OSM
CONSULTING ENGINEERS
LAND SURVEYORS

MINNEAPOLIS, MINNESOTA

2/18/87
K.4

SPECIFICATIONS FOR
SOUTH OAK POND EXPANSION
FOR THE
CITY OF ST. LOUIS PARK, MINNESOTA
PROJECT NO. 86-11

04

PREPARED BY

ORR-SCHELEN-MAYERON & ASSOCIATES, INC.
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MINNEAPOLIS, MINNESOTA 55413
(612) 331-8660

OSM COMMISSION NO. 3776.10

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Keith L. Shannon, P.E.

Date: February 18, 1987 Reg. No. 14380

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

James N. Grube

Date: February 18, 1987 Reg. No. 15012

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CITY OF ST. LOUIS PARK
ADVERTISEMENT FOR BIDS
SOUTH OAK POND EXPANSION
PROJECT NO. 86-11

NOTICE IS HEREBY GIVEN that the City Council of the City of St. Louis Park will receive sealed bids for City Project 86-11. Bids will be received at the office of the City Manager in the City Hall until 11 a.m., Tuesday, April 14, 1987.

ITEM	UNIT	QUANTITY
Dewatering	LUMP SUM	1
Select Granular Material	TON	24,000
Tensile Reinforcement Fabric	S.F.	213,500
Venting Media	S.F.	85,500
Geomembrane	S.F.	213,500

All bids shall be on the proposal form supplied by the City and shall be in accordance with specifications on file in the office of the Director of Public Works, copies of which are available in the City Hall, 5005 Minnetonka Boulevard, St. Louis Park, Minnesota, upon deposit of ten dollars ($10), said deposit to be refunded upon return of documents in good condition no later than May 1, 1987.

No bids shall be considered unless accompanied by a cash deposit, cashier's check, bid and performance bonds or certified check payable to the City Treasurer for not less than five (5%) of the net price bid.

Bids shall be directed to the City Manager, securely sealed and endorsed upon the outside wrapper with a brief statement as to the work for which the bid is made.

Bids will be opened publicly by the City Clerk and City Manager in the Council Chambers in the City Hall on April 14, 1987 at 11 a.m. The City reserves the right to reject any and all bids and to accept any bid deemed to be in the best interests of the City.

Dated: March 18, 1987

"EQUAL OPPORTUNITY EMPLOYER"

James L. Brimeyer
City Manager

Published in the St. Louis Park Sailor on March 23, 1987 and in the Construction Bulletin on March 27 and April 3, 1987.

PRE-BID MEETING

A pre-bid meeting will be held at the Saint Louis Park City Hall, 5005 Minnetonka Boulevard, Saint Louis Park, Minnesota, April 7, 1987 at 10:30 A.M., to discuss the scope and questions relating to the project.

CITY OF ST. LOUIS PARK, MINNESOTA
PROPOSAL FOR
SOUTH OAK POND EXPANSION

PROJECT NO: 86-11

BIDS CLOSE: 11:00 A.M., April 14, 1987

TO THE CITY COUNCIL OF THE CITY OF ST. LOUIS PARK, MINNESOTA:

The undersigned has examined the Contract Documents, including Advertisement for Bids, Instructions to Bidders, General Contract Conditions for Construction, Special Provisions, Form of Contract, Detailed Specifications, including drawings and plans on file in the office of the Director of Public Works of the City of St. Louis Park, Minnesota, and is familiar with the site and location of the project, the work to be done and local conditions affecting the cost of the work under which it must be performed, and hereby proposes to furnish all labor, materials and equipment for the complete construction of the projects as described in the contract documents for the following prices:

MnDOT SPEC. NUMBER	ITEM	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
02101	Clearing and Grubbing	LUMP SUM	1		_____
02105	Pond Excavation and Disposal (Estimated 50,000 Cubic Yards)	LUMP SUM	1		_____
02105	Rubble	C.Y.	200	_____	_____
02105	Contaminated Material For Re-use On Site	C.Y.	250	_____	_____
02105	Contaminated Material Not Suitable for Re-Use	C.Y.	150	_____	_____
02105	Dewatering	LUMP SUM	1		_____
02250	Select Granular Material	TON	24,000	_____	_____
02250	Tensile Reinforcement Fabric	S.F.	213,500	_____	_____
02250	Venting Media	S.F.	85,500	_____	_____
02250	Geomembrane	S.F.	213,500	_____	_____
02503	15" R.C.P. Class V with R-4 Joint	L.F.	32	_____	_____

MnDOT SPEC. NUMBER	ITEM	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
02503	27" R.C.P. Class II with R-4 Joint	L.F.	32	_____	_____
02503	15" R.C.P. Flared End Section	EACH	1	_____	_____
02503	27" R.C.P. Flared End Section	EACH	1	_____	_____
02511	Class II Rip Rap	C.Y.	6	_____	_____
02575	Seeding as Specified	LUMP SUM	1		_____
02575	Furnish and Spread Topsoil	C.Y.	4,000	_____	_____
TOTAL BASE BID				_____	_____

The Contractor understands that the quantities of work as shown herein are approximate only and are subject to increase or decrease and further understands that the quantities of work performed (whether increase or decrease) are to be performed at the unit prices bid.

Bid security in the amount of $_____, being 5% of the total bid amount accompanying this proposal, the same being subject to forfeiture at the option of the City in the event of default by failure of the successful bidder to execute the written contract, and supply contractors bond and proper insurance documents as specified in the Instructions to Bidders and General Contract Conditions.

It is understood by the undersigned that the right is reserved by the City Council of St. Louis Park, Minnesota, to reject any and all bids or to accept any bid, and that these bids may not be withdrawn until thirty (30) days after the time the bids are opened. If this bid is accepted, the undersigned agrees to furnish contractors bond and execute the contract form or forms provided by the City within seven (7) days after receiving notice of acceptance of bid and further agrees that if awarded such contract, work shall be commenced and be fully performed as provided in the special provisions.

The Contractor shall pay to the City as liquidated damages for failure to complete the contract within the stipulated time, the sum of Two Hundred Dollars ($200) per day until the date of final completion.

This is to acknolwedge receipt of addenda numbered _____, _____, _____, _____, and _____.

Acknowledgement: _____
(Signature)

State Whether Bidder is:

Partnership_____

Individual_____

Corporation_____

Name of Partner_____

State in Which Incorporated:

_____

Respectfully submitted:

_____
Firm Name

_____
By

_____
Title

_____
Address

_____
Telephone Number

AFFIDAVIT AND INFORMATION REQUIRED OF BIDDERS

Affidavit of Non-Collusion:

I hereby swear (or affirm) under the penalty for perjury:

(1) That I am the bidder (if the bidder is an individual), a partner in the bidder (if the bidder is a partnership), or an officer of employee of the bidding corporation having authority to sign on its behalf (if the bidder is a corporation);

(2) That the attached bid or bids have been arrived at by the bidder independently, and have been submitted without collusion with, and without any agreement, understanding, or planned common course of action with, any other vendor of materials, supplies, equipment or services described in the invitation to bid, designed to limit independent bidding or competition;

(3) That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids, and will not be communicated to any such person prior to the official opening of the bid or bids; and

(4) That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Signed: _____

Firm Name: _____

Subscribed and sworn to before me
this ____ day of _____, 19___.

_____
Notary Public
My commission expires _____ 19___.

Bidder's E. I. Number
(Number used on Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941): _____.

Fair Trade Items:
List below each item upon which a bid is made, the price of which is affected by a resale price maintenance or "fair trade" contract between the bidder and the person or firm supplying the item to the bidder. (Use reverse side if necessary).

_____

_____

_____

BIDDERS QUALIFICATIONS

1. List of personnel available for this project.

_____

_____

2. List of person(s) who will supervise the Work of this Project and number of years experience.

_____

_____

3. List of motorized equipment available for this Project.

_____

_____

_____

_____

4. List of other available equipment.

_____

_____

_____

5. List of similar type projects performed within the last three (3) years.

1) Name of client_____ Date_____

Contact person _____Telephone_____

2) Name of client_____ Date_____

Contact person _____Telephone_____

3) Name of client_____ Date_____

Contact person _____Telephone_____

SUBCONTRACTORS QUESTIONNAIRE

Each Bidder shall enter in the spaces provided the names of major subcontractors he proposes to employ and classification or type of work they will perform.

A major subcontractor is defined as a subcontractor whose subcontract constitutes approximately five percent (5%) or more of the total Contract price.

SUBCONTRACTOR	WORK

CITY OF ST. LOUIS PARK
AGREEMENT FOR CONSTRUCTION OF

_____

IMPROVEMENT NO._____

AGREEMENT, made as of _____, between the CITY OF ST. LOUIS PARK, a Minnesota municipal corporation ("city"), and _____, ("contractor").

The city and the contractor agree as follows:

1. CONTRACT DOCUMENTS

The contract documents shall consist of the following:

1. This instrument.
2. Any supplemental plans or drawings which may be furnished by the engineer from time to time to make clear and to define in greater detail the intent of the plans and specifications.
3. Any supplemental specifications and engineering data which may be furnished by the engineer from time to time to make clear and to define in greater detail the intent of the plans and specifications.
4. Any addenda issued prior to the opening of bids.
5. Plans and drawings.
6. Specifications.
7. Special Provisions.
8. Special Conditions.
9. Advertisement for bids.
10. Instructions to bidders.
11. Affidavit of Non-Collusion and Information Required of Bidders.
12. General contract conditions.
13. Accepted proposal.
14. Bond of Public Contract.
15. Insurance Certificate Contract.
16. Sworn Construction Statement.

These documents form the contract and they are as fully a part of the contract as if attached to this instrument. In the event that any provision in any of the component parts of this contract conflicts with any provision of any other component part, the provision of the component part listed first in this paragraph shall govern unless otherwise specifically stated.

2. WORK TO BE PERFORMED.

The contractor shall provide the materials as specified, and will perform all the work ordered by the City Council of the city, in a good and workmanlike manner, for the full completion of City Improvement No. _____ in conformity with the contract documents.

3. COMMENCEMENT AND COMPLETION

The contractor shall commence work under this contract _____ and shall fully complete all work _____.

4. THE CONTRACT PRICE.

The City agrees to pay the contractor for the work performed pursuant to this agreement, a total price of $_____, as set forth in the proposal of the contractor. A copy of the proposal is attached and made a part of this agreement. The final payment on the contract sum shall be due and payable fifteen days after receipt by the City Council of the City of a certificate by the engineer that the work has been fully completed and this contract fully performed by the contractor.

5. RETAINAGE

The minimum retainage required under this contract shall be five (5) percent of the work completed.

6. LIQUIDATED DAMAGES

The contractor shall pay to the City as liquidated damages for failure to complete the contract within the stipulated time, the sum of $ _____ per day before the date of substantial completion, and the sum of $ _____ per day after the date of substantial completion and until the date of final completion.

EXECUTED as to the day and year first above written.

