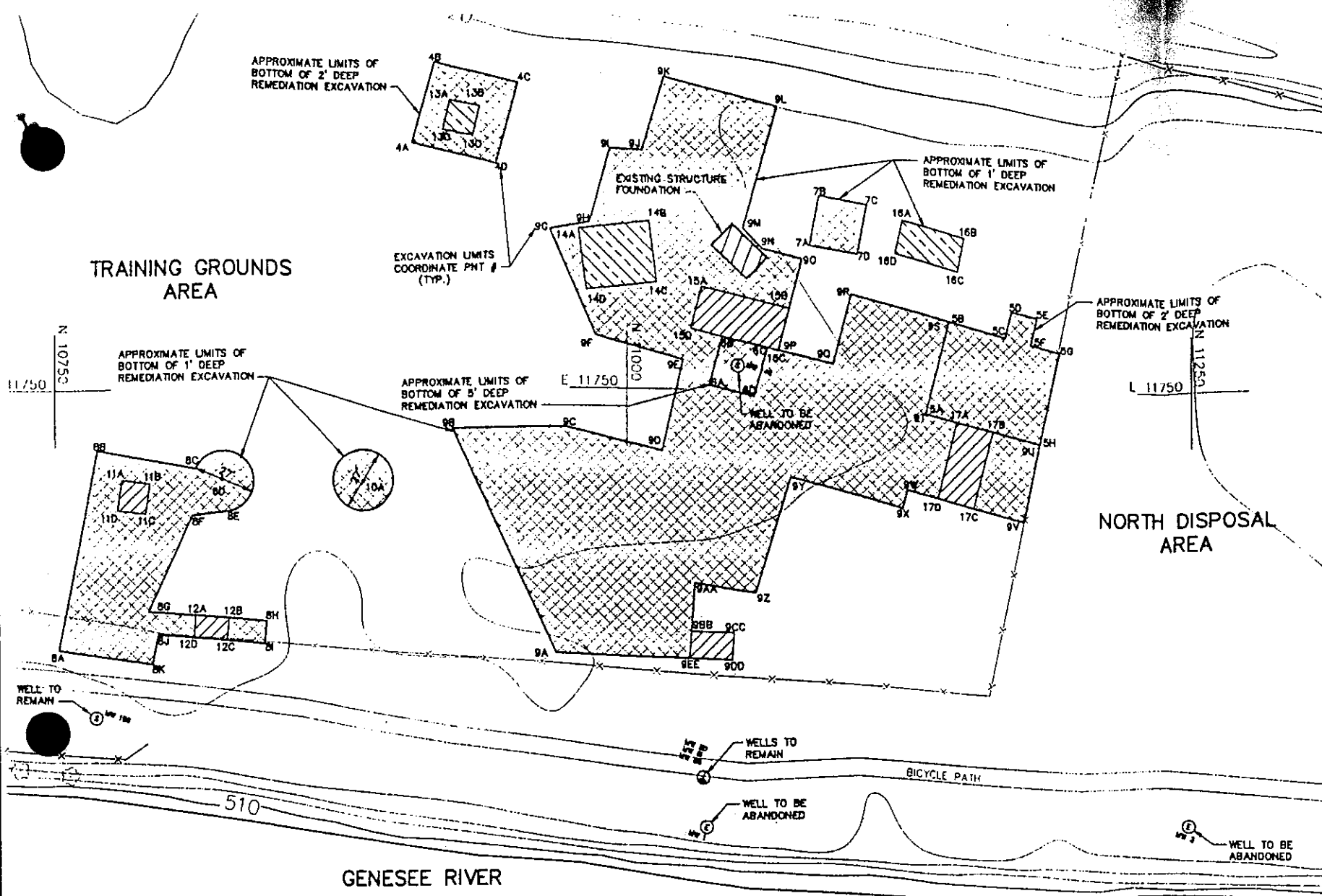
NO.	BY	DATE	REVISIONS
1	MTG	10/11/94	ISSUED FOR PERMIT
2	MTG	10/11/94	REVISED FOR COMMENTS
3	MTG	10/11/94	REVISED FOR COMMENTS
4	MTG	10/11/94	REVISED FOR COMMENTS
5	MTG	10/11/94	REVISED FOR COMMENTS
6	MTG	10/11/94	REVISED FOR COMMENTS
7	MTG	10/11/94	REVISED FOR COMMENTS
8	MTG	10/11/94	REVISED FOR COMMENTS
9	MTG	10/11/94	REVISED FOR COMMENTS
10	MTG	10/11/94	REVISED FOR COMMENTS

CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
 ROCHESTER, NEW YORK
 REMEDIAL CONSTRUCTION

FIRE TRAINING ACADEMY
 PROPOSED SITE PLAN- SOUTH DISPOSAL
 & GENESEE VALLEY PARK AREAS

MALCOLM PIRNIE, INC.
 DATE OCTOBER 1994

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2204.3 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERING PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 2204.3.



PNT #	NORTHING	EASTING
4A	10907	11641
4B	10917	11608
4C	10953	11616
4D	10943	11632

TRAINING GROUNDS AREA
2' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
5A	11130	11761
5B	11141	11720
5C	11166	11727
5D	11169	11715
5E	11180	11718
5F	11177	11730
5G	11190	11733
5H	11181	11733

TRAINING GROUNDS AREA
5' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
6A	11036	11748
6B	11042	11727
6C	11061	11732
6D	11055	11753

SEE NOTE 3

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
7A	11079	11687
7B	11084	11686
7C	11104	11670
7D	11100	11691

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
8A	10752	11864
8B	10769	11777
8C	10812	11785
8D	10824	11791
8E	10825	11804
8F	10810	11806
8G	10791	11847
8H	10843	11851
8I	10842	11861
8J	10795	11857
8K	10793	11870

PNT #	NORTHING	EASTING
9A	10969	11865
9B	10924	11767
9C	10973	11767
9D	11015	11777
9E	11025	11737
9F	10960	11727
9G	10967	11880
9H	10954	11677
9I	10993	11645
9J	11007	11646
9K	11016	11613
9L	11065	11626
9M	11050	11680
9N	11059	11688
9O	11076	11693
9P	11066	11733
9Q	11090	11739
9R	11098	11709
9S	11141	11720
9T	11130	11761
9U	11181	11773
9V	11182	11773
9W	11182	11773
9X	11174	11807
9Y	11122	11794
9Z	11120	11802
9AA	11071	11788
9BB	11058	11839
9CC	11030	11834
9DD	11028	11855
9EE	11047	11856

TRAINING GROUNDS AREA
2' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
10A	10865	11790

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
10A	10865	11790

TRAINING GROUNDS AREA
2' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
11A	10779	11790
11B	10791	11791
11C	10790	11805
11D	10777	11803

PNT #	NORTHING	EASTING
12A	10812	10849
12B	10828	11850
12C	10825	11860
12D	10811	11859

TRAINING GROUNDS AREA
2' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
13A	10923	11623
13B	10936	11626
13C	10933	11639
13D	10920	11638

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
14A	10979	11680
14B	11010	11677
14C	11013	11703
14D	10982	11707

PNT #	NORTHING	EASTING
15A	11033	11705
15B	11071	11715
15C	11086	11733
15D	11028	11724

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

PNT #	NORTHING	EASTING
16A	11120	11676
16B	11148	11683
16C	11145	11698
16D	11117	11691

TRAINING GROUNDS AREA
1' DEEP EXCAVATION LIMITS
APPROXIMATE COORDINATES

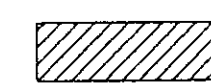
PNT #	NORTHING	EASTING
17A	11144	11764
17B	11160	11768
17C	11152	11802
17D	11136	11798

NOTES:

- CONTRACTOR SHALL REMOVE/DEMOLISH ALL STRUCTURES IDENTIFIED ON THE PROPOSED DEMOLITION PLAN SHEET G-3 PRIOR TO EXCAVATION.
- CONTRACTOR SHALL STAKE OUT LIMITS OF EXCAVATION FROM COORDINATES SHOWN IN THE SCHEDULES LISTED ON THIS SHEET PRIOR TO EXCAVATION.
- SOIL WITHIN THE 5' DEEP EXCAVATION SHALL BE EXCAVATED AND HAULED TO THE SOUTH DISPOSAL AREA FOR CONDITIONING AS SPECIFIED.
- ALL EXCAVATION SHALL BE TO A DEPTH OF 1' FOLLOWING REMOVAL OF EXISTING CRUSHED STONE UNLESS OTHERWISE INDICATED. ALL DEPTHS SHALL BE BELOW EXISTING GRADE.
- THE LEVEL OF CONTAMINATION AND REMEDIATION WITHIN THE LIMITS OF EXCAVATION ARE DELINEATED AS FOLLOWS:



APPROX. LIMITS OF PCBS > 50 mg/kg TO BE DISPOSED OFFSITE. MAY REQUIRE SOLIDIFICATION/STABILIZATION (ON SITE OR OFF SITE) DEPENDING ON RESULTS OF WASTE CHARACTERIZATION TESTING REQUESTED BY DISPOSAL FACILITY



APPROX. LIMITS OF PCBS > 50 mg/kg & LEAD > 250 mg/kg TO BE DISPOSED OFFSITE. MAY REQUIRE SOLIDIFICATION/STABILIZATION (ON SITE OR OFF SITE) DEPENDING ON RESULTS OF WASTE CHARACTERIZATION TESTING REQUESTED BY DISPOSAL FACILITY



APPROX. LIMITS OF PCBS 10-50 mg/kg AND/OR LEAD > 250 mg/kg TO BE SOLIDIFIED/STABILIZED AND DISPOSED OF IN THE NORTH DISPOSAL AREA AS SPECIFIED

- CONTRACTOR SHALL PROTECT ALL EXISTING WELLS TO REMAIN FROM DAMAGE. CONTRACTOR SHALL REPAIR OR REPLACE ANY WELL DAMAGED AS DIRECTED BY OWNER OR THEIR REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 7701.2 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED THE ALTERING PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 7701.2.

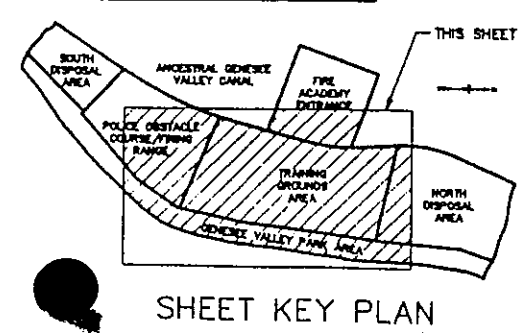
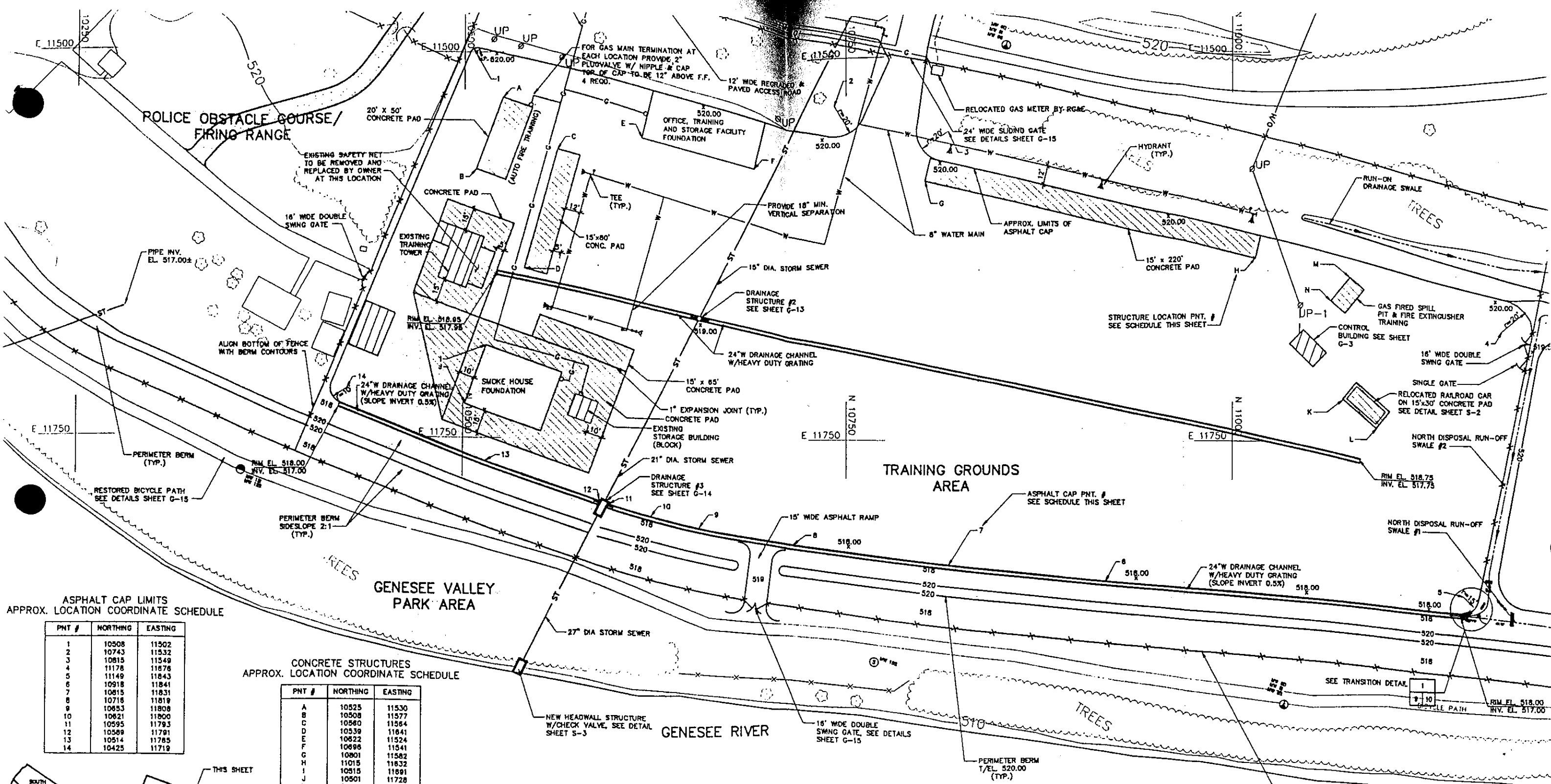
NO.	BY	DATE	REVISIONS
1	KAM/MS	10/1/94	DESIGN
2	SH	10/1/94	REVISED

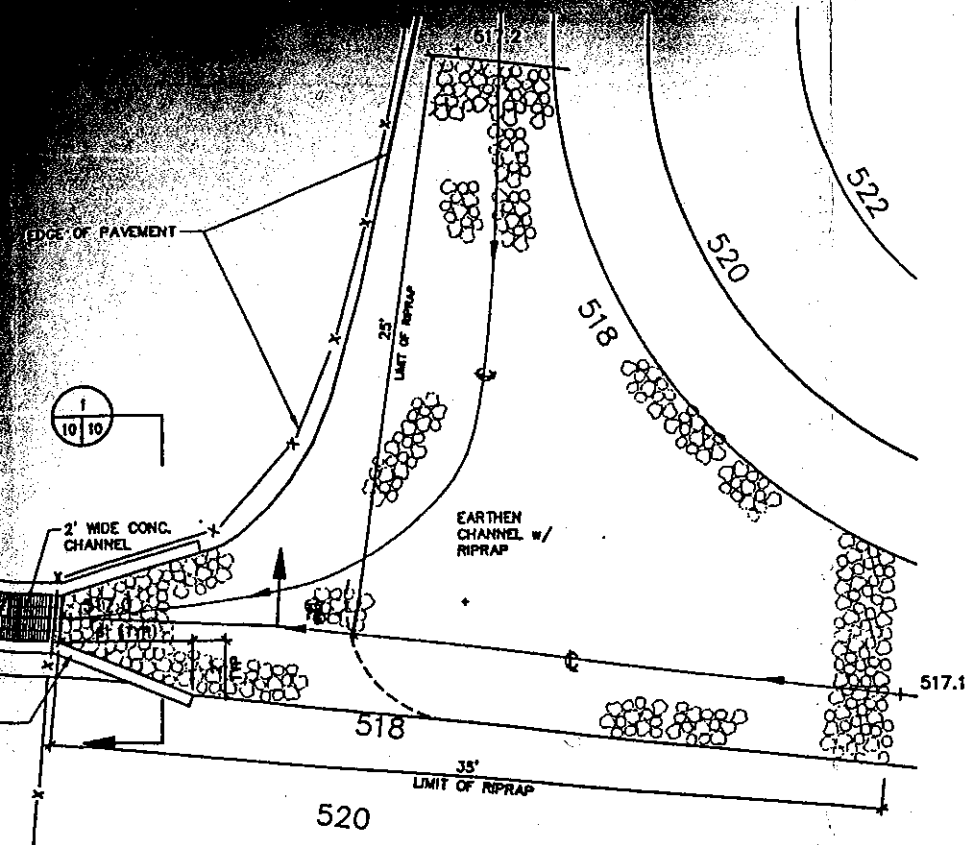
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIATION CONSTRUCTION

FIRE TRAINING ACADEMY
EXCAVATION PLAN
TRAINING GROUNDS AREA

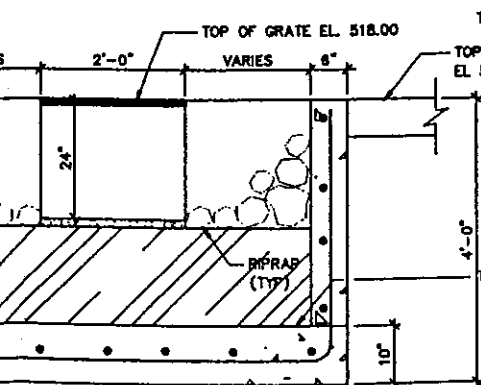
MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994
G SHEET 8 OF 12





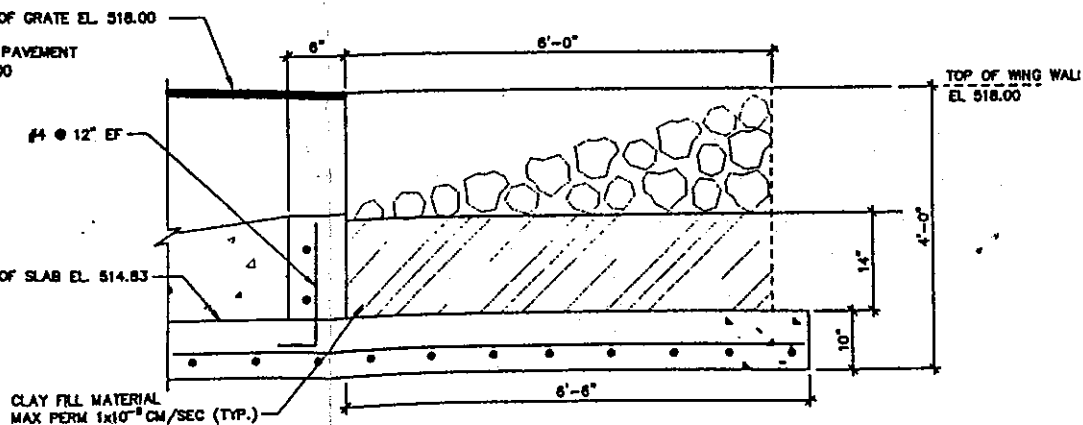
TRANSITION DETAIL

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



CHANNEL SECTION

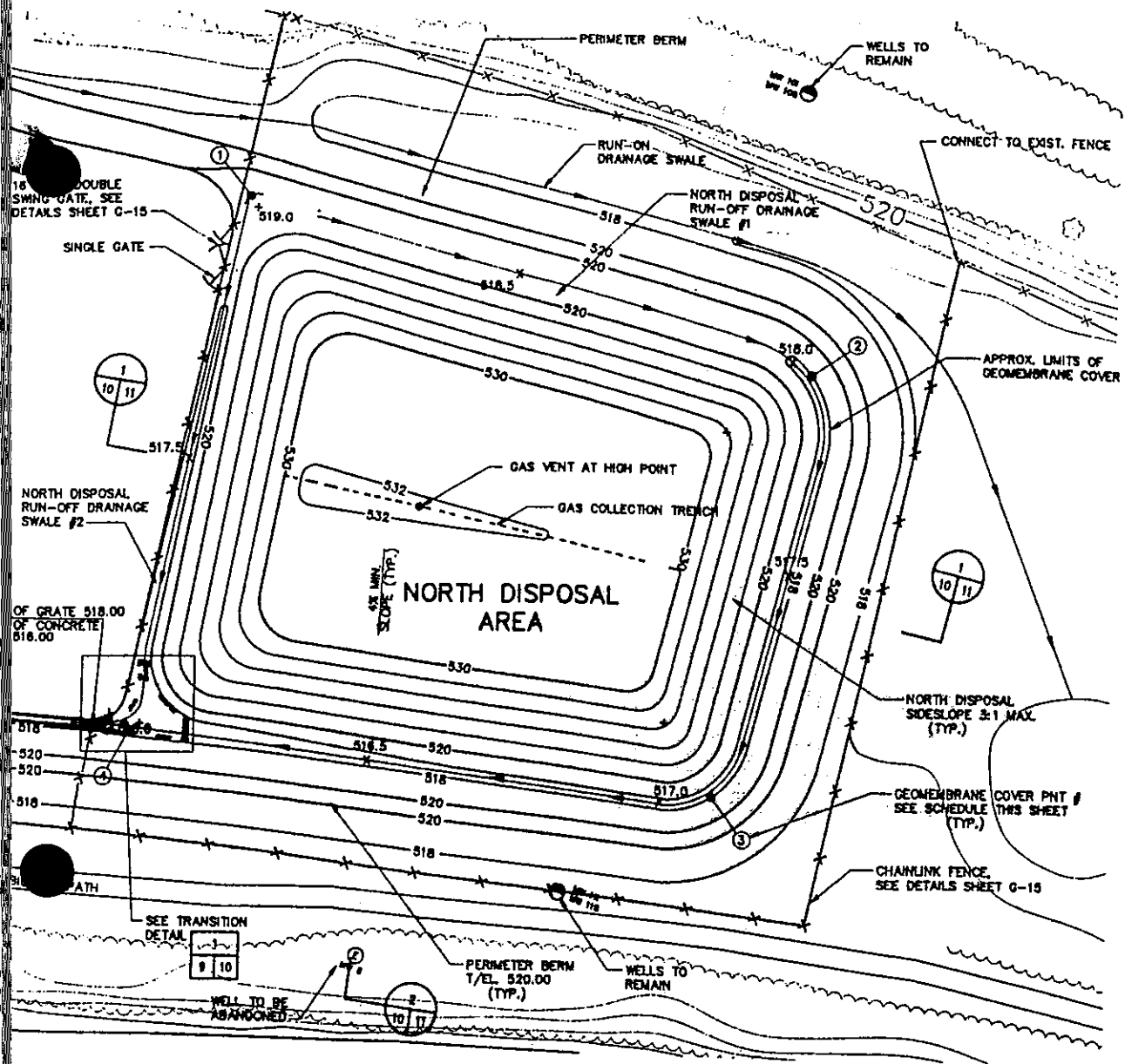
SCALE: 3/4"=1'-0"



TRANSITION CHANNEL SECTION

SCALE: 3/4"=1'-0"

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2205.2 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED THE ALTERING PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 2205.2.

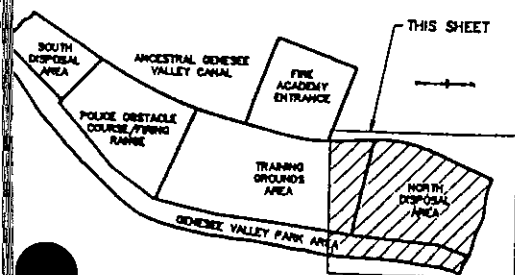


SCALE: 1"=30'

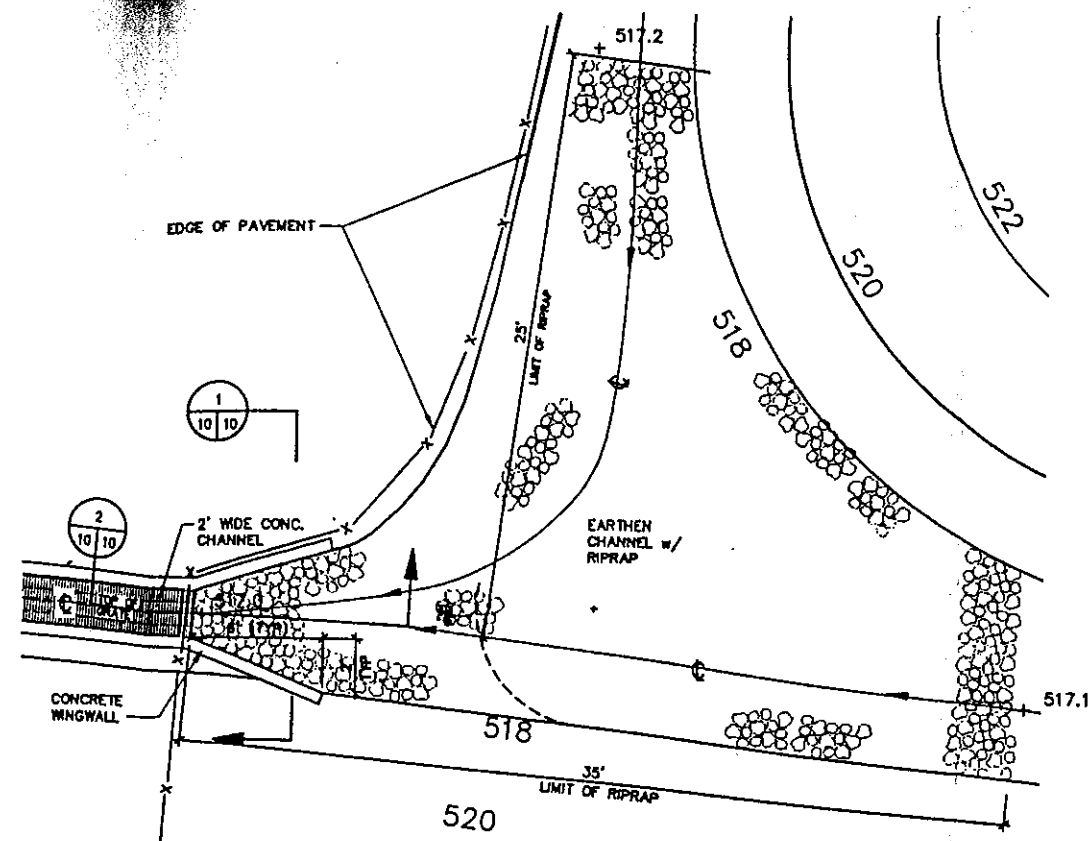
APPROX. LIMIT GEOMEMBRANE COVER

PNT #	NORTHING	EASTING	RADIUS
1	11208	11870	5
2	11378	11749	37
3	11357	11855	32
4	11187	11859	5

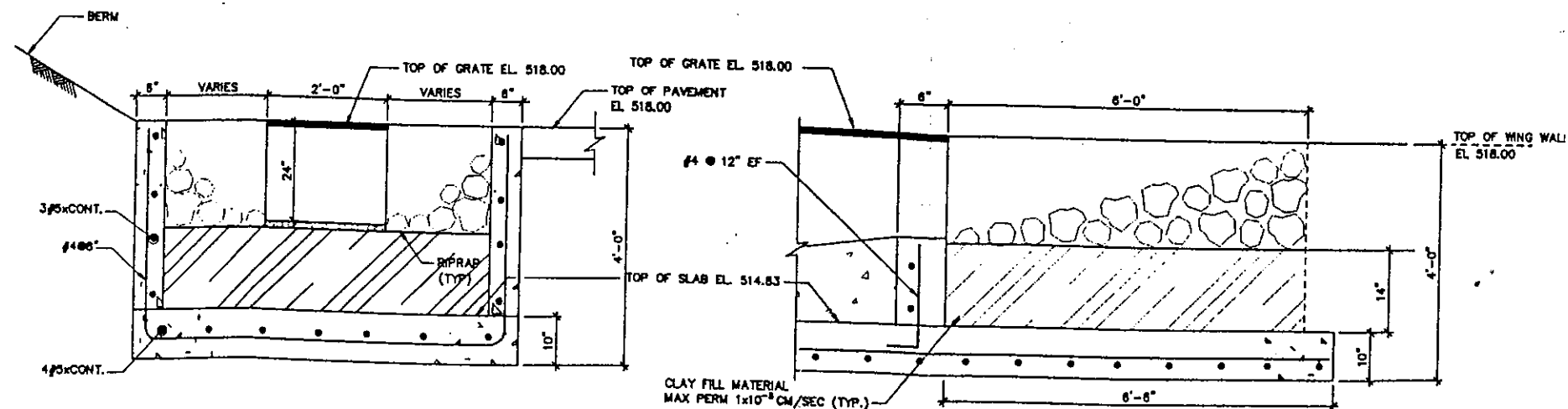
NOTE: PROPOSED NORTH DISPOSAL AREA COVER ELEVATIONS MAY VARY DEPENDING ON QUANTITY OF MATERIAL DISPOSED.



SHEET KEY PLAN



TRANSITION DETAIL
SCALE: 1/4"=1'-0"



TRANSITION CHANNEL SECTION
SCALE: 3/4"=1'-0"

TRANSITION CHANNEL SECTION
SCALE: 3/4"=1'-0"

MALCOLM PIRNIE

STATE OF NEW YORK
PUBLIC WORKS

NO.	BY	DATE	REVISIONS
1	MSJ	10/10/94	
2	MSJ	10/10/94	
3	APR	10/10/94	

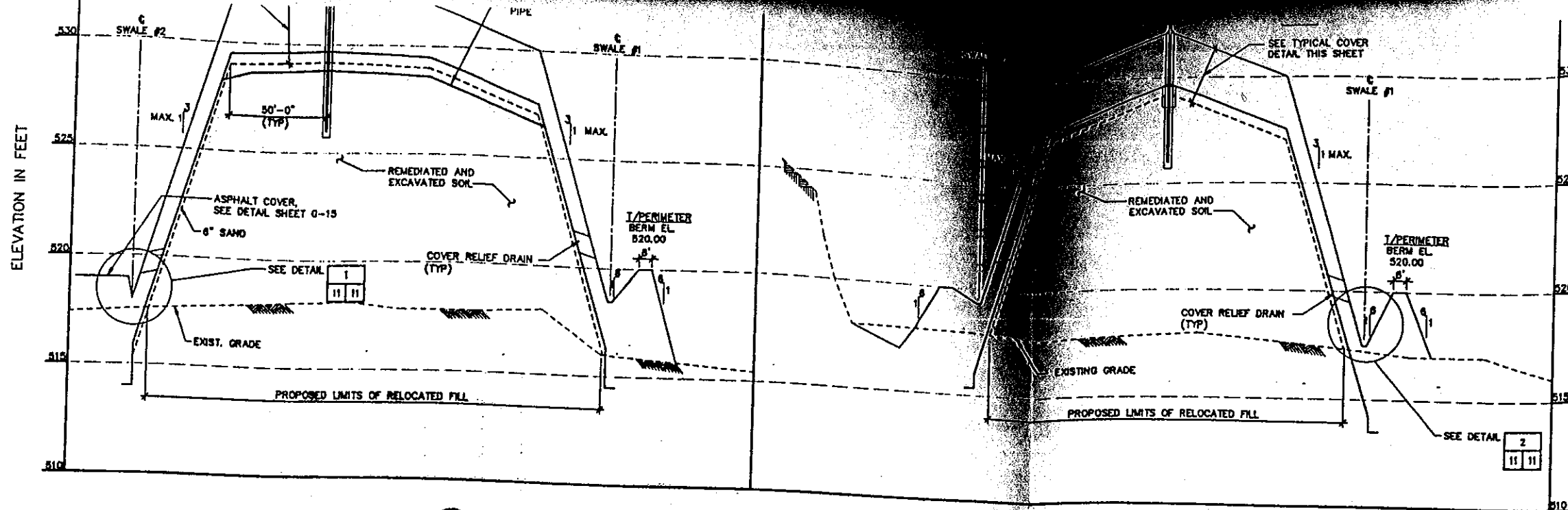
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIAL CONSTRUCTION

FIRE TRAINING ACADEMY
PROPOSED PLAN AND DETAILS
NORTH DISPOSAL AREA

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2205 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED THE ALTERNATE PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 2205.2.

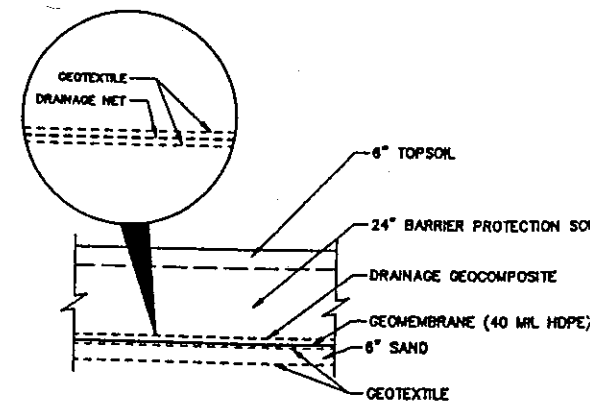
MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994



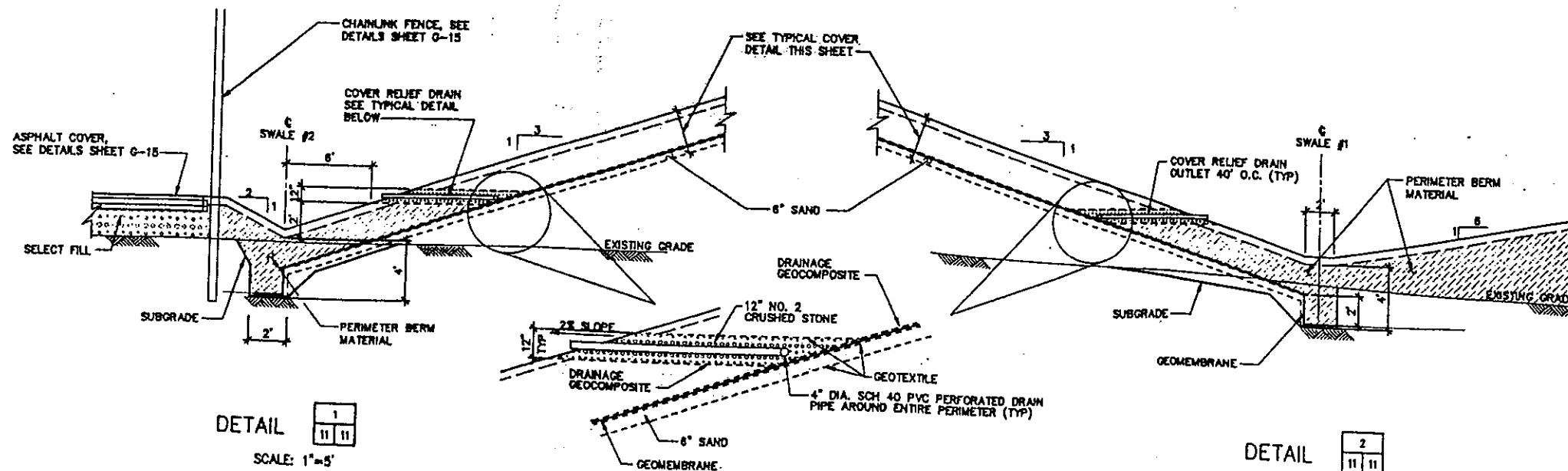
SECTION 1
SCALE: HORIZ. 1"=30'
VERT. 1"=3'

NOTE: PROPOSED NORTH DISPOSAL AREA COVER ELEVATIONS MAY VARY DEPENDING ON QUANTITY OF MATERIAL DISPOSED.

SECTION 2
SCALE: HORIZ. 1"=30'
VERT. 1"=3'

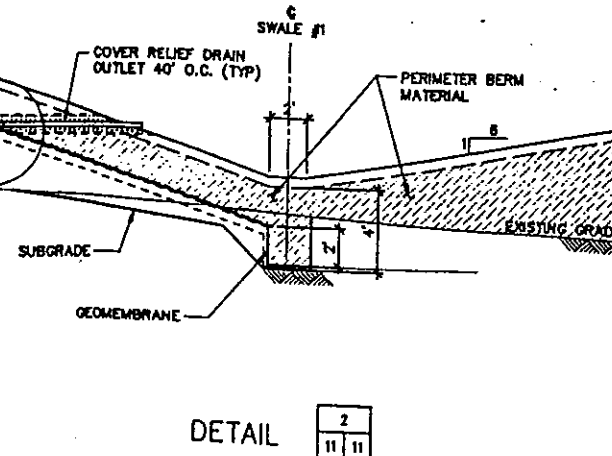


TYPICAL COVER DETAIL
NOT TO SCALE

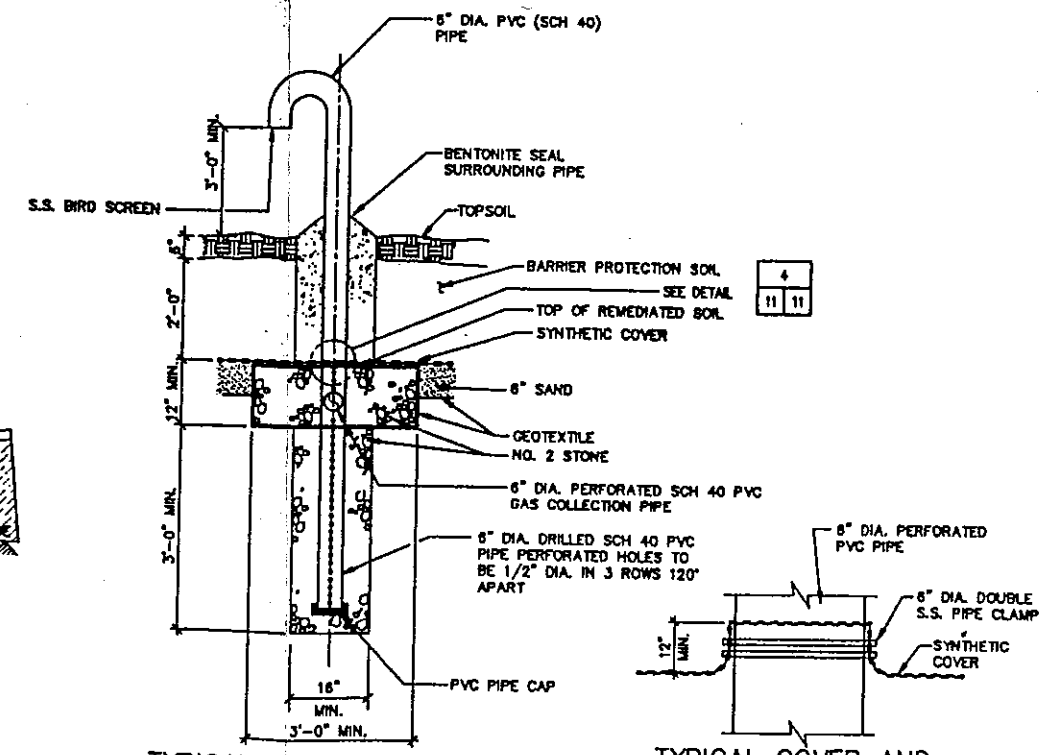


DETAIL 1
SCALE: 1"=5'

COVER RELIEF DRAIN DETAIL
NOT TO SCALE



DETAIL 2
SCALE: 1"=5'



TYPICAL COVER AT GAS VENTING STATION

DETAIL 3
NOT TO SCALE

TYPICAL COVER AND VENT PIPE SEAL

DETAIL 4
SCALE: NOT TO SCALE

MALCOLM
PIRNIE



NO.	BY	DATE	REVISIONS
1	JP	10/29/94	ISSUED FOR CONSTRUCTION
2	JP	11/11/94	REVISED TO ADD DETAIL 4

CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK
REMEDIAL CONSTRUCTION

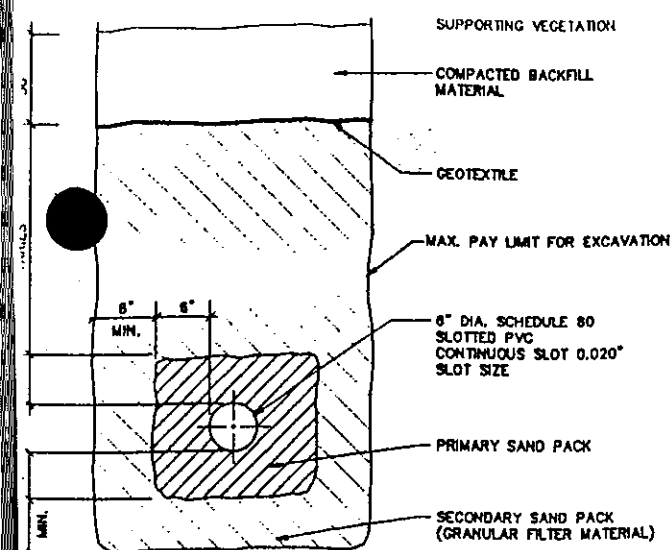
FIRE TRAINING ACADEMY
SECTIONS AND DETAILS
NORTH DISPOSAL AREA

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2201.3 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED THE ALTERED PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 2201.3.