Reviewed for administration:

_____
City Manager

Approved as to form and legality:

_____
City Attorney

Reviewed for engineering

_____
Director of Public Works

Accounting Records Posted:

_____
Director of Finance

Resolution Authorizing No. _____

CITY OF ST. LOUIS PARK

By _____
Mayor

and _____
City Manager

_____

By _____

Its _____

By _____

Its _____

Approved as to Form and Execution

_____
Date City Attorney

CITY OF ST. LOUIS PARK
BOND OF PUBLIC CONTRACTOR

KNOW ALL MEN BY THESE PRESENTS, that _____

_____

as principal ("contractor") and _____

_____

a corporation duly organized under the laws of the State of _____ and authorized to transact business as a corporate surety in the State of Minnesota, as surety ("surety"), are held and firmly bound to the City of St. Louis Park, Minnesota, as obligee, ("city") in the sum of _____ Dollars, for which payment the contractor and surety bind themselves, their respective heirs and legal representatives, successors and assigns, jointly and severally.

The conditions of this obligation are that the contractor has entered into a contract with the City dated _____ for _____ _____ which is specifically made a part hereof by reference.

NOW THEREFORE, if the contractor shall perform the contract according to its terms; shall pay as they become due all just claims for work done, tools, machinery, skill, materials, insurance premiums, equipment and supplies as may be provided for the completion of the contract in accordance with its terms; shall indemnify and save the city harmless from all damage that may arise on account of the failure of the contractor to fully perform the contract or any part thereof, including all costs, damages, and charges that may accrue on account of the doing of the work specified; and shall pay all costs of enforcing the terms of this bond in all actions which may be brought thereon, including reasonable attorney' fees, shall comply with all laws applicable to the contract; shall, in case the contract price specified in the contract shall for any reason be increased, furnish an additional bond in the sum of at least such increase within ten days after a demand in writing from the city; then this obligation shall become void but otherwise it shall remain in full force and effect.

No modification of the terms of the contract or of the work to be performed, or extensions of time or changes in the mode and manner of payment, nor any forbearance on the part of the city shall in any way release the contractor of the surety from liability. Notice to the surety of any such modification, extension or forbearance is waived.

EXECUTED as of _____, 19 ____.

_____

_____

_____
Principal

_____

_____

_____
Surety

(Complete acknowledgments of parties on reverse and attach power of attorney from the surety certified to include the date of the bond.)

Individual Principal

State of Minnesota }
} ss.
County of Hennepin }

On this .... day of ...., 19 ......, before me, a ....
within and for said County, personally appeared ....
....
to me known to be the person described in, and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

....

Notary Public, ... County, Minnesota

My Commission Expires .... 19........

Partnership Principal

State of Minnesota }
} ss.
County of Hennepin }

On this .... day of ...., 19 ......, before me, a ....
within and for said County, personally appeared ....
a member of a partnership consisting of ....
....
doing business under the firm name and style of ....
to me known to be the person described in, and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed and as the free act and deed of said partnership.

....

Notary Public, ... County, Minnesota

My Commission Expires .... 19........

Corporation Principal

State of Minnesota }
} ss.
County of Hennepin }

On this .... day of ...., 19 ......, before me, a ....
within and for said County, personally appeared ....
and ...., to me personally known, who, being each by me duly sworn did say that they are respectively the .... President and the .... of the Corporation named in the foregoing instrument, and that the seal affixed to said instrument is the corporate seal of said corporation, and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors and said .... and ....,
acknowledged said instrument to be the free act and deed of said corporation.

....

Notary Public, ... County, Minnesota

My Commission Expires .... 19........

Surety Company

State of Minnesota }
} ss.
County of Hennepin }

On this .... day of ...., 19 ...... before me, a notary public in and for said County, personally appeared .... to me personally known and being by me duly sworn, did say, that he is the Attorney-in-Fact of ....
.............................., a corporation of ...., created, organized and existing under and by virtue of the laws of the State of .... and authorized to contract as surety in the State of Minnesota, that the said instrument was executed on behalf of the corporation by authority of its Board of Directors and that the said .... acknowledges said instrument to be the free act and deed of said corporation and the seal affixed to said instrument is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my official seal at ...., the day and year last above written.

....

Notary Public, ... County, Minnesota

My Commission Expires .... 19........

Contractor_____

Contract No._____

Improvement Proj t

Type_____

This Statement M

1. Prepare a st
contractors d
certificate su

2. Attach names n
men.

3. Under the he
with or tota an
sub-contract
"Amount Paid
of making th a
enter the di er
to each cont
in detail an a
any contract ,
payment any
this sworn c

4. Statements m t
least one we

5. In order to e
any part of

Approved as to Form and Execution

_____
Date City Attorney

INSURANCE CERTIFICATE - CONTRACT

To: City of St. Louis Park
City Hall
St. Louis Park, Minnesota 55416

Re: Insurance Coverage Required by Contract
for Improvement No._____

The undersigned is an authorized representative of_____ which is the insuring company for_____, the contractor on Improvement No._____.

In compliance with this contract of the City of St. Louis Park, we certify as follows:

1. We have fully read and checked for compliance the requirements of insurance set forth in the contract documents, a copy of which is attached to this certificate.

2. The contractor has in effect insurance that complies in every respect with the requirements of insurance set forth in the contract documents, including all of the conditions specified:

_____ Yes

_____ No (any required coverage that is not included under this certificate and will be covered by a separate certificate is as follows:_____
_____).

3. Any deductibles in excess of $500.00 applicable to any of the required coverages other than umbrella coverage are as follows:

_____
_____.

4. The name and address of the insurance agent for the coverage included in this certificate is_____
_____.

5. The insurer handling the errors and omissions coverage for the agent is _____Company.

Dated at_____ on_____.

_____
(Insurance Company)

_____
(Authorized Representative)

Enclosure

Instructions

Who should file?

If you are a prime contractor, a contractor or a subcontractor who performed work on a project for the State of Minnesota or any of Minnesota's political or governmental subdivisions (counties, cities, school districts, etc.), you must file a completed Form IC-134 if you wish to receive final payment for the work you performed.

Prime contractor. You are considered a prime contractor if you were awarded a contract to perform work but you subcontracted all or part of the work to other contractors.

Contractor. You are considered a contractor if you were awarded a contract to perform work and you and/or your employees were the only persons who performed the work.

Subcontractor. You are considered a subcontractor if a prime contractor hired you to perform all or part of the work on a contract.

When to file

If you are a subcontractor, file Form IC-134 when you have completed your part of the project.

If you are a prime contractor or contractor, file Form IC-134 when the entire project is completed.

How to file

Complete Form IC-134 and send two copies to the Minnesota Department of Revenue. A prime contractor must also attach a copy of each subcontractor's certified Form IC-134 to his/her Form IC-134.

Form IC-134 is certified when it is completed and signed at the bottom by an authorized representative of the Department of Revenue.

Prime contractor. If you and your subcontractors have complied with the withholding tax laws of Minnesota, the Department of Revenue will certify your affidavit and return one copy to you. It is necessary in submitting your Form IC-134 for certification that you attach certified copies of all your subcontractors Form IC-134's. Failure to do so will delay processing, certification and receipt of your final payment. Take the certified copy to the governmental unit for which the work was performed in order to obtain final payment for the project.

Contractor. If you have complied with the withholding tax laws of Minnesota, the Department of Revenue will certify your affidavit and return one copy to you. Take the certified copy to the governmental unit for which the work was performed in order to obtain final payment for the project.

Subcontractor. If you have complied with the withholding tax laws of Minnesota, the Department of Revenue will certify your affidavit and return one copy to you. Take the certified copy to the prime contractor for the project. He/she will have to attach a copy of your form IC-134 to his/her own Form IC-134 to obtain final payment for the entire project.

AV 00258 05

Where to file

Send the original and one copy of Form IC-134 to:

Minnesota Department of Revenue
Revenue Accounting
P.O. Box 64446
St. Paul, Minnesota 55164

Minnesota identification number

You need a Minnesota tax identification number if you have e[mp]loyees who do work in Minnesota. If you need a number but do not h[ave] one, you should file Form MBA, Application for Tax Identi[fica]tion Number. If you need Form MBA or any other tax forms or i[nfor]mations, write to: Minnesota Income Tax Forms, Room B-20, C[ent]ennial Office Building, St. Paul, Minnesota 55145 or call 297-378[0] in the Twin City metropolitan area. Elsewhere in Minnesota, c[all] toll-free: (800) 652-9094.

If you do not need a Minnesota identification number because you have no employees (for example, you are a sole proprietor, a [part]ner in a partnership or a shareholder in an S corporation), fill in you[r so]cial security number in the space marked "Minnesota identificat[ion] number" in the top right corner of Form IC-134. Explain why you do not need an identification number on a separate sheet and attach it to Form IC-134.

Are you both a prime contractor and a subcontractor on the same project? It is possible for you to be considered both a subcontractor and a prime contractor on the same project. A subcontractor becomes a prime contractor if he/she subcontracts all or part of his/her portion of the project to yet another contractor. In this case, you must complete and file one Form IC-134 as a subcontractor and one Form IC-134 as a prime contractor.

Use of information

All information on this affidavit is private by state law. It cannot be given to others without your consent except to the Internal Revenue Service, to other states which guarantee the same privacy rights, and certain state or county agencies as provided by law. The information on this affidavit may also be compared with other information you may have furnished the Department of Revenue.

All information on this affidavit, except your telephone number, is required for identification and to verify that all income tax withholding requirements have been met. If you do not provide all requested information, the Department of Revenue may refuse to certify the affidavit and you will not be able to obtain final payment of your contract with the Minnesota governmental unit. We ask that you provide a telephone number where you can be reached during the work day so we can contact you quickly if we have a question about your affidavit.

Information and assistance

If you need help or additional information to complete this affidavit, call 296-3781 in the Twin City metropolitan area. Elsewhere in Minnesota, call toll-free: (800) 652-9094

SUPPLEMENTARY GENERAL CONDITIONS

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract and all other provisions as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

SC-2c Definitions

Add to the definitions: "Contract Documents" are the Advertisement for Bids, Instructions to Bidders, Bid Proposal, Bid Bond Form, General Conditions, Supplementary General Conditions, Specifications and all plans and drawings.

SC-5 Contractor's Insurance

Add to Article 5, Contractor's Insurance of the General Conditions the following:

> The Contractor shall provide and maintain an Umbrella Liability Policy to satisfy claims in excess of the limits of liability set forth in Article 5 up to a maximum of one million dollars ($1,000,000) filed against himself or his agents. The Owner and the Engineer shall be named as also insured on the policy. Prior to commencing any work on the project, the Contractor shall submit evidence in the form of certificates that the insurance is in force.

SC-7 Permits

The City will obtain the necessary permits from other governmental agencies for the construction of the pond. The Contractor shall abide by all conditions of these permits.

SC-12 Prosecution of Work

Add a new paragraph at the end of this section of the General Requirements which reads as follows:

> All work to be constructed under this project shall be completed within 60 working days. All work performed after the prescribed time shall be subject to liquidated damages.