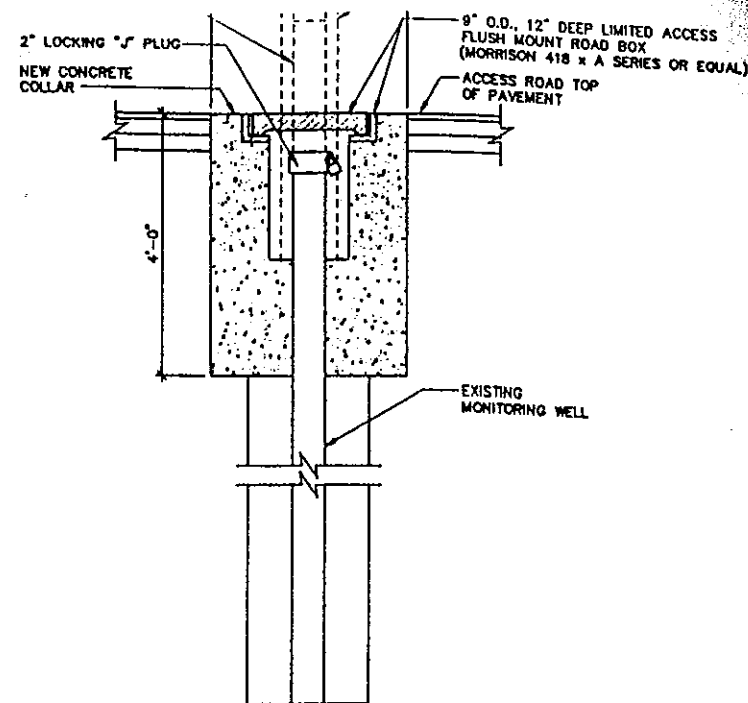
MALCOLM PIRNIE, INC.

DATE: OCTOBER 1994

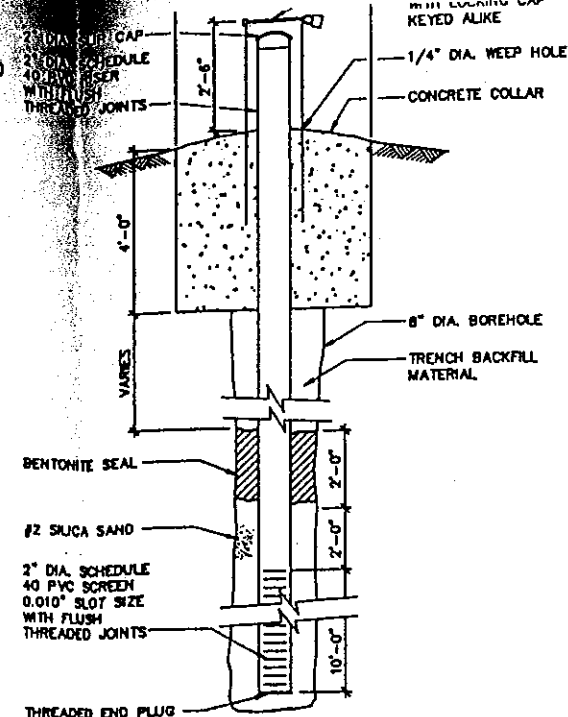
PROJECT NO. 100-11



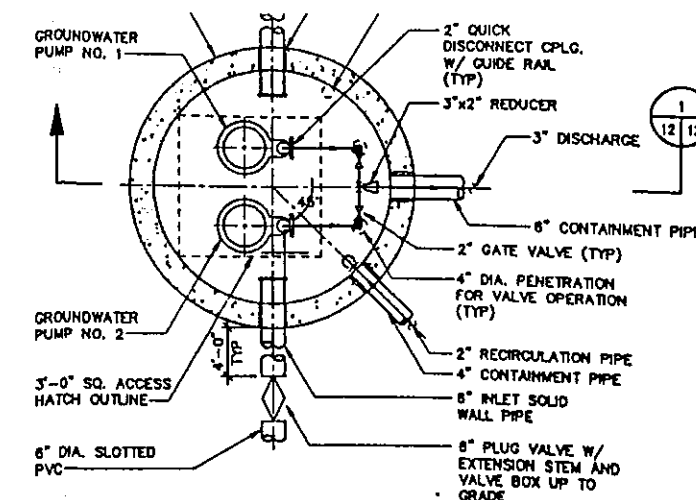
CAL GROUNDWATER COLLECTION
TRENCH BEDDING DETAIL
NOT TO SCALE



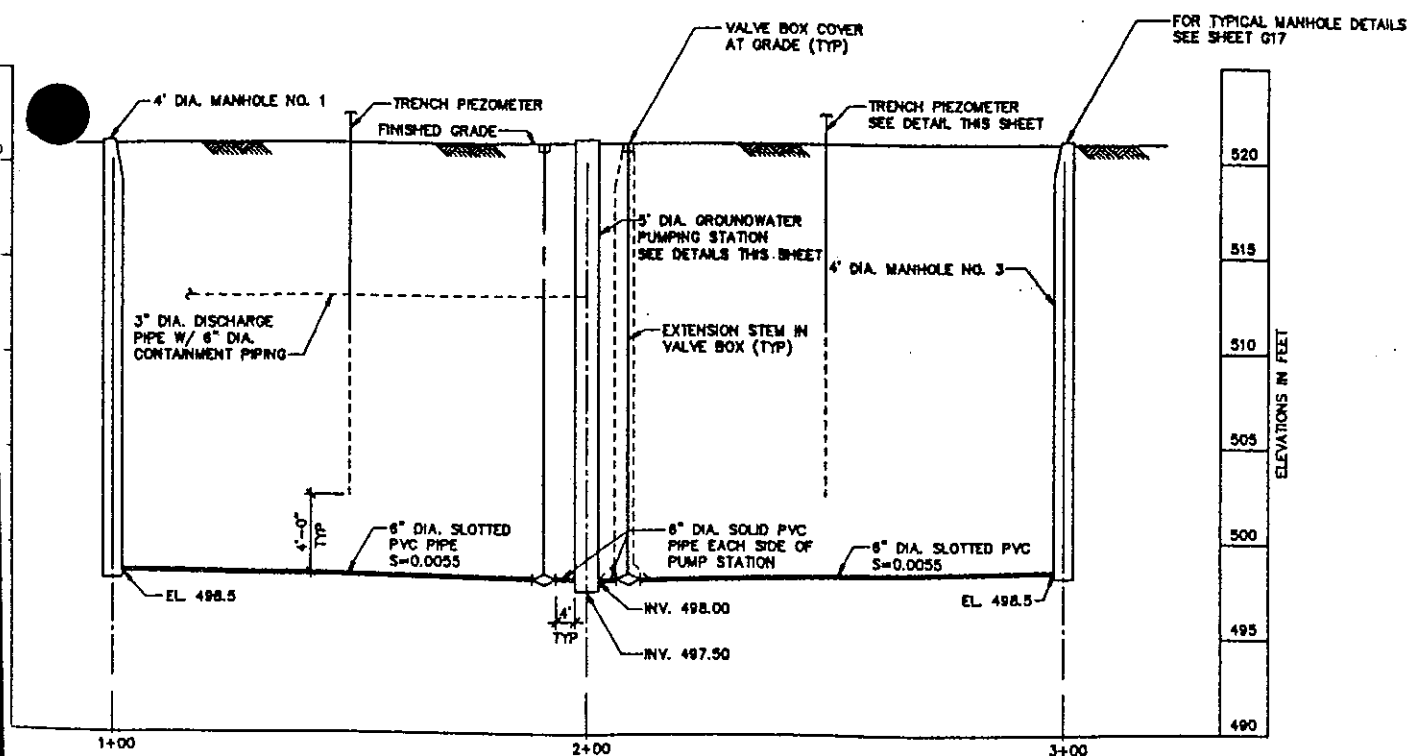
EXISTING MONITORING WELL MODIFICATION DETAIL
NOT TO SCALE



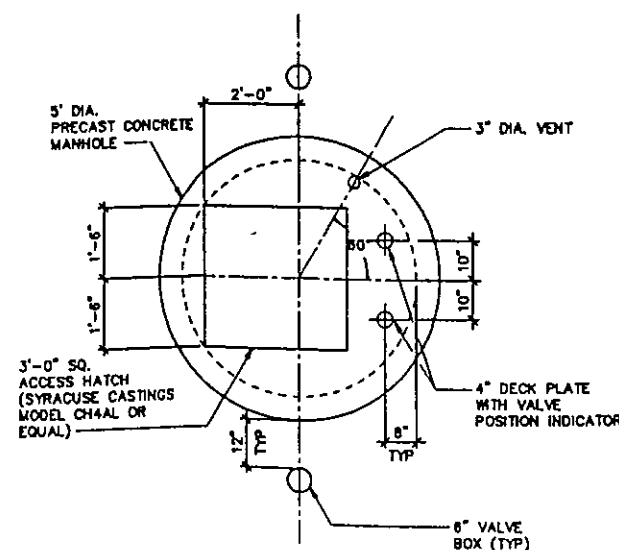
TRENCH PIEZOMETER DETAIL
NOT TO SCALE



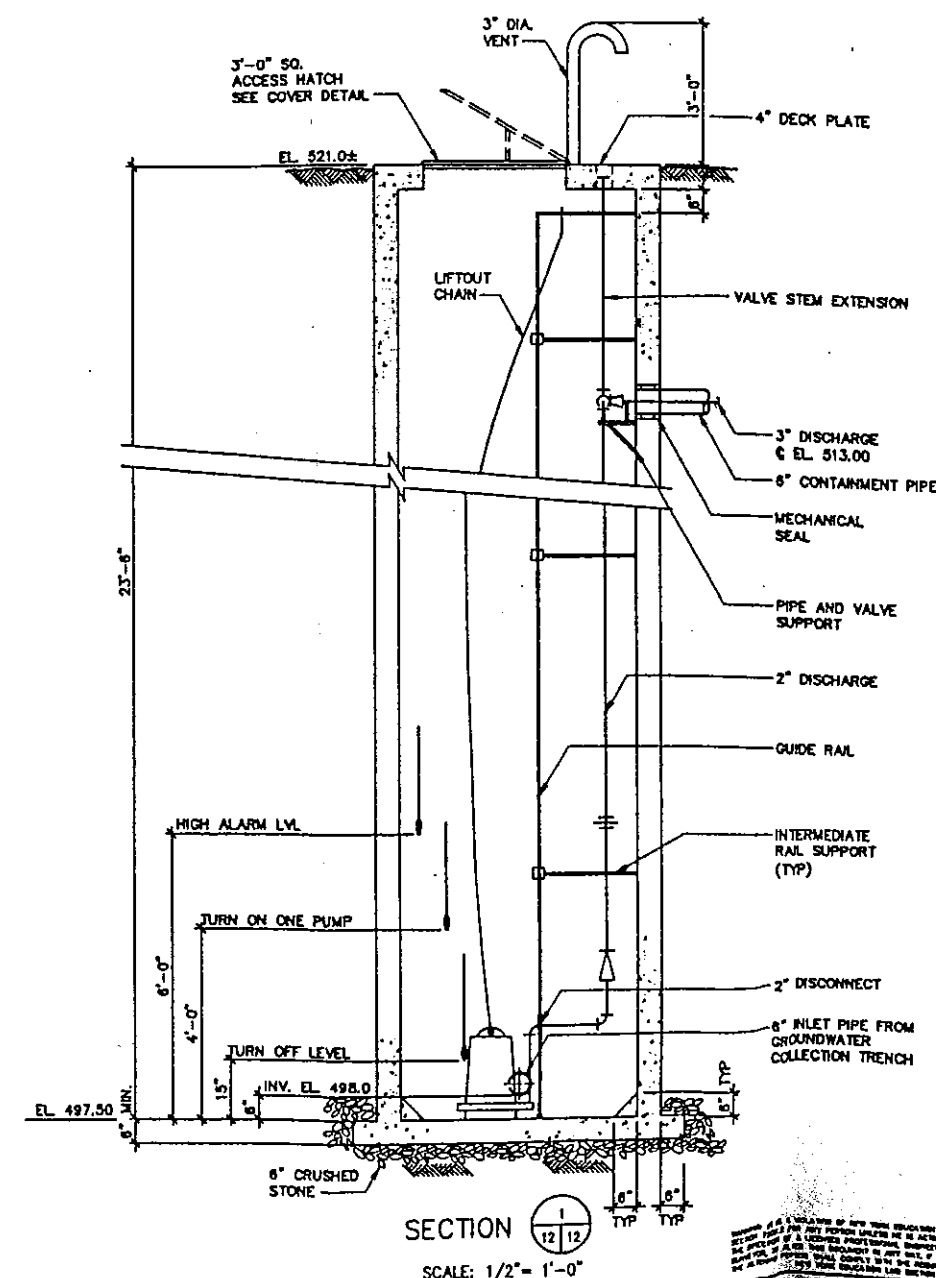
GROUNDWATER PUMPING STATION PLAN
SCALE: 1/2\"/>



GROUNDWATER COLLECTION TRENCH PROFILE
SCALE: VERT. 1\"/>



GROUNDWATER PUMPING STATION
COVER DETAIL
SCALE: 1/2\"/>



SECTION
SCALE: 1/2\"/>

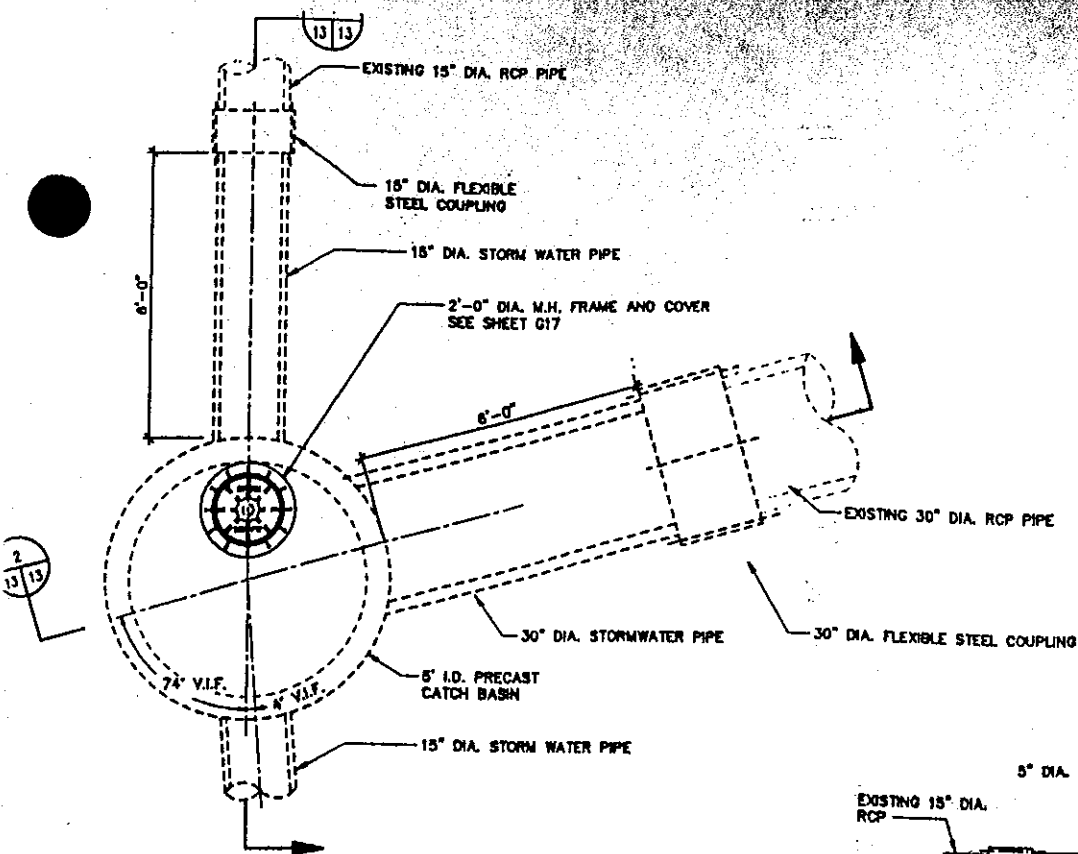
NO.	BY	DATE	REVISIONS	REASON
1	AK/10/94	10/10/94		
2	AK/10/94	10/10/94		

STATE OF NEW YORK
COUNTY OF MONROIE
CITY OF ROCHESTER

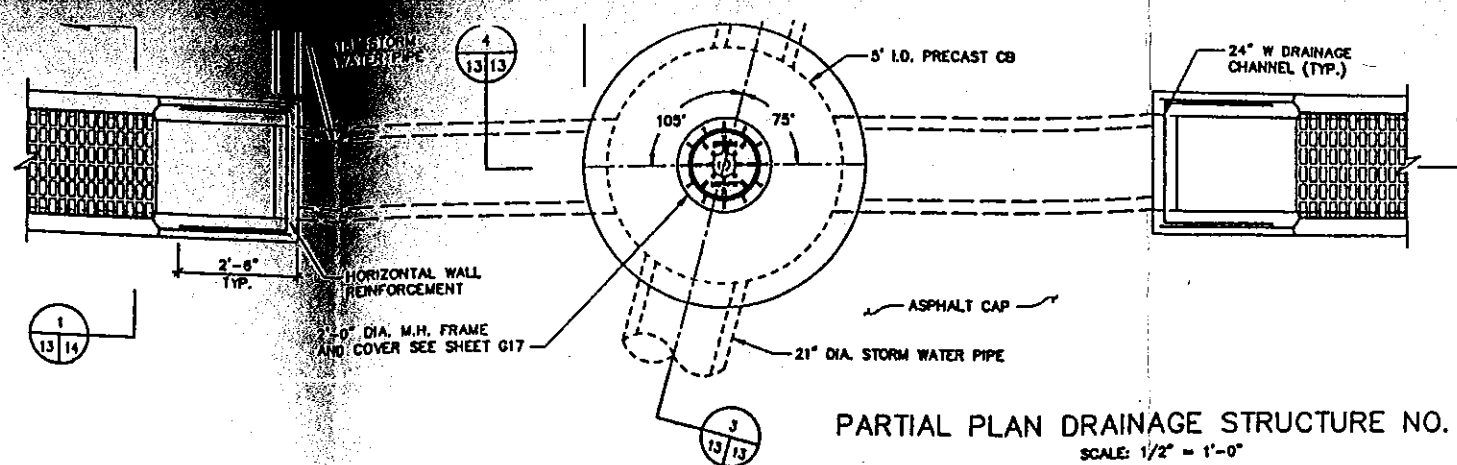
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

FIRE TRAINING ACADEMY
GROUNDWATER COLLECTION SYSTEM

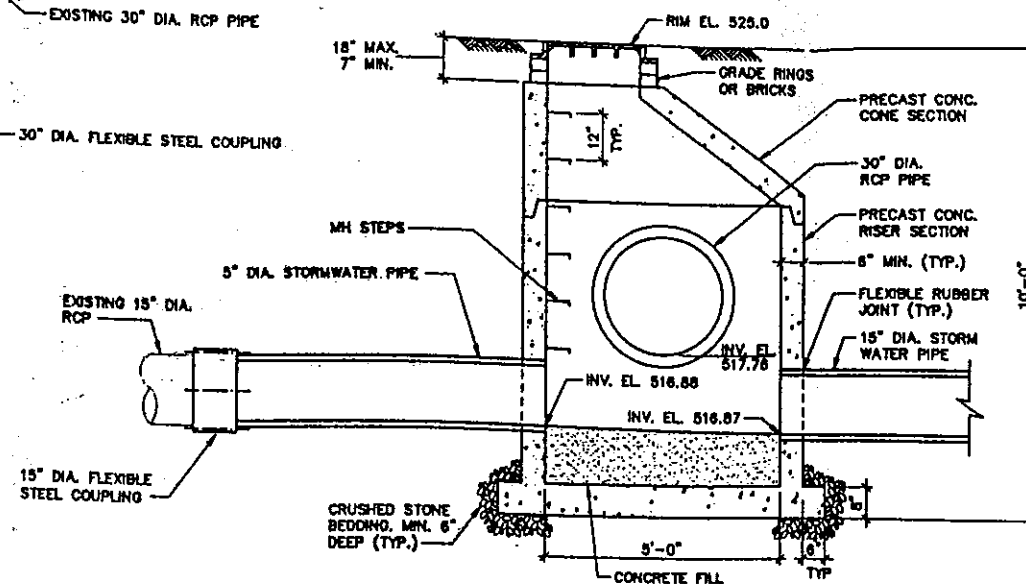
MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994



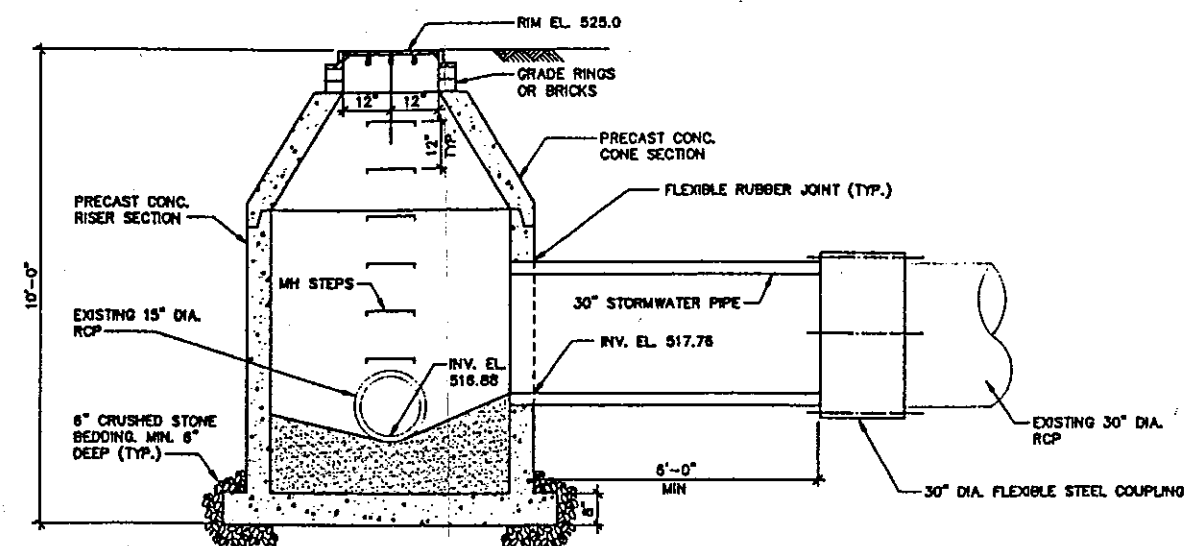
PARTIAL PLAN DRAINAGE STRUCTURE NO. 1
SCALE: 1/2" = 1'-0"



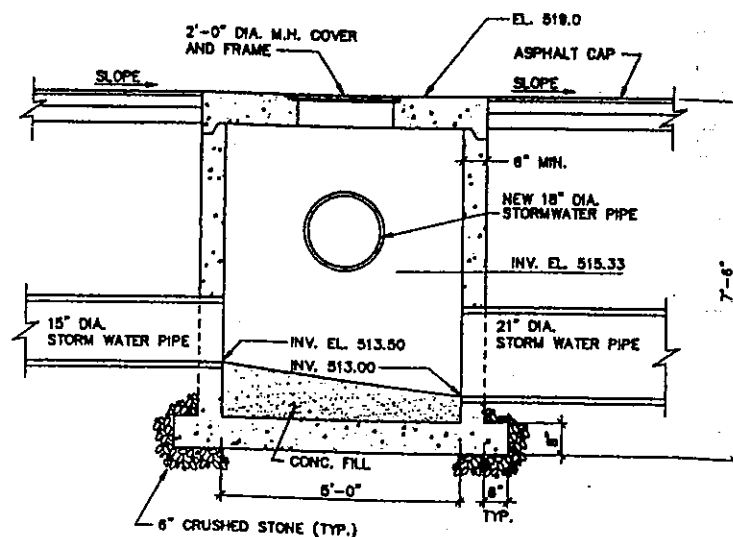
PARTIAL PLAN DRAINAGE STRUCTURE NO. 2
SCALE: 1/2" = 1'-0"



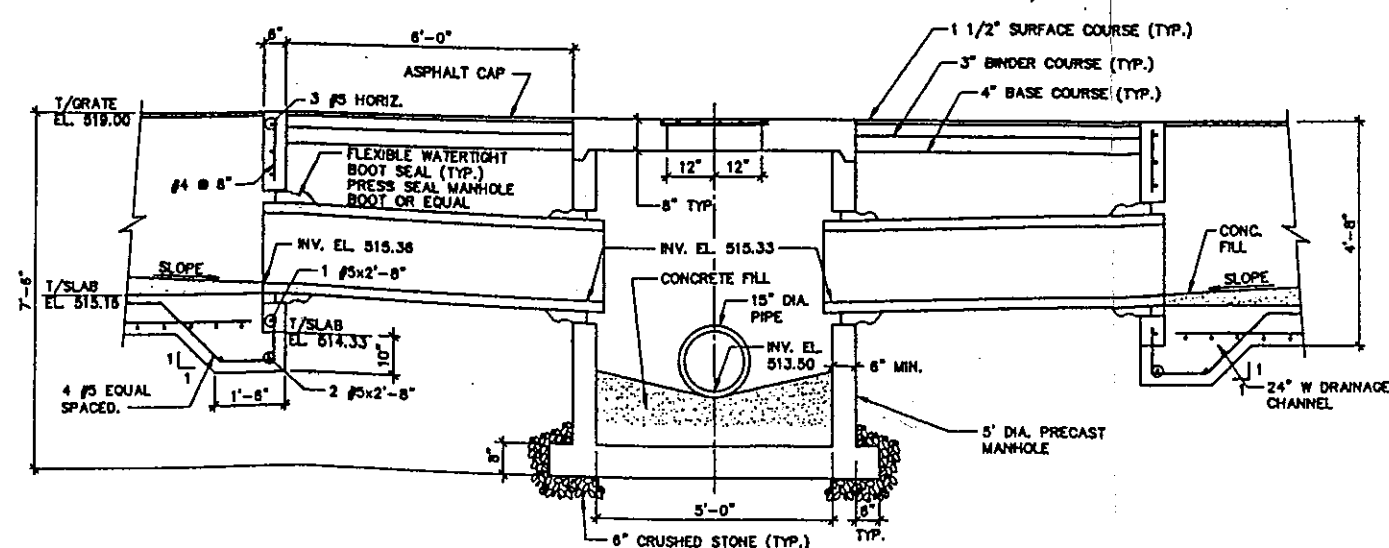
SECTION 1
SCALE: 1/2" = 1'-0"



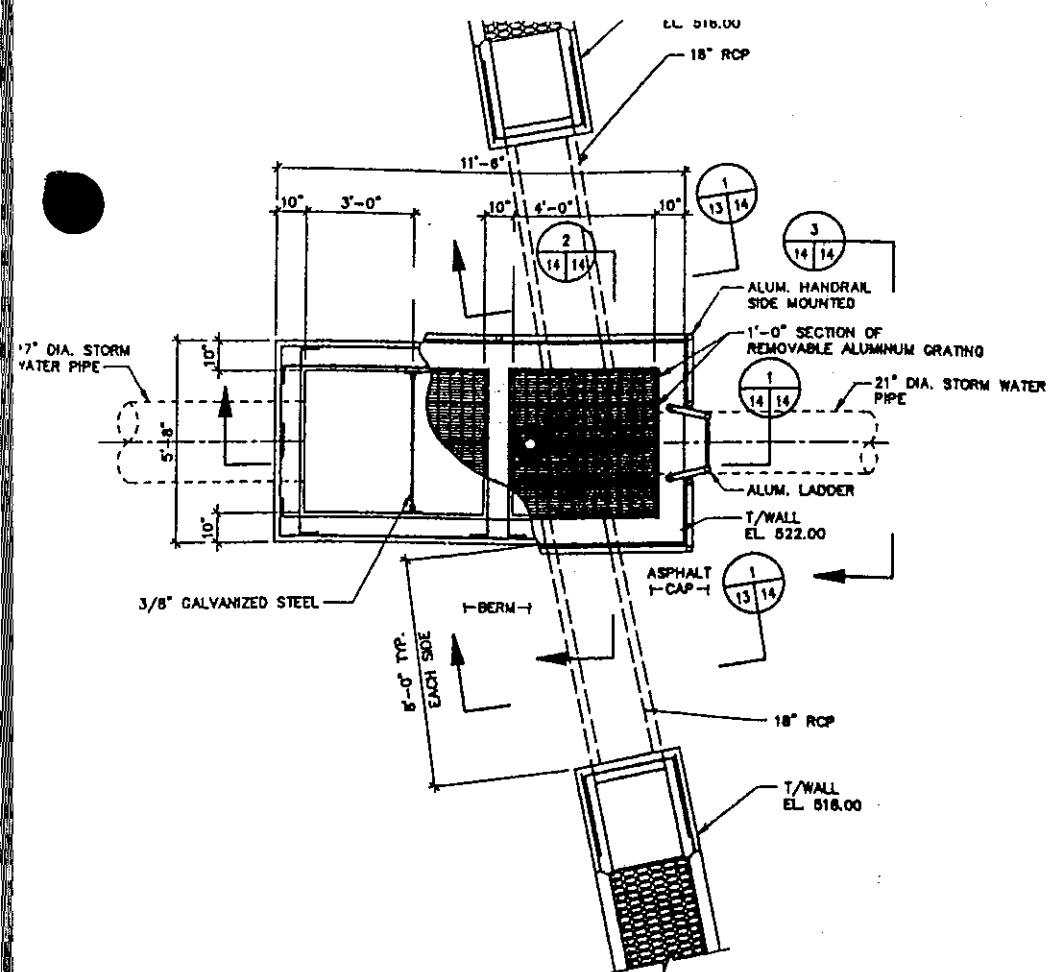
SECTION 2
SCALE: 1/2" = 1'-0"



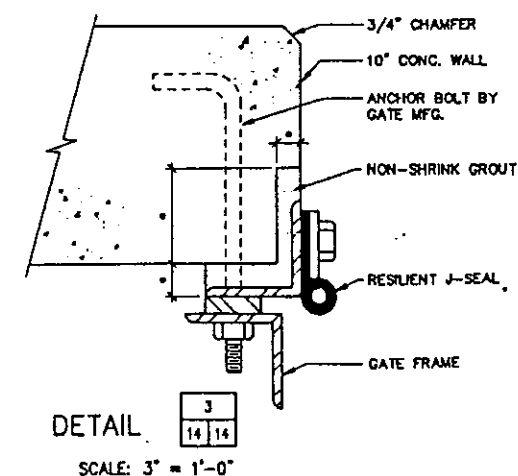
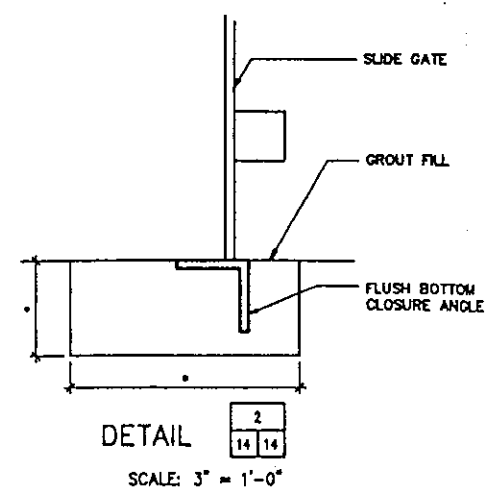
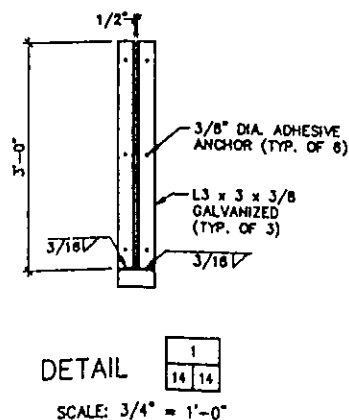
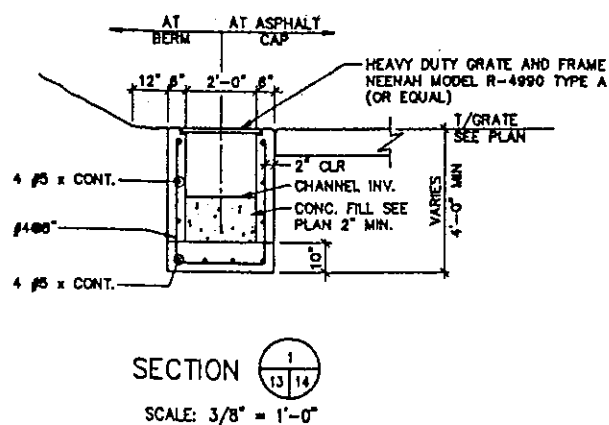
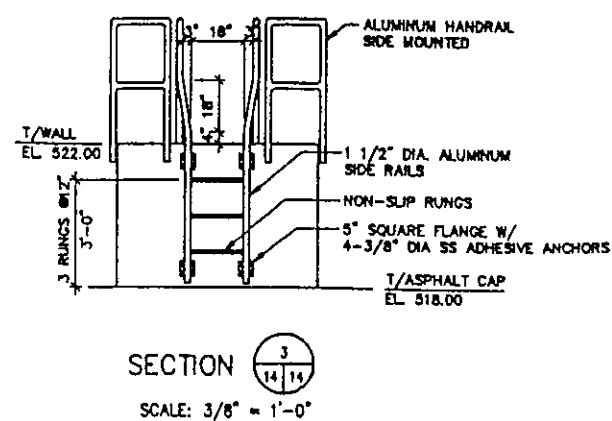
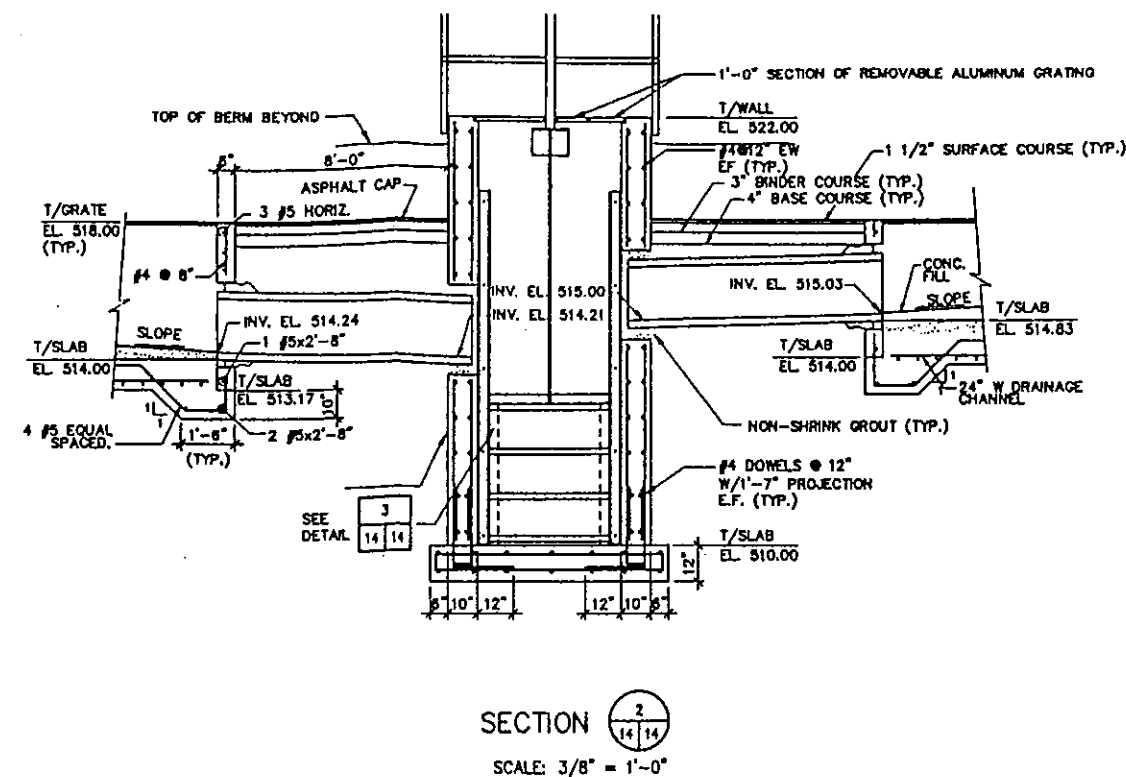
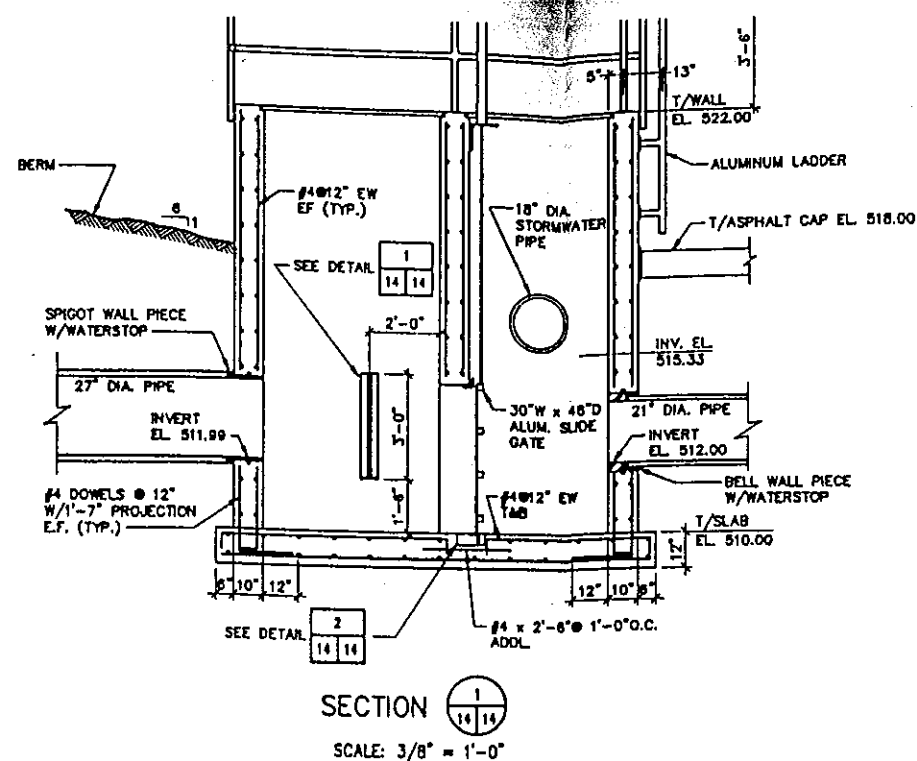
SECTION 3
SCALE: 1/2" = 1'-0"



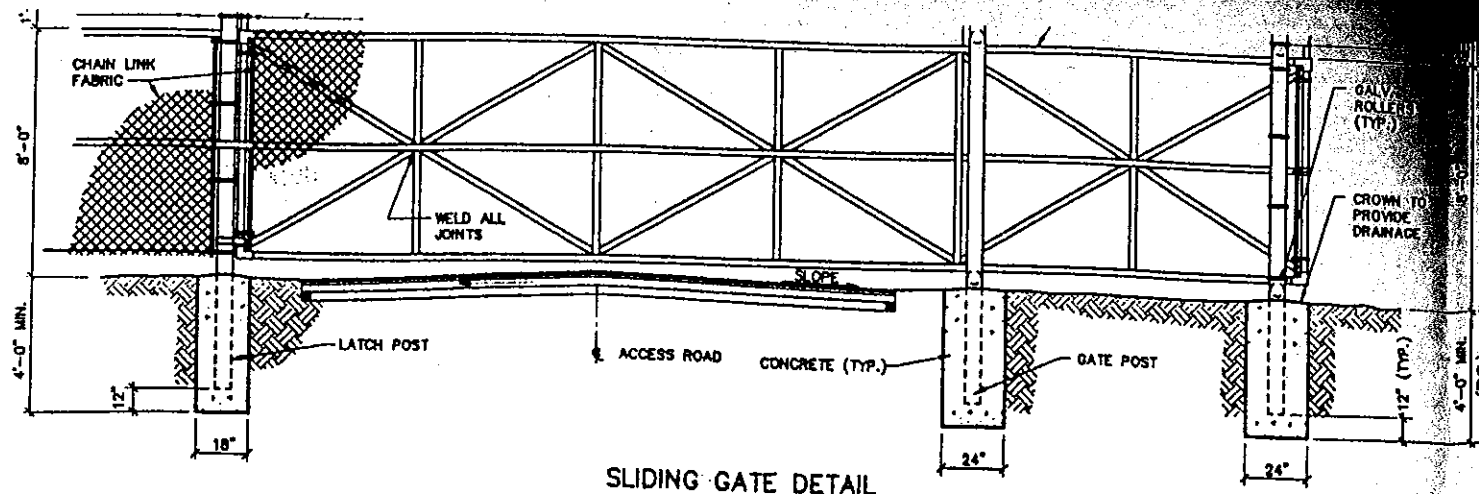
SECTION 4
SCALE: 1/2" = 1'-0"



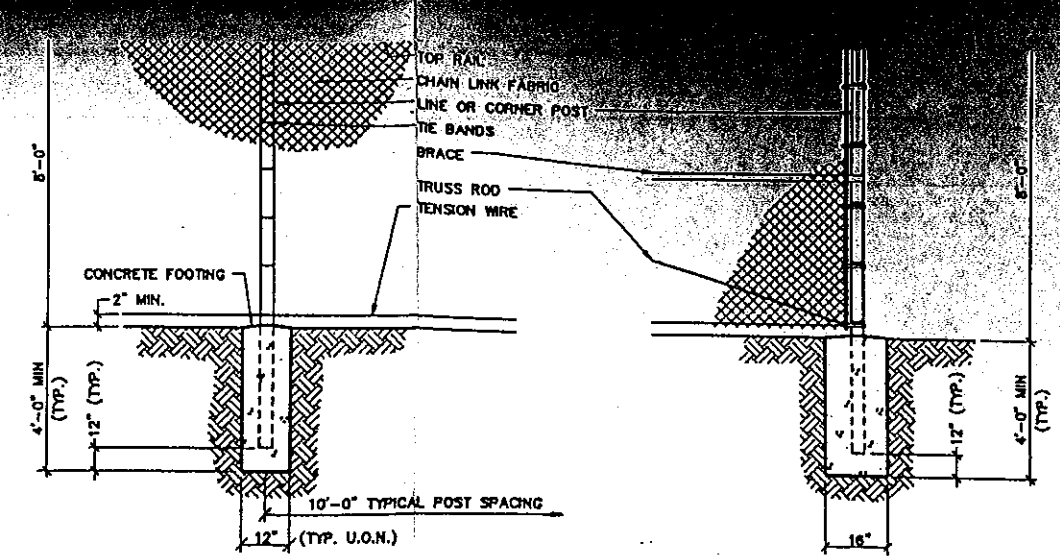
PARTIAL PLAN DRAINAGE STRUCTURE NO. 3
SCALE: 3/8" = 1'-0"



* INDICATES DIMENSION TO BE COORDINATED
DURING CONSTRUCTION W/APPROVED EQUIPMENT.

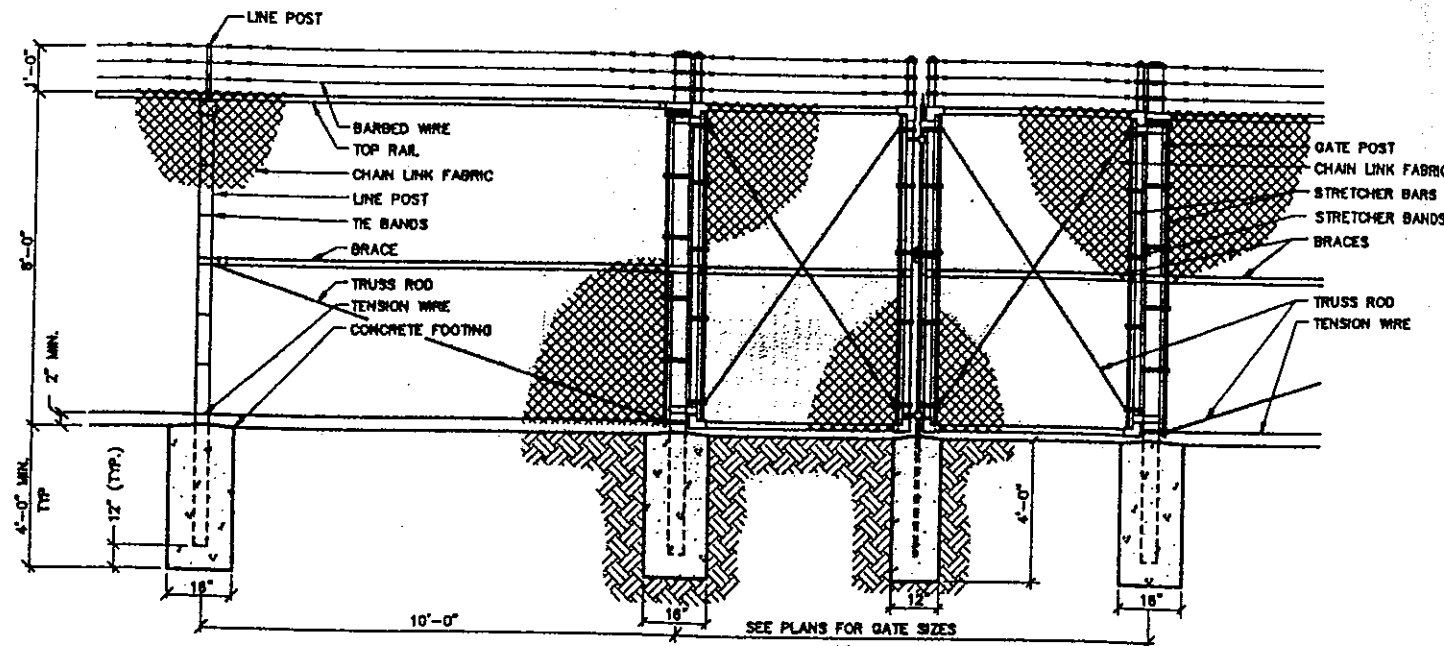


SLIDING GATE DETAIL

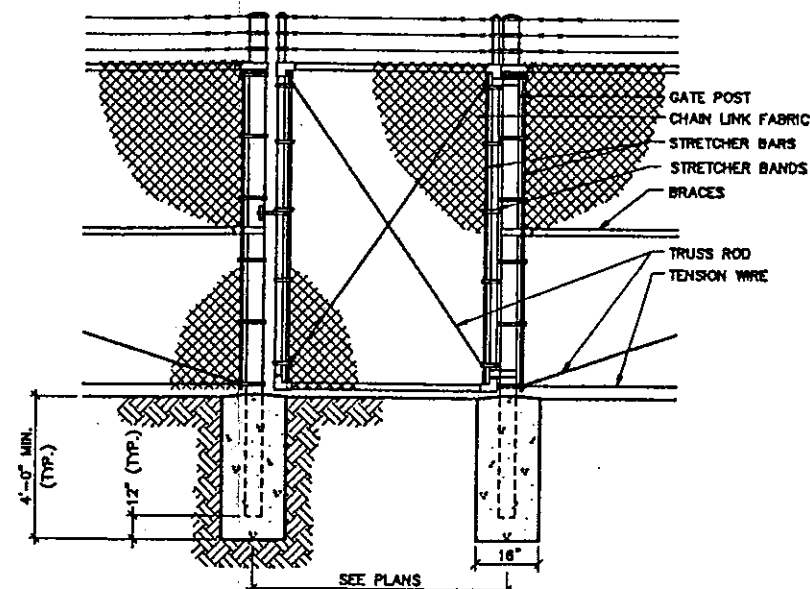


LINE POST DETAIL

END POST DETAIL



DOUBLE GATE DETAIL

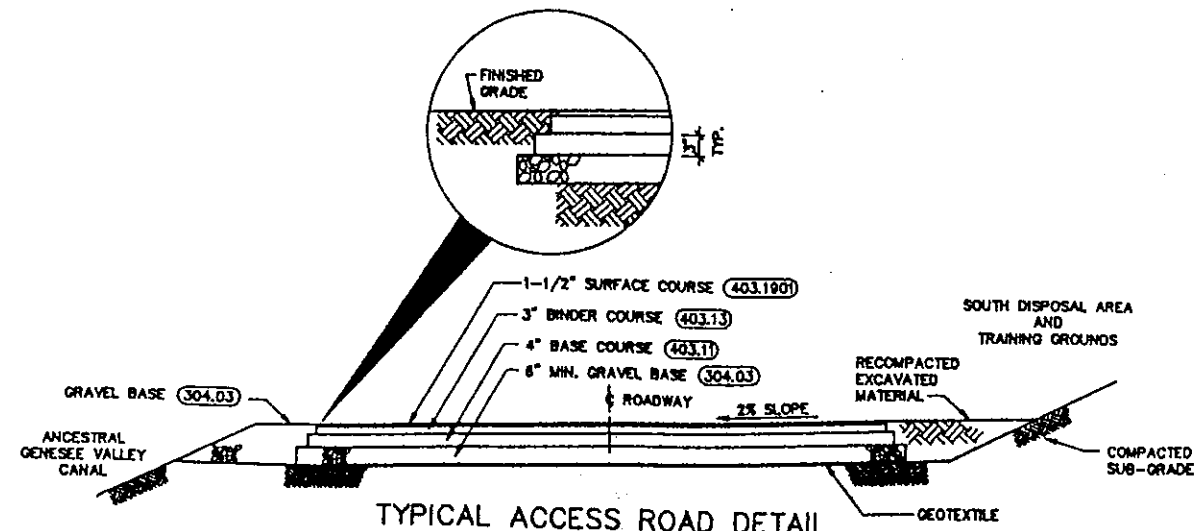


SINGLE GATE DETAIL

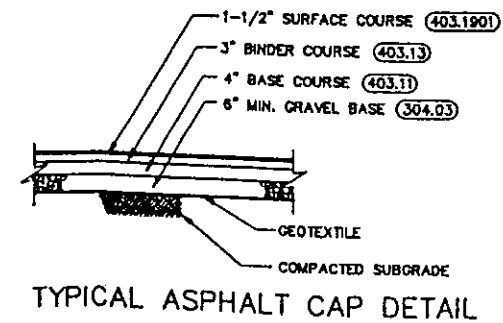
TYPICAL CHAIN LINK FENCE DETAILS
NOT TO SCALE

NOTES:

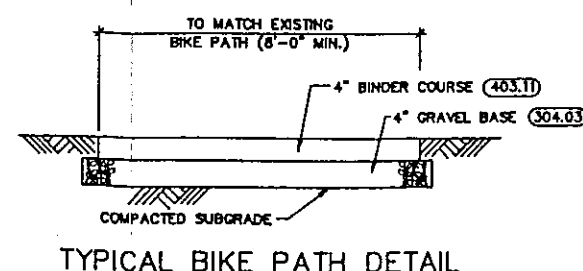
- 1.) PROVIDE PVC COATING OVER GALVANIZED FINISH ON ALL POSTS, RAILS, BRACES, AND CHAIN LINK FABRIC.
- 2.) PROVIDE GALVANIZED FINISH ON ALL ACCESSORIES AND HARDWARE.



TYPICAL ACCESS ROAD DETAIL



TYPICAL ASPHALT CAP DETAIL



TYPICAL BIKE PATH DETAIL

NOTES: 1. NUMBERS INSIDE OF SYMBOL INDICATES NYSDOT ITEM NO.

NOTES: 1. NUMBERS INSIDE OF SYMBOL INDICATES NYSDOT ITEM NO.

NOTES: 1. NUMBERS INSIDE OF SYMBOL INDICATES NYSDOT ITEM NO.

WARNING: IT IS A VIOLATION OF NEW YORK EDUCATION LAW SECTION 2004.1 FOR ANY PERSON UNLESS HE IS ACTING UNDER THE SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER THIS CONTRACT IN ANY WAY. IF ALLOWED THE ALIENED PERSON SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW SECTION 2004.1.

MALCOLM
PIRNIE



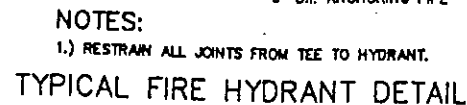
NO.	BY	DATE	REVISIONS
1	MP	10/15/94	ISSUED FOR PERMIT
2	MP	10/15/94	REVISED FOR PERMIT
3	MP	10/15/94	REVISED FOR PERMIT
4	MP	10/15/94	REVISED FOR PERMIT
5	MP	10/15/94	REVISED FOR PERMIT
6	MP	10/15/94	REVISED FOR PERMIT
7	MP	10/15/94	REVISED FOR PERMIT
8	MP	10/15/94	REVISED FOR PERMIT
9	MP	10/15/94	REVISED FOR PERMIT
10	MP	10/15/94	REVISED FOR PERMIT

CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIAL CONSTRUCTION

FIRE TRAINING ACADEMY
TYPICAL FENCE AND SITE DETAILS

MALCOLM PIRNIE, INC.
DATE OCTOBER 1994



AREAS BASED ON AN INTERNAL PRESSURE OF 150 P.S.I.G.
AND A SOIL BEARING PRESSURE OF 2000 P.S.F.

NOTES:

1. THRUST BLOCKS ARE TO BE PLACED AT ALL BENDS AND TEES.
2. THRUST BLOCKS ARE TO BE PLACED AT ALL TAPPING SLEEVE AND VALVE CONNECTIONS AS SHOWN ABOVE FOR TEE.
3. WOOD BLOCKING WILL NOT BE PERMITTED.



NOTES:

1. BEDDING/BACKFILL FOR WATER MAINS TO BE SAND.
2. MINIMUM COVER TO BE AS FOLLOWS:
 - 5'-0" FOR WATER MAINS
 - 5'-0" FOR FORCE MAIN/STORM SEWER
 - 3'-0" FOR GAS MAIN
3. PROVIDE 8 MIL POLYETHYLENE ENCASUREMENT FOR WATER MAIN.



1. THRUST BLOCKS ARE TO BE PLACED AT ALL BENDS AND TEES.
2. THRUST BLOCKS ARE TO BE PLACED AT ALL TAPPING SLEEVE AND VALVE CONNECTIONS.
3. WOOD BLOCKING WILL NOT BE PERMITTED.



1. ONE STANDARD FULL LENGTH OF FORCE MAIN OR WATER MAIN PIPE IS TO BE CENTERED UNDER THE SEWER OR PETROLEUM SO THAT BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE.
2. THRUST RESTRAINT IS TO BE PROVIDED AT ALL BENDS AND IS TO BE AS INDICATED ON THE STANDARD DRAWINGS.
3. THERE IS TO BE 1 FOOT 8 INCHES MINIMUM VERTICAL SEPARATION BETWEEN SEWER OR PETROLEUM PIPES AND FORCE MAIN OR WATER MAIN PIPES.
4. WHERE THE FORCE MAIN OR WATER MAIN PASSES UNDER THE SEWER OR PETROLEUM PIPE, THERE IS TO BE A MINIMUM OF 6 INCHES OF CONCRETE OR GRAVEL BEDDING FOR THE SEWER OR PETROLEUM PIPING.

TYPICAL CROSSING
AT EXISTING PIPE

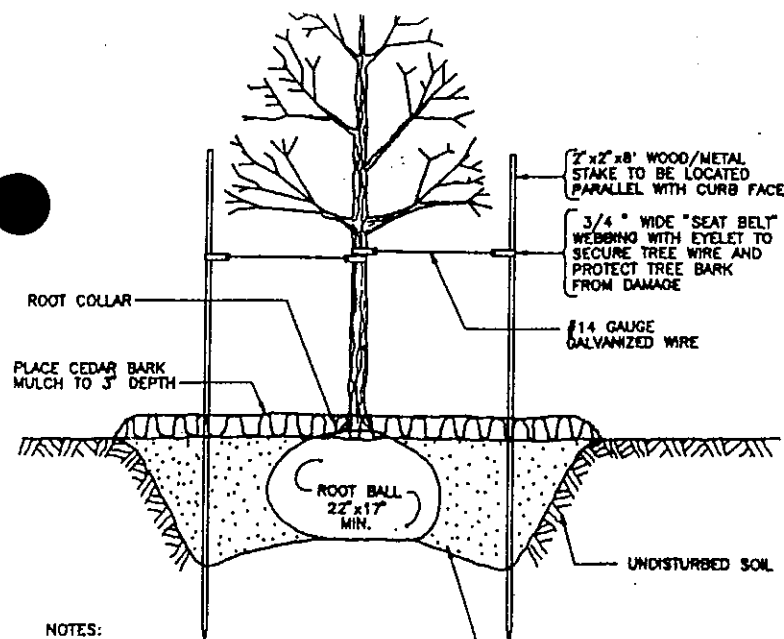
- WATER MAIN		(1)	MINIMUM ALLOWABLE DIMENSIONS FOR VERTICAL THRUST BLOCKS (IN FEET)								
SIZE	BEND		A	B	C	D	E	F	G	H(2)	
4, 6"	11 1/4"	0.20 C.Y.	1.0	2.5	1.0	2.0	0.5	1.0	2.0	0.5	
	22 1/2"	0.40 C.Y.	1.0	2.5	1.5	2.0	1.0	2.0	2.0	1.5	
	45°	0.80 C.Y.	1.5	2.5	1.5	2.5	1.5	2.0	2.5	1.5	
	90°	1.50 C.Y.	1.5	2.5	2.0	4.0	1.5	2.0	3.0	1.5	
8"	11 1/4"	0.35 C.Y.	1.0	2.5	1.5	2.0	1.0	1.5	2.0	1.0	
	22 1/2"	0.70 C.Y.	1.5	2.5	1.5	2.5	1.0	2.0	2.5	1.5	
	45°	1.40 C.Y.	1.5	2.5	2.0	4.0	1.5	2.0	3.0	1.5	
	90°	2.60 C.Y.	2.0	2.5	2.0	4.0	2.0	3.0	3.5	2.5	

1. MINIMUM VOLUME OF CONCRETE FOR THRUST BLOCK DIMENSIONS D,E,F,G
2. REBAR LENGTH

NOTES:

1. TIE RODS ARE TO BE USED IN CONJUNCTION WITH CONCRETE THRUST BLOCKS FOR VERTICAL BENDS

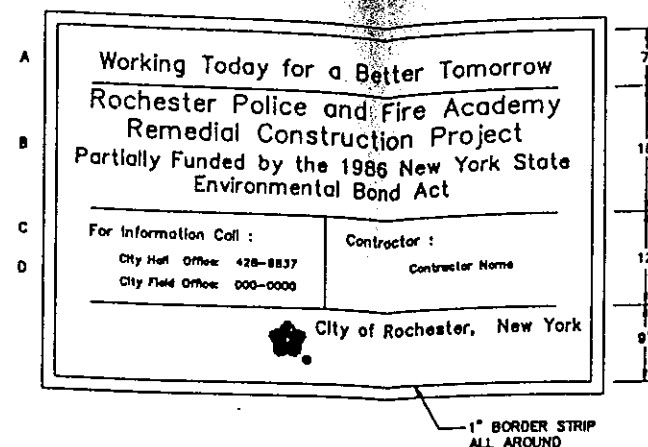
VERTICAL THRUST BLOCKS AND DIMENSION CHART



- NOTES:
1. LOOSEN AND BLEND THE SOIL IN THE ENTIRE PLANTING AREA 10" - 12" DEEP. IN THE CENTER OF THE PLANTING AREA DIG A HOLE AT LEAST AS WIDE AS THE ROOT BALL AND NO DEEPER.
 2. REMOVE TREE FROM BURLAP, WIRE BASKET, OR CONTAINER AND PLACE ON SOLIDLY PACKED SOIL. ROOT COLLAR IS SLIGHTLY ABOVE SURROUNDING GRADE. STAKING SYSTEM TO BE REMOVED AFTER SIX MONTHS.
 3. CHECK MOISTURE AT 4" - 6", IF DRY, WATER TO 6" DEEP.

TYPICAL EASTERN WHITE PINE TREE PLANTING
NOT TO SCALE

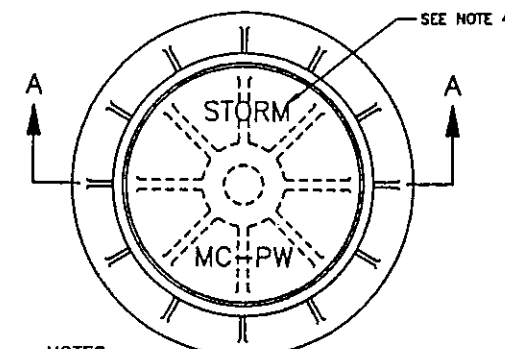
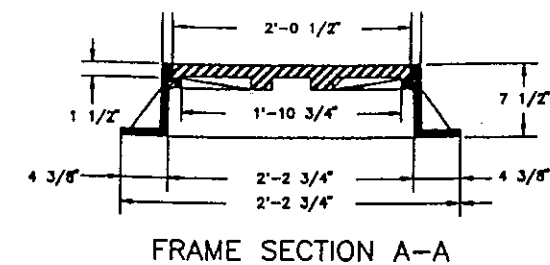
SIZE (CALLIPER) MIN.	WHITE PINE
2"	
NUMBER REQUIRED	110
HEIGHT MIN.	48"
SPACING	30'



- LETTERS:
- LINE A - 2" LETTERS
LINE B - 3" LETTERS
LINE C - 1 1/4" LETTERS
LINE D - 1" LETTERS
CITY SIGNATURE - 1 1/2" LETTERS
HORIZONTAL BARS - 3/4"
VERTICAL BAR - 1/4"
- COLORS:
- SIGN: WHITE EXTERIOR ENAMEL BORDER
REFLEX BLUE EXTERIOR ENAMEL BACKGROUND
LETTERS & BARS: WHITE EXTERIOR ENAMEL

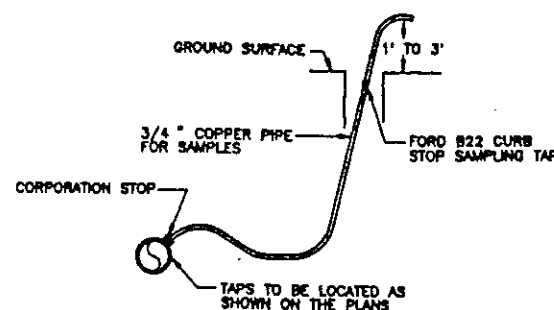
- NOTES:
1. CITY SIGNATURE WILL BE PROVIDED BY THE CITY PRIOR TO FABRICATION OF THE SIGN.
 2. ALL LETTERING TO BE HELVETICA MEDIUM EXCEPT FOR CITY SIGNATURE.
 3. BOARD TO BE 4'0" x 6'0" x 3/4" MARINE PLYWOOD MOUNTED ON P.T. 2"x4" FRAME
 4. SUPPORTS TO BE 2'-8" x 6" P.T. WOODEN POSTS IN 42" AUGURED HOLE BACKFILLED WITH NO. 2 STONE

PROJECT SIGN
NOT TO SCALE



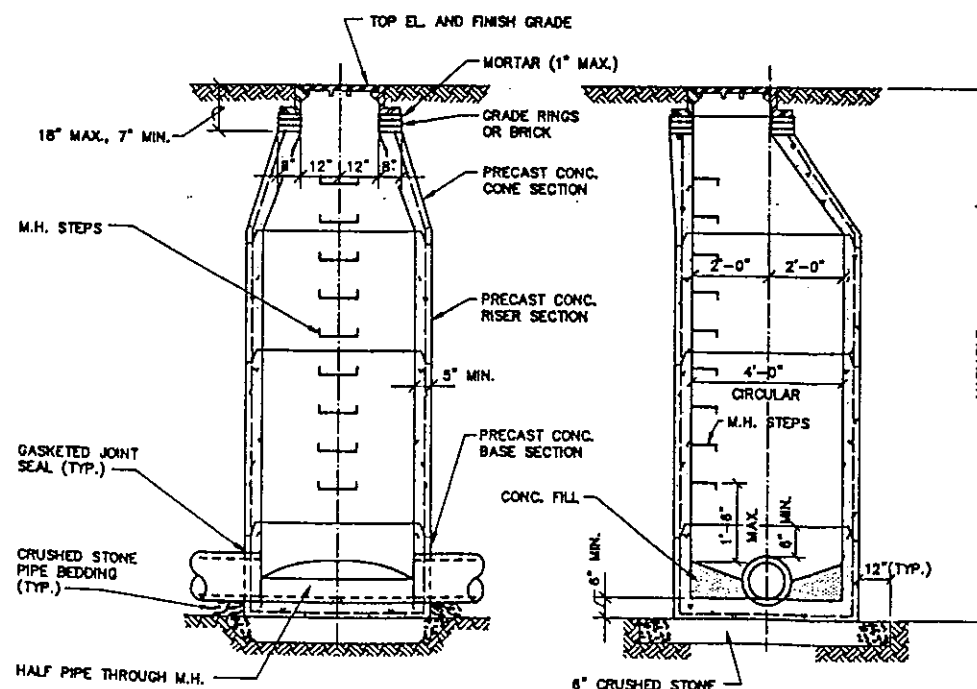
- NOTES:
1. MANHOLE FRAME AND COVER SHALL BE HEENAH TYPE R 1728A WITH TYPE F CONCEALED PICK HOLE (STANDARD) OR EQUIVALENT.
 2. HORIZONTAL BEARING SURFACES ON BOTH FRAME AND COVER SHALL BE MACHINED.
 3. TOTAL WEIGHT OF FRAME AND COVER IS 350± POUNDS.
 4. WORD "STORM" AND LETTERS "MC-PW" IN LETTERS AT LEAST 2" HIGH SHALL BE STAMPED OR CAST INTO DRAINAGE STRUCTURES NO. 1 AND 2 COVERS AND PLAINLY VISIBLE. ONLY LETTERS "MC-PW" AT LEAST 2" HIGH SHALL BE STAMPED OR CAST INTO MANHOLES NO. 1 AND NO. 3 COVERS AND PLAINLY VISIBLE.

MANHOLE FRAME AND COVER
NOT TO SCALE

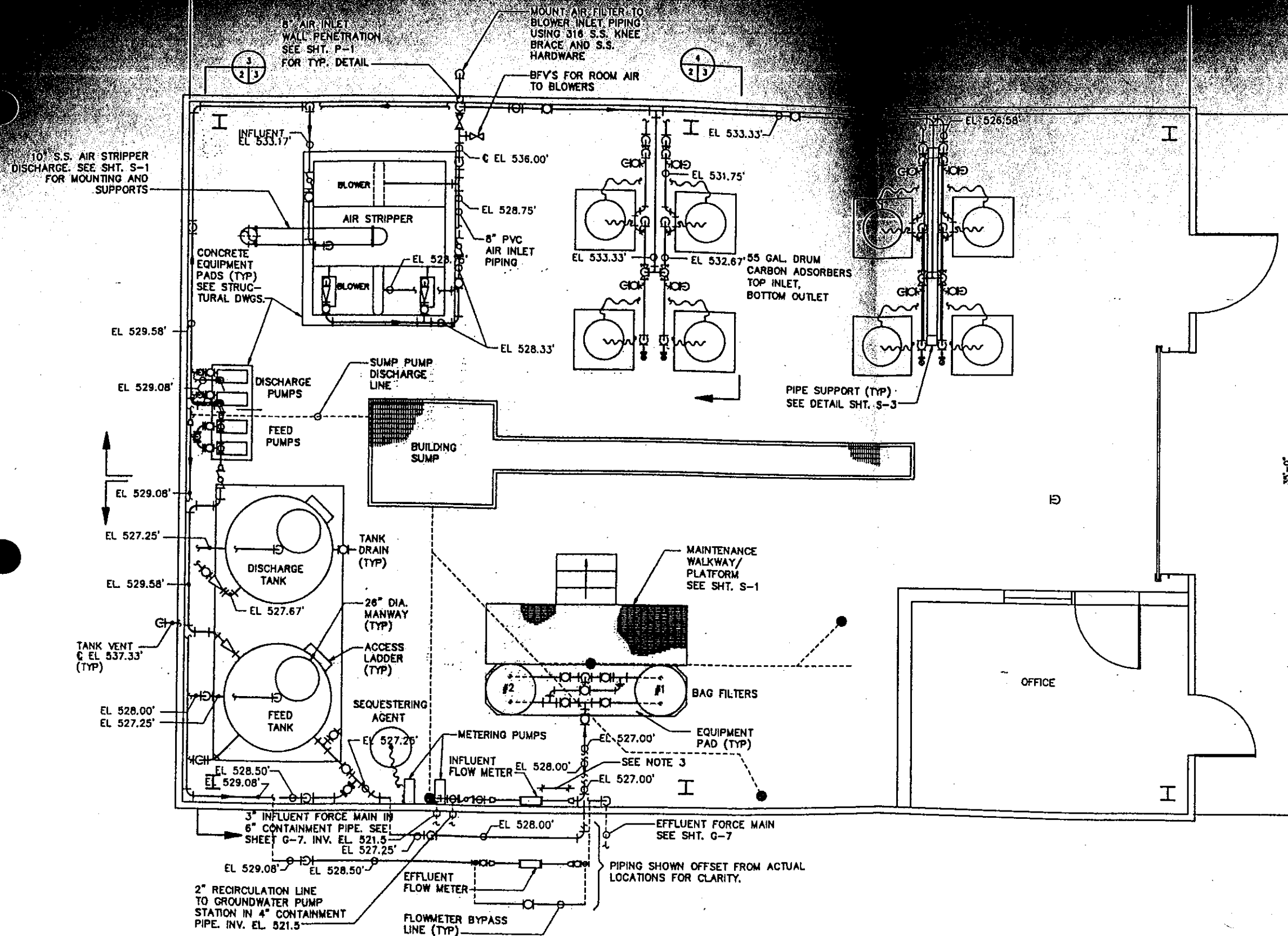


- NOTES:
1. WHEN LOCATED IN PAVEMENT, TAP IS TO BE KEPT BELOW GROUND SURFACE EXCEPT WHEN IN USE. UPON NOTIFICATION OF ACCEPTABLE SAMPLES RESULTS, CORPORATION STOP IS TO BE CLOSED, AND TAP AND TUBING DISCONNECTED.
 2. TAP MAY BE LOCATED AT THE SAME LOCATION OF A NEW WATER SERVICE. AFTER SAMPLE IS APPROVED, COPPER TUBING TO THE SURFACE IS TO BE REMOVED.
 3. LOCATION OF TAP IS SUBJECT TO PRIOR APPROVAL OF THE CITY OF ROCHESTER AND MONROE COUNTY HEALTH DEPARTMENT.
 4. MAXIMUM DISTANCE BETWEEN DISINFECTION/SAMPLING TAPS ON NEW WATER MAIN INSTALLATION IS 1000 FEET.

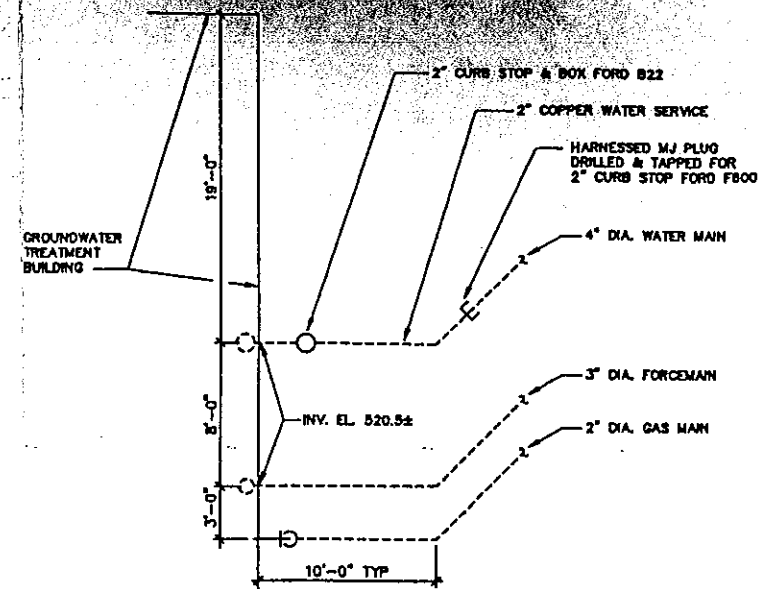
DISINFECTION SAMPLING TAP
NOT TO SCALE



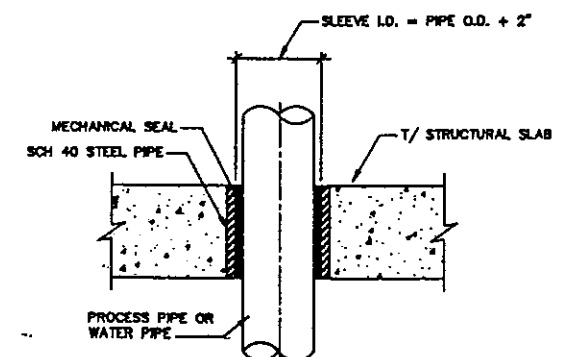
TYPICAL MANHOLE DETAIL
(PRECAST CONCRETE SECTIONS)
NOT TO SCALE



PLAN VIEW



ENLARGED PIPING PLAN #1
NOT TO SCALE

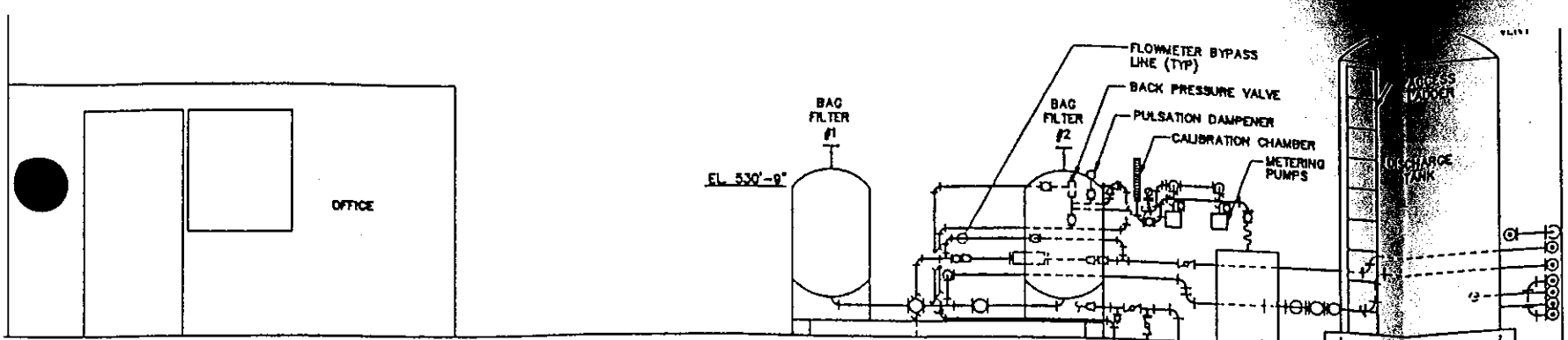


TYPICAL FLOOR PENETRATION DETAIL
NOT TO SCALE

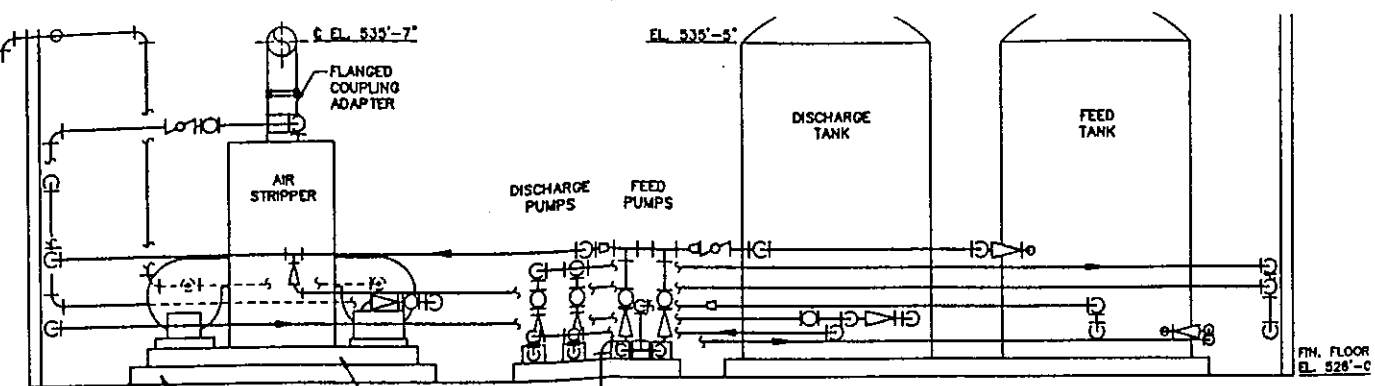
NOTE:

1. METERING PUMP PIPING NOT SHOWN. REFER TO SECTION
2. ALL PROCESS WASTEWATER PIPING TO BE 2\"/>
3. MINIMUM DIMENSION EACH SIDE OF INFLUENT/ EFFLUENT METERS TO BE 18\"/>
4. AIR STRIPPER INLET AND DISCHARGE PIPING TO BE INSULATED WITHIN BUILDING. SEE SPECIFICATIONS FOR MATERIALS.

THIS IS A VARIATION OF THE NEW YORK EDUCATION LAW SECTION 119(2)(b) FOR ANY PERSON WHOSE NAME IS LISTED IN THE SECTION OF A LICENSED PROFESSIONAL ENGINEER OR ARCHITECT. NO PART OF THIS DOCUMENT IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE NEW YORK EDUCATION LAW SECTION 119(2)(b).

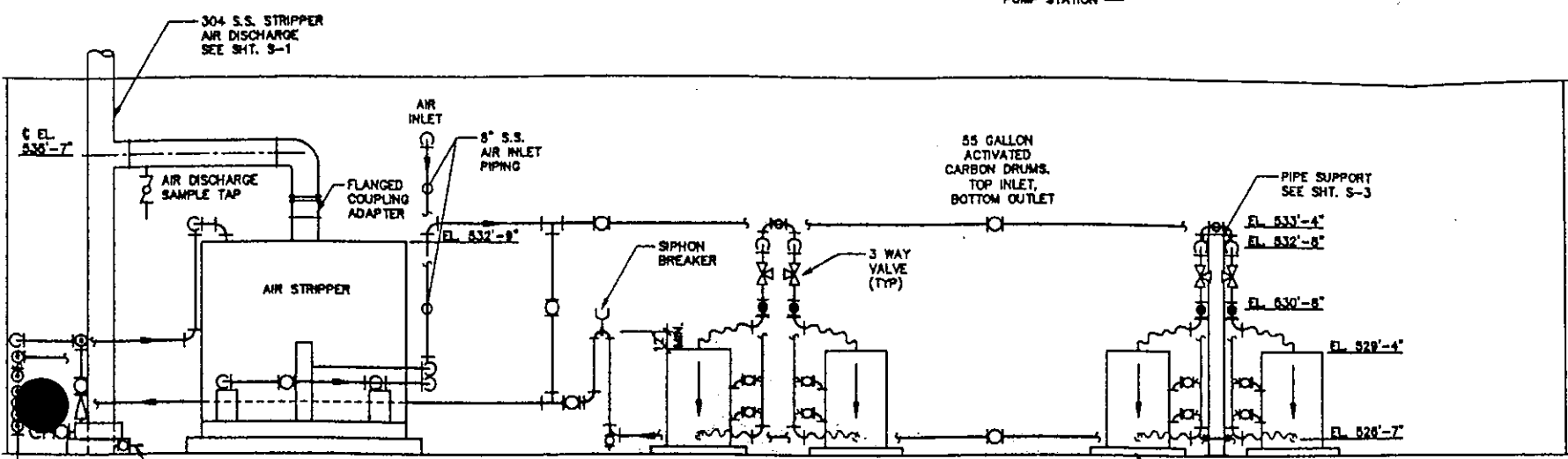


SECTION 1
2/3

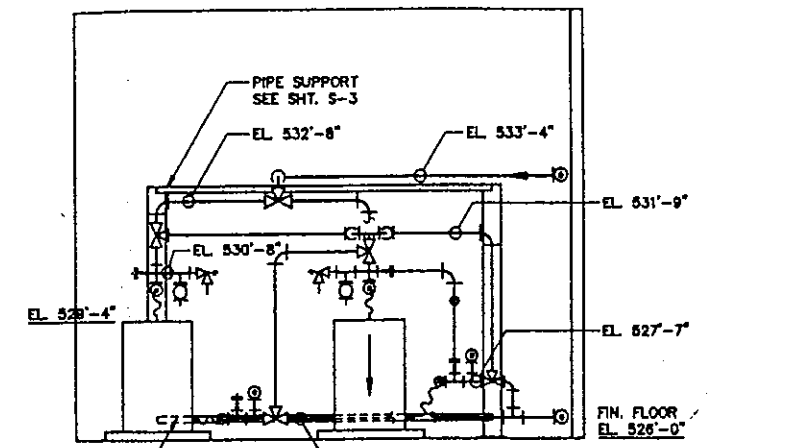


SECTION 3
2/3

- NOTES:
1. BAG FILTER DRAIN LINES TO BE FIELD LOCATED.
 2. BAG FILTER MAINTENANCE WALKWAY/PLATFORM NOT SHOWN FOR CLARITY.
 3. AIR DISCHARGE STACK NOT SHOWN IN SECTION 3 FOR CLARITY.
 4. METERING PUMP DISCHARGE SHOWN OFFSET FOR CLARITY.
 5. SEQUESTERING AGENT FEED TO BE CONNECTED TO GROUNDWATER INFLUENT PIPING DOWNSTREAM OF INFLUENT FLOWMETER.
 6. METERING PUMPS TO BE MOUNTED ON FABRICATED STEEL TABLE FROM PUMP VENDOR.
 7. ALL PROCESS WASTEWATER PIPING TO BE 2" PVC SCH. 80 UNLESS OTHERWISE NOTED. SEE SPECIFICATIONS FOR PIPING AND VALVE SCHEDULES. CONNECTIONS TO VALVES, PUMPS, AND OTHER EQUIPMENT TO BE REDUCED AS NECESSARY.
 8. FOR FLOOR PENETRATION DETAIL, SEE SHEET M-2.