SC-26 Failure to Complete Work on Time

The sum of Two Hundred Dollars ($200.00) will be the daily liquidated damages on this project.

DIVISION 1

GENERAL REQUIREMENTS

INDEX

DIVISION 1

GENERAL REQUIREMENTS

01010 - SUMMARY OF WORK

The work to be done under this Contract shall include the furnishing of all labor, materials, tools and equipment necessary to complete the work as shown on the plans and specified herein.

The Owner is the City of St. Louis Park. All work will be done within City owned property.

01014 - SCOPE OF WORK

The Contractor shall perform his work in such a manner as to cause the least interference with work being done on adjacent properties. The properties to the east and southeast of the pond construction are privately owned. The owners of these properties are planning construction work which could be taking place simultaneously with the pond construction.

The Contractor shall select his own method for removal and disposal of the common excavation material. The method shall be reviewed and approved by the City Engineer. The disposal shall be the responsibility of the Contractor.

A copy of geotechnical reports with soil borings are included in the Appendix for information only. Neither the Consulting Engineer nor the City is responsible for their content, accuracy or interpretation.

01050 - FIELD ENGINEERING

The City will provide the Contractor with bench marks within the area from which he can work to establish his elevations. The City will check the grading operation periodically to verify that the grades are properly maintained.

01200 - PROJECT MEETINGS

Prior to the start of the work, there will be a preconstruction conference arranged by the Engineer. Representatives of the Engineer, Owner, and Contractor shall be present at this meeting.

The Contractor's project superintendent will be present at this meeting. He shall be familiar with all phases of the work to be executed and shall oversee the work during its progress. The project superintendent shall represent the Contractor in is his absence, and communications and directions given to him shall be as binding as if given to the Contractor.

The Contractor's work schedule shall be reviewed along with any other information necessary for an orderly execution of the work.

Throughout the construction phase regular meetings will be called, as deemed necessary by the Engineer, to review progress and discuss items necessary for an orderly completion.

01300 - SUBMITTALS

Prior to the preconstruction conference the Contractor shall submit in writing to the Engineer for review a schedule of procedure indicating the order in which the Contractor proposes to perform the various stages of the work, the dates on which he will start the various features thereof, and the contemplated dates for completing the same. This schedule shall be in the form of a bar chart of a suitable scale to indicate appropriately the percentage of work schedule and completed by weekly schedules. The Contractor shall not deviate from this schedule after once approved without written permission of the Engineer.

The Contractor shall present to the Engineer six (6) copies of detailed, dimensioned manufacturer's drawings of all materials and apparatus, and for such fittings and devices as the Engineer may direct. This shall include, but not be limited to all fabrics, membranes, layout patterns, equipment and field joining, and granular material. The Engineer will keep two copies of each set and return the rest to the Contractor with the Engineers approval or notations. In case of lack of approval, the Contractor shall submit new drawings, corrected as required by the Engineer. All such drawings shall be submitted to the Engineer with ample time allowance for consideration.

The Engineer's approval of such drawings or schedules shall not relieve the Contractor from the responsibility for deviations from drawings or specifications unless he has, in writing, called the Engineer's attention to such deviations at the time of submission, nor shall it relieve him from the responsibility for errors of any sort in shop drawings or schedule. No work shall be started until the drawings have been approved by the Engineer.

01400 - QUALITY CONTROL

Any person representing federal, state or county agencies, the Engineer, or Owner shall have the right of entry to inspect the work being performed by the Contractor. If the case warrants, the Contractor shall provide proper facilities for such access and inspection.

The Contractor shall notify the resident inspector anytime he anticipates working on this project. No work will be allowed without notifying the inspector a minimum of 24 hours beforehand.

01401 - EXPERIENCE WITH GEOMEMBRANE CONSTRUCTION

The geomembrane manufacturer shall have at least five years continuous experience in manufacturing HDPE geomembrane rolls and/or a manufacturing record totaling not less than 2 million square feet of HDPE. The manufacturer shall have produced HDPE for at least ten completed facilities similar in scope to that of the specific project shown in the design drawings.

If a geomembrane fabricator is involved in the production of the roll goods, the fabricator must have an experience record similar to or exceeding that of the manufacturer. Additionally, the fabricator shall have at least one individual involved with the project who has fabricated not less than 1 million square feet of geomembrane using the seaming method specified for this project.

The installer of the geomembrane shall have at least five years of continuous experience in the installation of HDPE geomembrane and/or an installation record

totaling not less than 2 million square feet. The installer shall have installed HDPE for at least 10 completed sites similar in scope to that of the specific project as shown in the design drawings.

Installation shall be performed under the direction of a single field supervisor who must remain on site throughout liner installation. The field supervisor shall be on site during subgrade observation and testing, panel layout, seaming, testing, repairs and other contracted activities. The field supervisor shall be responsible and in absolute charge of the installation and have an experience record totaling not less than 1 million square feet of geomembrane.

Field seaming of the geomembrane panels shall be performed under the direction of a seaming supervisor who may or may not be the same person as the field supervisor. The seaming supervisor shall have an experience record totaling not less than 1 million square feet of HDPE geomembrane installed using the seaming method specified in this project.

If a qualified field supervisor and/or seaming supervisor cannot be provided, the Owner reserves the right to provide such personnel at the installer's expense.

01516 - TEMPORARY SANITARY FACILITIES

The Contractor, at his own expense, shall provide and maintain temporary toilet facilities at the site during the construction period.

01533 - BARRICADES

The Contractor shall furnish, erect and maintain warning lights and barricades as required by the Engineer to adequately warn and protect the public from hazardous protrusions, materials, excavations, etc., resulting directly or indirectly from the construction.

The Contractor shall designate one man and two alternates who are on 24 hour call to have responsible charge of proper erection and maintenance of traffic barriers, warning signs, flashers, street maintenance, etc. These signs, barricades and flashers shall conform to the standards illustrated in the Mn/DOT Manual on Uniform Traffic Control Devices, Appendix B.

The work required in this Section shall be considered incidental to the project.

01546 - PROTECT EXISTING UTILITIES

Prior to commencing construction, the Contractor shall check all existing manholes, catch basins, gate valve boxes, stop boxes and storm sewer lines in the construction zones to determine their condition. Failure to report deficiencies in writing, and have such deficiencies acknowledged in writing by the Engineer, will be cause for any required repairs and or cleaning to be charged to this Contractor.

The plans included in this contract will contain information relative to the location of existing utilities to the extent this information is available from the respective utility company. The City does not, however, guarantee the locations as shown on the plans, and it is the Contractor's responsibility to ascertain the final location of these utilities and to notify the utility companies prior to commencing construction. The City shall not be responsible for any delay which

the Contractor may encounter by reason of the utility company involved failing to promptly do their necessary work.

It is the Contractor's responsibility to coordinate his work with the utility companies and preserve the existing condition of said utilities. All crossings will be thoroughly backfilled and compacted, using mechanical tampers to prevent any displacement or settlement of the utility lines.

01561 - NOISE CONTROL

The Contractor shall comply with local and state ordinances on noise abatement.

01562 - USE OF CITY STREETS

In disposing of the excess material, the Contractor shall review the streets he desires to use with the City Engineer. The City Engineer shall have the right to dictate what streets can be used for haul routes. All streets within the City that are used for haul roads shall be checked daily for spillage of material. Any material spilled on these streets shall be cleaned daily by the Contractor. Failure to maintain the streets in a proper condition shall be just cause for the Engineer to direct necessary maintenance tasks to be completed and charged to the Contractor.

01568 - EROSION CONTROL

The Contractor shall be responsible for providing the necessary controls over his operations to prevent erosion. Erosion control measures shall be provided where necessary to protect adjacent property. The Contractor shall use hay bales between the existing pond and the new pond as shown on the plans. The cost of erosion control shall be considered incidental to the project.

01600 - WORKING WITH CONTAMINATED MATERIAL

The Contractor is advised the pond expansion site is located southerly of an area whose subsurface soils contain creosote or coal tar constituents. In the event the Contractor encounters excavated material containing creosote or coal tar constituents, the Contractor shall notify the Owner. The Owner or Engineer shall classify the excavated material as suitable for use or disposal on the site or provide for its disposal at a location beyond the construction limits of the project.

Physical hazards associated with exposure to creosote or coal tar constituents include skin irritation similar to sunburn; therefore, the Contractor is advised that all employees must be protected according to applicable regulations of the enclosed Health and Safety Plan (Appendix A).

01710 - CLEANUP

During the progress of the work, the area affected shall be kept clean and free of all rubbish and surplus materials. All unneeded construction equipment shall be removed from the site and all damage repaired so that the public and adjacent property owners are inconvenienced as little as possible.

Where materials or debris have washed or flowed into or have been placed in water courses, ditches, gutters, drains, catch basins, or elsewhere as a result of the

Contractor's operations, such material or debris shall be removed and satisfactorily disposed of during progress of work. All ditches, channels, drains, etc., shall be kept in a clean and neat condition.

On or before the completion of work, the Contractor shall, unless otherwise directed in writing, remove all temporary works, tools and machinery or other construction equipment placed by him. He shall remove all rubbish from any grounds which he has occupied and shall leave all of the premises and adjacent property affected by the operation in a neat and restored condition satisfactory to the Engineer.

DIVISION 2 - SITEWORK

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DIVISION 2

SITEWORK

02000 - GENERAL

This work shall be done in accordance with the Minnesota Department of Transportation's "Standard Specifications for Highway Construction" (referenced 'Mn/DOT') 1983 Edition and any amendments thereto or as modified herein. The numbering system used herein corresponds to the numbering systems used in the above named specifications with the exception that a "0" has been added preceeding the 5 digit number.

02101 - CLEARING AND GRUBBING

02101.1 - DESCRIPTION: All trees and brush within the grading limits shall be removed and disposed of by the Contractor.

02101.5 - BASIS OF PAYMENT: Payment will be made at the lump sum price bid and shall include all removal and disposal.

02105 - EXCAVATION

02105.1 - DESCRIPTION: This work shall consist of excavating the pond to the elevations shown on the plan. The pond shall be subcut as per the typical section and the subgrade prepared for placement of the granular material.

02105.2 - MATERIALS

A. EXCAVATED MATERIAL: Classification of excavated materials will be made by the Engineer as work progresses. The excavations will be classified for payment in accordance with the following provisions:

A1. COMMON EXCAVATION: All excavated materials not otherwise classified herein shall be considered common excavation.

A2. RUBBLE: All rock, concrete, wood, railroad ties, or other debris that has been deposited on the site shall be classified as rubble.

A3. CONTAMINATED MATERIAL SUITABLE FOR RE-USE: Excavated material containing creosote or coal tar constituents can be used as backfill along the pond side slopes or intermixed with non-affected backfill material for placement within the site.