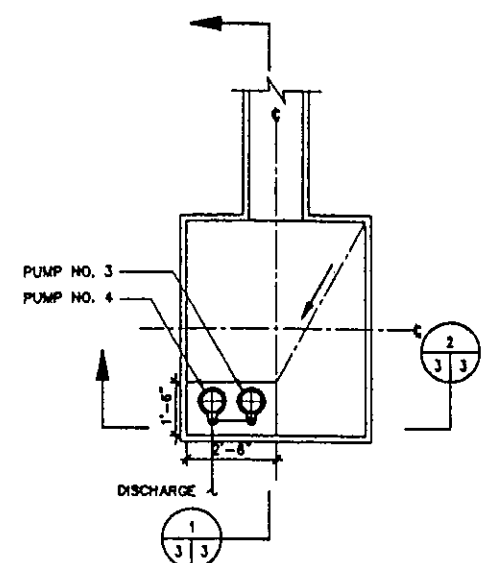


SECTION 2
2/3

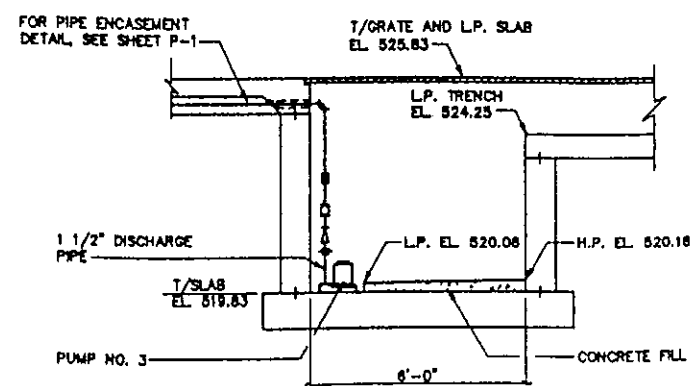


SECTION 4
2/3

NOTE: PRESSURE RELIEF VALVE DISCHARGE PIPING TO BE FIELD LOCATED.

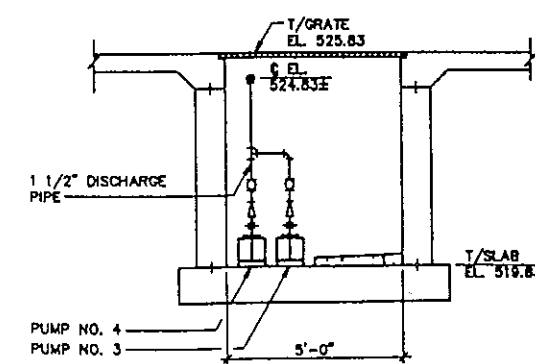


SUMP PUMP - PLAN VIEW

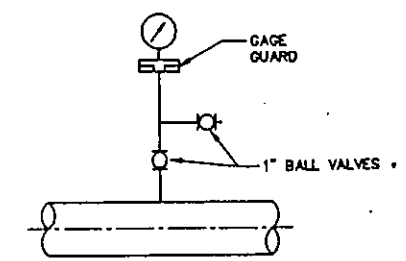


SECTION 3
3/3

NOTE: SEE SHEET S-1 FOR REINFORCING DETAILS.



SECTION 2
3/3



PRESSURE GAGE WITH GAGE GUARD DETAIL
NOT TO SCALE



REV.	BY	DATE	REVISIONS
1	KAL	10/1/94	ISSUED FOR PERMIT
2	9/11	10/1/94	REVISED FOR CONSTRUCTION

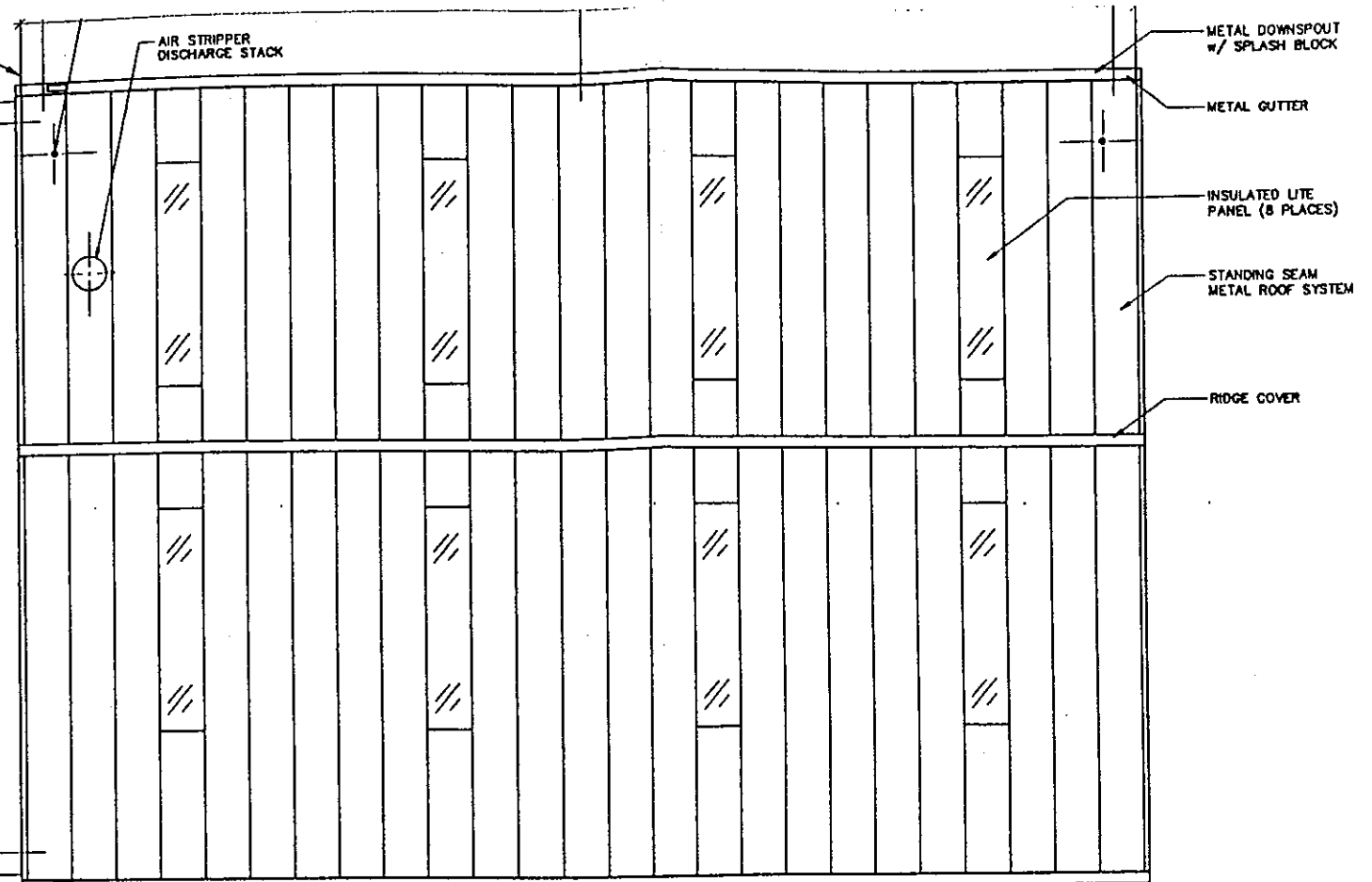
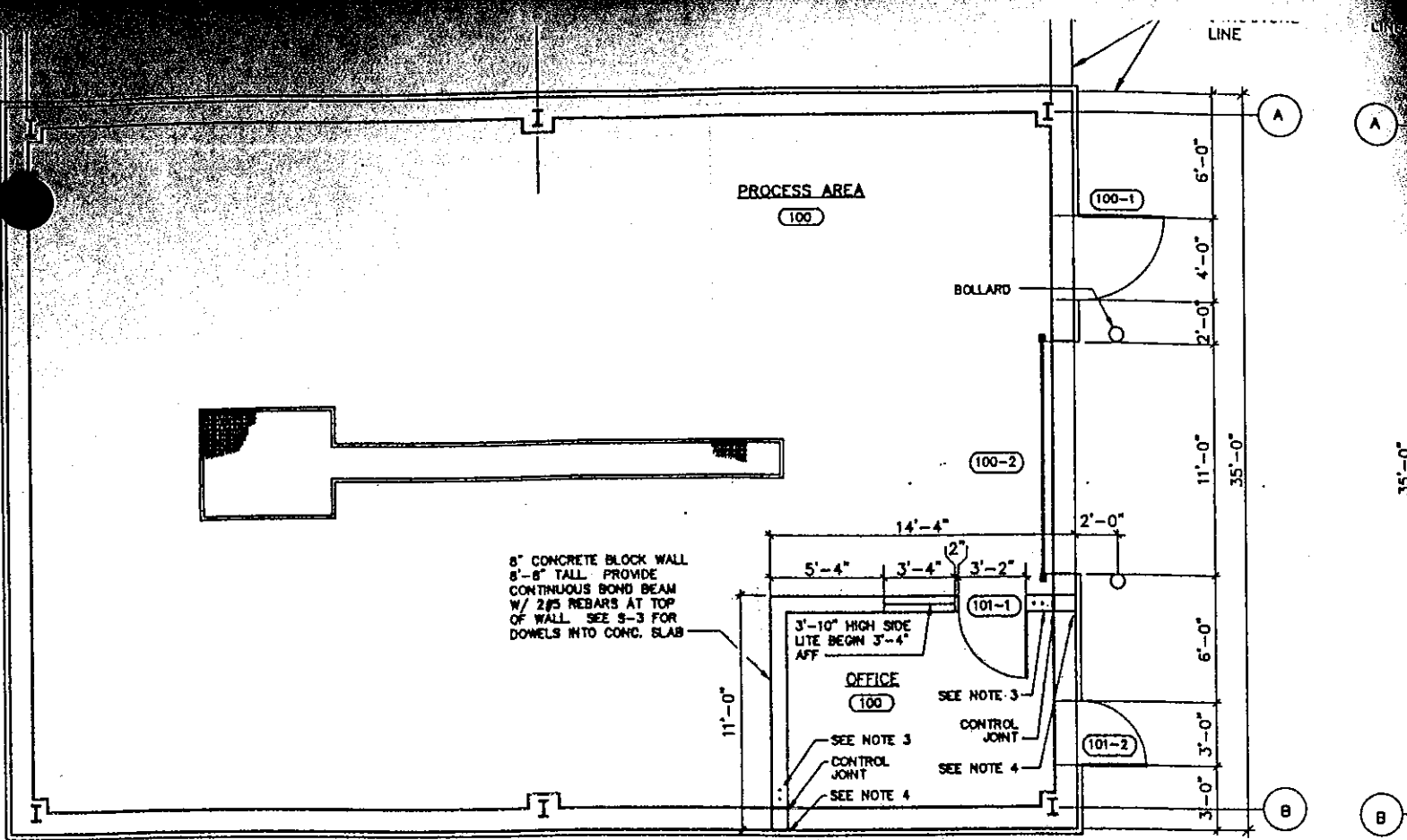
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIATION CONSTRUCTION

FIRE TRAINING ACADEMY
GROUNDWATER TREATMENT SYSTEM -
SECTIONS AND DETAILS

MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994
M SHEET 3 OF 3

THIS IS A VARIATION OF THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION'S STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF WASTEWATER TREATMENT PLANTS. THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION HAS REVIEWED AND APPROVED THIS VARIATION. THE VARIATION SHALL BE USED IN CONJUNCTION WITH THE STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF WASTEWATER TREATMENT PLANTS.

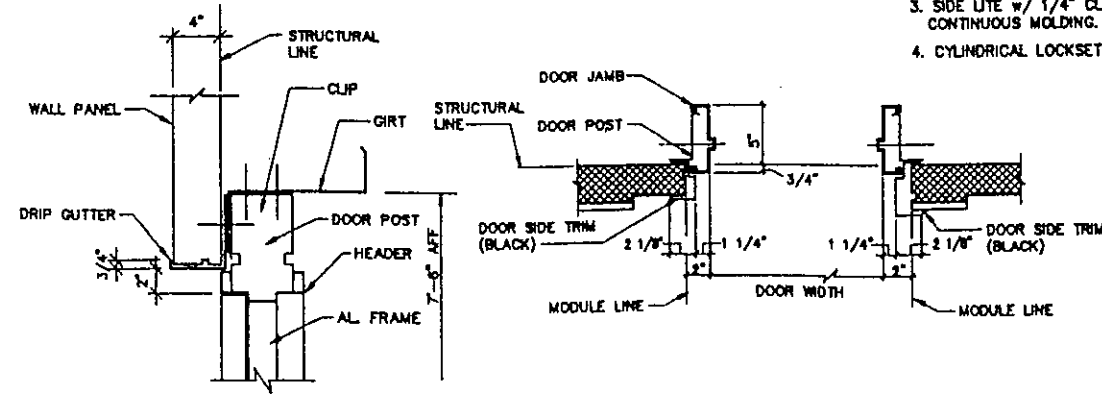


- NOTES:
1. PAINT EACH SIDE OF 8" CONCRETE BLOCK TO MATCH INTERIOR OF METAL BUILDING SIDING.
 2. PROVIDE "I" BAR SUSPENDED CEILING (2'x4' GRID) AND 6" FIBERGLASS INSULATION AT 8'-0" A.F.F. IN OFFICE.
 3. 2 #4 BARS FULL HEIGHT w/ DOWELS TO MATCH. GROUT CORES SOLID.
 4. 3/8" JOINT w/ BACKER ROD AND SEALANT EACH SIDE.

FLOOR PLAN
SCALE: 1/4" = 1'-0"

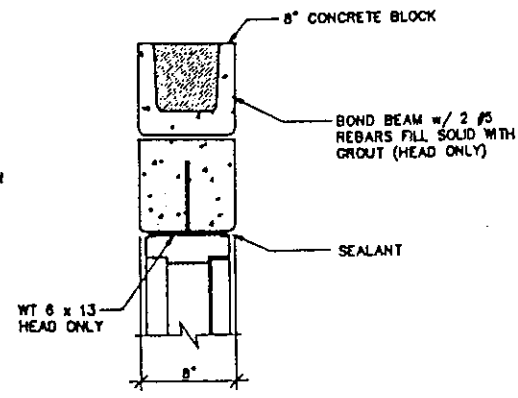
DOOR SCHEDULE						
DOOR NUMBER	ROUGH OPENING		DETAILS			REMARKS
	WIDTH	HEIGHT	HEAD	JAMB	THRESHOLD	
100-1	4'-0"	7'-8"	A	A	A	1,2,6
100-2	11'-0"	12'-0"	C	C	B	
101-1	8'-8"	7'-4"	B	B	A	3,4
101-2	3'-0"	7'-8"	A	A	A	2,5
200-1	3'-0"	7'-8"	B	B	A	2,5,7

1. VISION PANEL w/ 1/4" CLEAR WIRE GLASS
2. FULL PERIMETER WEATHER STRIPPING
3. SIDE LITE w/ 1/4" CLEAR WIRE GLASS AND CONTINUOUS MOLDING.
4. CYLINDRICAL LOCKSET
5. MORTISE LOCKSET
6. PANIC DEVICE WITH THUMB PIECE TRIM
7. VERIFY ROUGH OPENING IN EXISTING MASONRY BUILDING

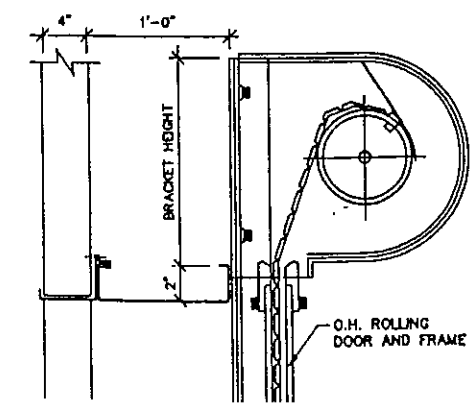


HEAD A
SCALE: 1 1/2" = 1'-0"

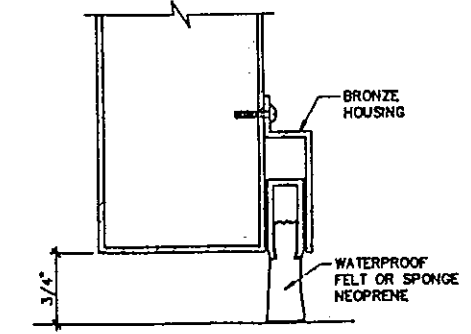
JAMB A
SCALE: 1 1/2" = 1'-0"



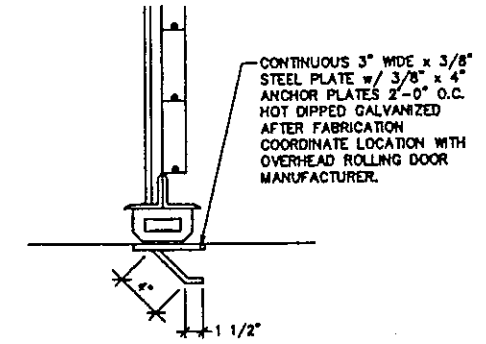
HEAD B JAMB B - SIMILAR
SCALE: 1 1/2" = 1'-0"



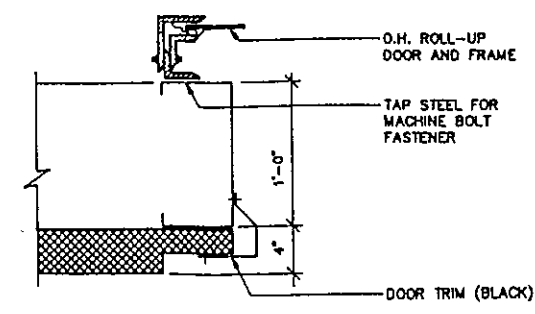
HEAD C
SCALE: 1 1/2" = 1'-0"



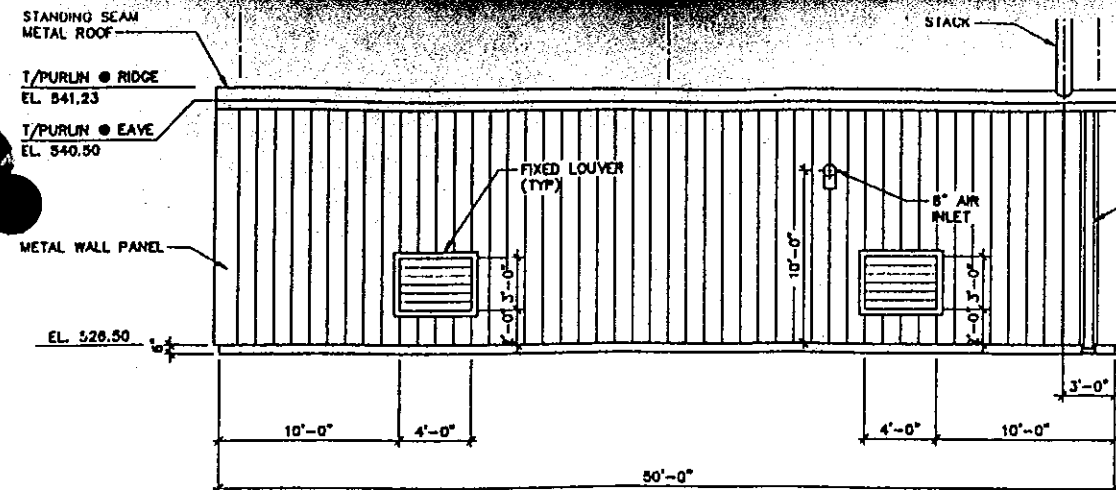
THRESHOLD A
SCALE: FULL



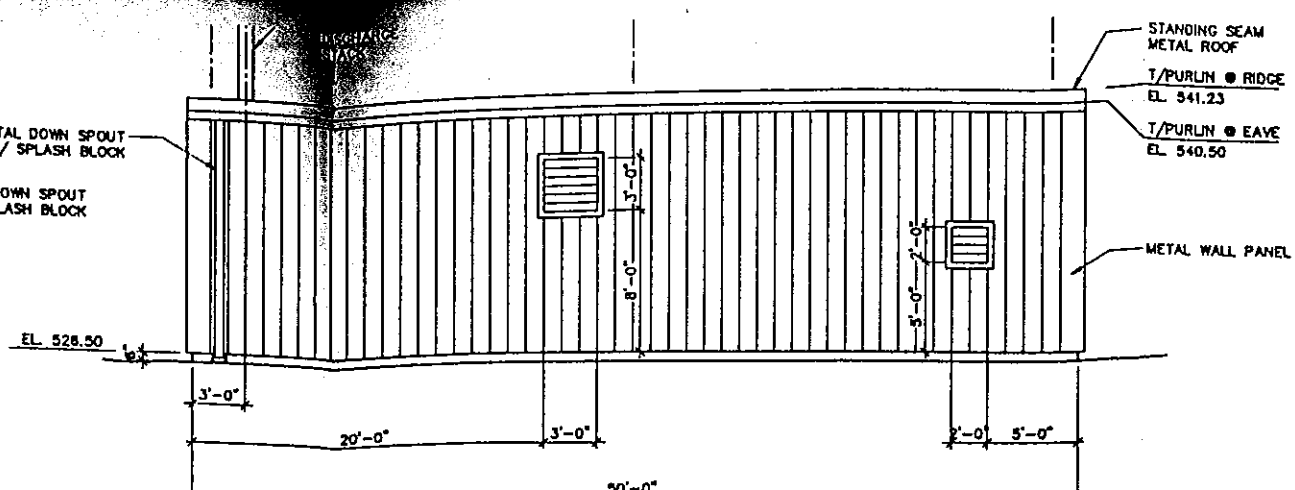
THRESHOLD B
SCALE: 1 1/2" = 1'-0"



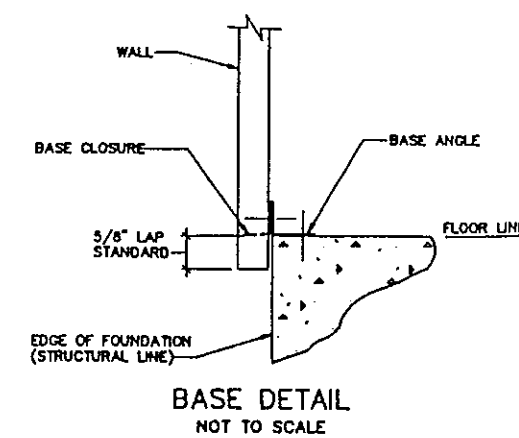
JAMB C
SCALE: 1 1/2" = 1'-0"



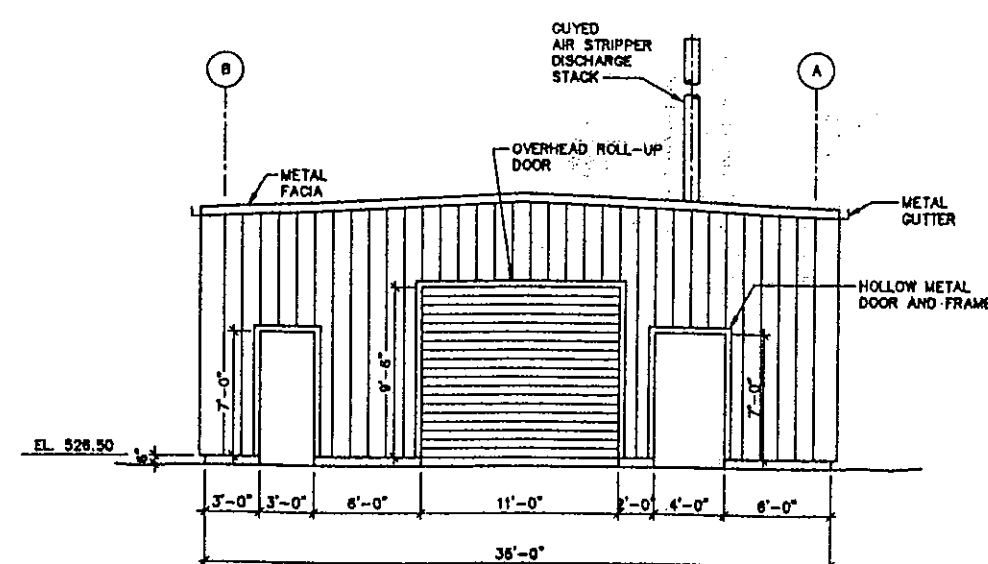
WEST ELEVATION
SCALE: 3/16" = 1'-0"



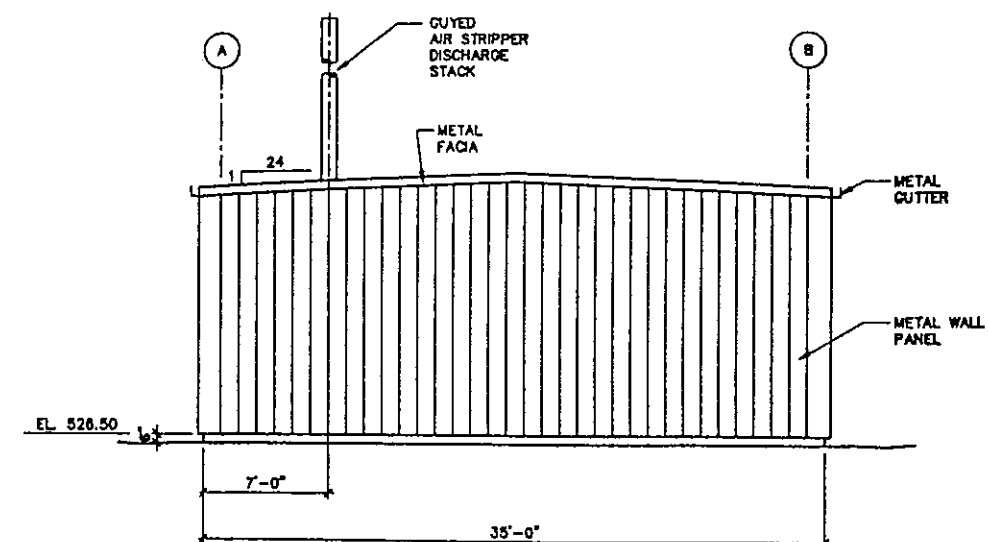
EAST ELEVATION
SCALE: 3/16" = 1'-0"



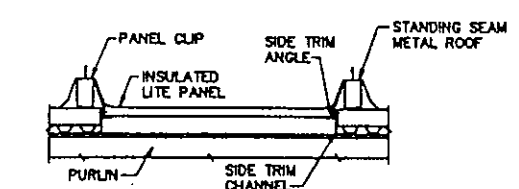
BASE DETAIL
NOT TO SCALE



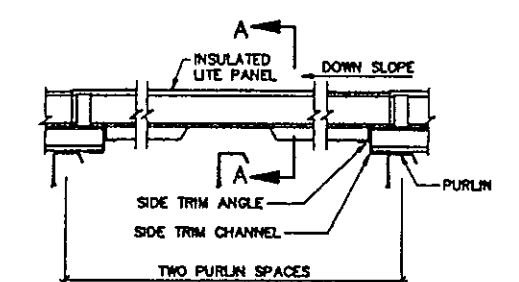
NORTH ELEVATION
SCALE: 3/16" = 1'-0"



SOUTH ELEVATION
SCALE: 3/16" = 1'-0"

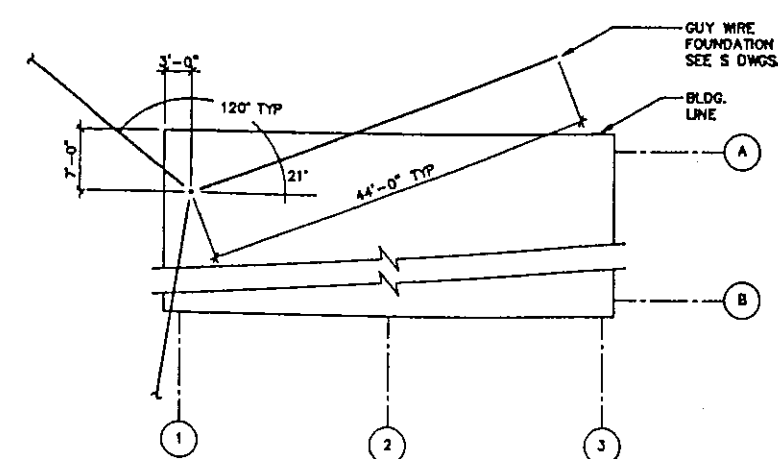


SECTION A-A

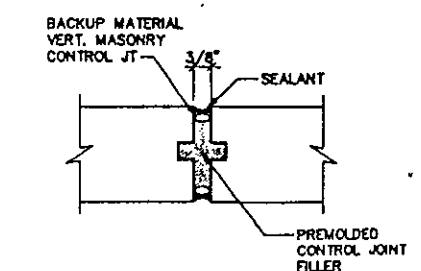


INSULATED LITE PANEL
NOT TO SCALE

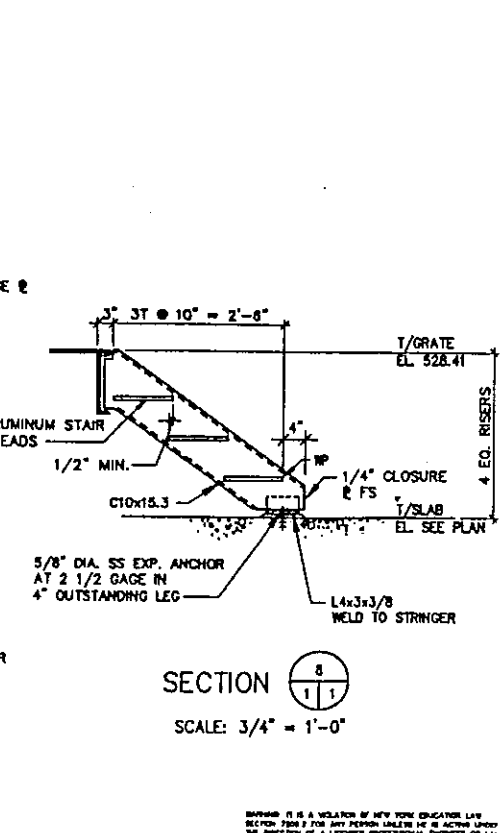
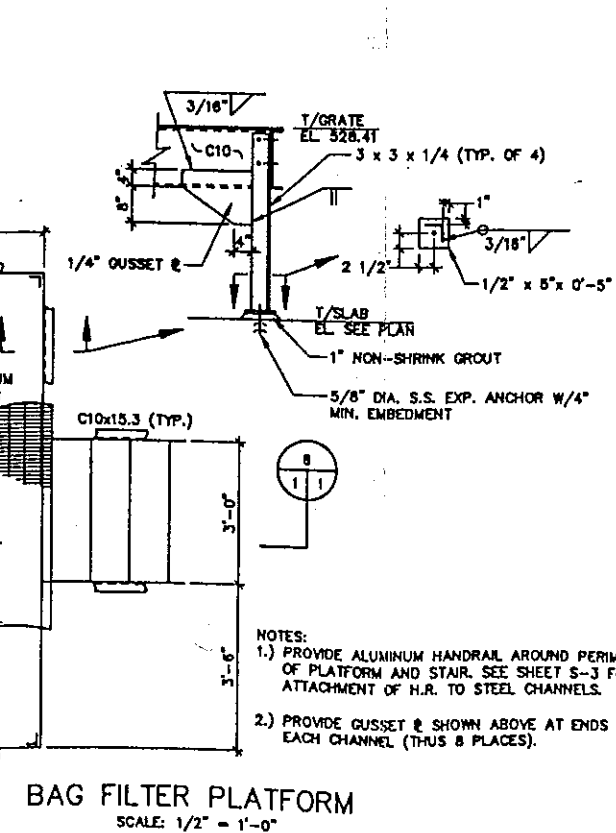
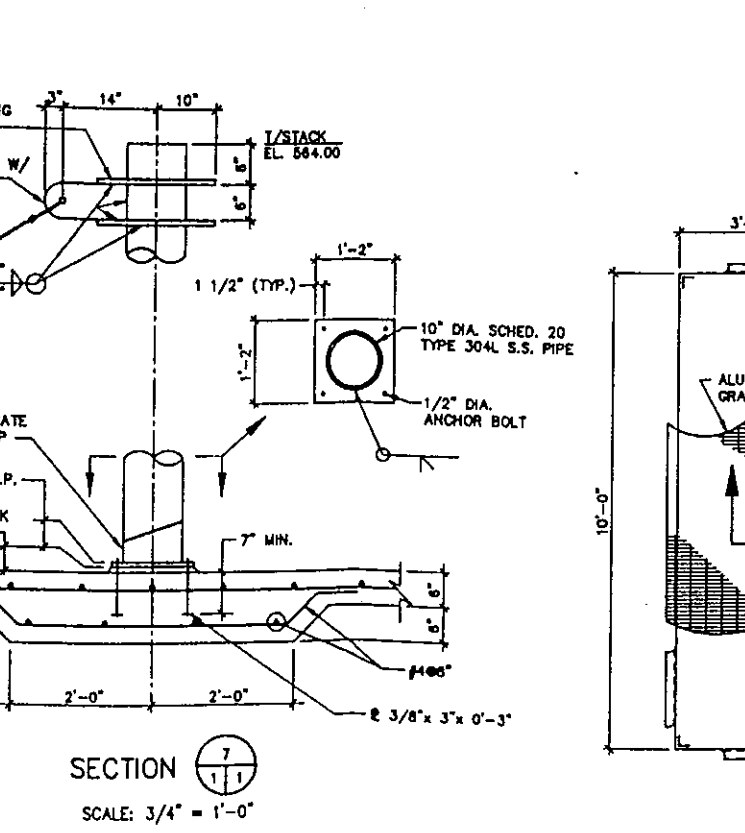
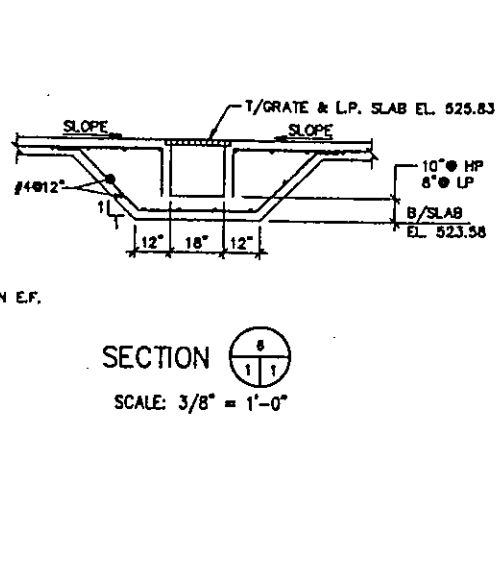
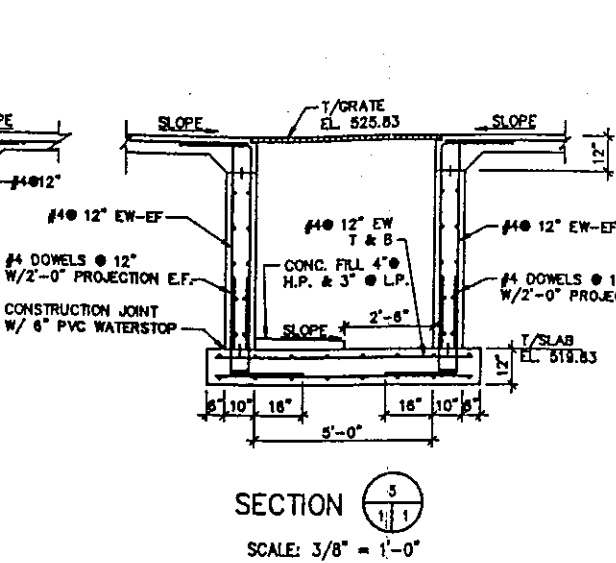
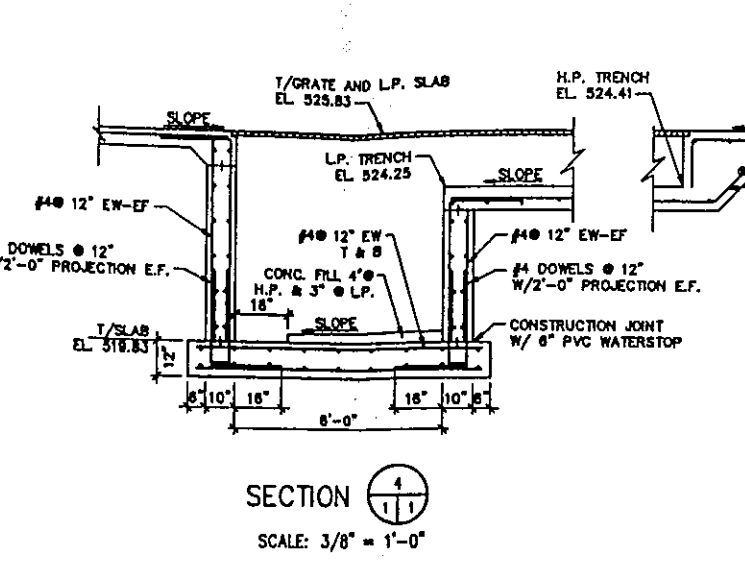
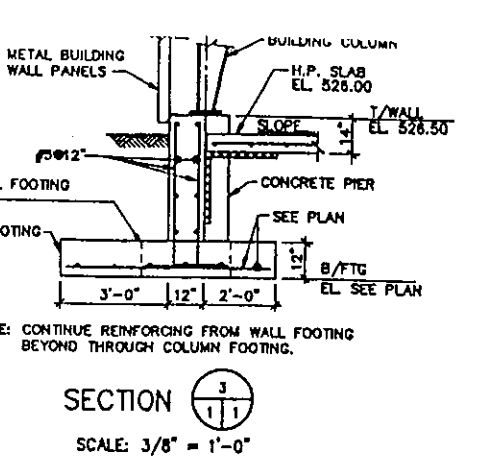
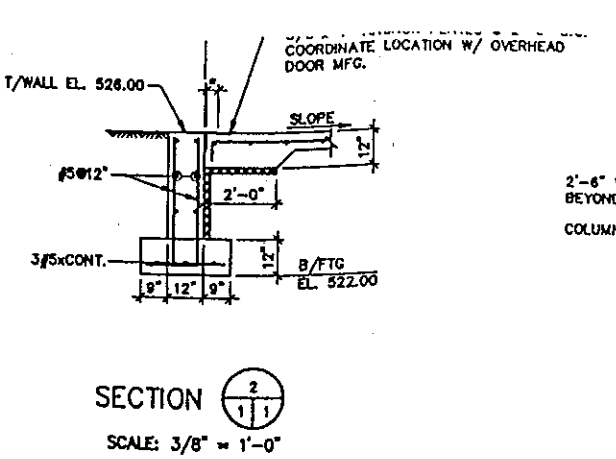
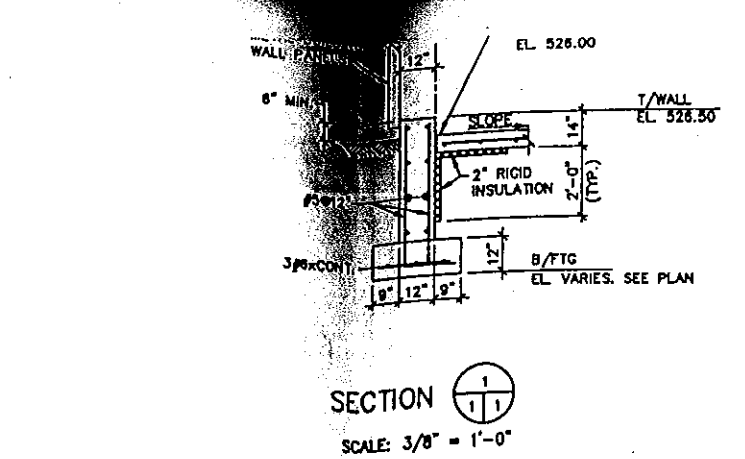
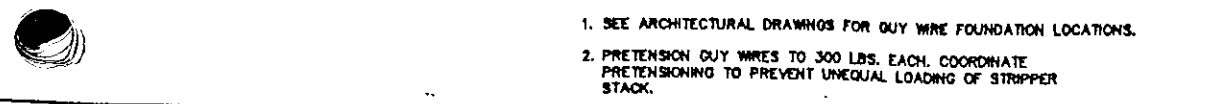
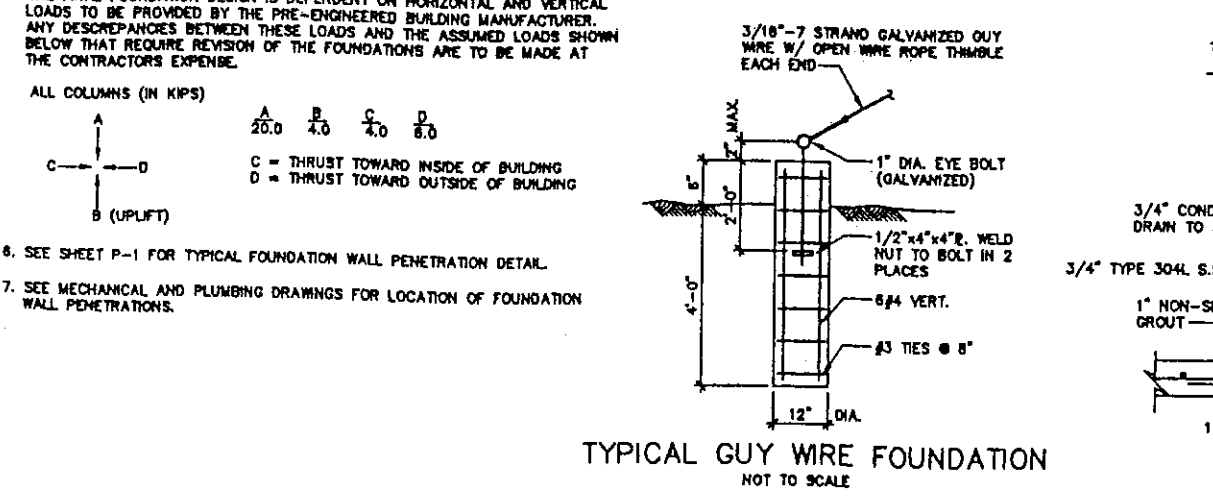
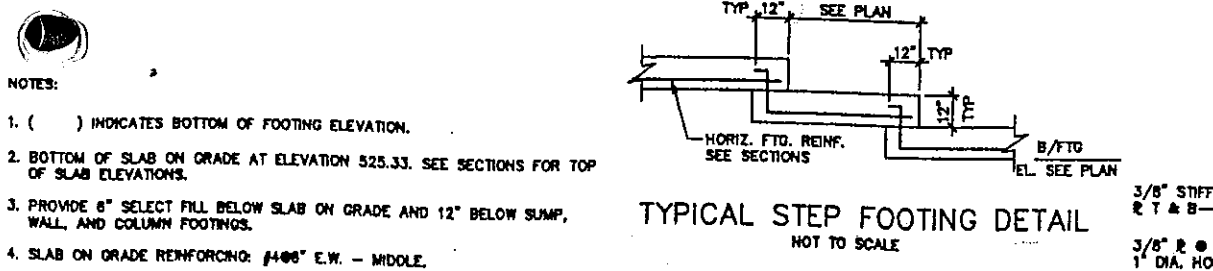
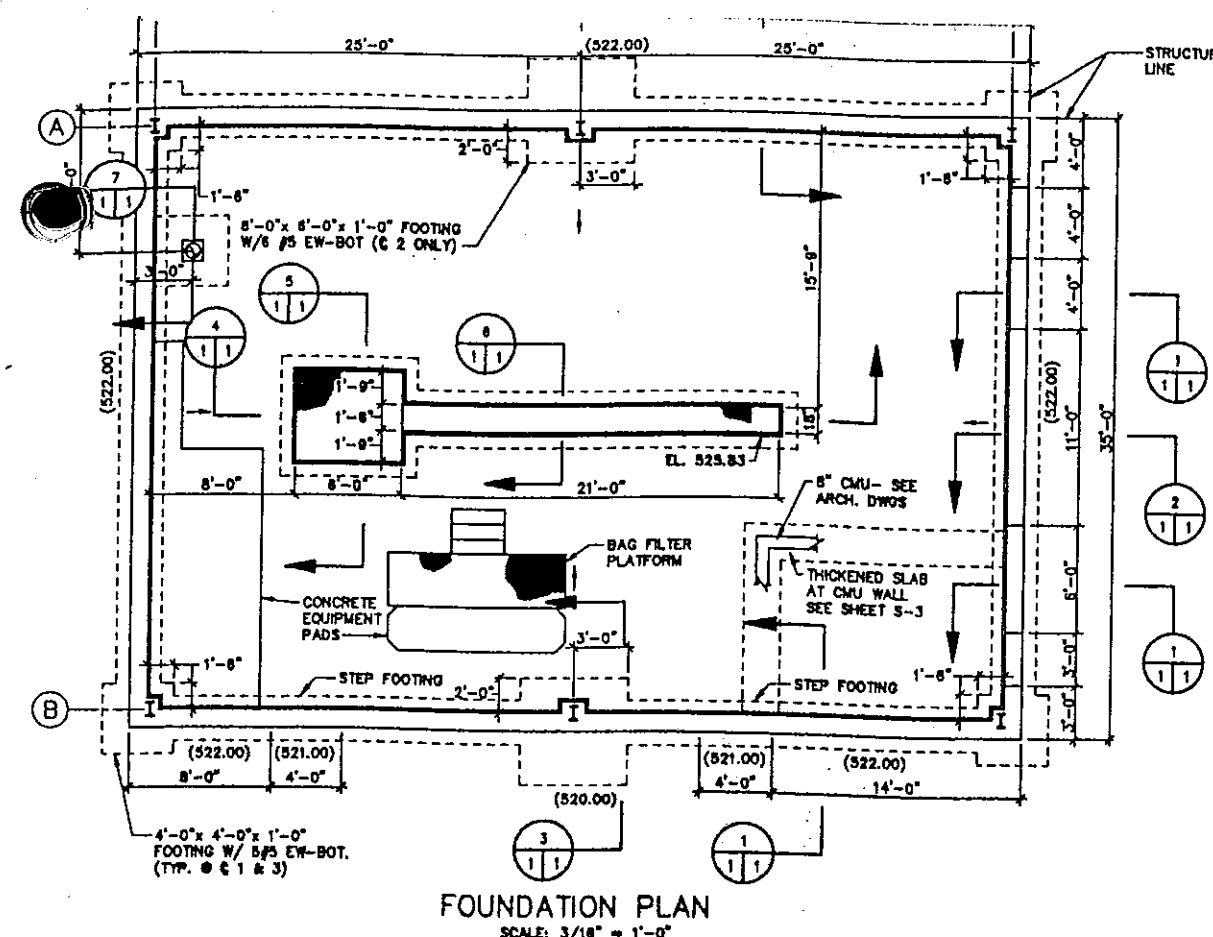
- GENERAL NOTES:
1. ALL EXITS SHALL BE OPERABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE.
 2. FOR DOOR SCHEDULE AND DETAILS, SEE SHEET A-1
 3. ALIGN ALL LOUVER FACES WITH OUTSIDE PLANE OF METAL WALL PANELS.
 4. PROVIDE FIXED LOUVERS FOR ALL CONDITIONS.
 5. COORDINATE ALL PENETRATIONS IN METAL SKING AND ROOF WITH APPROVED EQUIPMENT.

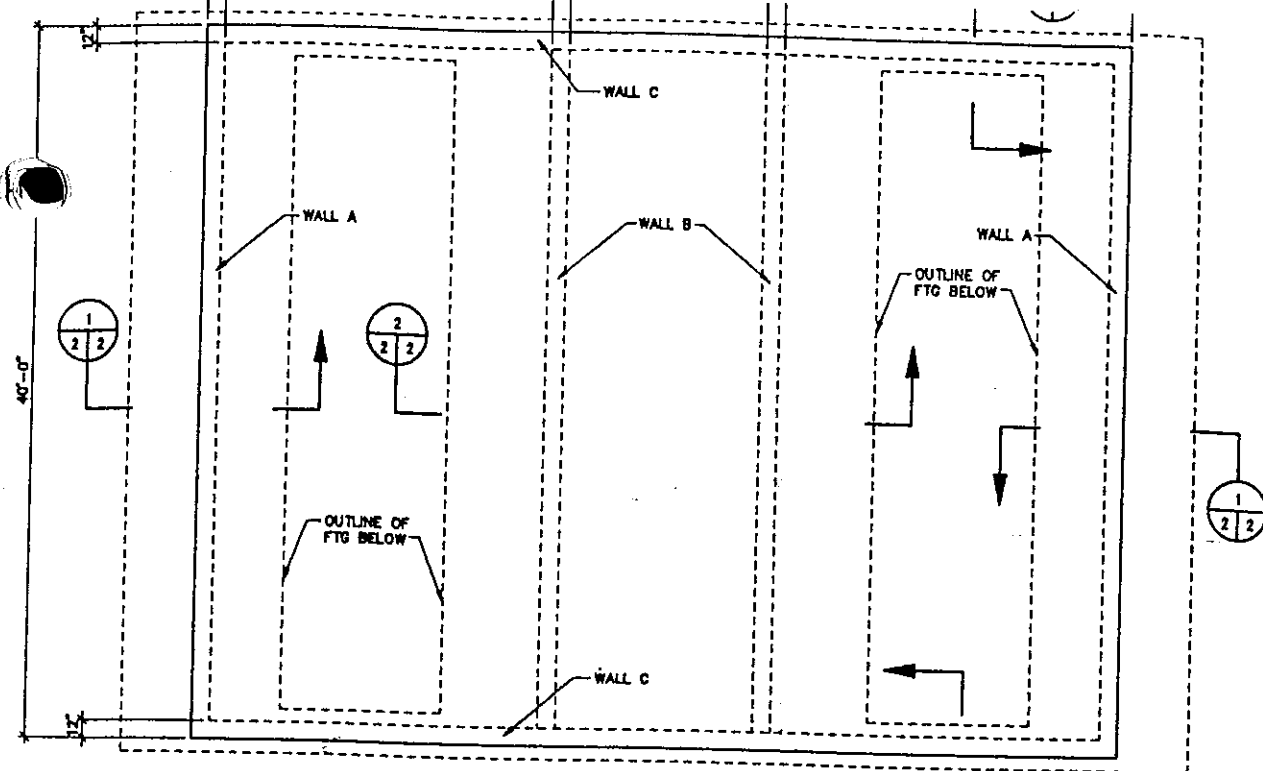


AIR STRIPPER STACK GUY WIRE LAYOUT
SCALE: 3/32" = 1'-0"



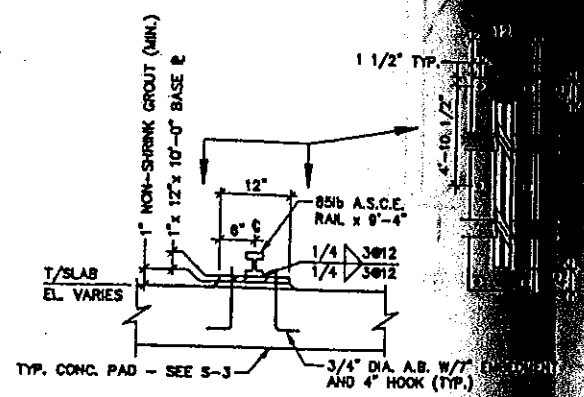
TYPICAL CONTROL JOINT DETAIL
SCALE: 1 1/2" = 1'-0"





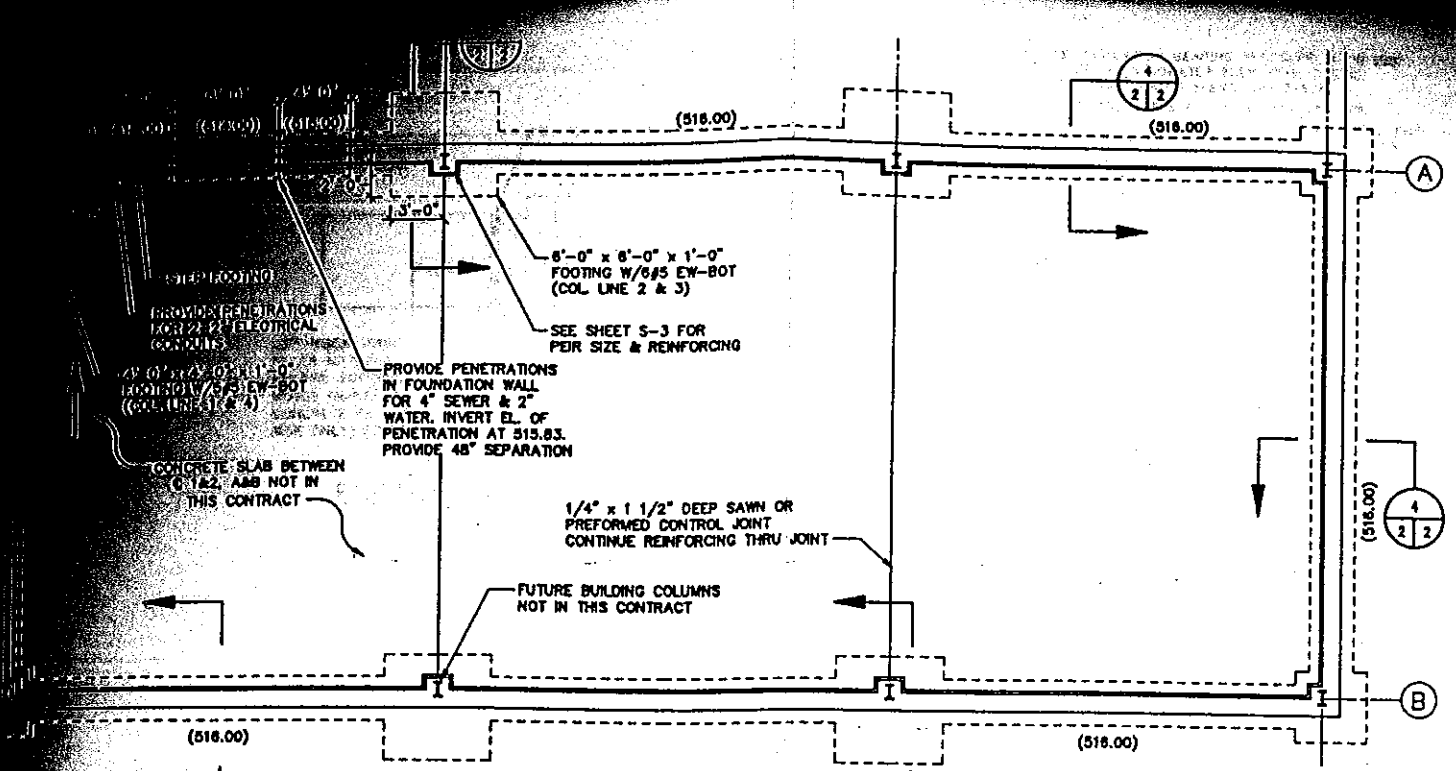
SMOKE HOUSE FOUNDATION PLAN
SCALE: 3/16" = 1'-0"

- NOTES:
1. FOOTINGS TO BEAR AT ELEVATION 514.5. SEE SECTIONS FOR FOOTING SIZE AND REINFORCING.
 2. TOP OF 6" SLAB ON GRADE AT ELEVATION 519.0.
 3. SLAB ON GRADE REINFORCING: #4@8" E.W.-MIDDLE.
 4. FOUNDATION WALLS A, B, AND C ARE DESIGNED FOR THE FOLLOWING LOADS:
WALL A 7,800 POUNDS PER LINEAL FOOT.
WALL B 15,800 POUNDS PER LINEAL FOOT.
WALL C 3,250 POUNDS PER LINEAL FOOT.
 5. PROVIDE 12" SELECT FILL BELOW FOOTINGS AND AS SHOWN IN SECTIONS.



RAILROAD CAR FOUNDATION
SCALE: 3/4" = 1'-0"

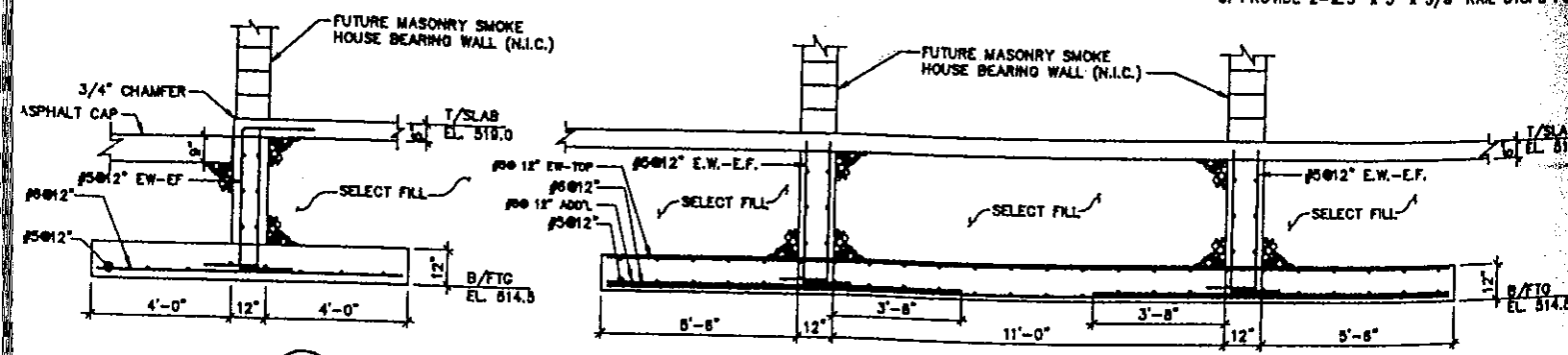
- NOTES:
1. PROVIDE ONE FOUNDATION FOR EACH WHEEL PAIR OF EXISTING RAIL CAR.
 2. COORDINATE LOCATION OF RAILS W/ RAIL CAR WHEEL LOCATIONS.
 3. PROVIDE 2- $\angle 3" \times 3" \times 3/8"$ RAIL STOPS FOR EACH A.S.C.E. RAIL.



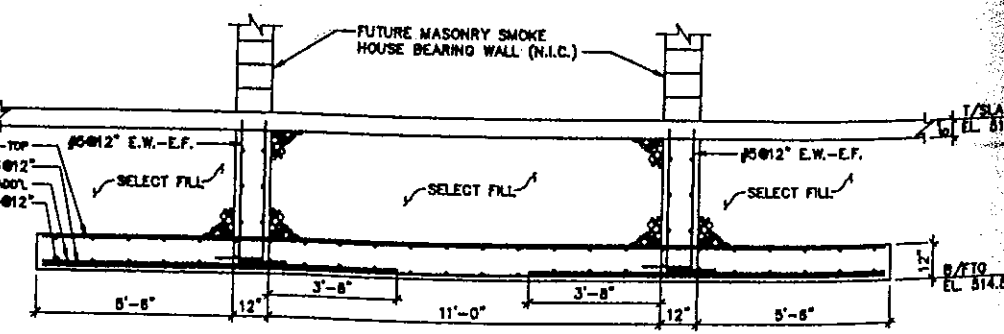
TRAINING CENTER FOUNDATION PLAN
SCALE: 3/16" = 1'-0"

- NOTES:
1. () INDICATES BOTTOM OF FOOTING ELEVATION.
 2. FOOTINGS TO BEAR AT ELEVATION 516.00. SEE PLAN FOR FOOTING SIZE AND REINFORCING.
 3. TOP OF 6" SLAB ON GRADE AT ELEVATION 520.50.
 4. SLAB ON GRADE REINFORCING: #4@12" E.W.-MIDDLE.
 5. PROVIDE 6" SELECT FILL BELOW SLAB ON GRADE AND 12" BELOW WALL AND COLUMN FOOTINGS.
 6. PROVIDE VAPOR BARRIER BELOW SELECT FILL UNDER SLAB ON GRADE.
 7. SEE SHEET P-1 FOR TYPICAL FOUNDATION WALL PENETRATION DETAIL.

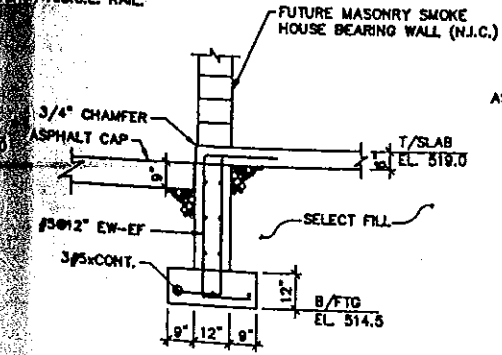
8. THE COLUMN FOOTINGS ARE DESIGNED FOR THE FOLLOWING LOADS AND LOAD CASES:
ALL COLUMNS (IN KIPS)
- | | A | B | C | D |
|--|------|-----|-----|-----|
| | 20.0 | 4.0 | 4.0 | 8.0 |
- C = THRUST TOWARD INSIDE OF BUILDING
D = THRUST TOWARD OUTSIDE OF BUILDING
B (UPLIFT)
- LOAD CASE I- COMBINED EFFECT OF COLUMN LOAD A & D
LOAD CASE II- COMBINED EFFECT OF COLUMN LOAD B & C
9. PROVIDE 80 MIL HDPE MEMBRANE OVER FINISHED CONCRETE SLAB. BALAST MEMBRANE WITH #2 WASHED GRAVEL (4" MIN.)



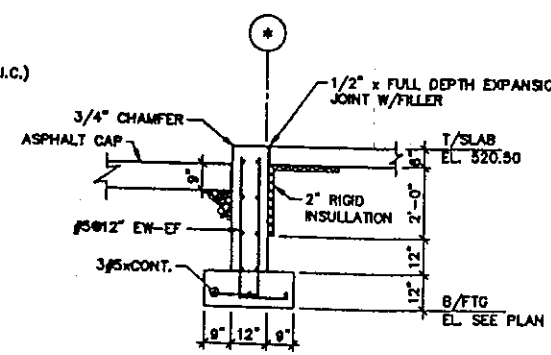
SECTION 1/2
SCALE: 3/8" = 1'-0"



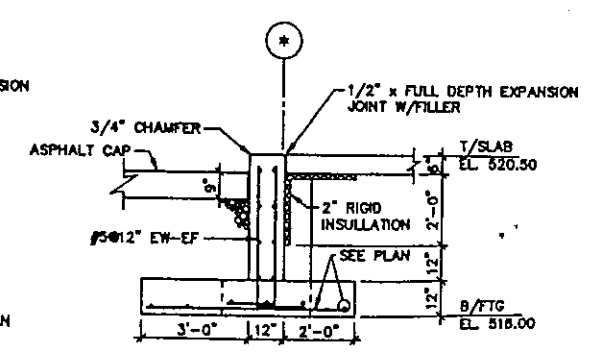
SECTION 2/2
SCALE: 3/8" = 1'-0"



SECTION 3/2
SCALE: 3/8" = 1'-0"

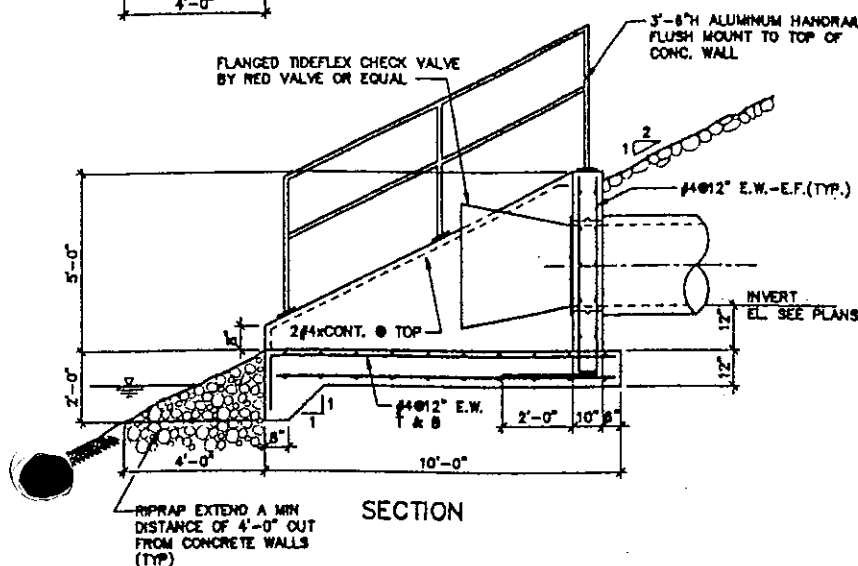
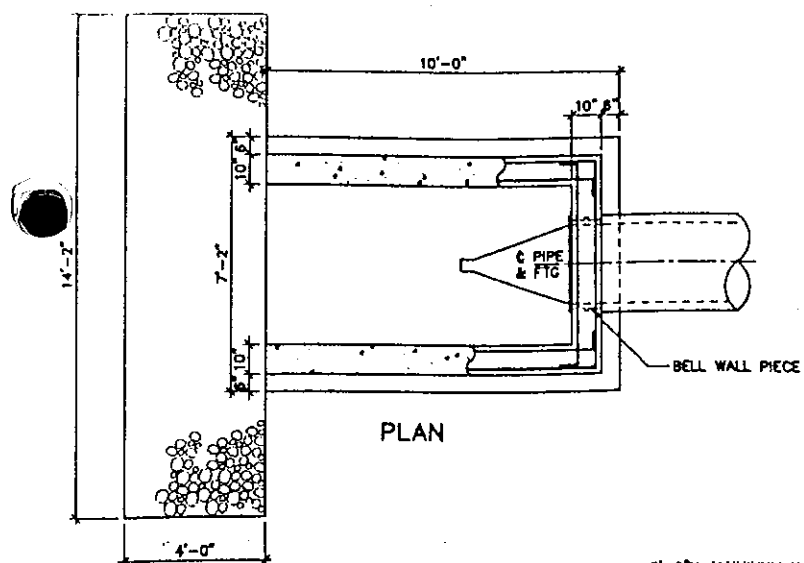


SECTION 4/2
SCALE: 3/8" = 1'-0"

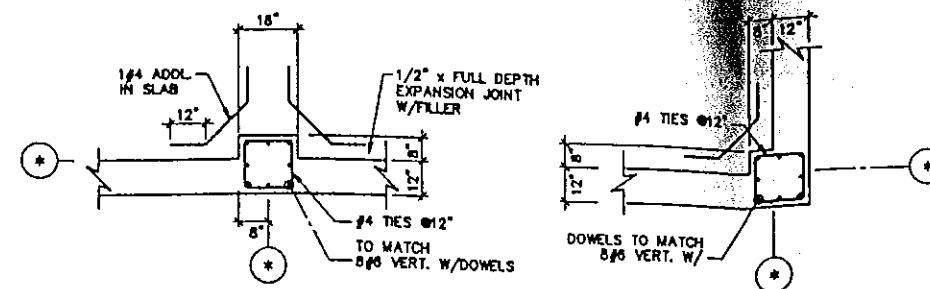


SECTION 5/2
SCALE: 3/8" = 1'-0"

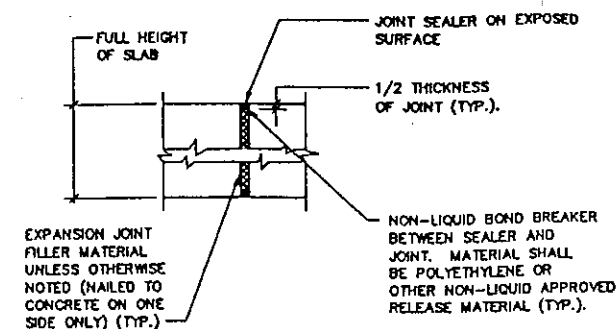
NOTE: CONTINUE REINFORCING FROM WALL FOOTING BEYOND THROUGH COLUMN FOOTING.



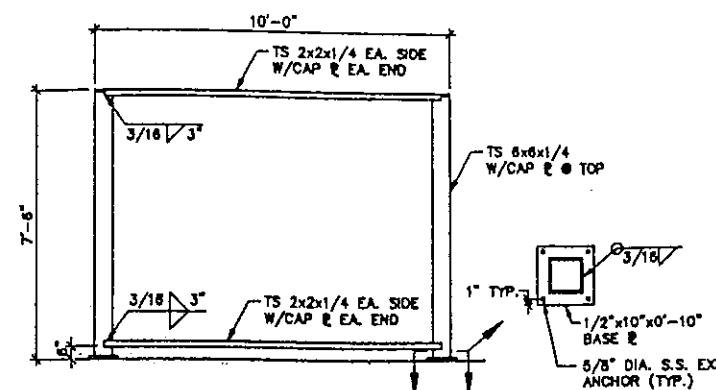
TYPICAL HEADWALL DETAIL
SCALE: 3/8" = 1'-0"



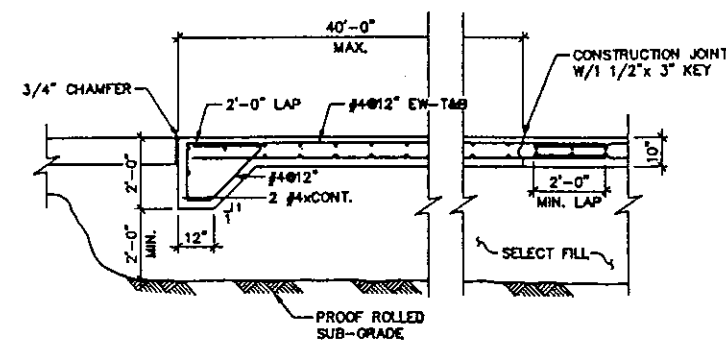
TYPICAL COLUMN DETAILS AND ADDITIONAL SLAB REINFORCING AT COLUMN PIERS
SCALE: 3/8" = 1'-0"



EXPANSION JOINT DETAIL
NOT TO SCALE

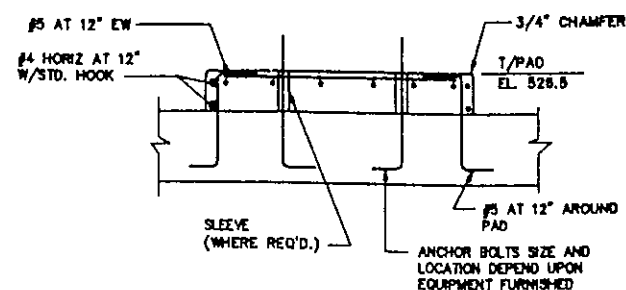


TYPICAL PIPE SUPPORT FRAME @ CARBON FILTERS
NOT TO SCALE



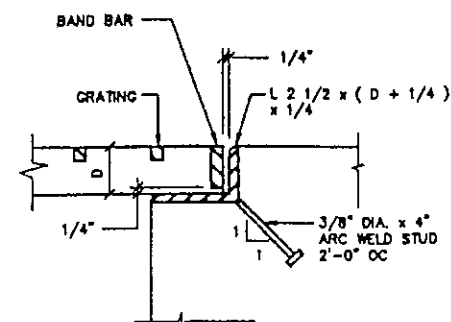
TYPICAL CONCRETE PAD DETAIL
NOT TO SCALE

NOTES:
1. SEE PLANS FOR PAD DIMENSIONS.
2. PROVIDE 1/2" EXPANSION JOINT WHERE PAD IS ADJACENT TO EXISTING STRUCTURES.

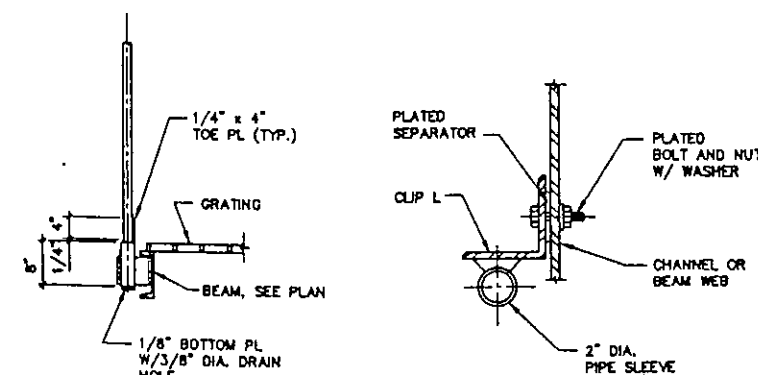


TYPICAL CONCRETE EQUIPMENT PAD DETAIL
NOT TO SCALE

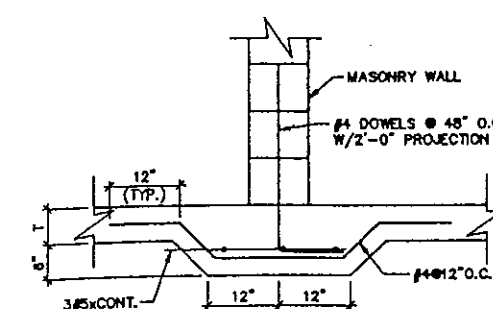
COORDINATE PAD SIZE DURING CONSTRUCTION WITH APPROVED EQUIPMENT.



TYPICAL GRATING SUPPORT DETAIL
NOT TO SCALE



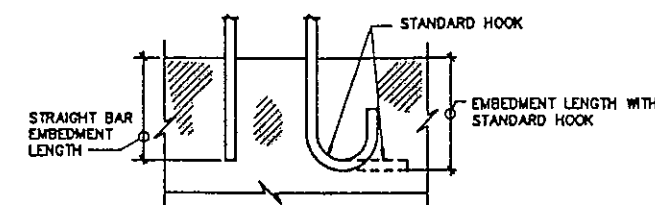
MOUNTING DETAILS RAILING POST BASE CONNECTIONS
NOT TO SCALE



TYPICAL THICKENED SLAB UNDER MASONRY WALLS
SCALE: 3/4" = 1'-0"

- A) SHALLOW FOUNDATION BEARING PRESSURE: 1300 PSF
B) APPROXIMATE GROUNDWATER ELEVATION: 515.00
C) 100-YEAR FLOOD WATER ELEVATION: 519.00
- F-2 CONCRETE GENERAL NOTES APPLY TO FOUNDATIONS.
F-3 LEVELS OF BACKFILL AGAINST CONCRETE WALLS SHALL NOT DIFFER BY MORE THAN 2'-0" ON EITHER SIDE OF WALLS UNLESS ADEQUATELY BRACED.
F-4 PROTECT EXCAVATION FROM FLOODING UNTIL ALL WALLS AND GRADE LEVEL SLABS ARE IN PLACE. WATER LEVEL SHALL BE MAINTAINED BELOW TOP OF BACKFILL AT ALL TIMES.
- CONCRETE
C-1 CONCRETE STRENGTH: 4000 PSI AT 28 DAYS. WEIGHT: 145 PCF.
C-2 BAR REINFORCEMENT: ASTM A615, GRADE 60
C-3 MESH REINFORCEMENT: ASTM A185 AND A82
C-4 DETAILS, WORKMANSHIP, AND GENERAL PROCEDURE: ACI 318, ACI 315, ACI 301, UNLESS OTHERWISE NOTED.
C-5 THE MINIMUM LENGTH OF LAPS FOR SPLICES SHALL BE AS GIVEN IN THE TABLE FOR CLASS "B" LAPS. PROVIDE CLASS "A" LAPS WHERE NOTED ON THE DRAWINGS OR WHERE NO MORE THAN ONE-HALF OF THE BARS ARE LAP SPICED WITHIN A LAP LENGTH.

REINFORCING LAP SPlice & EMBEDMENT LENGTH							
BAR SIZE	BAR SPACING	MINIMUM LAP LENGTH (INCHES)				MIN. EMBEDMENT LGTH. (IN.)	
		TOP BARS		OTHER BARS		STRAIGHT BARS	
		CLASS A	CLASS B	CLASS A	CLASS B	TOP BARS	WITH STD. HOOK
#3		14	18	12	14	14	12
#4		19	24	14	19	19	14
#5		23	30	18	23	23	18
#6	8" TO 12"	28	36	21	28	28	21
#7		32	42	25	32	32	25
#8		37	48	28	37	37	28



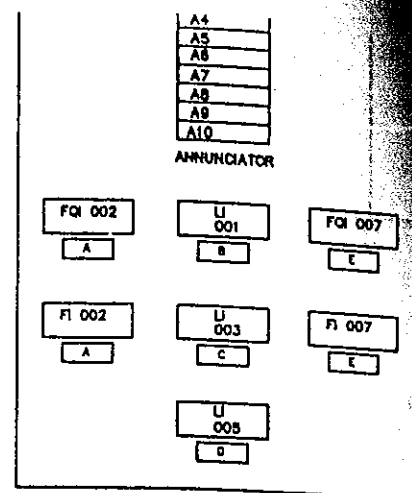
- C-6 CONSTRUCTION JOINTS SHALL BE LOCATED AS SHOWN ON THE DRAWINGS. SEE SPECIFICATIONS FOR LOCATION OF ADDITIONAL JOINTS.
C-7 CONCRETE COVER FOR REINFORCING SHALL BE:
A. FOOTING & SLAB ON GROUND 3"
B. FORMED SURFACES EXPOSED TO WEATHER OR IN CONTACT WITH SOIL 2"

STRUCTURAL STEEL

- S-1 GENERAL REQUIREMENTS: AISC SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, 1989 AND LATEST SUPPLEMENTS.
S-2 MATERIAL: ASTM A36.
S-3 CONNECTIONS: SEE SPECIFICATIONS.
S-4 PAINTING: SEE SPECIFICATIONS. DO NOT PAINT SURFACES TO BE IN CONTACT WITH FIELD PLACED CONCRETE.

A	ANALYSIS		ALARM	
B	BURNER/FLAME		CONTROL	CLOSED
C	CONDUCTIVITY (ELECTRICAL)			
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL	DETECTOR	
E	VOLTAGE (ELM)		PRIMARY ELEMENT	
F	FLOW RATE	RATIO (FACTOR)		
G	GASING (DIMENSIONAL)		GLASS GAGE (UNCALIBRATED)	
H	HAND (MANUALLY INITIATED)			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER	SCAN		
K	TIME OR TIME SCHEDULE LEVEL		CONTROL STATION	
L	MOISTURE OR HUMIDITY		LIGHT (PILOT)	LOW
M	UNCLASSIFIED		UNCLASSIFIED	MIDDLE OR INTER-MEDIATE
N	OVERLOAD		ORFICE (RESTRICTION)	UNCLASSIFIED
O	PRESSURE OR VACUUM		PORT (TEST CONNECTION)	OPEN
P	QUANTITY	INTEGRATE OR TOTALIZE		
R	RADIOACTIVITY		RECORD OR PRINT	REMOTE
S	SPEED, FREQUENCY/SAFETY		SWITCH	
T	TEMPERATURE		TRANSMIT	
U	UNIT		MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION		VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL	
X	SHOCK/FIRE		UNCLASSIFIED	UNCLASSIFIED
Y	EVENT STATUS	Y AXIS	RELAY OR COMPUTATION	
Z	POSITION		DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

SYMBOLS TABLE



SYSTEM MONITOR PANEL
NOT TO SCALE

ANNUNCIATOR	ENGRAVING
U 001	COLLECTION WELL HIGH
U 003	FEED TANK HIGH
U 005	STRIPPER MALFUNCTION
U 007	DISCHARGE TANK HIGH
U 009	BUILDING SUMP HIGH
U 010	NO ENGRAVING

THE SYMBOLS SHOWN ON THIS SHEET ARE STANDARD DESIGNATIONS;
NOT ALL SYMBOLS ARE APPLICABLE TO THE INCLUDED DIAGRAMS.

INSTRUMENT NUMBERING SYSTEM

SYMBOLS AND NUMBERS ARE BASICALLY THE SAME AS ISA (INSTRUMENT SOCIETY OF AMERICA) STANDARD INSTRUMENT NUMBER DETAILS.