A4. CONTAMINATED MATERIAL NOT SUITABLE FOR RE-USE: Excavated material containing creosote or coal tar constituents that cannot be re-used and must be removed from the site.

02105.3 - CONSTRUCTION REQUIREMENTS: The elevations shown on the plan are finished elevations. The Contractor shall excavate the pond to the subcut elevations shown on the typical section. All excess common excavation shall be disposed

of by the Contractor, off the site. Sufficient topsoil should be salvaged and stockpiled to use later.

As a part of the excavation, the Contractor shall prepare a smooth subgrade, free of lumps, free of standing water and capable of supporting the equipment necessary for installing the tensile reinforcement fabric and the granular material. Any over excavations shall be filled with suitable material from the excavation.

Excavated material containing creosote or coal tar constituents shall be used as backfill along designated areas of the pond side slopes or shall be intermixed with non-affected backfill material and placed on the site as directed, if neither the creosote nor coal tar constituents have undertaken a cementatious nature, artificially bonding the excavated soil as a concrete unit, nor if the constituents, upon close visual observations, are greater than fifty percent creosote related material.

1. If affected material is encountered, the Contractor shall immediately contact the Owner, Engineer, or its representative at which time he shall be directed to replace it on the site during the same work day or as soon thereafter as possible.

2. The handling of all affected materials shall be completed under the direct supervision of the Owner, Engineer, or its designated representative and in accordance with the provisions of the attached Health and Safety Plan (Appendix A).

In the event the Contractor encounters soils containing creosote or coal tar constituents which have undertaken a cementatious nature, artificially bonding the excavated soil as a concrete unit, or if the constituents, upon visual observation are greater than fifty percent creosote related material, The Contractor shall place said material within a fenced security area constructed by the Owner within the staging area. The staging area is located north of West Lake Street immediately adjacent to construction site as shown on plans.

1. Upon discovery of the material, the Contractor shall immediately contact the Owner, Engineer, or its representative at which time he shall be directed to place the material in the fenced security area (constructed by the Owner) and provide necessary labor and equipment to load the material onto transport vehicles provided by the Owner or others.

2. The handling of all affected materials shall be completed under the direct supervision of the Owner, Engineer, or its designated representative and in accordance with the provisions of the attached Health and Safety Plan (Appendix A).

The Contractor shall plan his work so that the connection to the existing pond is the last excavation made. The City will pump the existing pond down prior to the excavated connection being made.

The Contractor shall de-water the area with the use of wells or well points. Prior to the City pumping the lower pond down to facilitate the connection, the Contractor shall have the water table around the existing pond to elevation 170 or lower.

The Contractor shall take special care in making the connection to the existing pond so as not to damage the existing liner.

02105.4-.5 - METHOD OF MEASUREMENT AND PAYMENT: The basic pond excavation is being bid on a lump sum basis for common excavation. The Contractor shall be responsible for confirming his own quantities for the lump sum bid. For estimating purposes only, there are approximately 50,000 cubic yards of in place material to be excavated and disposed of.

The item for "Rubble" shall be measured and paid for on a cubic yard basis (vehicle measurement). This will be payment in full over and above the lump sum bid for common excavation, for hauling and disposal outside the City of St. Louis Park.

The item "Contaminated Material Suitable for Re-Use" shall be measured and paid for on a cubic yard basis (vehicle measurement) and shall be compensation in full for all labor, and equipment necessary to excavate the material, excavate a designated disposal location, or intermix the material with other fill material, and place the affected material in the designated site location. Payment for affected material excavation/replacement will only be made if such activities are fully documented by the Owner, Engineer or its designated representative. This will be payment in full over and above the lump sum bid for common excavation.

The item for "Contaminated Material Not Suitable for Re-Use" shall be measured and paid for on a cubic yard basis (vehicle measurement), and shall be compensation in full for labor, equipment, and material necessary to excavate, stockpile, and load the material onto transport vehicles provided by the Owner or its representative. Payment for affected material excavation, stockpiling, and loading onto transport vehicles shall be made only if such activities are fully documented by the Owner, Engineer, or its designated representative. This will be payment in full over and above the lump sum bid for common excavation.

The item for "Dewatering" is being bid as a lump sum. This will include all dewatering necessary during excavation of the pond, plus lowering the water table under this existing pond which will allow the City to pump the existing pond down during the connection of the new pond liner with the existing pond liner. This will include all pumps, piping, power, labor and other miscellaneous items necessary to dewater the area. The City has piezometers in place, which the Contractor can use to verify water elevations.

02250 - POND LINER AND VENTING SYSTEM

02250.1 - DESCRIPTION: This work shall consist of placing tensile reinforcement fabric, select granular material, venting media and a geomembrane on a prepared subgrade.

02250.2 - MATERIALS:

A. SELECT GRANULAR BORROW: Select granular borrow shall be a clean, granular material with well rounded particles having the following graduation.

TOTAL PERCENT PASSING SIEVE SIZE

3/4"	-	100
3/8"	-	65 - 100
#4	-	40 - 100
#10	-	25 - 90
#40	-	10 - 45
#200	-	0 - 5

B. TENSILE REINFORCEMENT FABRIC: A monofilament woven geotextile fabric with the following minimum requirements shall be used:

-- Mullen burst strength greater than 300 psi.
-- Grab tensile strength greater than 250 lbs. lin.
-- Percent open area of 10 - 15%
-- EOS of 30 - 50 U.S. standard sieve size.

The Contractor shall submit one (1) 3'x3' sample of material along with a 5 LF seam which has been sewn by the equipment to be used in the field for testing by Owner. Submittals shall be at least two weeks prior to intended use.

C. VENTING MEDIA: The three dimensional plastic structure and attached separator geotextile shall have the following properties:

Plastic Structure Requirements

-- Polyethylene polymer composition
-- Width $\geq$ 6.0 Ft.
-- Length $\geq$ 9.0 Ft.
-- Thickness $\geq$ 200 mils (or 0.2 inches), ASTM D-1777
-- Standard crush strength 130 psi, ASTM D-1621 Mod.
-- Flow capacity at:
14.5 psi $\geq$ 12.6 Gal/Min/Ft.
1.45 psi $\geq$ 13.0 Gal/Min/Ft.
ASTM D-35 03.84.02

Attached Non-Woven Separator Geotextile Product Requirements

-- Grab Tensile Strength (ASTM D-1682 modified - Geotextile Engineering Manual - 11/3/83) $\geq$ 90 Lbs.

-- Permativity (ASTM Designation 61-001) $\geq$ 0.3 $Sec.^{-1}$

-- AOS (Geotextile Engineering Manual II.12.84) of 50-100 U.S. sieve size.

The Contractor shall submit one (1) 3'x3' sample of material for testing by Owner. Submittals shall be at least two weeks prior to intended use.

D. GEOMEMBRANE

D1. RAW MATERIALS: The geomembrane and extrudate rods shall be manufactured of new, first quality resin, designed specifically for use in flexible

membrane liner installations. The HDPE resin shall meet the following specifications:

--	Specific Gravity > 0.94		ASTM D-792 Method A or ASTM D-1505
--	Melt Index	< 1.1 Grams/10 Min.	ASTM D-1238 Condition E

Reclaimed polymer shall not be added to the resin. However, the resin may contain polymer recycled during the manufacturing process if recycled polymer does not exceed 2% by weight.

D2. GEOMEMBRANE ROLL GOODS:

D.2.1 The geomembrane sheet used for this specific project shall meet the following specifications:

Property	40 mil	Test Method
Sheet thickness	40 mil ± 10%	ASTM D-1593
Force per unit width at yield	> 80 lbs.	ASTM D-638
Force per unit width at break	> 150 lbs.	ASTM D-638
Elongation at yield	> 10%	ASTM D-638
Elongation at break	> 500%	ASTM D-638
Modulus of elasticity	> 100,000 psi	ASTM D-638
Tear Resistance	> 30 lbs.	ASTM D-1004 Die C
Puncture resistance	> 50 lbs.	FTMS, 101B/2065
Resistance to soil burial (max. change)	> 10%	ASTM D-1204 as modified in NSF Appendix A
Dimensional stability	> 3%	ASTM D-1204 212^{o}F, 15 min.
Low temperature brittleness	> -40^{o}F	ASTM D-746, Proc. B
Carbon black content	2 - 3%	ASTM D-1603
Carbon black dispersion	A-1	ASTM D-3015
Environmental stress crack	> 2,000	ASTM D-1693 as modified in NSF Appendix A

NOTE: From National Sanitation Foundation.

D.2.2 The geomembrane shall consist of un-reinforced high density polyethylene containing at a maximum 3% by weight additives, fillers or extenders.

D.2.3 The geomembrane shall be free of holes, blisters, striations, roughness, undispursed raw material or any contamination by foreign matter.

D.2.4 The geomembrane is to be supplied in blankets or rolls. Each roll is to be labeled identifying the thickness of the geomembrane, the length and width of the roll, the manufacturer, lot number and roll identification number.

The Contractor shall submit one (1) 3'x3' sample of material for testing by Owner. Submittals shall be at least two weeks prior to intended use.

D3. EXTRUDATE:

D.3.1 Resin used in the polyethylene extrudate shall be the same as that used to manufacture the geomembrane sheets. Extrudate rods are to be delivered in original containers with the manufacturer's mark number. All extrudate rods shall be free of dirt, wetness and damage.

D4. FABRICATED SEAMS AND FIELD SEAMS:

D.4.1 Fabrication and field seaming of geomembrane sheets or panels shall be performed by an extrusion welding or fusion welding process. Extrusion welded seams are constructed by extruding a ribbon of polyethylene, having the same resin and physical properties as the geomembrane, between two overlapping sheets.

Acceptable fusion welding process includes both single hot wedge and dual hot wedge systems. Fusion welding consists of a heated element, taking the shape of a blade or wedge, which is passed between and in contact with two overlapping geomembrane panels thereby melting the surfaces. Immediately following the melting, roller pressure is applied to create a homogeneous bond.

Proposed alternatives for joining the geomembrane panels shall be documented and submitted for approval with the completed Bid Form.

D.4.2 The installer shall submit details of the specific equipment used for field seaming. At a minimum, the extruder shall be equipped with a temperature gauge at the barrel and nozzle. The fusion welder and any preheat equipment shall also be equipped with a temperature gauge capable of continuous monitoring. Digital or dial continuous recording temperature instruments shall be provided with each welding unit. These temperature recorders shall be in satisfactory working condition. Malfunction of these recorders shall be considered cause for the welding unit to be non-operative and welding with that unit shall cease immediately.

All equipment including, but not necessarily limited to welding machines, generators, electric cables, grinders and material containers shall be operated, stored and transported in a manner to avoid damage to the geomembrane. Any damage to the geomembrane shall be repaired or replaced as specified in.