INSTR. IDENTIFICATION (FROM SYMBOLS TABLE)

LOOP NUMBER

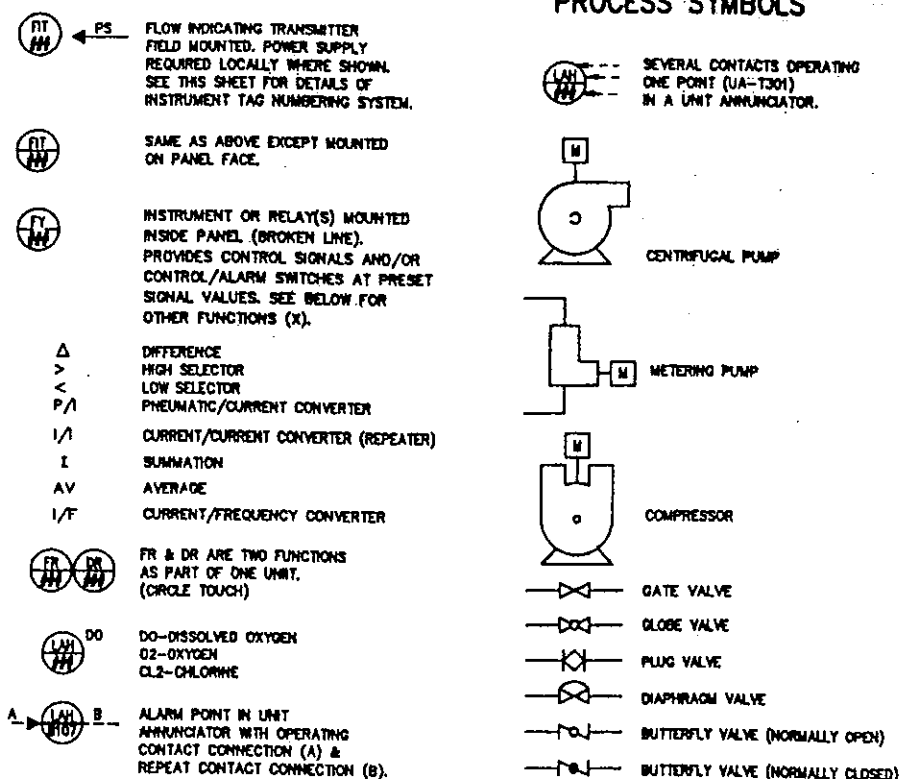
DUPLICATE INSTRUMENT NUMBER (IF REQ'D) ALPHA

FIT-101A

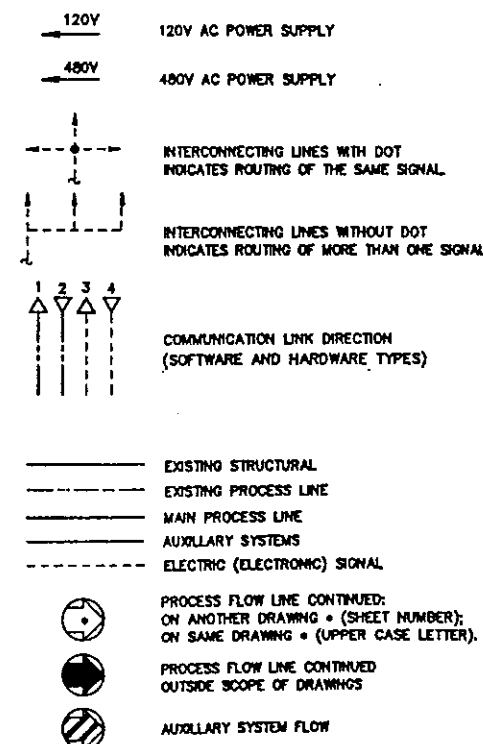
NOTES:

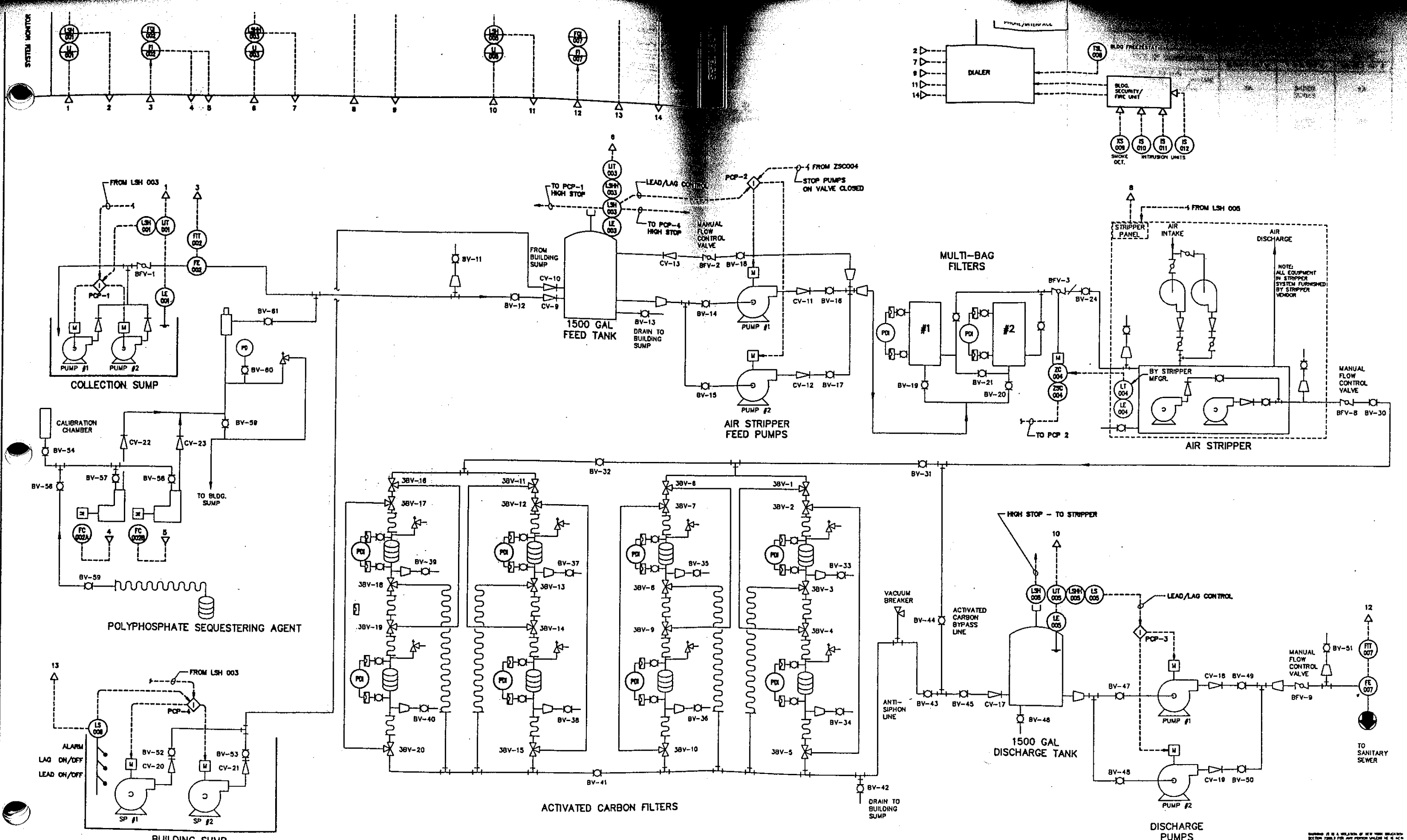
1. FIT-101A= FINAL ALPHA CHARACTER INDICATES DUPLICATE DEVICE EXISTS. FIT-101B MAY BE IN A PANEL.

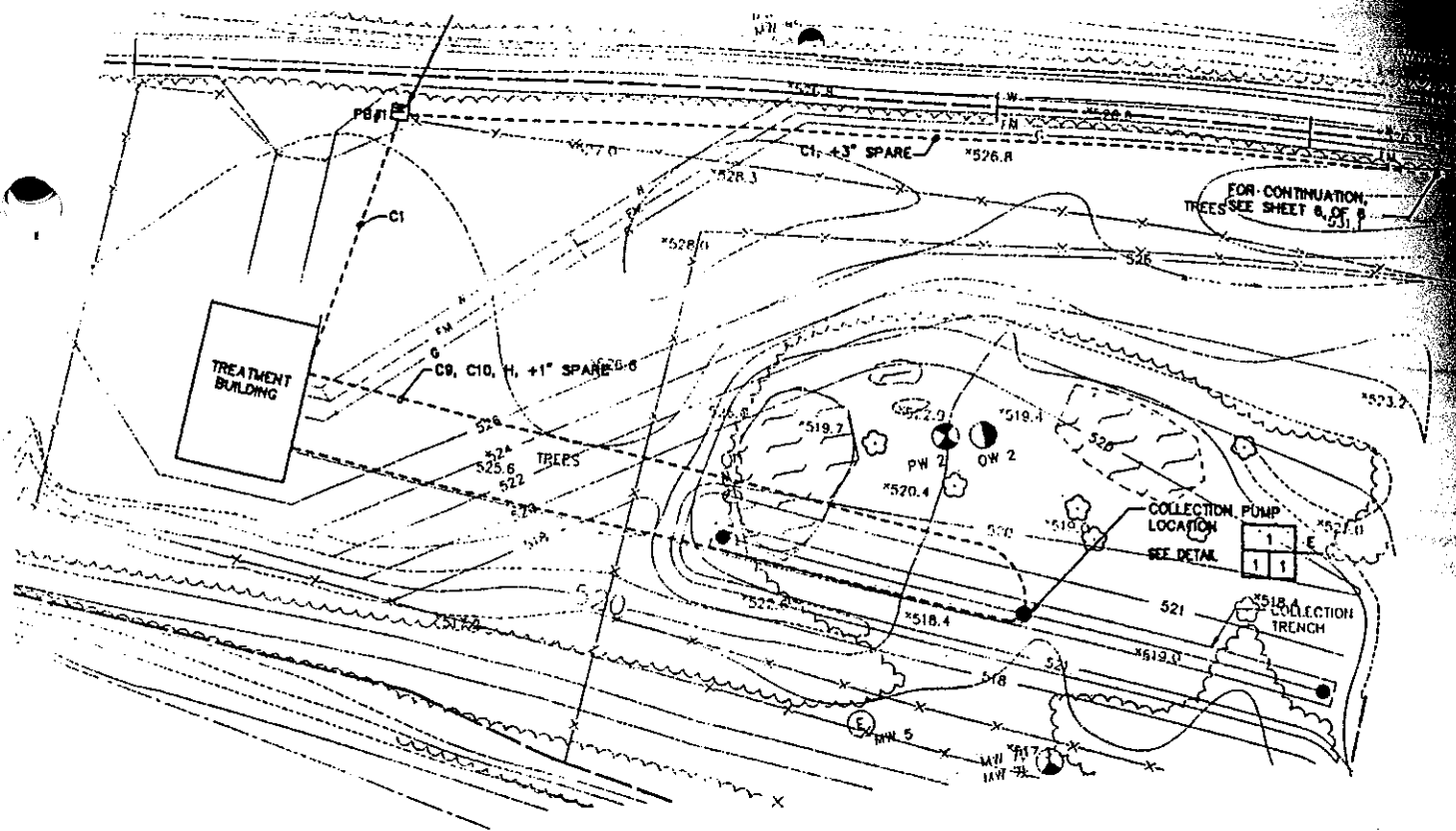
PROCESS SYMBOLS



ELECTRICAL SYMBOLS







TREATMENT AREA SITE PLAN
SCALE: 1" = 30'

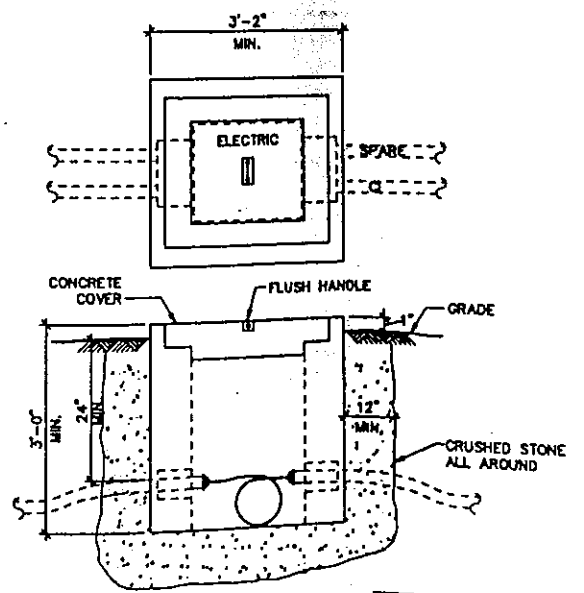
ELECTRICAL SYMBOLS

- LIGHTING PANEL
- POWER PANEL
- CP - CONTROL PANEL
- MCC
- DUPLEX CONVENIENCE RECEPTACLE, 2 POLE, 3 WIRE, 120 VAC
- DUPLEX WEATHERPROOF CONVENIENCE RECEPTACLE, 2 POLE, 3 WIRE, 120 VAC
- TELEPHONE OUTLET BOX
- ELECTRIC MOTOR (NO INDICATES HORSEPOWER)
- DAMPER MOTOR
- COMBINATION MAGNETIC MOTOR STARTER
- LINE DISCONNECT SWITCH - FUSED (SIZE AS REQUIRED OR AS NOTED)
- LINE SWITCH - SINGLE PHASE
- SINGLE POLE SWITCH
- THREE-WAY SWITCH
- FOUR-WAY SWITCH
- THERMOSTAT
- BRANCH CIRCUIT HOME RUN TO PANELBOARD LETTERS AND NUMERALS INDICATE PANELBOARD AND CIRCUIT NUMBER. CROSS LINES INDICATE MINIMUM NUMBER OF CONDUCTORS WHEN THERE ARE MORE THAN TWO. NO HASH MARKS INDICATES TWO CONDUCTORS. HALF HASH MARK INDICATES SIZE NEUTRAL AS REQ'D. C INDICATES GROUND CONDUCTOR MINIMUM SIZE 3/4" C WITH #12 CABLE.
- EXPOSED CONDUIT
- CONCEALED CONDUIT IN CEILING OR WALL
- CONDUIT TURNS UP
- CONDUIT TURNS DOWN
- EXPOSED CONDUIT BELOW SLAB
- EXISTING TO BE REMOVED
- CONCRETE DUCT BANK
- JUNCTION BOX
- REMOTE DEVICE

ABBREVIATIONS

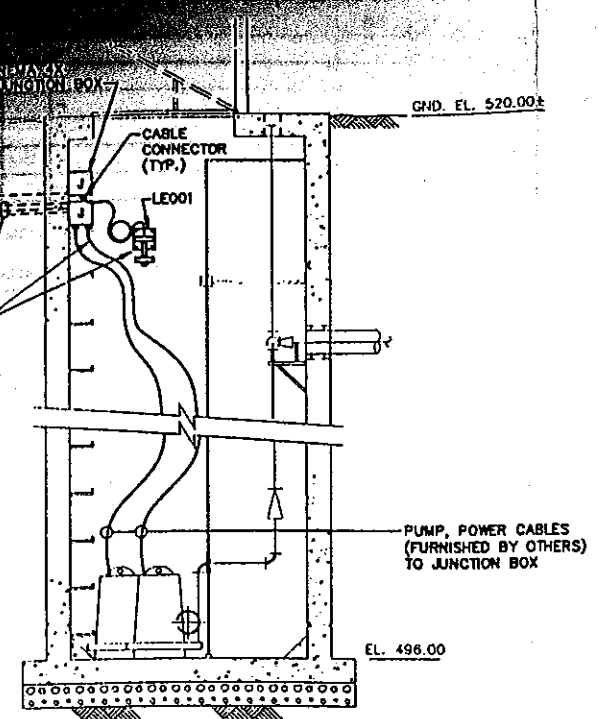
- AFF ABOVE FINISH FLOOR
- C CLOSING
- CS CENTRIFUGAL SWITCH
- CT CURRENT TRANSFORMER
- DN DOWN
- EL ELEVATION
- EXP EXPLOSION PROOF
- G GROUND
- GFI GROUND FAULT INTERRUPTER
- H HEATER
- HOA HAND-OFF-AUTOMATIC
- IP4 INTERPOSING RELAY 4
- JB JUNCTION BOX
- LA LIGHTING ARRESTER
- LCP LOCAL CONTROL PANEL
- NCTO NORMALLY CLOSED, TIMED TO OPEN
- NOTO NORMALLY OPEN, TIMED TO OPEN
- PT POTENTIAL TRANSFORMER
- SP SPARE
- TC TIME CLOCK
- TH THERMOSTAT
- (TYP) TYPICAL
- WP WEATHER PROOF
- MCP MOTOR CIRCUIT PROTECTOR
- Solenoid VALVE
- VOLTMETER - VOLTMETER SWITCH
- AMMETER - AMMETER SWITCH
- KEY INTERLOCK
- ETM RUNNING TIME METER
- INDICATING LIGHT

- NOTES:
- FURNISH AND INSTALL PULL BOXES AT 600' (MAX.) INTERVALS ON STRAIGHT RUNS AND AT ALL DIRECTION CHANGES.
 - ELECTRICAL CONTRACTOR SHALL INSTALL PUMP AND LEVEL PROBE CABLES (FURNISHED BY OTHERS). LEVEL PROBE MOUNTED BY OTHERS.



PULL BOX DETAIL

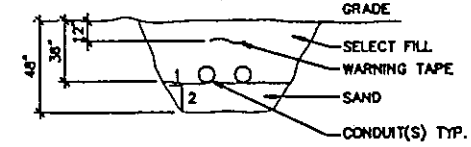
NOT TO SCALE



COLLECTION PUMP CONNECTIONS DETAIL

NOT TO SCALE

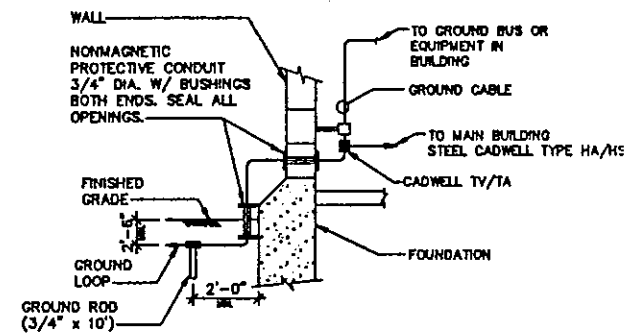
SIGNAL AND CONTROL			
CONDUIT AND CABLE TABLE			
DESIGNATION	CONDUIT SIZE	QTY.	CABLE SIZE
A	3/4" C	1	2C18SH
B	3/4" C	2	2C18SH
C	3/4" C	3	2C18SH
D	3/4" C	2	#14
E	3/4" C	4	#14
F	3/4" C	6	#14
G	3/4" C	8	#14
H	3/4" C	VENDOR FURNISHED CONTRACTOR INSTALLED	



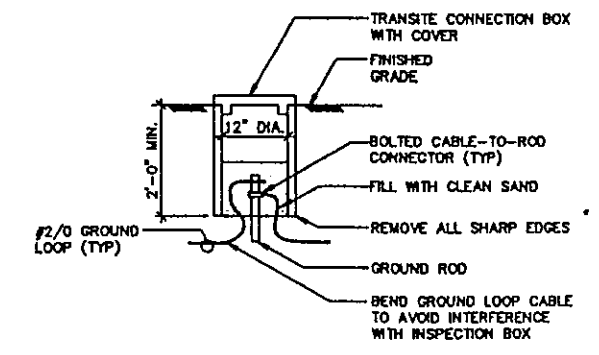
BURIED CONDUIT DETAIL

NOT TO SCALE

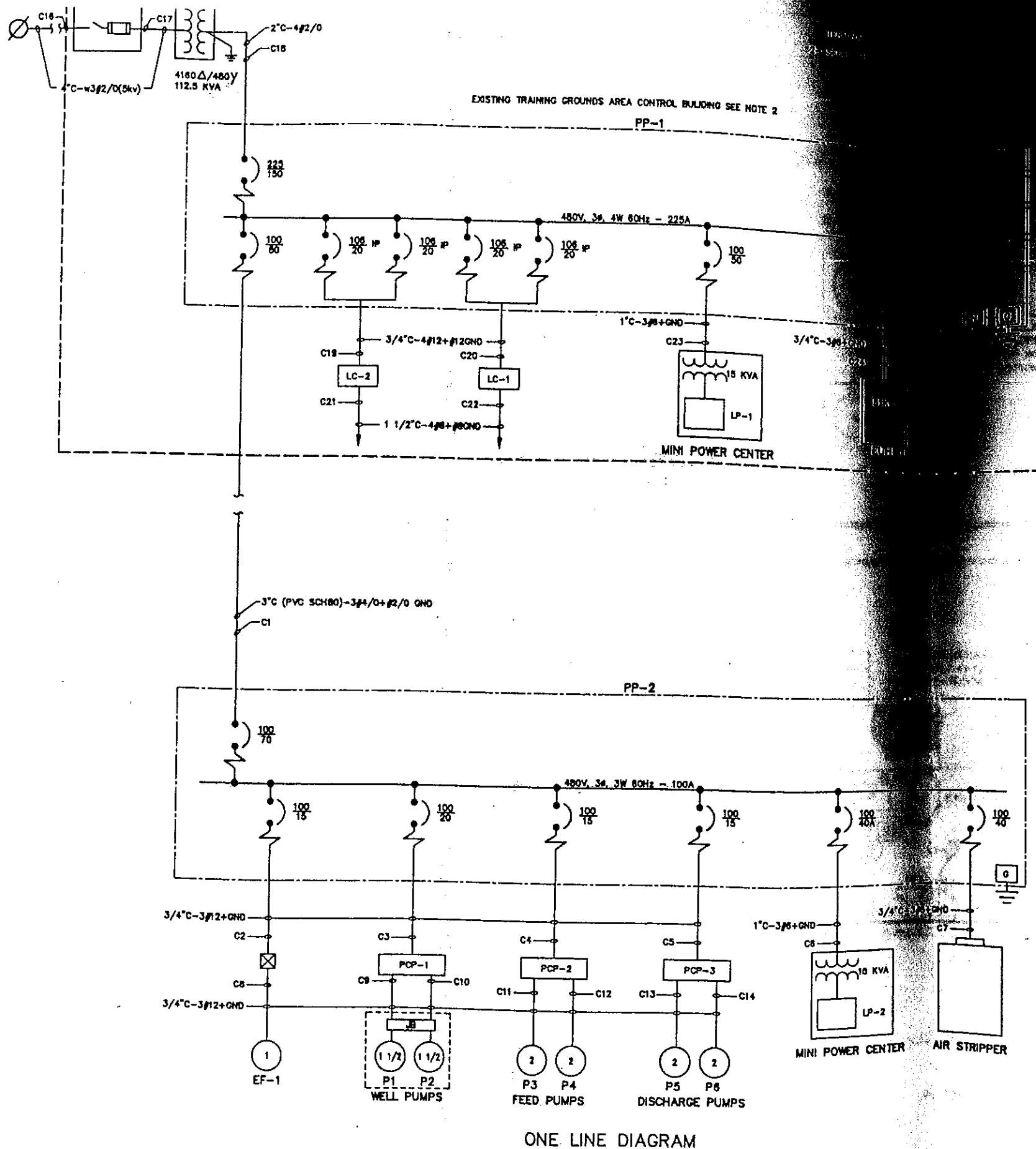
TYPE OF CONNECTION	BOLTED OR COMPRESSION		WELDED
	BURHOY CAT #	T & B CAT #	CADWELL CAT #
CABLE TO LUG	YA	54000 SERIES	LA
CABLE TO ROD	-	53000 SERIES	GT
ROD	GAR	-	GR
CABLE TO CABLE	GX	53000 SERIES	TV OR TA



WALL PENETRATION DETAIL



EXTERIOR GROUND TEST POINT



NO.	DESCRIPTION	LOAD KVA	A	B	C	LOAD KVA	DESCRIPTION	TRIP AMPS	CKT NO.
1	RECEPTACLES	1.0	2.0			1.0	LIGHTING	20	2
3	INSTRUMENTATION	1.0		2.0		1.0	OUTDOOR LIGHTING	20	4
5	CHEMICAL FEED PUMPS	0.5			1.0	0.5	RECEPTACLES	20	6
7	AIR CONDITIONER	1.0	1.5			0.5	MONITOR PANEL	20	8
9	UNIT HEATERS GWH-1,-2	0.5		2.0		1.5	SUMP PUMPS (PCP-4)	30	10
11					1.0	1.0	LIGHTING	20	12
13									14
15									16
17									18

DESIGNATION - LP-1 LOCATION - EXISTING CONTROL BUILDING	TOTAL KVA	1.0	0.5	-	15 kva MINI POWER CENTER - 40A PRIMARY BKR 208/120 VAC - 3 φ - 4 W - 50A SEC. BKR
	GRAND CONNECTED TOTAL KVA		1.5		

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD KVA	A	B	C	LOAD KVA	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	RECEPTACLES	1.0	2.0			1.0	LIGHTING	20	2
3	20	INSTRUMENTATION	1.0		2.0		1.0	OUTDOOR LIGHTING	20	4
5	20	CHEMICAL FEED PUMPS	0.5			1.0	0.5	RECEPTACLES	20	6
7	20	AIR CONDITIONER	1.0	1.5			0.5	MONITOR PANEL	20	8
9	20	UNIT HEATERS GWH-1,-2	0.5		2.0		1.5	SUMP PUMPS (PCP-4)	30	10
11						1.0	1.0	LIGHTING	20	12
13										14
15										16
17										18

DESIGNATION - LP-2 LOCATION - TREATMENT BUILDING	TOTAL KVA	3.5	4.0	2.0	15 kva MINI POWER CENTER - 40A PRIMARY BKR 208/120 VAC - 3 φ - 4 W - 50A SEC. BKR
	GRAND CONNECTED TOTAL KVA		9.5		

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD KVA	A	B	C	LOAD KVA	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	EAST LIGHT POLES	2	4.0			2	WEST LIGHT POLES	20	2
3	20	EAST LIGHT POLES	2		4.0		2	WEST LIGHT POLES	20	4
5		SPACE						SPACE		6
7										8
9	80	TREATMENT PLANT	17	18.7			1.7	HEATER	15	10
11			17		18.7		1.7			12
13			17			18.7	1.7			14
15		SPACE						SPACE		16
17										18
19										20
21		SPACE						SPACE		22
23										24

DESIGNATION - PP-1 LOCATION - EXISTING CONTROL BUILDING	TOTAL KVA	22.7	22.7	18.7	480V, 3φ, 4W 25 kA(SYM.) INT. RATING SERVICE ENTRANCE 100 AMP MAIN BREAKER - w/GND+NEU BUS
	GRAND CONNECTED TOTAL KVA		64.1		

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD KVA	A	B	C	LOAD KVA	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1			0.5	2.5			2			2
3	15	EXHAUST FAN	0.5		2.5		2	FEED PUMPS	15	4
5			0.5			2.5	2			6
7			1.5	2.5			1			8
9	15	DISCHARGE PUMPS	1.5		2.5		1	WELL PUMPS	15	10
11			1.5			2.5	1			12
13			5	10			5			14
15	40	AIR STRIPPER	5		10		5	LIGHTING PANEL	40	16
17			5			10	5			18
19										20
21										22
23										24

DESIGNATION - PP-2 LOCATION - TREATMENT BUILDING	TOTAL KVA	15	15	15	480V, 3φ, 3W 70A MAIN BKR 100AMP BUS W/GND+NEU BUS
	GRAND CONNECTED TOTAL KVA		45		

MALCOLM
PIRNIE



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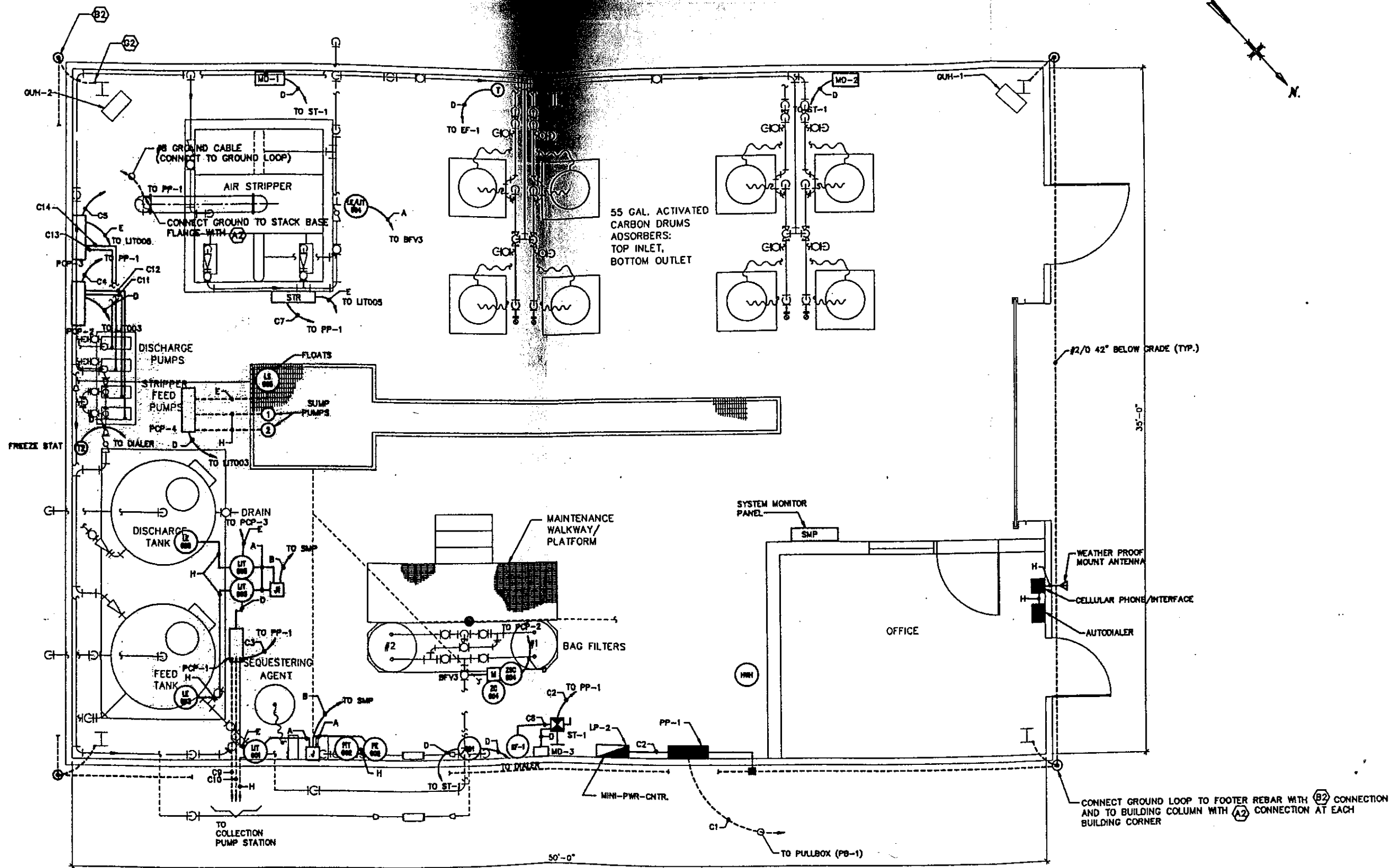
CITY OF ROCHESTER DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIAL CONSTRUCTION

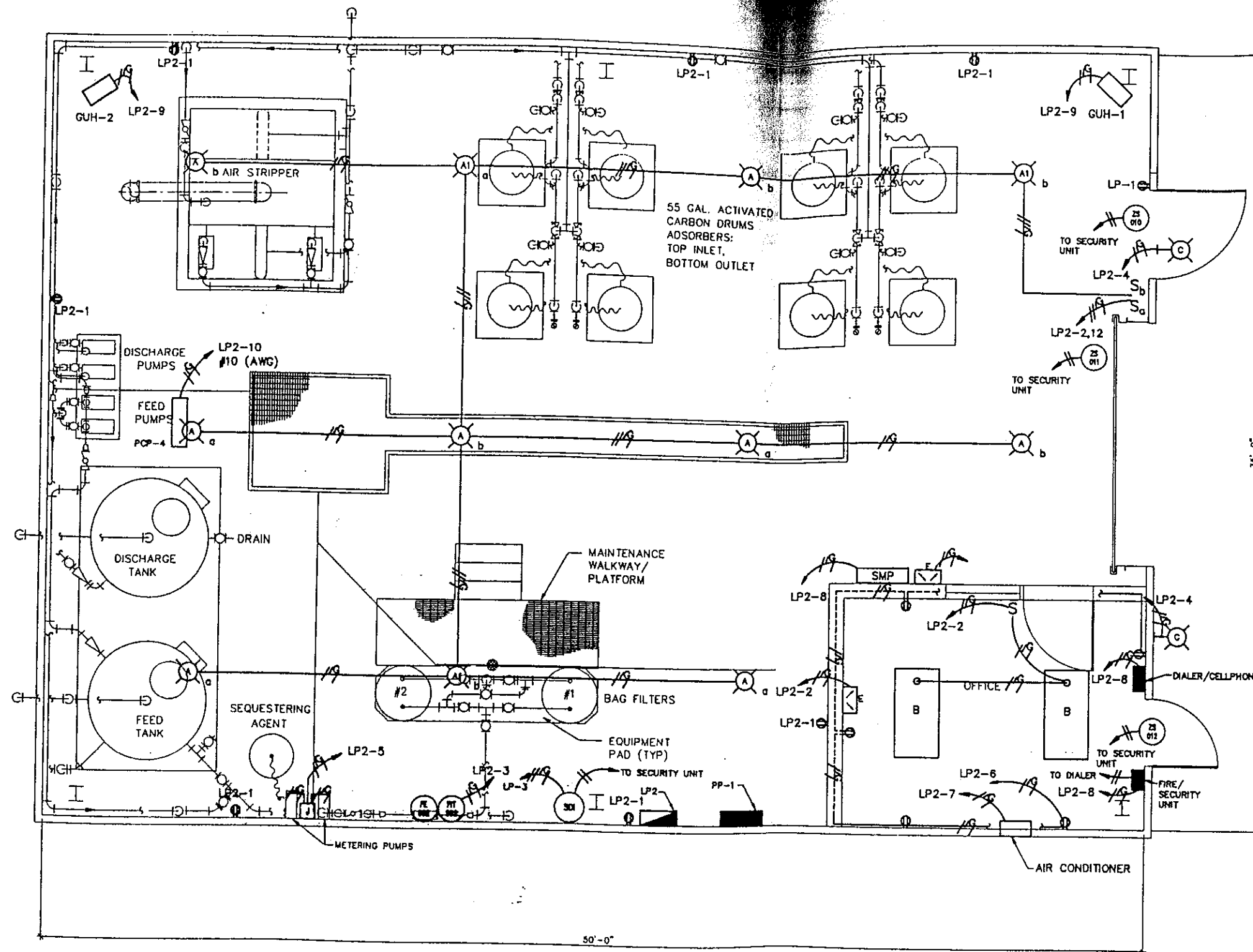
FIRE TRAINING ACADEMY
ONE LINE DIAGRAM

MALCOLM PIRNIE, BY

DATE OCTOBER 1994



PLAN VIEW



DESIGNATION	DESCRIPTION
A	HIGH PRESSURE SODIUM 150 WATT, ENCLOSED AND GASKETED LUMINAIRE. BALLAST SHALL BE HOUSED IN DIE CAST ALUMINUM. REFRACTOR SHALL BE ACRYLIC WITH SYMMETRICAL DISTRIBUTION. PENDANT MOUNTED WITH POWER HOOK/CORD. CAT NO. BANT 15AHP1A45C F1 PHCB-06035-L BY HOLOPHANE.
A1	SAME AS TYPE 'A' EXCEPT INCLUDES EMERGENCY QUARTZ LAMP.
B	2'x 4' GRID TROFFER WITH TWO F40T12CW LAMPS. DOOR FRAME SHALL BE FINISH BAKED POLYESTER WHITE AND 1 1/2" DEEP MULTI-CELL ALUMINUM CLOSURE. CAT. NO. RS2GNCJ30-EIE BY HUBBELL LIGHTING, INC.
C	WALL MOUNTED EXTERIOR LIGHT WITH DIECAST ALUMINUM WEATHERPROOF HOUSING AND ASYMMETRIC MOLDED PRISMATIC GLASS REFRACTOR. LAMP TO BE 70W HPS WITH PHOTO CELL CONTROL. CAT. NO. WP2A070HP12BZF1P-WPSBBZ BY HOLOPHANE.
D	POLE MOUNTED (SLIP FITTER) FLOOD LIGHT LUMINAIRE WITH COPPER FREE DIE CAST ALUMINUM HOUSING AND ANODIZED NARROW TRANSVERSE ELLIPTICAL REFLECTOR. INCLUDES 400 WATT HP5 LAMP AND SAYINGS BALLAST U.L. LISTED FOR WET LOCATIONS. LUMINAIRE SHALL BE CAT. NO. PF-40LHP-27-K-N-4-B-C-PS-PFWG AND POLE SHALL BE 35'- CAT. NO. AZRT35J3U BY HOLOPHANE.
E	INDUSTRIAL EMERGENCY LAMP WITH 12 VOLT SEALED NI-CAD BATTERY ALL METAL CONSTRUCTION. INCLUDES PAR 36 HALOGEN HEADS (2), A.C. LOCKOUT, PUSH-TO-TEST SWITCH, AND BROWNOUT PROTECTION. CAT. NO. HP-12-36-2-P12H BY HUBBELL LIGHTING, INC.
F	ENCLOSED AND GASKETED FLUORESCENT FIXTURE WITH 2-F40T12/CW LAMPS AND LOW TEMP. BALLAST. ENCLOSURE SHALL BE HIGH IMPACT ACRYLIC WITH ABS HOUSING CAT. NO. EDL042RSPDR-EI-LI BY HUBBELL LIGHTING INC.

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CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

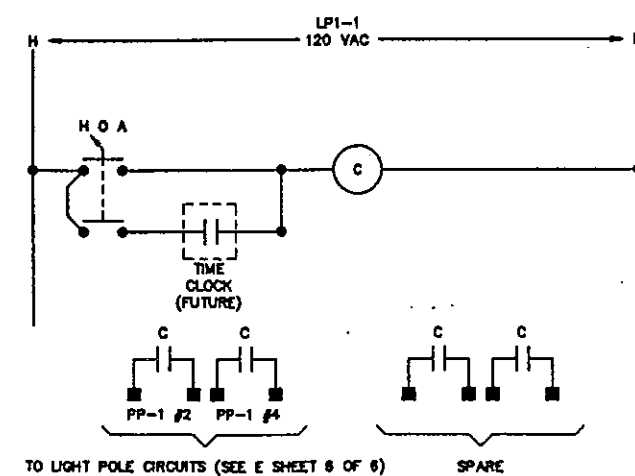
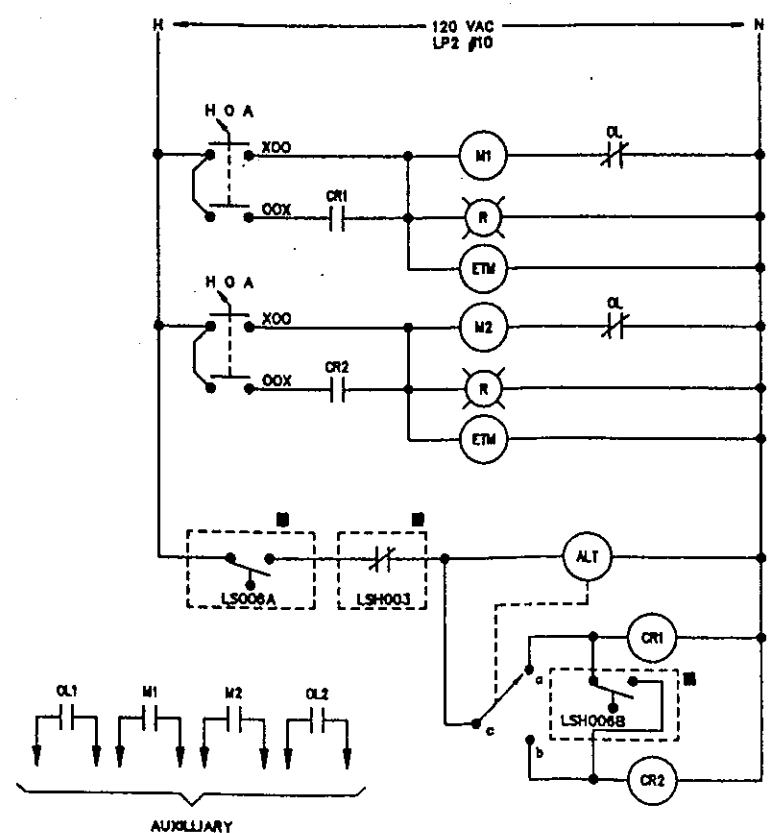
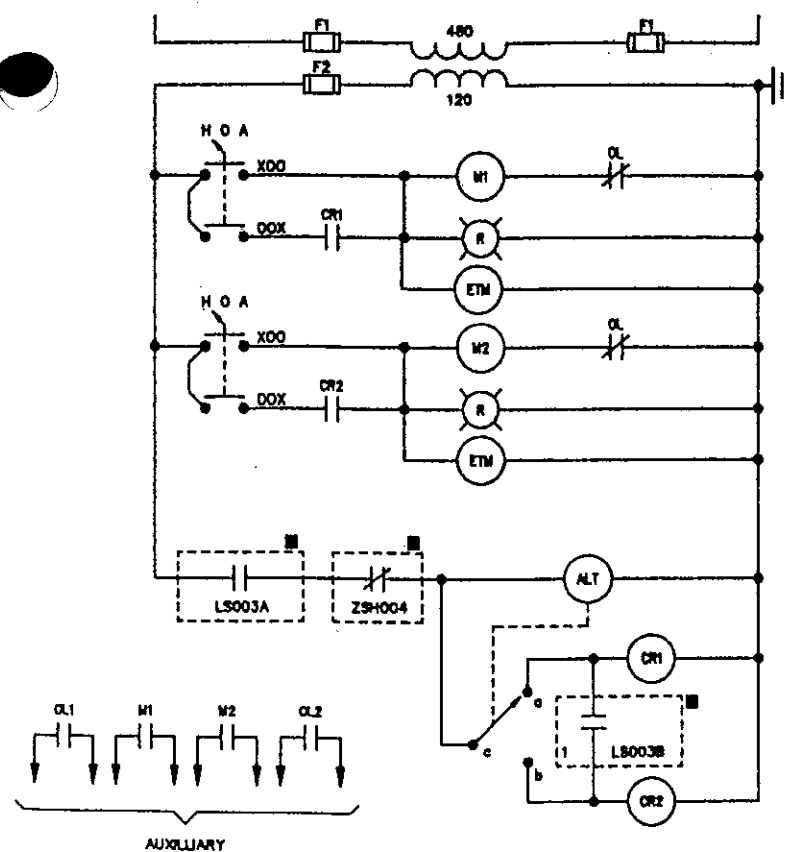
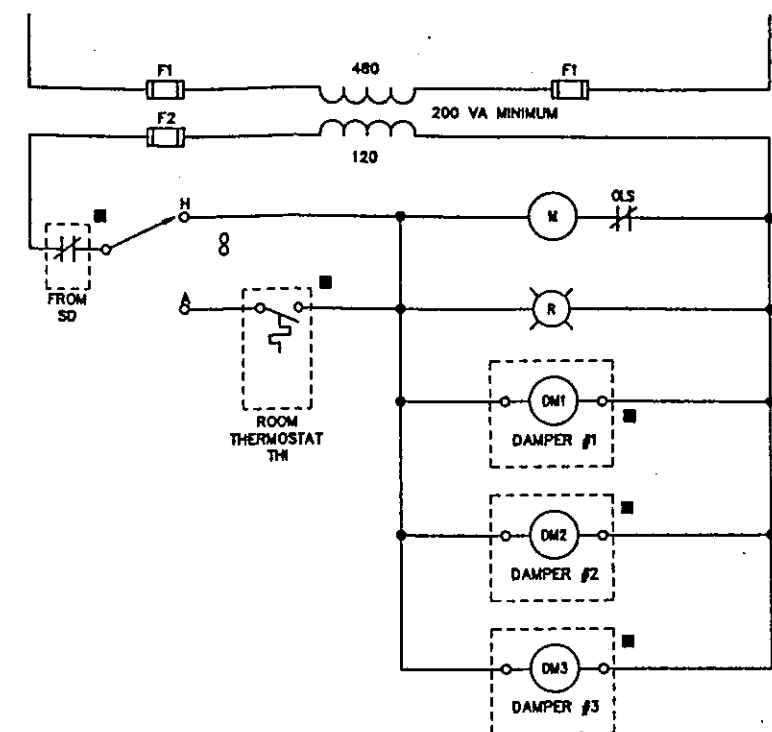
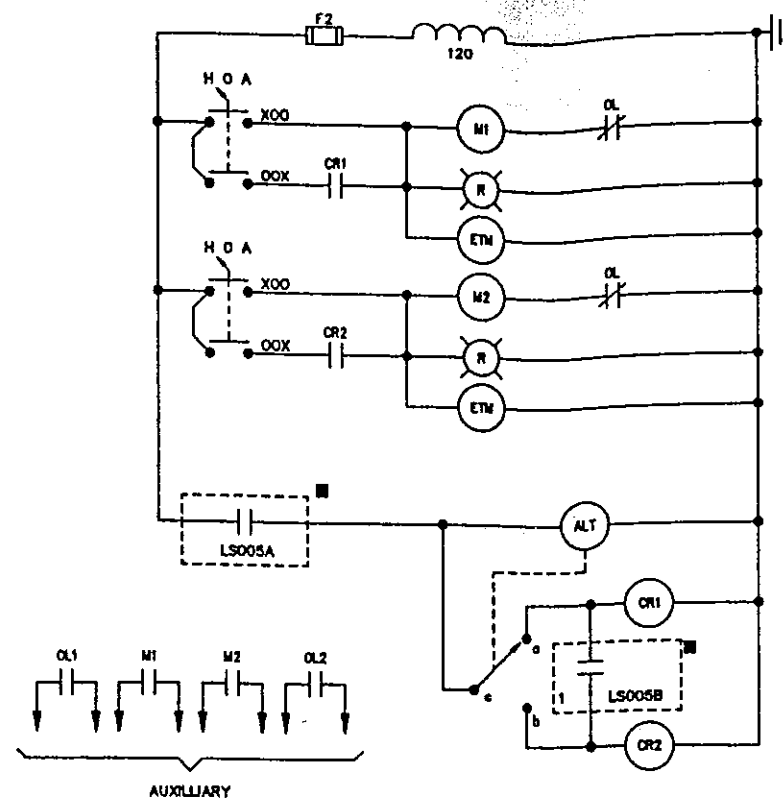
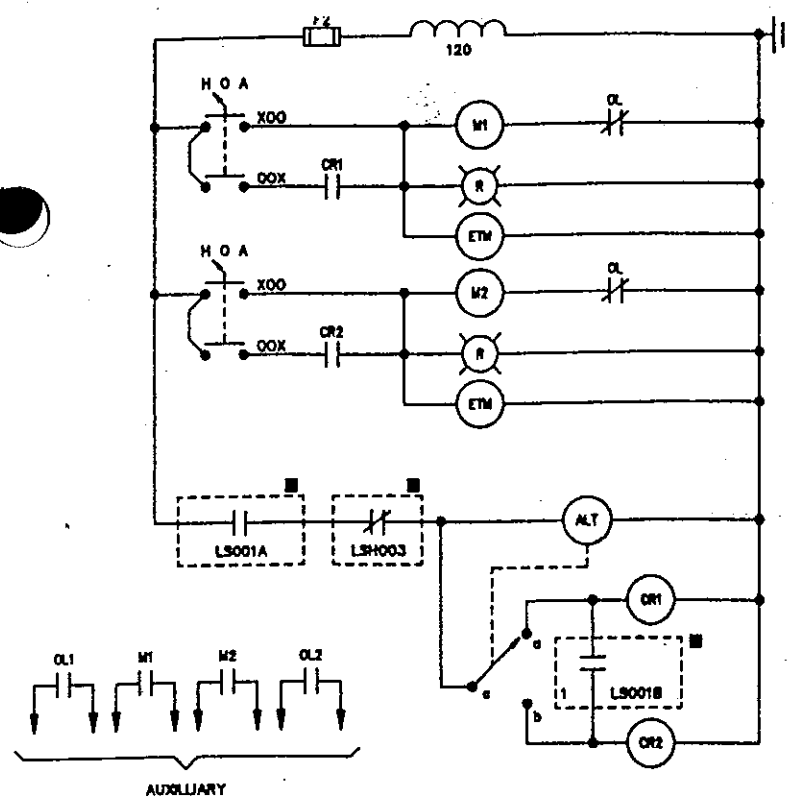
REMEDIAL CONSTRUCTION

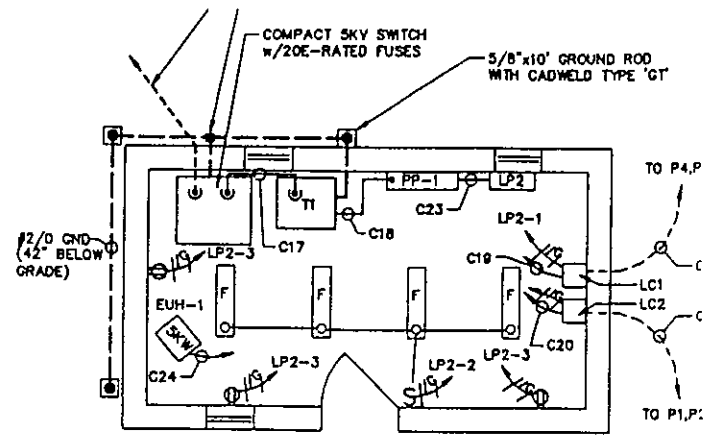
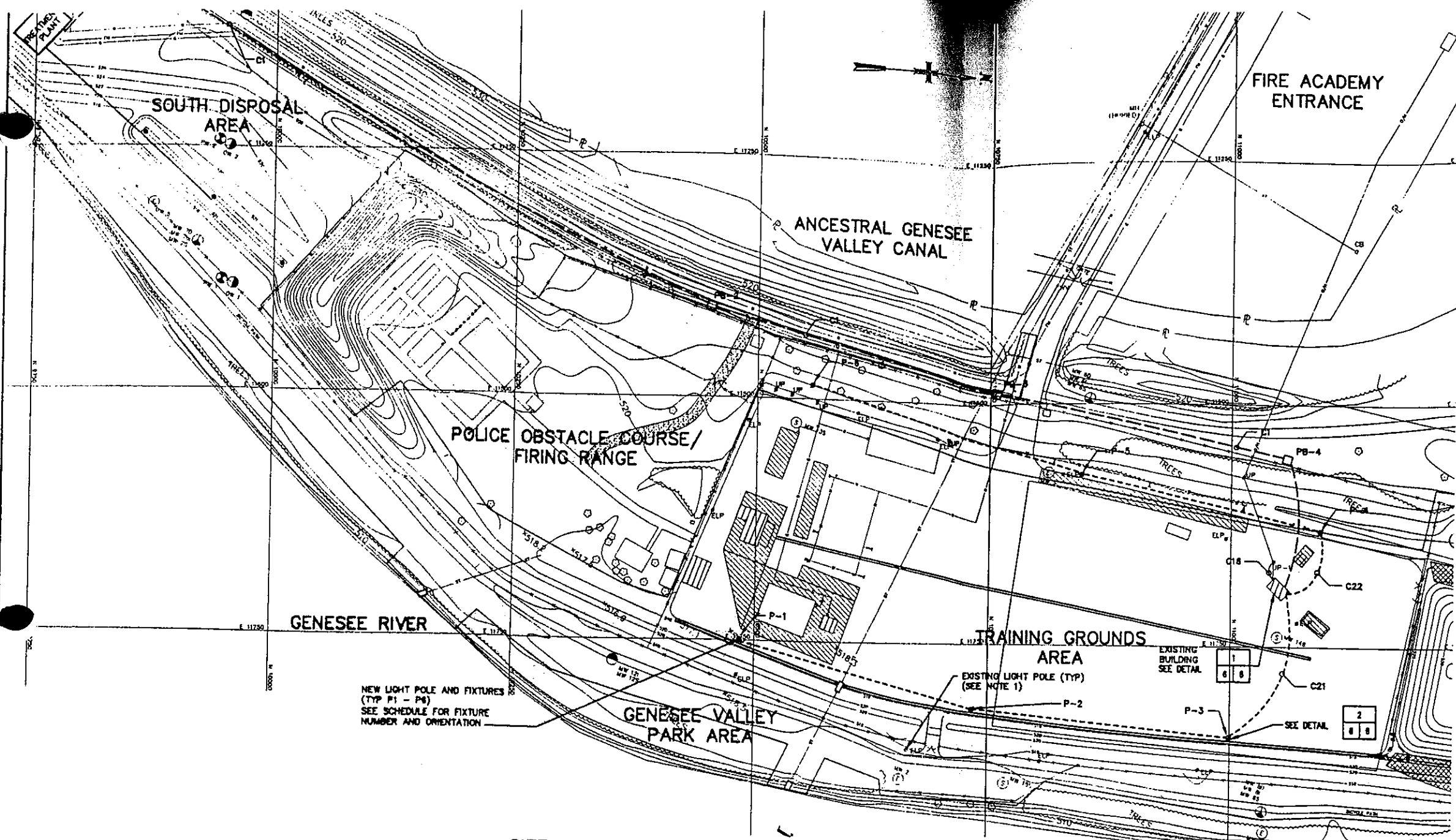
FIRE TRAINING ACADEMY
TREATMENT BUILDING LIGHTING

MALCOLM PIRNIE, INC.

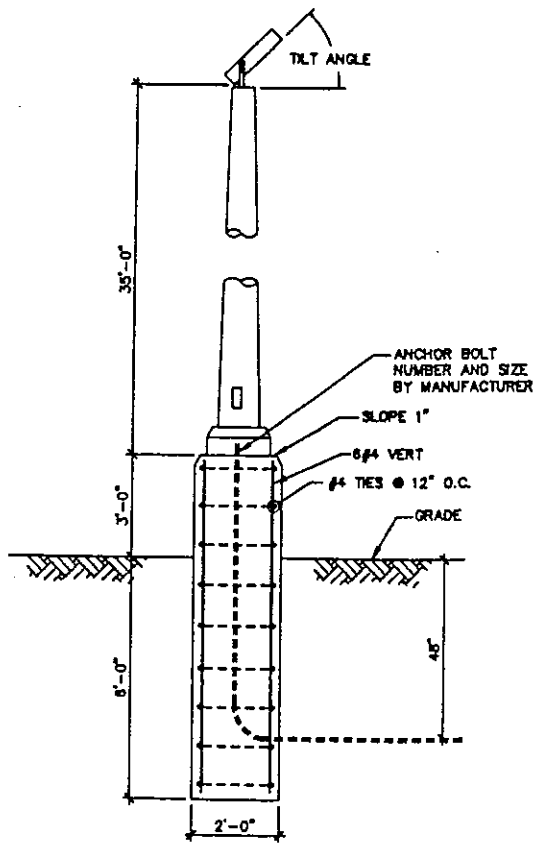
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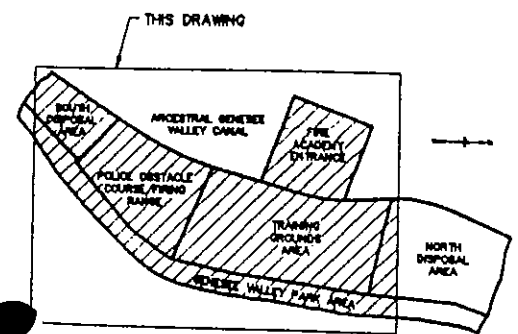




POWER AND LIGHTING
EXISTING CONTROL BUILDING MODIFICATION
DETAIL 1
SCALE: 1/4" = 1'



DETAIL 2
SCALE: NOT TO SCALE



SHEET KEY PLAN

- NOTES:
1. REMOVE ALL EXISTING LIGHT POLES AND FIXTURES WITHIN THE FENCED PERIMETER OF THE TRAINING GROUNDS AREA.
 2. REMOVE AND DISPOSE OF ALL EXISTING ELECTRICAL EQUIPMENT IN THE EXISTING CONTROL BUILDING. COORDINATE ANY CONNECTION TO EXISTING DRIVEWAY LIGHT FIXTURES AND RECONNECT TO THE NEW LIGHTING PANEL LP2 AS REQUIRED.
 3. ALL CONDUITS IN THE TRAINING GROUNDS AREA SHALL BE A MINIMUM OF 42" BELOW FINAL GRADE.
 4. REUSE EXISTING CONDUIT C18 (FROM EXISTING INCOMING SERVICE POLE UP-1 TO EXISTING CONTROL BUILDING) AND EXTND AS REQUIRED TO FEED NEW SWITCH. FURNISH AND INSTALL NEW #2/0 SKY CABLES TO REPLACE EXISTING SKY CABLES.

POLE	FIXTURES	TIPT ANGLE	FIXTURE ORIENTATION	PP-1 PANEL CIRCUIT NO.	FIXTURE LAYOUT
	NO. TYPE	0°=VERTICAL DOWN ROTATION=CCW	0°=WEST ROTATION=CCW		
P-1	3 D	75° 78° 78°	P-1A = 340° P-1B = 25° P-1C = 70°	3 1 1	
P-2	3 D	75° 75° 75°	P-2A = 300° P-2B = 0° P-2C = 60°	1 3 3	
P-3	3 D	78° 75° 75°	P-3A = 300° P-3B = 0° P-3C = 60°	1 3 3	
P-4	3 D	78° 75° 75°	P-4A = 240° P-4B = 180° P-4C = 120°	4 2 2	
P-5	3 D	75° 75° 75°	P-5A = 240° P-5B = 180° P-5C = 120°	4 2 2	
P-6	3 D	75° 78° 78°	P-6A = 200° P-6B = 155° P-6C = 110°	2 4 4	

POWER POLE SCHEDULE

**MALCOLM
PIRNIE**



NO.	BY	DATE	REVISIONS
1	DES	10/15/94	DESIGN
2	CHK	10/15/94	CHECK
3	APP	10/15/94	APPROVE

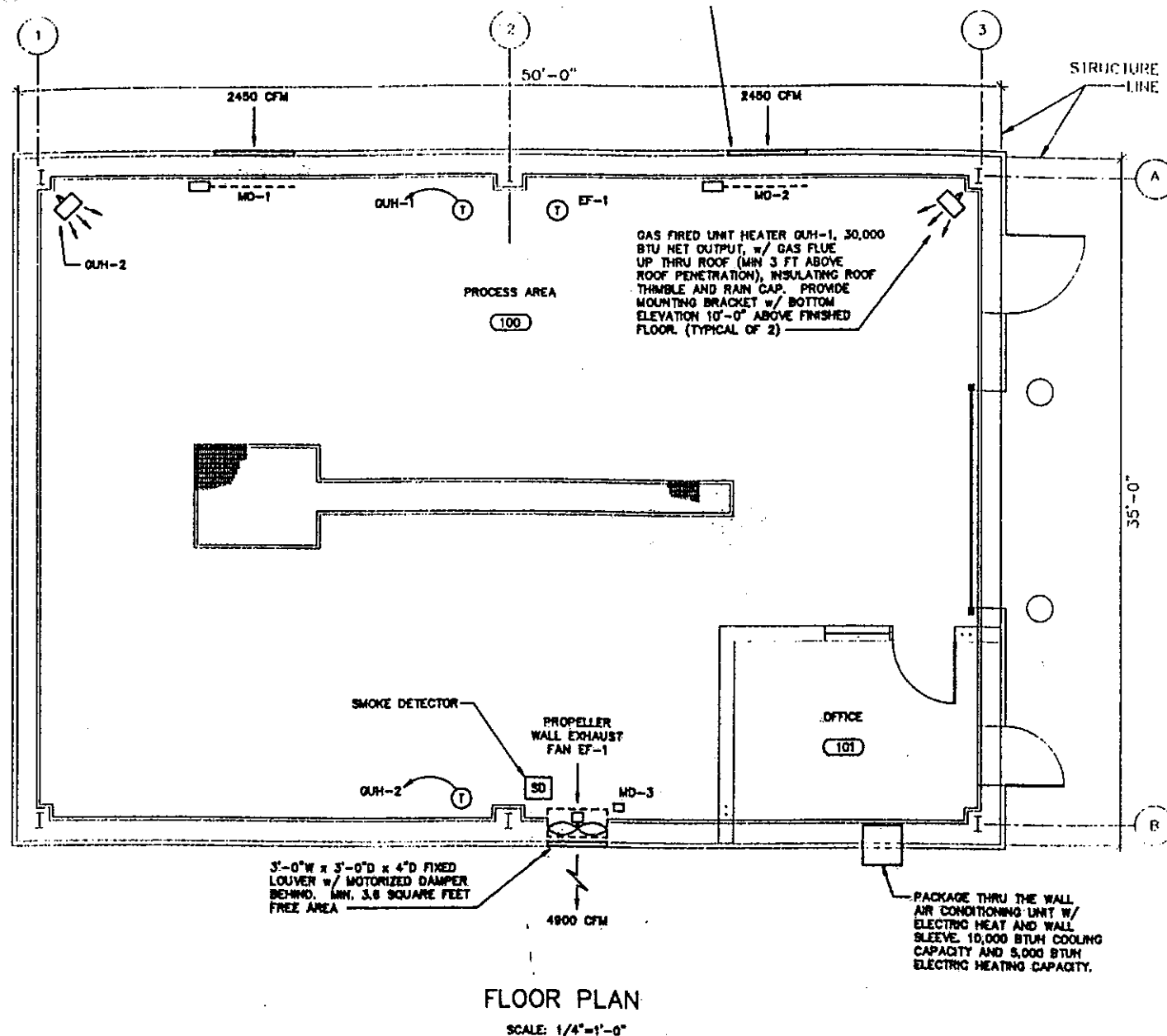
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIAL CONSTRUCTION

FIRE TRAINING ACADEMY
TRAINING GROUNDS AREA
LIGHTING (CONTR)

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MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994



FLOOR PLAN
SCALE: 1/4"=1'-0"

AIR CONDITIONING

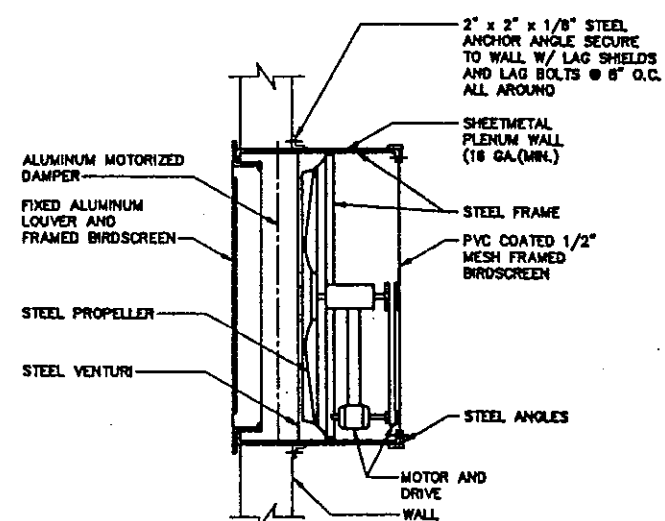
1. UNIT SHALL BE CONTROLLED BY UNIT MOUNTED THERMOSTAT AND CONTROL SWITCHES FACTORY INSTALLED AND WIRED.

UNIT HEATERS

1. EACH UNIT HEATER SHALL BE CONTROLLED BY A ROOM THERMOSTAT SET TO OPERATE THE GAS BURNER AND FAN MOTOR WHENEVER SPACE TEMPERATURE FALLS BELOW THE SET POINT.

EXHAUST FAN EF-1

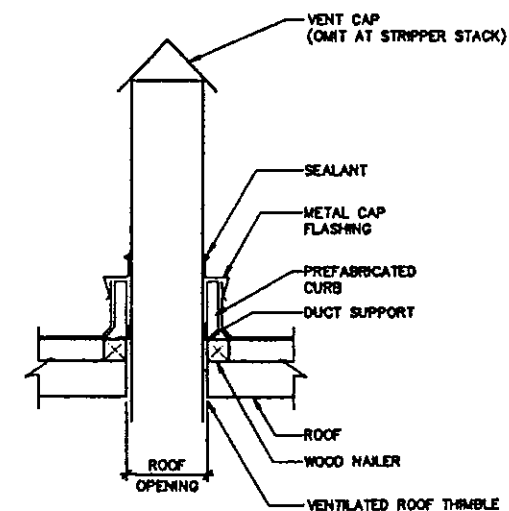
1. EF-1 SHALL BE CONTROLLED BY A HOA SWITCH. SEE ELECTRICAL DRAWINGS FOR SWITCH LOCATION.
2. IN THE "HAND" POSITION FAN SHALL OPERATE.
3. IN THE "AUTO" POSITION FAN SHALL OPERATE WHENEVER SPACE TEMPERATURE EXCEEDS 80° F (ADJUSTABLE)
4. MOTOR OPERATED DAMPERS MD-1, MD-2, AND MD-3 SHALL BE INTERLOCKED WITH FAN EF-1 TO OPEN WHEN FAN IS OPERATING.
5. SMOKE DETECTOR SHALL SHUT DOWN EF-1 UPON THE DETECTION OF SMOKE



TYPICAL PROPELLER WALL FAN
DETAIL
NOT TO SCALE

NOTES:

1. ALL FIELD INSTALLED METAL ANGLES, PLENUMS, AND COMPONENTS SHALL BE EPOXY COATED.
2. COORDINATE FAN INSTALLATION WITH PREFABRICATED BLDG. MFG.



CIRCULAR ROOF
PENETRATION DETAIL
NOT TO SCALE



DATE	BY	CHKD	REVISIONS
10/1/94	RFX		

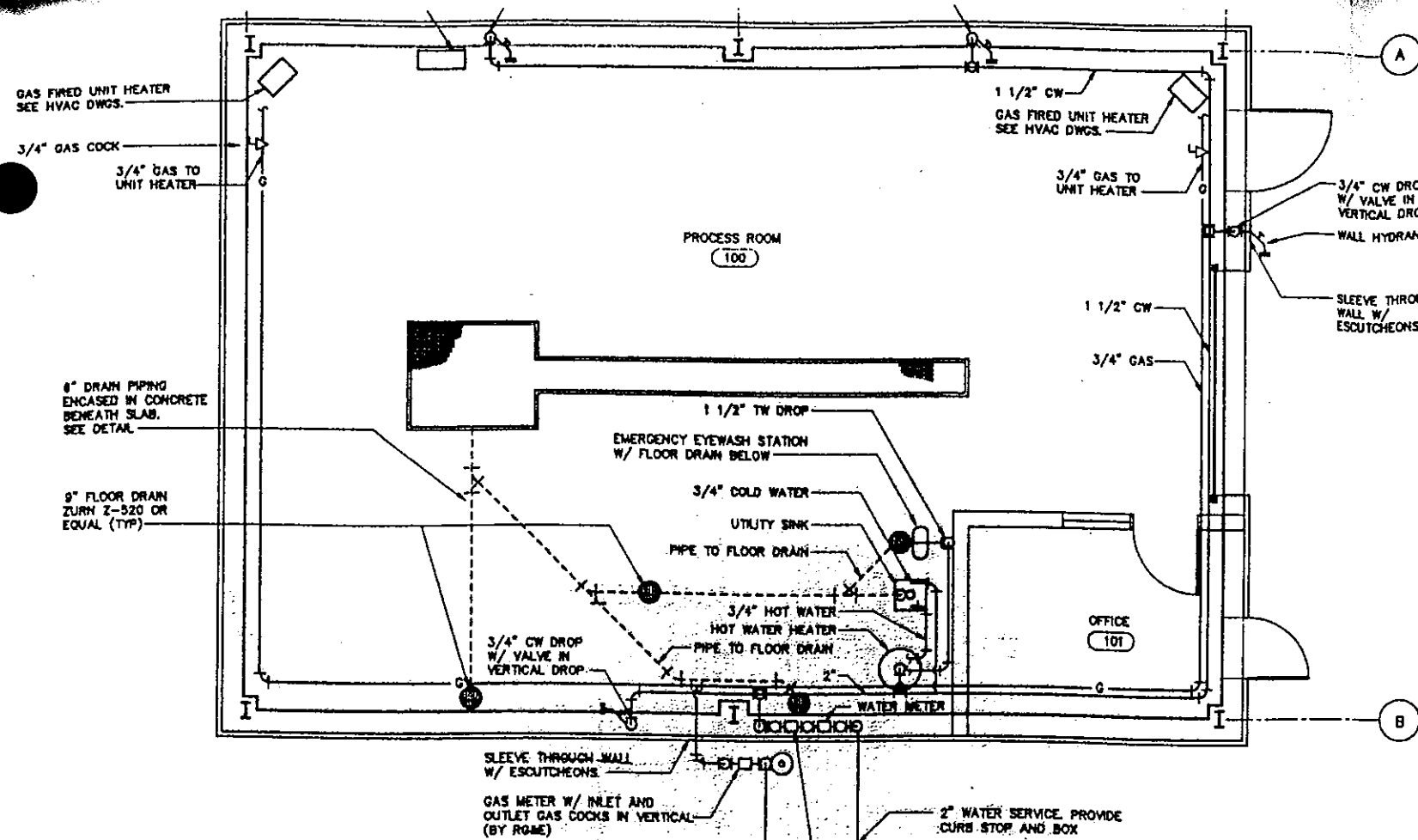
CITY OF ROCHESTER, DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

FIRE TRAINING ACADEMY
GROUNDWATER TREATMENT BUILDING

MALCOLM PRINCE, INC.

DATE: OCTOBER 1994

WARNING - IT IS A VIOLATION OF NEW YORK EDUCATION LAW, SECTION 2201.2, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR A LICENSED PROFESSIONAL ARCHITECT, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERED PORTION SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK LAW, SECTION 2201.2.

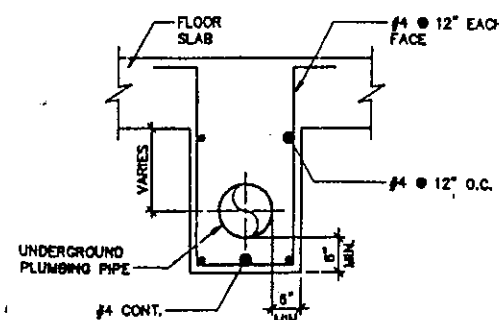


NOTE:

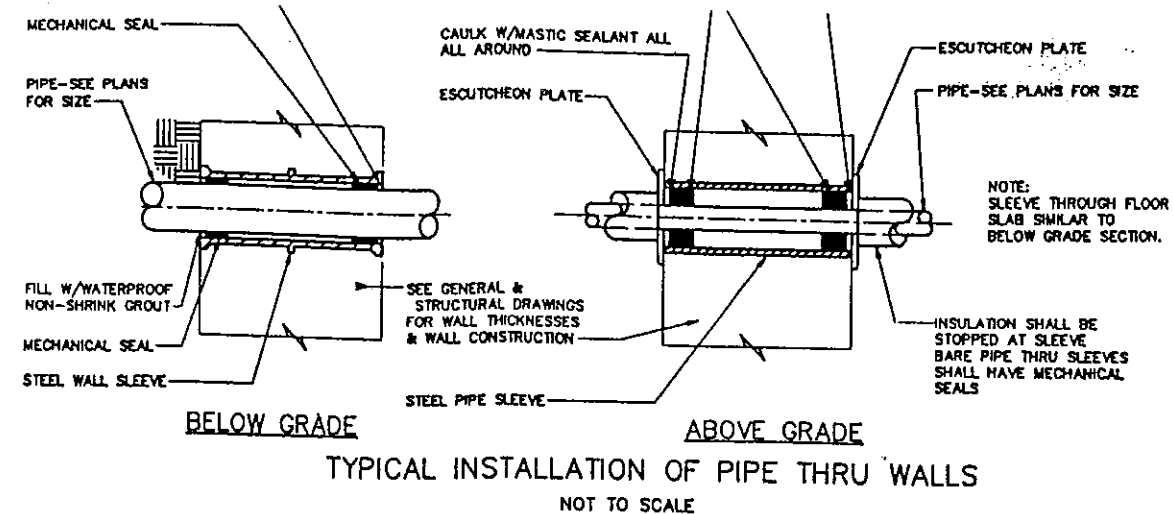
- 1.) WATER METER SHALL MEET THE REQUIREMENTS OF THE CITY OF ROCHESTER, DIVISION OF WATER.
- 2.) FOR TYPICAL FLOOR SLEEVE DETAIL, SEE MECHANICAL DRAWINGS.

FLOOR PLAN

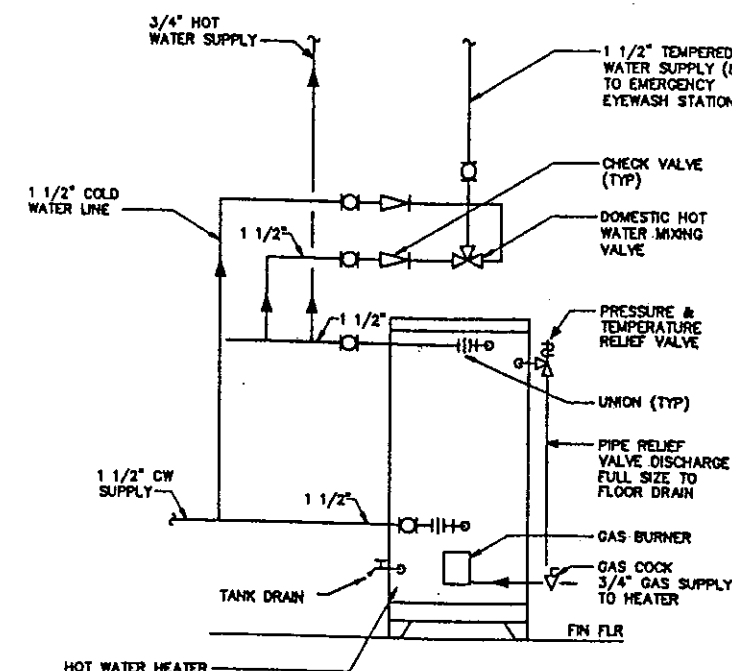
SCALE: 1/4" = 1'-0"



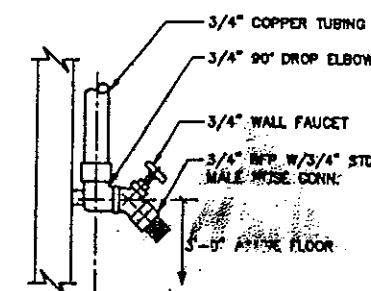
TYPICAL BURIED PIPE ENCASEMENT DETAIL
NOT TO SCALE



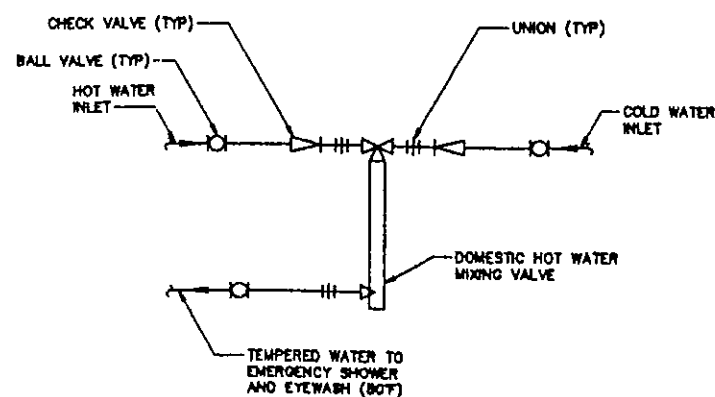
TYPICAL INSTALLATION OF PIPE THRU WALLS
NOT TO SCALE



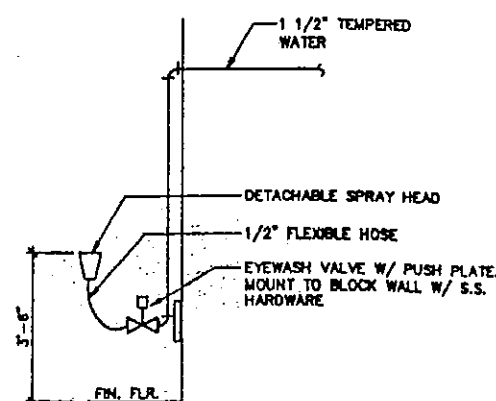
TYPICAL HOT WATER HEATER DETAIL
NOT TO SCALE



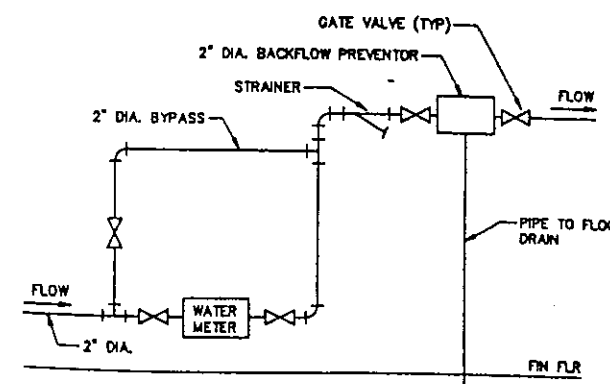
WALL FAUCET DETAIL
NOT TO SCALE



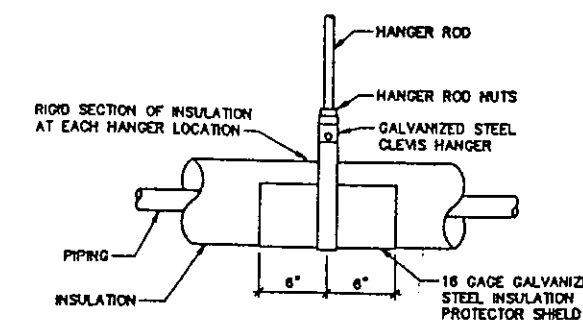
DOMESTIC HOT WATER MIXING VALVE PIPING DETAIL



EYEWASH DETAIL



BACKFLOW PREVENTOR DETAIL



TYPICAL DETAIL HANGER ARRANGEMENT OF INSULATED PIPING

MALCOLM PIRNIE



REV	DATE	REVISIONS
1	10/10/94	ISSUED FOR PERMIT
2	10/10/94	REVISED

CITY OF ROCHESTER DEPARTMENT OF ENVIRONMENTAL SERVICES
ROCHESTER, NEW YORK

REMEDIATION CONSTRUCTION

FIRE TRAINING ACADEMY
GROUNDWATER TREATMENT BUILDING
PLUMBING

MALCOLM PIRNIE, INC.
DATE: OCTOBER 1994

EXHIBIT 2-7

**Citizen Participation Plan
Rochester Fire Academy Inactive
Hazardous Waste Site
(NYS Registry No. 828015)**

**Citizen Participation Plan
Rochester Fire Academy Inactive Hazardous Waste Site
(NYS Registry No. 828015)**

1. INTRODUCTION

The City of Rochester (City), as part of its efforts to responsibly address the threat of hazardous waste contamination at the currently active Rochester Police and Fire Academy facility, has prepared this Citizen Participation Plan to promote public understanding of the site issues, the clean up process and provide an opportunity for public involvement during the remediation of this site. Such public involvement is considered an important element of the site remediation process by the City.

2. SITE INFORMATION

The Rochester Police and Fire Academy (RFA) is an 18-acre police and firefighters' training facility at 1190 Scottsville Road in the City of Rochester, Monroe County, New York (See Attached Map) which is currently listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites (Site No. 828015). Flammable liquids (some of which may have contained hazardous substances) were accepted at this facility for use in training activities from 1955 to 1980. Contamination found on-site is believed to have been caused by liquid spills, residues (as a result from burning waste as part of the academy's training in burning exercises), and other wastes. See attached site location map. Three primary areas of concern have been identified at the Academy. Two areas were used to dispose residues from burning exercises and other materials. (North Disposal Area (NDA) and South Disposal Area (SDA)). The third area of concern is the actively used Training Grounds Area (TGA). See attached map of specific areas at academy site.

3. PROJECT BACKGROUND

The New York State Department of Environmental Conservation (NYSDEC) began investigating the facility's disposal practices in 1980 and subsequently directed the removal of over 200 drums and numerous chemical reagent bottles from the three areas of concern. Late in 1981 the City retained Empire Soils Investigations of Buffalo, New York to perform a soil sampling and analysis program. Inorganic and organic constituents were detected in soil samples collected from the TGA.

In 1981 the City ended the practice of burning waste solvents, and the NYSDEC began an environmental investigation by reviewing available site information. During 1982 the City applied to NYSDEC for a hazardous waste treatment, storage and disposal permit, but the application was rejected and the Fire Training Academy ceased the practice of using industrial wastes for training purposes. The site was added to the registry in 1982.

Recognizing the need for remedial steps, the City proposed a remedial program to NYSDEC in December 1986. NYSDEC rejected this proposal in early 1987 because it was not based on sufficient site-specific data. In response, the City and its consultant, Malcolm Pirnie,

Inc. developed an action plan to investigate the site. A remedial investigation/feasibility study (RI/FS) work plan was submitted to NYSDEC in July 1987. After negotiations were completed, NYSDEC approved the work plan in January 1989. In June 1989, the City of Rochester signed a consent order with NYSDEC to conduct the RI/FS.

4. REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) DESCRIPTION

After the listing of the site, Phase I and Phase II State Superfund investigations were conducted by Recra Research, Inc. in 1983 and 1985, respectively. The presence of hazardous waste on site was identified. As a result of a "Class 2" classification assigned to the site in late 1986, the NYSDEC required that a RI/FS be conducted to determine the nature and extent of hazardous waste contamination at the site, evaluate potential risks, and identify feasible alternatives of site remediation. Recognizing the need for remedial steps, the City proposed a remedial program to NYSDEC in December 1986. NYSDEC rejected this proposal in early 1987 because it was not based on sufficient site-specific data. In response, the City and its consultant, Malcolm Pirnie Inc., developed an action plan to investigate the site. A remedial investigation/feasibility study (RI/FS) work plan was submitted to NYSDEC in July 1987. After negotiations were completed, NYSDEC approved the work plan in January 1989. In June 1989, the City of Rochester signed a consent order with NYSDEC to conduct the design and remediation of the site. The remedial investigation was performed in two phases. Several types of preliminary surveys were undertaken to define the extent of on site disposal areas and location of disturbed soil, buried metallic objects, radioactive materials, and detectable volatile soil gas vapors both on site and in the immediate surrounding areas. An electromagnetic terrain conductivity survey was used to locate disturbed soil and buried metallic objects. A soil gas survey was used to locate volatile soil gas in the shallow soils. Surficial soils were scanned for radioactivity through a radiological survey. The preliminary surveys identified areas of the site having elevated organic vapor concentrations and/or unidentified geophysical anomalies which represented buried metallic materials, contamination, or different soil types. No radiation above natural levels was detected on site or off site. No geophysical anomalies or elevated soil gas concentrations above background were found to the west of the site with the exception of a single trace organic vapor concentration within the former Genesee Canal area near the site entrance. These initial surveys provided the basis for more detailed on site investigations undertaken as part of the RI.

Results from the initial Preliminary Site Characterization was used as a basis for refining the Detailed Site Investigation activities that followed. Test pits, soil borings, ground water well installation and development, and the sampling/testing program were performed during the Detailed Site Investigation. More detailed characterization of the site included the collection and analysis of surface and subsurface soil samples and groundwater samples on two different occasions, as well as the collection and analysis of surface water and/or sediment samples in order to fully delineate the extent of contamination related to the use and disposal of hazardous waste at the RFA.

The RI/FS identified the extent of hazardous waste contamination, evaluated the potential environmental and public health risks, and identified alternatives for site remediation. Following review of the RI, it was determined that further sampling and analysis was necessary to better define the lateral and vertical extent of soil contamination. In addition, in order to

address the contamination present in the groundwater, pump testing was determined to be necessary to better establish the hydraulic characteristics of the aquifer and to provide groundwater for treatability evaluations.

The information and data from the remedial investigation was used to perform a feasibility study. The remedial investigation and feasibility study were completed by the City in January 1993. The RI/FS identified primary areas of contamination as the SDA, TGA, and the NDA. Refer to Figure 2. The study identified cleanup technologies and approaches that are appropriate for the site. The Feasibility Study was conducted according to State and Federal guidelines. A thorough review of the proposed remedial approach, including a public hearing, took place on February 23, 1993. Responding to all public comments received, NYSDEC issued a record of decision (ROD) in March 1993, finalizing the selected remedial action plan.