D.4.3 Fabricated seams and field seams shall meet the following minimum specifications:

Nominal Geomembrane Gauge	40 mil	Test Method
Bonded Seam Strength at Yield	>80 lbs. & FTB	ASTM D-3083 Modified in NSF Appendix A
Peel Adhesion	FTB	ASTM D-413 or ASTM D-638 as Modified in NSF Appendix A

NOTE: Must fail at film tear bond (FTB)

D5. APPURTENANCES:

D.5.1 In areas where the geomembrane is to be installed around any pipe or other appurtenance protruding through the geomembrane, a geomembrane sleeve (prefabricated boot), identical in physical characteristics and resin to the geomembrane panels, should be used as recommended by the manufacturer. All bolts and batten strips used in attaching the geomembrane to the concrete anchor pad shall consist of stainless steel. A closed cell neoprene sponge at least 1/4-inch thick shall be used between all batten strips and the geomembrane.

02250.3 - CONSTRUCTION REQUIREMENTS

A. Upon completion of the prepared subgrade, the Contractor shall place tensile reinforcement fabric. All seam construction shall be up and available for inspection. Using light weight construction equipment, the Contractor shall then place 9 inches of select granular material. Material shall be pushed out over the fabric with a small wide-track dozer. Traffic shall be such that no turning or rutting of construction equipment is allowed. Piles of fill shall be limited to a maximum of 3.0 feet in height.

B. With the select granular layer graded to the proper elevation, the venting media shall be placed. The venting media shall be rolled into place, spaced at 15-foot intervals along the pond bottom and continued up the side slopes of the pond and tied into the venting trench at the top of the embankment. A 4-inch overlap with plastic ties connecting the different rolls shall be used. The material shall be kept clean so as not to fill the voids.

C. GEOMEMBRANE:

C1. HANDLING, TRANSPORTING, AND STORAGE:

C.1.1 Geomembrane rolls shall be packaged and labeled prior to transporting to the site. Roll labels shall contain all appropriate information regarding the geomembrane including the manufacturer, thickness, Lot No., roll dimensions and roll identification. Geomembrane rolls delivered to the site shall be wrapped in relatively impermeable and opaque protective cover.

Geomembrane transportation shall be done in a manner which reduces the possibility of liner damage during shipment. Transportation of the geomembrane is the responsibility of the manufacturer.

On-site storage of the geomembrane is the responsibility of the installer. Geomembrane rolls shall be stored in a safe manner protected from grease, dirt, moisture, direct heat and other possible sources of damage including theft and vandalism. Storage areas shall be designated by the Engineer and approved by the installer.

Material delivered to the site shall be checked for proper labeling and visually inspected for transport or manufacturing damage. The Engineer reserves the right to reject any unacceptable material at no cost to the Owner.

C.1.2 For each roll of geomembrane, the manufacturer shall submit to the Engineer physical test data on the roll and on the raw material from which the roll was produced. If conformance test results are not submitted with delivered rolls, the Engineer reserves the right to conduct performance testing at the installers expense.

C.1.3 Geomembrane panel size should be determined from the layout plans provided by the installer. When cutting the geomembrane roll goods into panels, a cutting backup board is required.

C.1.4 Only that quantity of geomembrane which is to be placed for a particular day shall be removed from the packaging. Geomembrane rolls shall be transported from the storage area to the construction site using nylon straps and properly sized forklifts, front end loaders or other equipment. Under no circumstances shall any heavy equipment be allowed directly on the geomembrane. Prior to placement, the geomembrane shall be observed for compliance. Severely damaged material (in the opinion of the Engineer) shall be rejected. Minor damages may be repaired as specified. Any damage to the geomembrane caused by the installer during handling shall be repaired or replaced at the installer's expense.

C2. PANEL PLACEMENT:

C.2.1 The dewatering system shall not be terminated or lessened to any degree until the membrane, anchors, and membrane cover soils are

fully in place. The system shall not be shut down until authorized by the Engineer.

C.2.2 Geombrane panels should be placed as designated on the installer's placement diagram. Handling of the panels during placement shall be done without damaging, scratching or crimping the geomembrane. All panels shall be placed with a minimum amount of wrinkles. Panels shall be properly weighted or anchored using sand bags, rubber tires or other approved methods to avoid uplift and damage due to the wind. Geomembrane panels shall not be placed in excessive winds. All personnel working on the geomembrane shall not smoke, wear damaging shoes or engage in any other behavior which could damage the geomembrane.

C.2.3 All panels shall be assigned a panel identification number to reference test results and location diagrams.

C.2.4 In-place panels shall be observed prior to seaming. Damaged panels, including those panels permanently deformed, shall be replaced at no cost to the Owner. Panels with minor damage shall be repaired as specified. All drawings and repairs shall be recorded and located on as-built drawings.

C.2.5 The geomembrane panels shall be placed in the prepared anchor trench.

C.2.6 The Contractor shall leave all sandbags used for anchorage on the membrane as a part of the completed project. The installer is to provide a sufficient number of sandbags, spaced in a manner to avoid liner uplift due to wind. Because the sandbags will remain in the pond indefinitely, sandbags shall be fabricated without using wire or other materials potentially harmful to the liner.

C3. SEAMING PROCESS:

C.3.1 The seaming process shall be performed by extrusion welding or fusion welding in a manner as specified, unless an alternative method has been approved. Geomembrane panels which are to be joined shall overlap between 3 to 5 inches. The contact area between adjacent geomembrane sheets shall be clean and free of moisture, dust, dirt, debris and foreign material. Seams shall be aligned to minimize the number and size of wrinkles. If necesasary, a protective layer (geotextile) shall be used directly below each seam overlap to achieve proper support and a clean work surface.

C.3.2 If extrusion welding is used the contact surface between adjacent panels shall be prepared by surface grinding to remove oxidation.

C.3.3 Extrusion welding and fusion welding shall be performed to provide a tight and homogeneous bond between panels. All seams shall extend to the outside edge of the panels. A quality control technician or monitoring engineer shall follow each welding machine and visually inspect the seam. Visually defective seams shall be repaired. The Engineer or his representative will also observe seams.

C.3.4 Geomembrane seams are to be oriented parallel to the line of maximum slope gradient. There should be no unsupported seams horizontal to side slopes. All unsupported seams shall be at least 5 feet interior from the toe of the slope. The number of field seams performed shall be minimized.

C.3.5 Each field seam shall have a designated identification number for reference to test results and as-built drawings.

C.3.6 Extrusion welding, fusion welding and tack welding equipment shall be monitored on an hourly basis to record and control the temperature of the extrudate, wedge or hot air.

C.3.7 Test seams are to be prepared from each piece of seaming equipment by the corresponding operator at the beginning of each seaming period or at the discretion of the Engineer. At least two (2) test seams per day shall be prepared by each operator. Test seams should be at least 2 feet long (in the direction of the seam) by at least 1 foot wide and may be performed on scrap pieces of geomembrane.

The installer shall prepare two 1 inch long specimens from each test seam sample. These specimens shall be tested in the field for shear and peel strength by hand or by a tensiometer. (For hand testing, it may be necessary to prepare specimens 0.5 inches in width).

A successful seam will not fail before failure of the geomembrane itself. If a faulty seam is detected, the seaming apparatus that produced the faulty seam shall not be used until the deficiency is corrected to the satisfaction of the Engineer and additional test seams have been successfully performed.

Each test seam is to be labeled with an equipment and operator identification number. A 12 inch long sample of each labeled test seam shall be retained for the Engineer and a 12 inch long sample retained by the installer.

No welder may start work until the prepared test seams have been approved by the Engineer.

C.3.8 Seaming of the geomembrane panels should be performed at a sheet temperature between 40°F and 75°F. If seaming is performed below 40°F, the contact surface must be preheated and the installer shall certify, in writing, that low temperature seaming procedures will not cause short term or long term damage to the geomembrane.

C.3.9 To avoid excessive stress on the geomembrane due to thermal expansion and contraction, it may be necessary to perform field seaming during the coolest part of the day or night. Special scheduling shall be approved by the Engineer. If panel placement and welding needs to be done at night, the Contractor shall provide the necessary illumination at no additional cost to the Owner.

C4. NON-DESTRUCTIVE TESTS:

C.4.1 Each field seam shall be observed by the installer and by the Engineer or his representative. Depending on the specific type of weld used by the installer, the seam may not be visible from the surface and a screwdriver wedged between the overlap may be required to test seam quality.

C.4.2 All field seams are to be vacuum tested or air pressure tested along the entire seam length by the installer. If an alternative non-destructive seam testing procedure is proposed, details should be submitted with the completed bid.

In vacuum testing, a seam length approximately 48 inches long by 12 inches wide is to be wetted with a solution of water and soap. A vacuum box consisting of a rigid housing, transparent viewing window, valve assembly, vacuum gauge and neoprene gasket is to be compressed over the wetted area. A leak tight seal is created and a vacuum of not less than 5 psig should be applied for not less than 30 seconds. Areas where soap bubbles appear should be marked, repaired and retested. If no bubbles appear, the vacuum box should be moved to the adjacent seam section with a minimum overlap of 3 inches and the process repeated.

Air pressure testing is approved for double fusion seams where an air channel exists between the two bonded lengths of seam. In air pressure testing, both ends of a given seam length are sealed and a needle with an attached pressure gauge and air valve is inserted into the air space between the welded areas. Pressure of not less than 30 psig is applied to the air channel and the gauges monitored for a drop in air pressure over time as an indication of seam continuity. After applying pressure for a period of 15 minutes, a faulty seam is detected if the drop in air pressure exceeds 2 psi or if the air pressure fails to stabilize.

If non-destructive testing indicates the presence of a faulty seam, the seam is to be repaired.

C.4.3 In areas where non-destructive testing cannot be performed, the seams shall be cap stripped with geomembrane under careful observation by the seaming supervisor and Engineer.

C.4.4 Portions of field seams requiring repair are to be indicated on as-built drawings.

C.4.5 Repairs to geomembrane panels, not necessarily located along a seam shall also be non-destructively tested.

C5. DESTRUCTIVE TESTING:

C.5.1 Destructive testing of field seams should be performed on seam samples collected every 500 lineal feet of seaming or at the discretion of the Engineer. At a minimum, one destructive test sample

shall be collected for each panel. Destructive testing at the above mentioned frequency shall be performed by the installer with periodic verification by the engineer or his representative.

C.5.2 Destructive shear and peel testing shall be performed in general accordance with ASTM D-638. A successful seam will not fail before the film tearing bond.

C.5.3 Samples for destructive testing shall be prepared by obtaining a 38 inch long (in the direction of the seam) by 12 inches wide sample. A 1 inch long specimen shall be removed from each end of the sample by the installer tested in the field. A 12 inch long section of the remaining 36 inch long sample shall be retained by the installer for use in their quality control program. A second 12 inch long section shall be retained by the Engineer. All destructive test samples shall be identified and labeled. Test seams shall be observed in cross section to verify that a homogeneous bond has been formed.

All areas that have been destructively tested will be repaired as specified.

C.5.5 All results from the installer's laboratory shall be submitted to the Engineer as they become available. Results of destructive tests shall include test parameters such as grip separation, seam width, temperature, humidity and strain rate. The mode of failure, that is failure at the seam edge, grip edge or seam interface shall also be recorded.

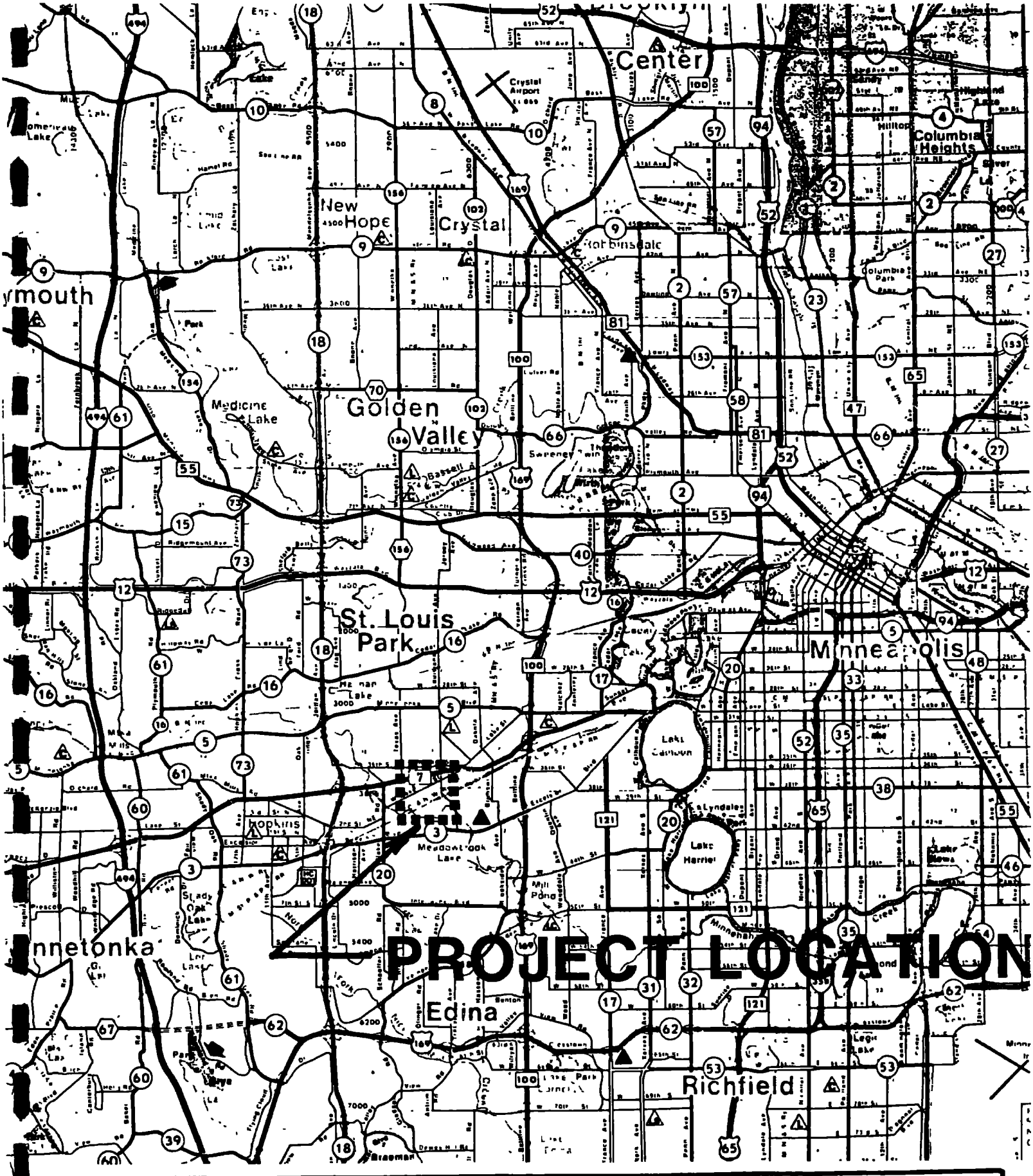
C.5.6 Seam failure during the destructive test occurs when the welded bond fails before the geomembrane panel. In the event of a seam failure by either the installer's or Engineer's test, the installer shall reconstruct the seam between the failed location and any successful test location in both directions. The reconstructed seams shall be re-tested.

At the discretion of the Engineer, testing of additional samples of seams constructed by the same welder or welding apparatus or performed during the same shift as any failed seam may be required. The cost of repairing and retesting areas which failed non-destructive tests shall be the responsibility of the installer.

C.5.7 The Engineer may require the installer to prepare destructive test samples from any portion of the lined area which may be suspect.

C6. DEFECTS AND REPAIRS:

C.6.1 Evaluation of the liner will be performed by the Engineer. The installer is responsible for clearing the geomembrane surface to the degree that observation is not inhibited. Each suspect location in seam and non-seam areas shall be non-destructively tested as specified. Each location failing testing shall be repaired by seaming or patching. All repairs and re-test results shall be documented by the installer. Testing of suspect areas shall be performed at no cost to the Owner.



PROJECT LOCATION MAP

SOUTH OAK POND EXPANSION

ST. LOUIS PARK, MINNESOTA

ORR-SCHELEN-MAYERON & ASSOCIATES, INC.

CONSULTING ENGINEERS

MINNEAPOLIS, MINNESOTA

HEALTH AND SAFETY PLAN

Introduction

This Health and Safety Plan applies to on-site personnel who will potentially be exposed to soil and/or groundwater affected by creosote or coal tar constituents during the construction of the South Oak Pond expansion. This plan has been designated to comply with, as a minimum, the requirements set forth in 29 CFR 1910.120, the OSHA standards governing hazardous waste operations. In no case may work be performed in a manner that conflicts with the intent of or the safety concerns expressed in this plan.

Materials of Concern and effects of Overexposure

The materials of concern which have been identified at this site are coal tar and creosote related materials including naphthalene, other polynuclear aromatic hydrocarbons (PAH) and phenolic compounds.

Coal tar and creosote are typically irritating to the eyes, skin and respiratory tract. Acute skin contact may cause burning and itching while prolonged contact and poor hygiene practices may produce dermatitis. Prolonged skin contact with creosote must be avoided to prevent the possibility of skin absorption.

Naphthalene is a hemolytic agent which, upon overexposure to the vapor or ingestion of the solid, may produce a variety of symptoms associated with the breakdown of red blood cells. Naphthalene is also irritating to the eyes and repeated or prolonged contact has been associated with the production of cataracts.

Repeated exposure to certain PAH compounds has been associated with the production of cancer. Contact of PAH compounds with the skin may cause photosensitization of the skin producing skin burns after subsequent exposure to ultraviolet radiation.

Phenolics are generally strong irritants which can have a corrosive effect on the skin and can also rapidly penetrate the skin. Overexposure to phenols and phenolic compounds may cause convulsions as well as liver and kidney damage.

Hazard Assessment

Initial

Because of the relatively low vapor pressures associated with PAH compounds (generally less than 10^{-4} mm Hg at $20^{o}C$), they are not expected to present a vapor hazard at this site. The most likely threat of exposure to these compounds will be via skin contact.

Although naphthalene and phenol also have relatively low vapor pressures (0.05 and 0.36 mm Hg at $20^{o}C$, respectively) there is a possibility that these substances may produce vapor hazards at this site under adverse conditions.

Continuing Hazard Assessment On-Site

Air Monitoring

An HNU Photoionization Detector (PID) equipped with a 10.2 eV lamp will be used by the City to provide semiquantitative data on VOC concentrations in and around the breathing zone of workers. The City will conduct air sampling by taking and recording periodic readings in the breathing zone over freshly-exposed soil being excavated.

TABLE 1

ACTION LIMITS FOR AIR CONTAMINANTS

Limit	Persistent Concentration in the Breathing Zone	Procedure
Lower	5 ppm	Don respirators, step up monitoring.
Upper	50 ppm	Stop work and back off from immediate work area until levels subside in the breathing zone.

Action Limits

The American Conference of Governmental Industrial Hygienists (ACGIH) has established threshold limit values (TLV) for phenol and naphthalene at 5 and 10 ppm, respectively, as 8-hour time weighted averages (TWA). Based on these values, the action limits in Table 1 have been set. The lower limit of 5 ppm is based on the TLV for phenol while the upper limit of 50 ppm is based on a minimum protection factor of 10 for a half-mask, air purifying respirator.

Response

When the PID yields persistent breathing-zone readings at or above the lower action limit, workers in the affected area will don respirators. Air sampling will continue on a more frequent basis. If readings are persistent at or above the upper limit, workers shall back off from the immediate work area until measured breathing-zone concentrations fall below the lower limit, at which time operations will resume and normal air monitoring will continue. If breathing zone levels do not fall below the upper limit, workers are to leave the work area and report the condition immediately to the City, the Engineer, or its representative. If necessary, engineering controls will be instituted to maintain vapor concentrations below the upper limit or arrangements will be made to upgrade to Level B protection.

Personal Protective Equipment

Personal protective equipment (PPE) will be donned, as necessary, based on the hazards encountered. Listed below is the personal protective equipment to be utilized during this project and the conditions requiring its use.

Personal Protective Equipment

- Coveralls - Polyethylene coated Tyvek if work involves contact with affected soil or groundwater.
- Boots - Chemical resistant type if work involves contact with affected soil or groundwater.
- Hard Hat - When working in the vicinity of operating heavy machinery.
- Face shield - If splash hazard exists.
- Gloves - Nitrile for potential contact with affected soil or groundwater.
- Respirator - MSA Comfo II with GMC-H Cartridges if PID reading exceeds 5 ppm or if dust or odors become objectionable.
- Chemical Safety Goggles - If eye irritation occurs.

Because of the carcinogenicity of certain PAH compounds, and because of the skin hazards associated with PAH and phenolic compounds, it is important that appropriate protective clothing be worn during work activities, which may involve the possibility of skin contact with affected soil or groundwater. As a minimum, the presence of visible creosote or coal tar related material shall constitute evidence of affected soil or groundwater.

Health and Safety Training

Site personnel covered by this Health and Safety Plan must have received appropriate health and safety training prior to their working on the site. Training will include:

- Requirements for and use of respirators and personal protective equipment.
- Cautions regarding the potential for trench collapse.
- Required personal hygiene practices.
- Requirements for employees to work in pairs.
- Proper material handling.
- Proper sampling procedures.
- Maintenance of safety equipment.
- Effective response to any emergency.
- Emergency procedures (e.g., in the event of a trench collapse).
- Hazard zones.
- Decontamination methods.
- General safety precautions.

A copy of the Standard Safety Procedures (Table 2) will be given to each worker covered by this health and safety plan.

Decontamination

Administrative procedures require hygienic practices consistent with work hazards. Employees will be instructed in the training program on proper personal hygiene procedures.

Contaminated, reuseable PPE, such as boots, hard hats, face shields and goggles, will be decontaminated prior to leaving the site. The decontamination procedure follows:

- Rinse with water to remove gross contamination.
- Wash in Alconox or equivalent detergent solution.
- Rinse with clean water.