5. REMEDIAL DESIGN/REMEDIAL ACTION

The approved cleanup plan for the RFA consists of:

- o soil remediation by enhanced volatilization, with collection and destruction of organic chemical vapors by catalytic oxidation;
- o excavation and off-site disposal of all soil contaminated with Polychlorinated Biphenyls (PCB's) above 50 parts per million (ppm);
- o on-site stabilization of all soils contaminated with PCB's between 10 and 50 ppm and soils contaminated with Lead above 250 ppm in the SD and TG areas;
- o removal and on-site placement of contaminated soils from the Genesee Valley Park and the stabilized soils into the NDA;
- o groundwater collection in SDA via a 210 foot trench and treatment of groundwater by air stripping and activated carbon before discharge to the sanitary sewer system.

The soil stabilization process involves the excavation, on-site treatment by enhanced volatilization of volatile organic compounds (VOCs) and/or solidification/stabilization of lead and PCB's. Since it is necessary to control VOC emissions during the excavation and conditioning of the VOC-contaminated materials, the excavation area and soil conditioning area will be enclosed within a temporary containment shelter. Air emissions from the structure are routed through a destructive oxidation unit, followed by a counter-current scrubber to neutralize any hydrochloric acid vapors formed as a result of destruction of the chlorinated VOCs. A backhoe or other heavy equipment is operated within the enclosure for excavation of the contaminated soils. Soils are excavated within the shelter on a batch basis and spread into lifts for conditioning. Conditioning will consist of screening to remove debris and tilling to effect volatilization. The lifts will be segregated according to soil type, and will not be combined during any of the conditioning or solidification/stabilization steps to avoid cross-contamination of materials. The lifts will be sampled for VOCs, lead and PCBs according to sample collection and analytical protocols presented in the specifications to determine the appropriate treatment

requirements. Following conditioning, lifts will be transported to the TGA where they will be solidified/stabilized, if necessary. Soils to be disposed off-site will be removed from the site as they become available following solidification, stabilization treatment. Soils to be placed in the NDA may be staged temporarily in TGA. The process will be repeated for the remaining SDA soils until the cleanup criteria have been met for all contaminated soils.

Approved final cover systems are a soil and grass cover over stabilized soils in the SDA; an asphalt cover over the TGA; and a synthetic/soil cover in the NDA, also institutional controls such as fencing. Groundwater will be collected from the SDA treated on-site and discharged under a sewer use permit to Monroe County Pure Waters System.

NYS-DEC and the New York State Department of Health (NYSDOH) approved the City of Rochester's final design to implement the selected remedy. The Health Department's involvement is to consider public health consequences of the site and the cleanup process. The estimated cost to clean up RFA is \$5.9 million. The cleanup is funded by the City of Rochester with NYS-DEC reimbursement of up to 75% of the eligible costs from the 1986 Environmental Quality Bond Act. A copy of the remedial design is currently available at the document repositories.

A neighborhood informational meeting on the clean up plans was held May 10, 1995 and a Public Availability Session was held on May 22, 1995.

The projected cleanup schedule is attached.

6. NOTIFICATION LISTS

The City has developed two lists of affected or interested parties. The Contact list represents people and organizations that have been notified of meetings and site activities. As the project progressed, a Neighborhood List was developed primarily because over time there was only a small group that regularly attended meetings. The Neighborhood List consists of the group that consistently expressed a high level of interest in the project. We felt that the group needed more specific attention. The lists will be modified, as necessary, to inform all those who want or need to know about the project and the project findings. The contact list presently includes appropriate government agencies and officials, adjacent property owners, the media, and other organizations. Any person or organization interested in being added to either the Contact List or the Neighborhood List, or wanting to verify information on the list, should contact Judy Farrell, City of Rochester (716)428-6011, Jim DiNardo, Project Manager (716)428-6040, or Joe Hamm, NYS-DEC (716)228-2466.

7. AGENCY CONTACTS

The City of Rochester and its consultant, Malcolm Pirnie, Inc., are providing oversight of the cleanup at the RFA. The City's efforts are under the oversight of the NYS-DEC. The NYS-DOH and MCHD assist and advise the DEC regarding site health issues.

A. City of Rochester

Mark Gregor
Manager of Environmental Quality Division
Department of Environmental
Services
Division of Environmental Quality
30 Church St, Room 300B
Rochester, NY 14614
(716)428-5978

or Jim DiNardo
Project Manager
Department of
Environmental Services
30 Church St, Rm 300B
Rochester, NY 14614
(716)428-6840

B. New York State Department of Environmental Conservation(1) Region 8 Office

Joe Hamm
NYS-DEC
6274 East Avon-Lima Road
Avon, New York 14414-9519
(716)226-2466

(2) Division of Environmental Enforcement

Glen Bailey, Esq.
NYS-DEC
600 Delaware Avenue
Buffalo, New York 14202
(716)847-4582

(3) Central Office

Amarinderjit S. Nagi, P.E.
NYS-DEC
Bureau of Construction Services
60 Wolf Road
Albany, NY 12233-7010
(518)457-9280

C. New York State Health Department

Dave Napier
Regional Toxics Coordinator
NYS-DOH
42 South Washington Street
Rochester, New York 14608
(716)423-8071

D. Monroe County Health Department

Richard Elliott, P.E.
Principal Public Health Engineer
111 Westfall Road
Rochester, New York 14692
(716)274-6067

E. New York State Department of Health Liaison Program

Anita Gabalski, Director
New York State Department of Health
Bureau of Toxic Substance Assessment
Health Liaison Program
2 University Place, Room 240
Albany, New York 12203-3399
1-800-458-1158 (ext. 402)

8. DOCUMENT REPOSITORIES:

Leroy V. Good Library
Monroe Community College
East Henrietta Road (Route 15A)
Rochester, New York 14620
Call for hours: 292-2312

City of Rochester
Department of Environmental Services
30 Church Street, Room 300B
Rochester, New York 14614-1278
Contact: Judy Farrell, (716)428-6011
Hours: By appointment only

NYS-DEC
6274 East Avon-Lima Road
Avon, New York 14414
Contact: Joe Hamm, (716)226-2466
Hours: By appointment only

Project documents beginning with the final Remedial Investigation/Feasibility Study Work Plan are currently available at the local repositories.

A list of the documents, and where appropriate, a brief description of each will be updated and provided. A copy of this citizen participation plan will be kept at the repository as well as any notices, fact sheets, and responsiveness summaries distributed regarding the project.

All project related reports, documents, and fact sheets are currently available at the local document repositories.

9. CITIZEN PARTICIPATION ACTIVITIES

The following activities were performed to keep the public informed of, and involved in, the remediation process for the Fire Academy Site. It is important to note that should significant site hazards be encountered, every attempt will be made to notify potentially affected parties.

A. Remedial Investigation Phase

- (1) Before the initiation of field investigation activities, a public information meeting was held. Notices informing those identified on the contact list of the meeting, the nature of the project, and the availability of the RI/FS/QA Work Plan at the document repositories were mailed two weeks before the meeting. The purpose of the notice and meeting was to:

- briefly describe the site
- discuss objectives of RI/FS
- provide overview of RI/FS
- identify the project's local document repositories
- identify the DEC and City of Rochester contact person

- (2) When the Remedial Investigation Report was completed, a copy of the report was placed in the document repositories for public review and a notice was mailed that:

- briefly described the site
- discussed objectives of the RI/FS
- summarized work completed during the remedial investigation
- summarized findings
- provided schedule for the remainder of the RI/FS
- identified the location of the project's local document repositories
- identified the City of Rochester and the DEC contact person(s)

In addition a special briefing was held for the police and firefighters to explain the findings of the Remedial Investigation.

B. Feasibility Study Phase

- (1) When the final draft of the Feasibility Study was available, the City placed a copy in the document repositories. A public notice was mailed to those on the full contact list to:

- briefly describe the site
- provide overview of work completed during the RI/FS
- summarize the findings of the RI/FS
- provide a brief analysis of the proposed remedial program
- summarize the City's reasons for selecting the proposed program over proposed alternatives

- request information and comment that may be useful in finalizing the RI/FS
 - identify the project's local document repositories
 - identify the City and the DEC contact person(s)
 - announce date, time and place of a public meeting
 - announce a comment period of at least thirty days following the public meeting for written comments
- (2) The public hearing was held on February 23, 1993 to:
- present the final draft RI/FS Report
 - discuss briefly remedial alternatives considered
 - describe in detail the most promising alternative and how this alternative mitigates problems at the site
 - receive public comment
 - present a schedule for future work
- (3) A transcript of the public meeting was prepared and made available at the Rochester City Hall for public inspection. Copies are available upon request. A copy of the transcript was also placed in the document repositories.
- (4) Written comments were received for a thirty day period after the public meeting by the Fire Academy RI/FS Project Manager, City of Rochester, Department of Environmental Services, Room 300B, 30 Church Street, Rochester, New York 14614.
- (5) After review of all comments received, a brief responsiveness summary was prepared by the City and its consultant to:
- provide a response to significant comments, criticisms and new data
 - provide a brief analysis of the remedial program selected for implementation
 - discuss any significant changes from the proposed remedial program
- March, 1993 the responsiveness summary was mailed to those on the most recent contact list and its availability was published as a legal notice in a local newspaper with a brief description.

C. Remedial Design Phase

A neighborhood informational meeting was conducted on March 9, 1993. The technical report regarding off-site conditions was provided to adjacent property owners on April 14, 1993. June 20, 1993 the draft remedial design drawing was sent to adjacent property owners. An update neighborhood informational meeting was held December 7, 1993.

- (1) A copy of the conceptual design document is available at the document repositories. Design impacts on adjacent park land were discussed with appropriate City and County agencies. Input from interested citizens groups and individuals were also sought. Copies of plans were provided to adjacent property owners for comment as well.
- (2) The final design documents are available at the document repositories. A notice was mailed to those on the updated contact and neighborhood list to:
 - briefly describe the site
 - provide brief synopsis of remedial efforts to date
 - request information and comments that may be useful in finalizing design
 - identify project's local document repositories
 - identify the City, DEC, and DOH contact persons
 - announce a public availability session to discuss the design and receive comments

D. Remedial Construction

- (1) Copies of plans, specifications, and health and safety plans are available at the document repositories. A notice was mailed to the contact list to:
 - provide brief background of site and remedial plan
 - describe significant elements of the health and safety plans
 - identify the project's local document repositories
 - identify the City, DEC, and DOH contact persons
- (2) Before the start of remedial construction activities that could affect the public or those actively using the site, a meeting was held on May 10, 1995 for those on the neighborhood contact list to:
 - briefly describe the site
 - provide a brief overview of the goals of the remedial construction
 - describe the remedial construction
 - discuss the upcoming activities
 - present schedule for remainder of work
 - identify the City, DEC, and DOH contact persons
 - identify project's local document repositories
- (3) Before the start of remedial construction activities that could affect the public or those actively using the site, a public availability session was held on May 22, 1995 for those on the contact list to provide an opportunity to address questions and/or concerns. Notices for the availability sessions were sent by the NYS-DEC to the full contact list.

- (4) During the remedial construction phase of the project, bimonthly newsletters will be mailed to those on the full contact list to provide updated information on the status of the project. Copies of the newsletters will be kept at the document repositories.
- (5) At the completion of site remedial construction activities, a notice will be sent to those on the updated contact list. The notice will:
 - briefly describe the site and the remedial program
 - explain how the remedial program mitigates the problems at the site
 - provide a brief description of the long-term operational, monitoring and maintenance requirements at the site
 - identify who is responsible for operations, monitoring and maintenance
 - identify DEC contact person (also DCL and DOH, if appropriate)

EXHIBIT 2-8

**Boring Logs for
New Wells 9S and 9I
Located at the
Groundwater Treatment Plant**

**MALCOLM
PIRNIE**

**INTEROFFICE
CORRESPONDENCE**

To: Bob Long (NYSDEC)
Dave Crosby (NYSDEC)

Date: September 12, 1998

From: Ford Ritz (MPI)

Copy: Mark Gregor (COR)
Jim DiNardo (COR)
Jim Raleigh (MPI)

Re: Installation of Piezometers and Monitoring Wells
Rochester Fire Academy

The South Disposal Area (SDA) groundwater collection trench piezometers are scheduled to be installed by the end of the month. Also the Contractor (ThermoCor Kimmins) is going to replace monitoring wells (9S & 9I) that were damaged. The replacement wells will be relocated from the access road to a position which is inside the fence and south of the Groundwater Treatment Plant Driveway. The new location will protect the wells from potential snow plow damage etc. Refer to Figure 1. Note that the groundwater gradient runs in a northeast direction.

If you have any questions or if you require further detail please call.

Thanks,

Ford

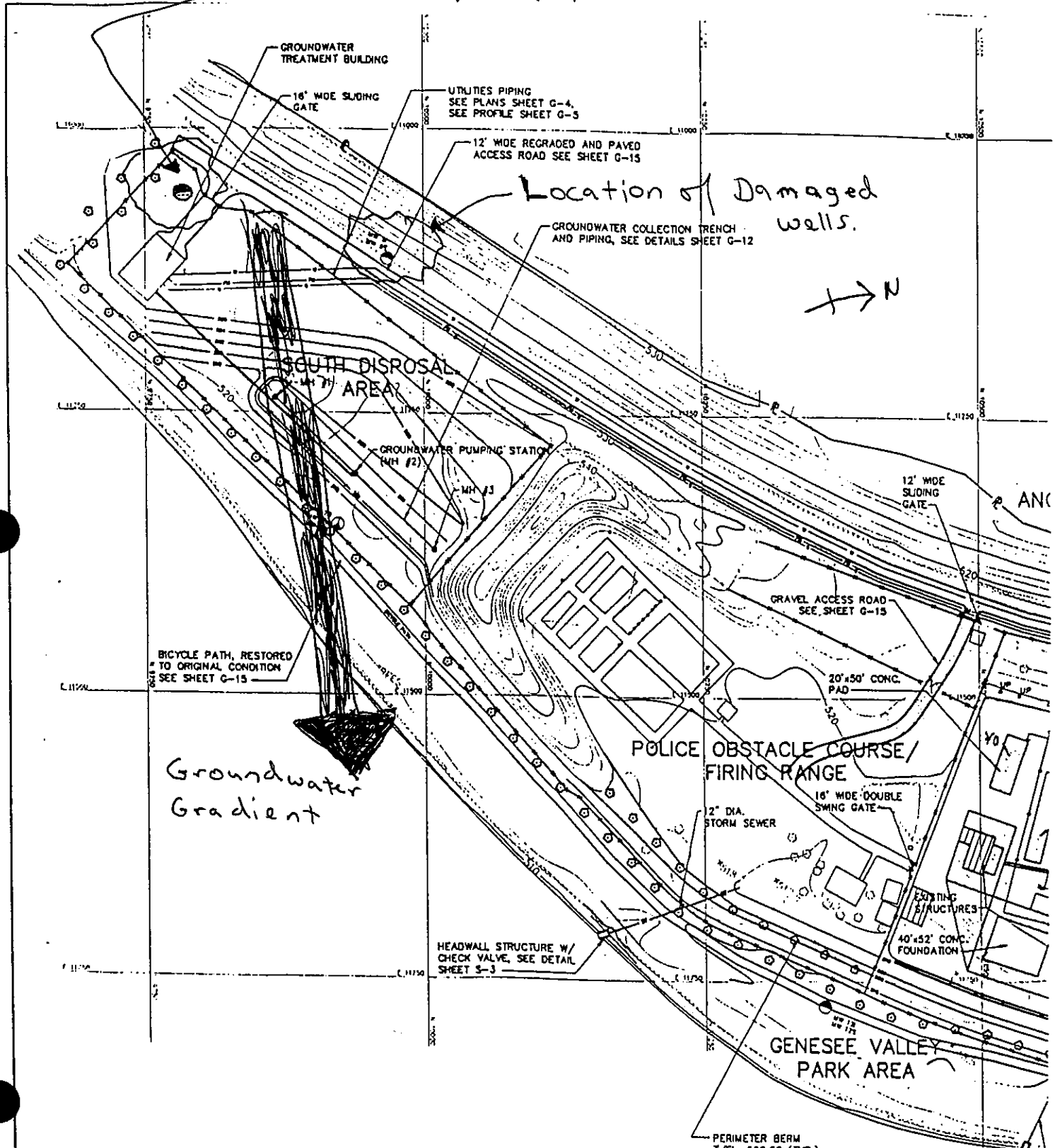
Attachment

New location of wells
95 & 91

Location of Damaged wells.

→ N

Groundwater Gradient



NOTES:

1. FOR REMEDIATION WORK SEE SHEETS G-6 & G-8
2. FOR GROUNDWATER COLLECTION SYSTEM
SEE DETAILS SHEETS G-12

THIS DRAWING



Kimmins Corp. 1501 - 2nd Avenue, Tampa, FL 33605
813/248-3878 FAX: 813/247-0183

FAX / LETTER OF TRANSMITTAL

TO:	From: Ralph J. Argen III, Ph.D. Kimmins, Project Manager
Malcolm Pirnie	Attention: Ford Ritz, PE
1000 Pittsford- Victor Road	Date: October 1, 1998
Pittsford NY, 14534	RE: drilling logs
716-248-5161, FAX: 716-248-2332	

The following item(s) are attached:

- ☐ Plans ☐ Prints ☐ Samples ☐ Submittals ☐ Shop Drawings ☒ Copy of Letter

[illegible]

The above item(s) are:

- ☐ Approved
 ☐ Approved as noted
 ☐ Returned for corrections
 ☐ For your use
- ☒ As requested
 ☐ For review and comment
 ☐ _____

Sincerely,

ThermoCor Kimmins, Inc.

NOTHNAGLE DRILLING

1821 Scottsville-Mumford Road
SCOTTSVILLE, NEW YORK 14546

Phone (716) 538-2328

Fax (716) 538-2357

Test Boring No. P-1

Page 1 of 1

ND Job # 1063

Project Rochester Fire Training Academy, 1190 Scottsville, Rochester, New York

Client Thermacor Kimmins, 1501 2nd Avenue, Tampa, Florida 33605

Elevation _____ Start 9/24/98 Completed 9/24/98 Driller J. Stockholm

Water Level - During Drilling 11'0" Inspector _____

Water Level - At Completion 9'0"

Seasonal and climatic changes may alter observed water levels.

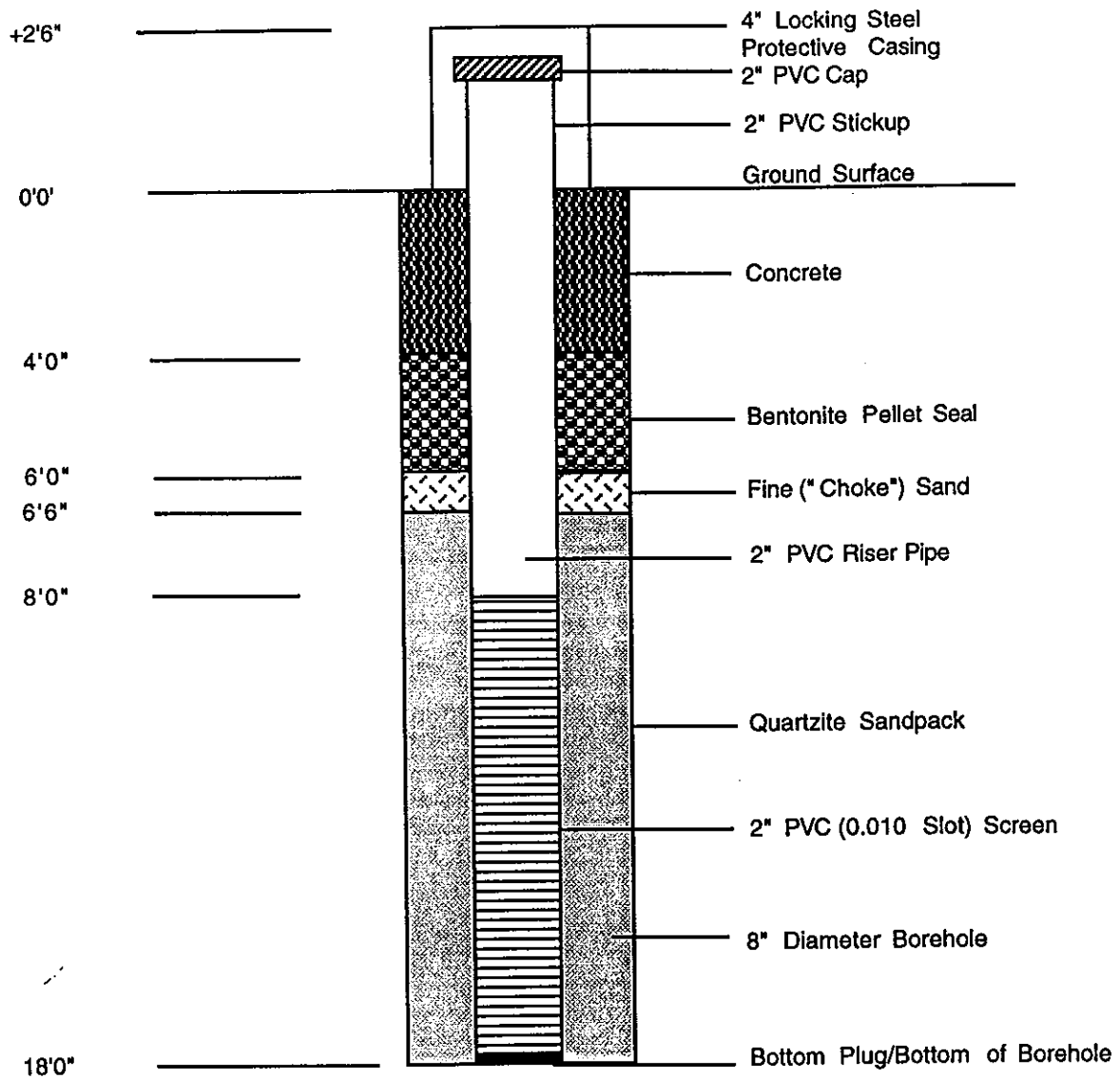
Seasonal and climatic changes may alter observed water levels.										
0	C	Blows on Sampler				Sample				Soil and Rock Information Remarks
		0" 6"	6" 12"	12" 18"	18" 24"	N	Rec.	No	Depth	
										Topsoil and organic matter 0'5"
										Brown-red silty sand little coarse to fine gravel (probable fill) <

N=No. of Blows to Drive 2" Spoon 12" with 140 lb. wt. 30" Ea. Blow

C=No. of Blows to Drive _____ Casing _____ with _____ lb. wt. _____ Ea. Blow

Well Detail Summary

P - 1



Note: Drawing Not to Scale.

NOTHNAGLE DRILLING1821 Scottsville-Mumford Road
SCOTTSVILLE, NEW YORK 14546

Phone (716) 538-2328

Fax (716) 538-2357

Test Boring No. P-2Page 1 of 1ND Job # 1063Project Rochester Fire Training Academy, 1190 Scottsville, Rochester, New YorkClient Thermacor Kimmins, 1501 2nd Avenue, Tampa, Florida 33605Elevation _____ Start 9/24/98 Completed 9/24/98 Driller J. StockholmWater Level - During Drilling 11'0" Inspector _____Water Level - At Completion 9'0"

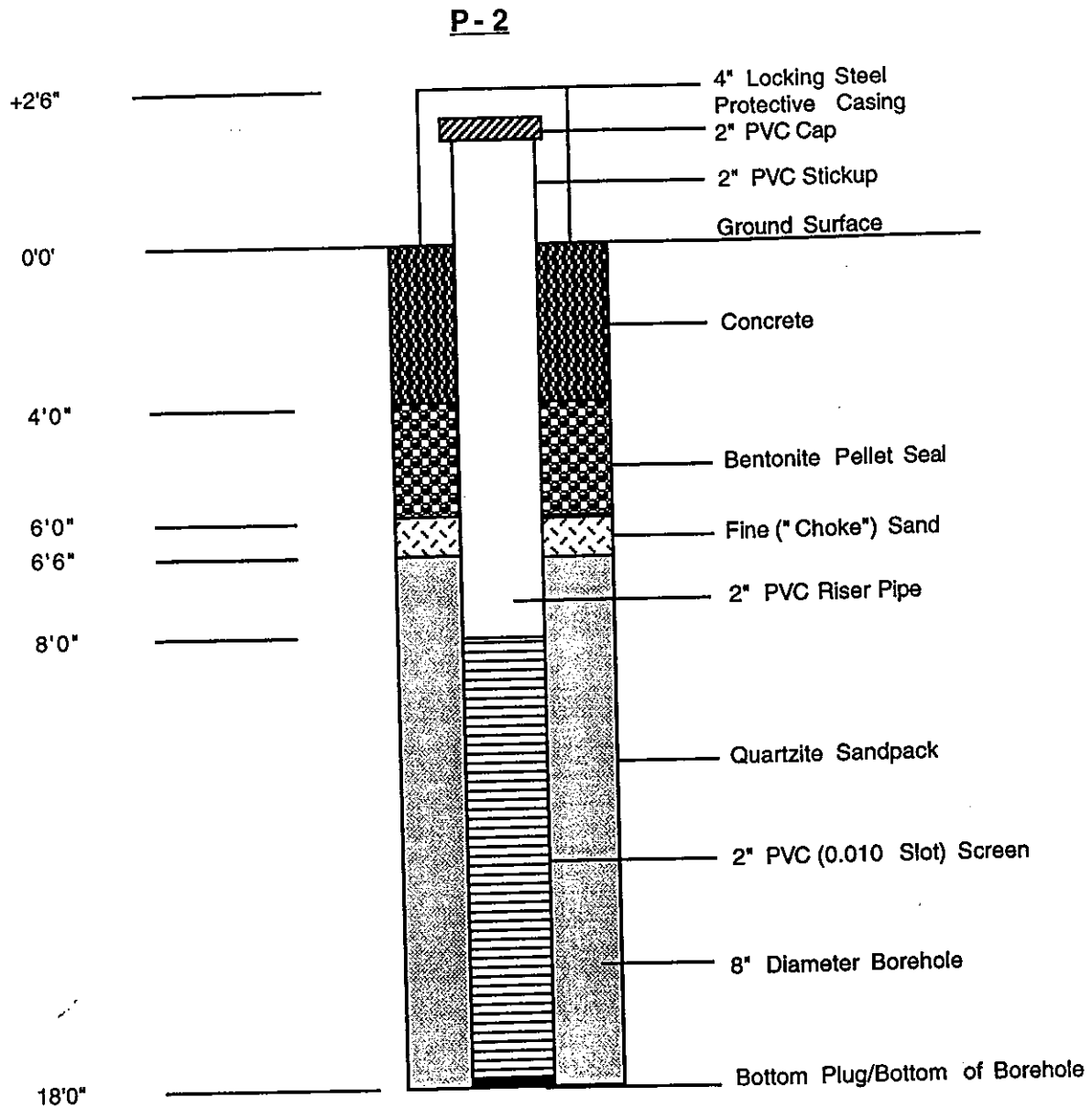
Seasonal and climatic changes may alter observed water levels.

0	C	Blows on Sampler				Sample				Soil and Rock Information Remarks
		0" 6"	6" 12"	12" 18"	18" 24"	N	Rec.	No	Depth	
										Topsoil and organic matter 0'5"
5										Brown-red silty sand little coarse to fine gravel (probable fill)
10										10'0"
15										Pea gravel
20										
25										Boring terminated at 18'0" Advanced test boring with hollow stem auger casing. Well installed in completed bore hole. See attached well diagram.
30										
35										
40										

N=No. of Blows to Drive 2" Spoon 12" with 140 lb. wt. 30" Ea. Blow

C=No. of Blows to Drive _____ Casing _____ with _____ lb. wt. _____ Ea. Blow

Well Detail Summary



Note: Drawing Not to Scale.

NOTHNAGLE DRILLING

1821 Scottsville-Mumford Road
SCOTTSVILLE, NEW YORK 14546

Phone (716) 538-2328

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Test Boring No. 91

Page 1 of 2

ND Job # 1063

Project Rochester Fire Training Academy, 1190 Scottsville, Rochester, New York

Client Thermacor Kimmins, 1501 2nd Avenue, Tampa, Florida 33605

Elevation _____ Start 9/24/98 Completed 9/25/98 Driller J. Stockholm

Water Level - During Drilling 10'5" Inspector _____

Water Level - At Completion _____

Seasonal and climatic changes may alter observed water levels.

0	C	Blows on Sampler				Sample				Soil and Rock Information Remarks
		0" 6"	6" 12"	12" 18"	18" 24"	N	Rec.	No	Depth	
		5	5							Topsoil and organic matter 0'5"
		12	10	13	11	18	19"	1	0'0"-2'0"	Stiff brown-red moist clay, some silt, little organics (probable fill)
				10	13	20	23"	2	2'0"-4'0"	Stiff brown-red moist
5		14	13	14	16	27	21"	3	4'0"-6'0"	Hard brown-red moist 4'3"
		11	23	14	16	37	24"	4	6'0"-8'0"	Firm brown wet medium to fine sand 4'10"
		9	11							Firm brown moist silt, trace fine sand
10		15	17	17	19	34	21"	6	10'0"-12'0"	Compact brown moist 9'2"
		39	100/3			100/3	8"	7	12'0"-12'9"	Compact brown-red moist silt, little sand (lenses), trace medium to fine gravel
15		22	35	64	51	99	21"	8	14'0"-16'0"	Compact brown-red moist 10'5"
		29	53	61	57	114	23"	9	16'0"-18'0"	Compact brown wet medium to fine sand and coarse to fine gravel
		22	16	12	11	28	20"	10	18'0"-20'0"	Very dense brown wet
20		5	3	4	4	7	24"	11	20'0"-22'0"	Very dense brown wet 16'0"
		5	8	8	12	16	21"	12	22'0"-24'0"	Very dense brown wet coarse to fine sand and coarse to fine gravel, trace silt
25		18	17	25	31	42	21"	13	24'0"-26'0"	Compact brown-gray wet
		21	33	37	41	70	23"	14	26'0"-28'0"	Loose brown-gray wet (some silt)
		26	43	44	48	87	21"	15	28'0"-30'0"	Firm brown-gray wet (some silt)
30		63	71	74	83	145	18"	16	30'0"-32'0"	Dense gray-brown wet
		42	81	100/4		181/10	13"	17	32'0"-33'4"	Very dense gray-brown wet
35		71	100/4			100/4	8"	18	34'0"-34'10"	Very dense gray-brown saturated
		100/5				100/5	3"	19	36'0"-36'5"	Very dense gray-brown wet
		100/5				100/5	3"	20	38'0"-38'5"	Very dense gray-brown wet
40										Very dense gray-brown wet

N=No. of Blows to Drive 2" Spoon 12" with 140 lb. wt. 30" Ea. Blow

C=No. of Blows to Drive _____ Casing _____ with _____ lb. wt. _____ Ea. Blow

NOTHNAGLE DRILLING1821 Scottsville-Mumford Road
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Test Boring No. 91Page 2 of 2ND Job # 1063Project Rochester Fire Training Academy, 1190 Scottsville, Rochester, New YorkClient Thermacor Kimmins, 1501 2nd Avenue, Tampa, Florida 33605Elevation _____ Start 9/24/98 Completed 9/25/98 Driller J. StockholmWater Level - During Drilling 10'5" Inspector _____

Water Level - At Completion _____

Seasonal and climatic changes may alter observed water levels.

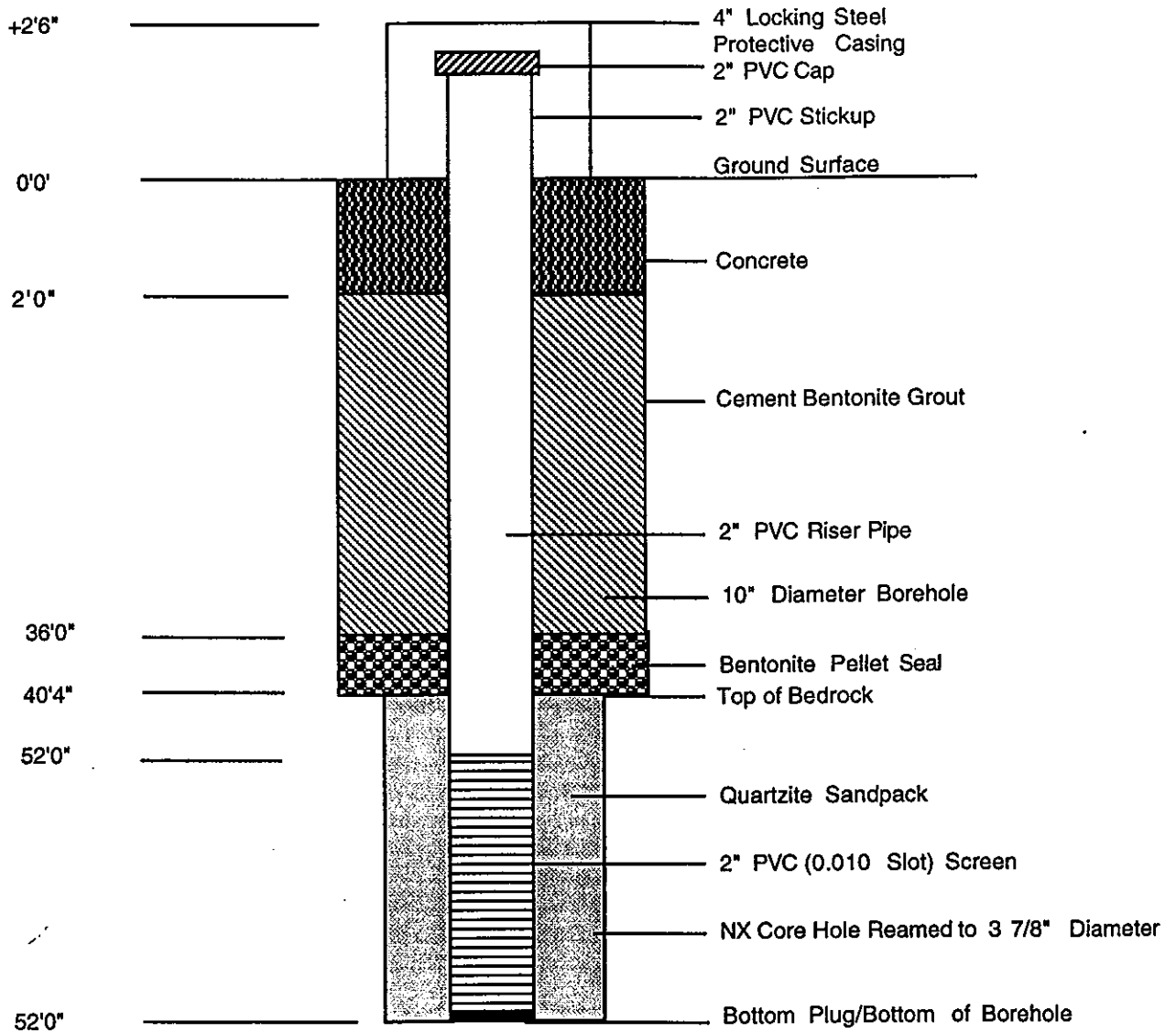
	C	Blows on Sampler				Sample				Soil and Rock Information Remarks
		0" 6"	6" 12"	12" 18"	18" 24"	N	Rec.	No	Depth	
40		100/1				100/1	0"	21	40'0"-40'1"	No recovery sample no. 21 Advanced Augers to Refusal 40'4" Medium hard gray dolomite mildly fractured horizontally with shadey parting and vugs (lost all drilling water @ 45'3")
									Run #1	
									40'4"-45'0"	
									Rec 53"	
45									RQD 90.2%	52'0"
									Run #2	
									45'0"-52'0"	
									Rec 81"	
50									RQD 79.8%	Boring terminated at 52'0" Advanced test boring with hollow stem auger casing. Cored with series "M" double tubed core barrel and diamond bit. Well installed in completed bore hole. See attached well diagram.
55										
60										
65										
70										
75										
80										

N=No. of Blows to Drive 2" Spoon 12" with 140 lb. wt. 30" Ea. Blow

C=No. of Blows to Drive _____ Casing _____ with _____ lb. wt. _____ Ea. Blow

Well Detail Summary

9 1



Note: Drawing Not to Scale.

NOTHNAGLE DRILLING1821 Scottsville-Mumford Road
SCOTTSVILLE, NEW YORK 14546

Phone (716) 538-2328

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Test Boring No. 9 SPage 1 of 1ND Job # 1063Project Rochester Fire Training Academy, 1190 Scottsville, Rochester, New YorkClient Thermacor Kimmins, 1501 2nd Avenue, Tampa, Florida 33605Elevation _____ Start 9/23/98 Completed 9/24/98 Driller J. Stockholm

Water Level - During Drilling _____ Inspector _____

Water Level - At Completion _____

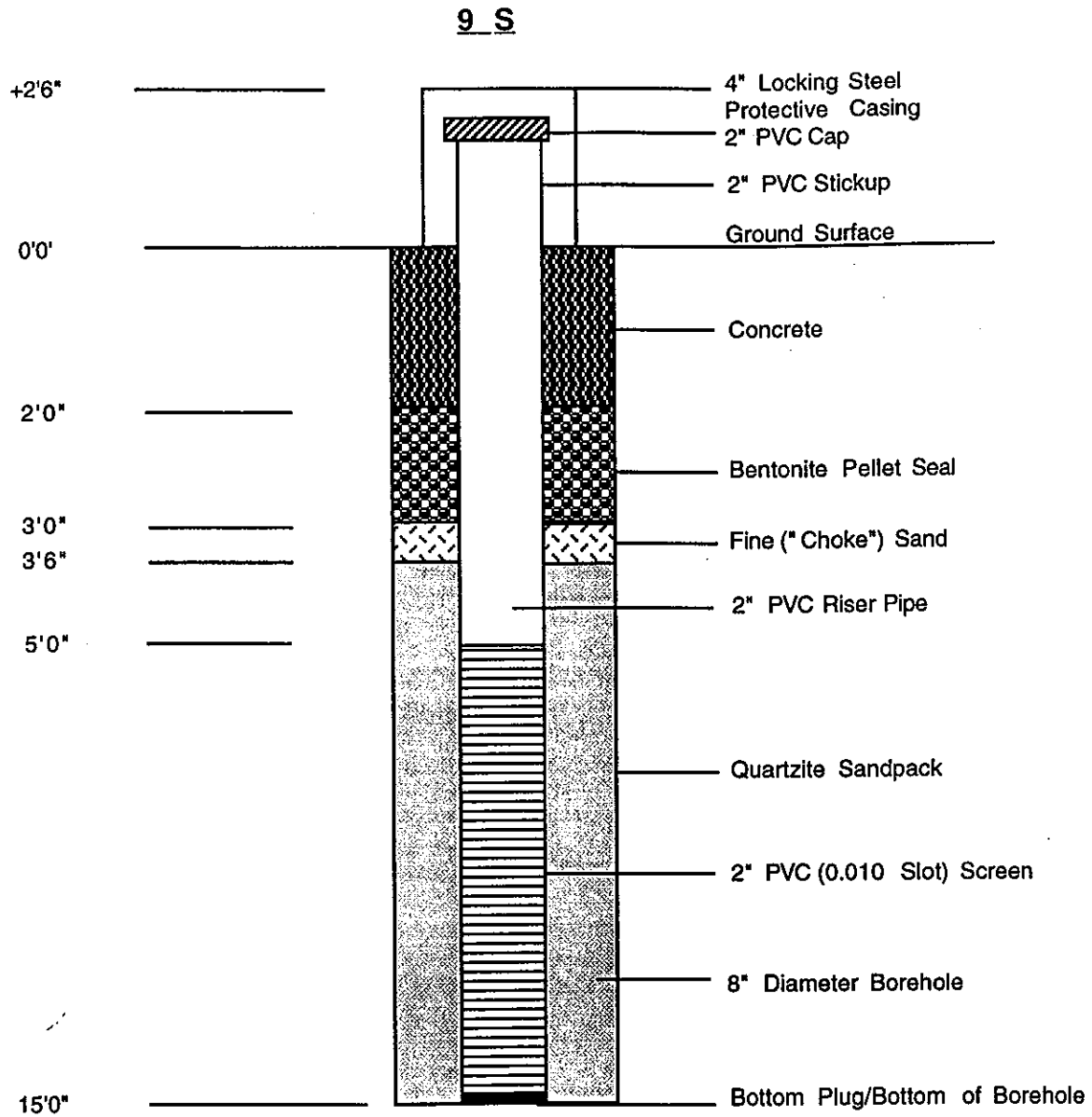
Seasonal and climatic changes may alter observed water levels.

0	C	Blows on Sampler				Sample				Soil and Rock Information Remarks
		0" 6"	6" 12"	12" 18"	18" 24"	N	Rec.	No	Depth	
										See boring no. 9 I for soil classifications
5										15'0" Boring terminated at 15'0" Advanced test boring with hollow stem auger casing. Well installed in completed bore hole. See attached well diagram.
10										
15										
20										
25										
30										
35										
40										

N=No. of Blows to Drive 2" Spoon 12" with 140 lb. wt. 30" Ea. Blow

C=No. of Blows to Drive _____ Casing _____ with _____ lb. wt. _____ Ea. Blow

Well Detail Summary



Note: Drawing Not to Scale.