Contaminated, disposable PPE, such as Tyvek coveralls and gloves will be placed in 55-gallon drums and stored on site while arrangements are made for disposal.

TABLE 2

STANDARD SAFETY PROCEDURES

- Employees are required to work in pairs.
- Wash face and hands prior to eating, smoking, or leaving the site.
- No smoking or eating is allowed in the work area during excavation or sampling activities.
- Wearing of contact lenses is not permitted in the work area.
- Contaminated material (e.g., Tyvek coveralls) must be properly disposed of before leaving the site. The disposed materials shall be placed in the fenced security area.
- All work must be conducted in accordance with local, state and federal EPA and OSHA regulations, particularly 29 CFR 1910.120.
- The walls of trenches greater than 4 feet in depth must be sloped back to the angle of repose prior to entering. For average soil, an angle of 45^{o} is recommended.

Respirators, if used, will be cleaned and disinfected after each day of use. The facepiece (with cartridge removed) will be washed in a hypochlorite (or equivalent) disinfecting solution, rinsed in warm water and air dried in a clean place.

Emergency Procedures

This Health and Safety Plan has been established to allow site operations to be conducted without adverse impacts on worker health and safety as well as public health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions at the site.

General

All accidents and unusual events will be dealt with in a manner to minimize a continued health risk to site workers. In the event that an accident or other unusual event occurs, the following procedure will be followed:

- First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be conducted so that those rendering assistance are not placed in a situation of unacceptable risk. In the event that a worker is caught in a trench collapse, call for emergency assistance immediately.

- All accidents/unusual events must be immediately reported to the Owner.

- All workers on site should conduct themselves in a mature, calm manner in the event of an accident/unusual event, to avoid spreading the danger to themselves, surrounding workers and the community.

Responses to Specific Situations

Emergency procedures for specific situations are given in the following paragraphs.

Worker Injury

If an employee in an affected area is physically injured, Red Cross first-aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If an excavation collapses and a worker is caught, call for emergency assistance immediately. If the person is in no immediate danger, do not attempt to move him. Internal injuries could be worsened. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing (if any) will be removed, emergency first-aid administered, and transportation to a local emergency medical facility awaited.

If the injury to the worker is chemical in nature (e.g., overexposure), the following first-aid procedures are to be instituted:

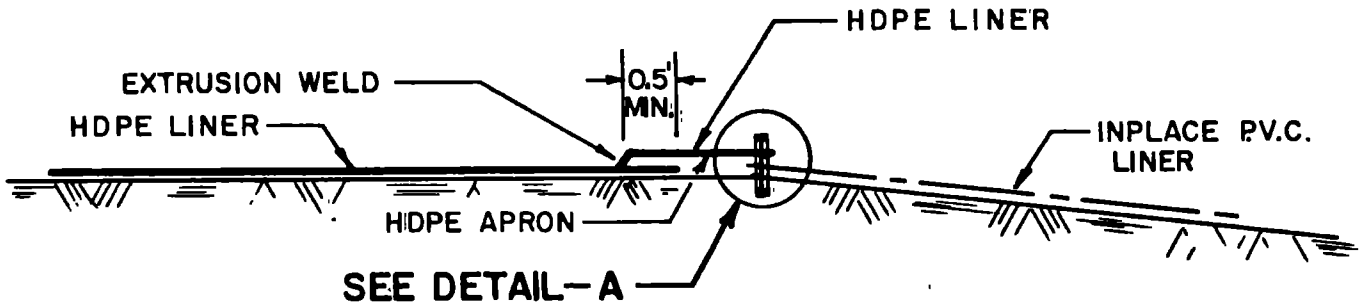
- Eye Exposure - If affected solids or liquids get into the eyes, wash eyes immediately using large amounts of water and lifting the lower and upper lid occasionally. Obtain medical attention immediately.

- Skin Exposure - If affected solids or liquids get on the skin, promptly wash the affected skin using soap or mild detergent and water. Obtain medical attention immediately when exposed to concentrated solids or liquids.

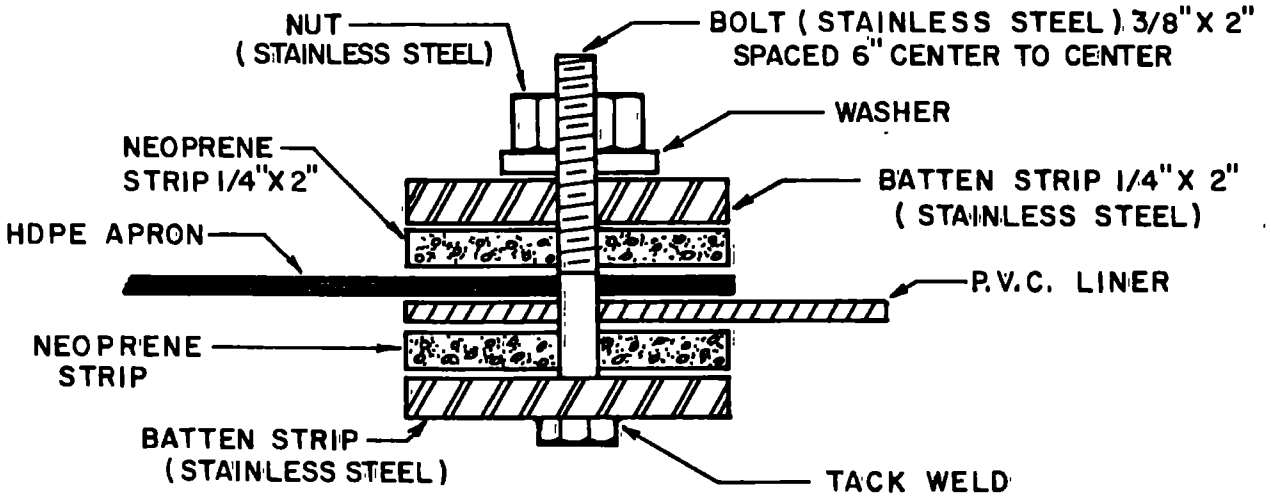
- Inhalation - If a person inhales large amounts of a toxic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

- Swallowing - When affected solids or liquids have been swallowed, the Poison Control Center will be contacted and their recommended procedures followed.

NO COMPENSATION WILL BE PROVIDED FOR SAFETY MEASURES TAKEN BY THE CONTRACTOR TO MEET THE REQUIREMENTS OF THIS HEALTH AND SAFETY PLAN.



PROPOSED CONNECTION JOINT OF EXISTING P.V.C. AND FUTURE HDPE LINER

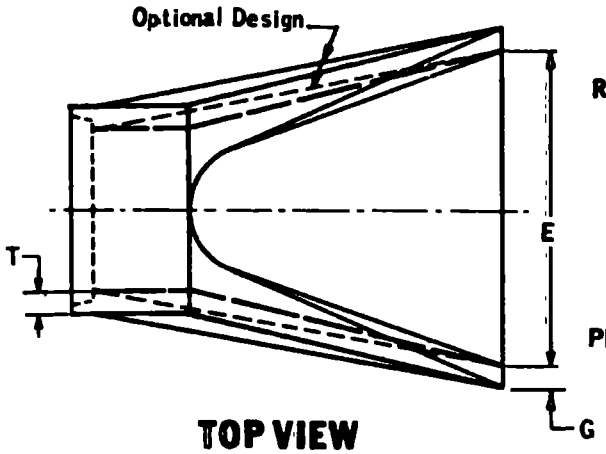


DETAIL-A

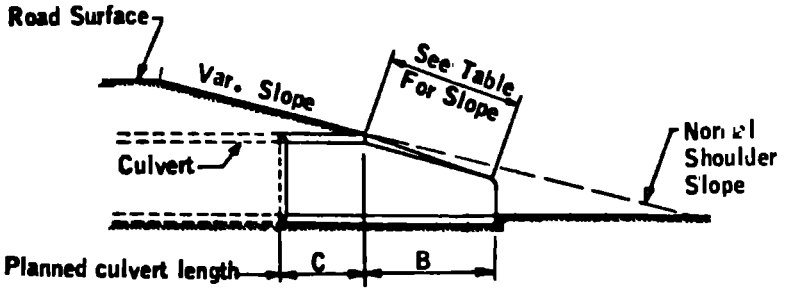
SOUTH OAK POND EXPANSION

CITY OF ST. LOUIS PARK, MN.

ORR-SCHELEN-MAYERON & ASSOCIATES, INC.
CONSULTING ENGINEERS
MINNEAPOLIS, MINNESOTA



TOP VIEW

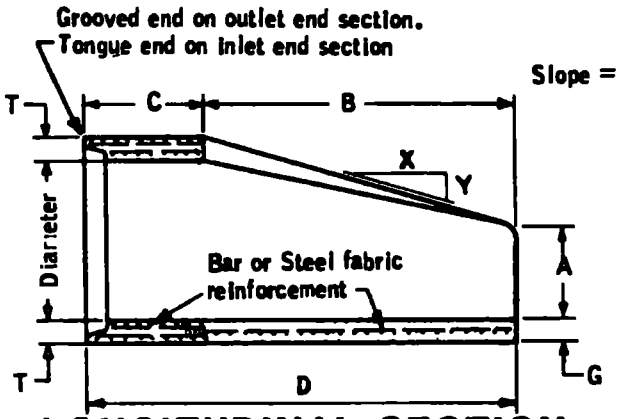


SLOPE DETAIL

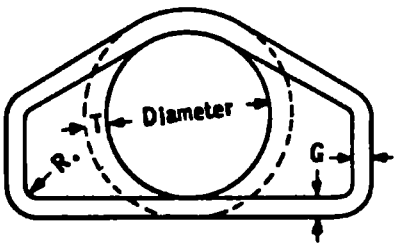
Note: Reinforcement and Design of End Section "C" shall conform to Standard Reinforced Concrete Pipe Class II.

Rounded edge permitted on sloped end "B".

Handling holes shall be provided as necessary for handling of aprons.



LONGITUDINAL SECTION



END VIEW

See Std. Plate 3000 for additional requirements.

Diam.	Weight Per Section (lbs.)	Approx. Slope X to Y	T	A	B	C	D	E	G	R	Ⓢ
12"	530	2.4 to 1	2"	4"	24"	48-7/8"	72-7/8"	24"	2"	1-1/2"	.07
15"	740	2.4 to 1	2-1/4"	6"	27"	46"	73"	30"	2-1/4"	1-1/2"	.07
18"	990	2.3 to 1	2-1/2"	9"	27"	46"	73"	36"	2-1/2"	1-1/2"	.07
21"	1280	2.4 to 1	2-3/4"	9"	36"	37-1/2"	73-1/2"	42"	2-3/4"	1-1/2"	.07
24"	1520	2.5 to 1	3"	9-1/2"	43-1/2"	30"	73-1/2"	48"	3"	1-1/2"	.07
27"	1930	2.5 to 1	3-1/4"	10-1/2"	49-1/2"	24"	73-1/2"	54"	3-1/4"	1-1/2"	.13
30"	2190	2.5 to 1	3-1/2"	12"	54"	19-3/4"	73-3/4"	60"	3-1/2"	1-1/2"	.14
36"	4100	2.5 to 1	4"	15"	63"	34-3/4"	97-3/4"	72"	4"	1-1/2"	12
42"	5380	2.5 to 1	4-1/2"	21"	63"	35"	98"	78"	4-1/2"	1-1/2"	.15
48"	6550	2.5 to 1	5"	24"	72"	26"	98"	84"	5"	1-1/2"	18
54"	8240	2.0 to 1	5-1/2"	27"	65"	33-1/4"	98-1/4"	90"	5-1/2"	1-1/2"	.22
60"	8730	1.9 to 1	6"	35"	60"	39"	99"	96"	5"	1-1/2"	.25
66"	10710	1.7 to 1	6-1/2"	30"	72"	27"	99"	102"	5-1/2"	1-1/2"	31
72"	12520	1.8 to 1	7"	36"	78"	21"	99"	108"	6"	1-1/2"	35
78"	14770	1.8 to 1	7-1/2"	36"	90"	21"	111"	114"	6-1/2"	1-1/2"	.40
84"	18160	1.6 to 1	8"	36"	90-1/2"	21"	111-1/2"	120"	6-1/2"	1-1/2"	46
90"	20900	1.5 to 1	8-1/2"	41"	87-1/2"	24"	111-1/2"	132"	6-1/2"	6"	.51

Ⓢ Continuous basic reinforcement in sq. in. per lineal ft. for sloped end "B" (larger of inner or outer cage on Std. Plate 3000). For wall thicknesses less than 4", locate reinforcement at center of wall. For wall thicknesses 4" and greater, locate reinforcement with a min. of 2" of cover measured from the outside of the wall.

NOTE: Unless specified otherwise in the plans, when an apron is required for a run of gasket joint pipe (Std. Plate 3006), the producer may furnish either:

1. An apron with a Std. Plate 3006 joint, or
2. An apron with Std. Plate 3000 joint and the end of the Std. Plate 3006 pipe connecting to the apron provided with a Std. Plate 3000 joint. This joint is to be sealed with a preformed mastic sealer.

APPROVED May 8, 1985

R H Sullivan

Assistant Division Director
Technical Services

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

CONCRETE APRON FOR REINFORCED CONCRETE PIPE

SPECIFICATION REFERENCE: 2501, 2503

STANDARD PLATE NO.: 3100G

APPROVED Feb 13, 1985
R.H. Sullivan
Assistant Division Director
Technical Services

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

RIPRAP AT RCP OUTLETS

SPECIFICATION REFERENCE 3601

STANDARD PLATE NO. 3133B

TABLE OF QUANTITIES

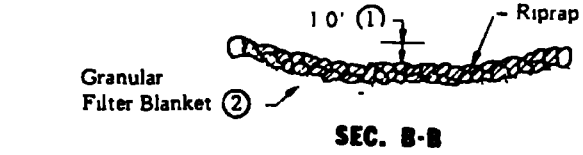
RIPRAP AT RCP OUTLETS

	Class II d_{50} = 6"		Class III d_{50} = 9"		Class IV d_{50} = 12"		Class V d_{50} = 15"	
Dia Round Pipe (In)	9" Depth Riprap (Cu Yd)	4 5" Depth Granular Filter (Cu Yd)	15" Depth Riprap (Cu Yd)	7 5" Depth Granular Filter (Cu Yd)	18" Depth Riprap (Cu Yd)	9" Depth Granular Filter (Cu Yd)	24" Depth Riprap (Cu Yd)	12" Depth Granular Filter (Cu Yd)
12	1 3	0 6	2 1	1 1	2 6	1 3	3 4	1 7
15	1 7	0 9	2 9	1 4	3 5	1 7	4 6	2 3
18	2 2	1 1	3 6	1 8	4 4	2 2	5 8	2 9
21	2 8	1 4	4 6	2 3	5 6	2 8	7 4	3 7
24	3 5	1 7	5 8	2 9	6 9	3 5	9 2	4 6
27	4 1	2 1	6 9	3 4	8 3	4 1	11 0	5 5
30	5 0	2 5	8 3	4 1	9 9	5 0	13 2	6 6
36	6 6	3 3	11 0	5 5	13 2	6 6	17 6	8 8
42	8 2	4 1	13 6	6 8	16 4	8 2	21 8	10 9
48	10 1	5 0	16 8	8 4	20 1	10 1	26 8	13 4
54	11 9	5 9	19 8	9 9	23 7	11 9	31 6	15 8
60	13 8	6 9	23 0	11 5	27 6	13 8	36 8	18 4
66	16 2	8 1	27 0	13 5	32 4	16 2	43 2	21 6
72	18 7	9 3	31 1	15 6	37 4	18.7	49 8	24 9
84	24 0	12 0	40 0	20 0	48 0	24 0	64 0	32 0
90	27 3	13 7	45 5	22 8	54 6	27 3	72 8	36 4

RIPRAP AT RCP-A or BOXES OF EQUIVALENT SPAN WIDTH

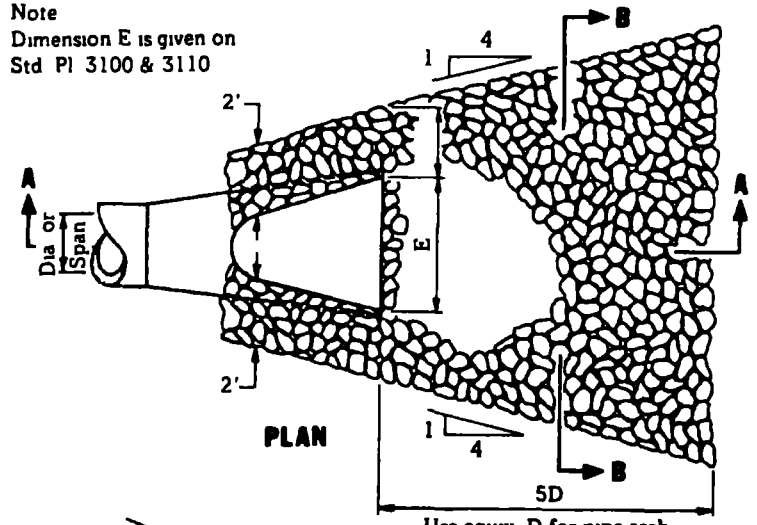
	Class II d_{50} = 6"		Class III d_{50} = 9"		Class IV d_{50} = 12"		Class V d_{50} = 15"	
Span Pipe-Arch (In)	9" Depth Riprap (Cu Yd)	4 5" Depth Granular Filter (Cu Yd)	15" Depth Riprap (Cu Yd)	7 5" Depth Granular Filter (Cu Yd)	18" Depth Riprap (Cu Yd.)	9" Depth Granular Filter (Cu Yd)	24" Depth Riprap (Cu.Yd)	12" Depth Granular Filter (Cu Yd)
22	2 2	1 1	3 6	1 8	4 4	2 2	5 8	2 9
28	3 5	1 7	5 8	2 9	6 9	3 5	9 2	4 6
36	4 9	2 4	8 1	4 1	9 8	4 9	13 0	6.5
43	6 6	3 3	11 0	5 5	13 2	6 6	17 6	8.8
51	8 2	4 1	13 6	6 8	16 4	8 2	21 8	10 9
58	9 9	5 0	16 5	8 3	19 8	9.9	26 4	13 2
65	11 9	5 9	19 8	9 9	23 7	11 9	31 6	15 8
73	14 0	7 0	23 3	11 6	27 9	14 0	31.2	18 6
88	19 4	9 7	32 4	16 2	38 9	19 4	51 8	25 9
102	26 1	13 1	43 5	21 8	52 2	26 1	69 6	34 8
115	26 4	13 2	44 0	22.0	52 8	26 4	70 4	35 2
122	29 6	14 8	49 3	24 6	59 1	29 6	78 8	39 4
138	36 8	18 4	61 3	30 6	73 5	36 8	98 0	49 0
154	44 6	22 3	74 4	37 2	89 3	44 6	119 0	59 5

Note Requirements for riprap size and thickness and filter blanket will be designated in the plans.



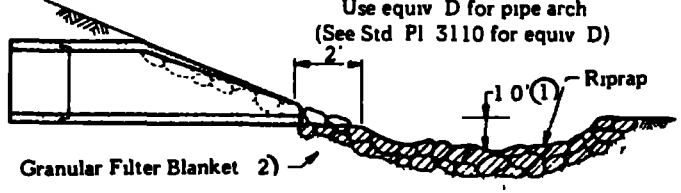
SEC. B-B

Note
Dimension E is given on
Std Pl 3100 & 3110



PLAN

Use equiv D for pipe arch
(See Std Pl 3110 for equiv D)



SEC. A-A

(1) For pipes greater than or equal to 48", use 2 0'

(2) The contractor, at his option, may substitute a geotextile fabric, Spec. 3601 for the granular filter blanket unless otherwise specified in the plans The fabric should cover the area of the riprap and extend under the culvert apron 3 feet

STS Consultants Ltd.
Consulting Engineers

2405 Annapolis Lane, Suite 280
Minneapolis, Minnesota 55441
(612) 559-1900

December 1, 1986

Mr. Jim Grube, P.E.
City Engineer
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

STS Project 94024

Re: Geotechnical Report and Design Recommendations for the Proposed Storm Water Retention Pond to be Located Southeast of the Intersection of Taft Avenue and West Lake Street in St. Louis Park, Minnesota

Dear Mr. Grube:

We have completed our evaluation of the geotechnical design parameters for the above-referenced project. This work was authorized by yourself on September 22, 1986. Please find enclosed with this report a description of the project, a brief outline of the field work performed and conditions encountered, and our recommendations for this project. Our recommendations include subgrade preparation, geotextile utilization and potential construction problems; however, our recommendations do not include geomembrane design and fabrication. If you or representatives of Orr-Schelen-Mayeron have any questions regarding the enclosed information, please do not hesitate to contact our office.

Very truly yours,

STS CONSULTANTS, LTD.

William B. Tepley

William B. Tepley, EIT
Assistant Project Engineer

James H. Overtoom, P.E.
Principal Engineer

Stephan M. Gale, P.E.
Director of Engineering

WBT/dn
cc: Keith L. Shannon, P.E., OSM
Encs.

Report

Project

GEOTECHNICAL REPORT AND DESIGN RECOMMENDATIONS FOR
THE PROPOSED STORM WATER RETENTION POND TO BE LOCATED
SOUTHEAST OF THE INTERSECTION OF TAFT AVENUE AND
WEST LAKE STREET IN ST. LOUIS PARK, MINNESOTA

Client

Mr. Jim Grube, P.E.
City Engineer
CITY OF ST. LOUIS PARK
5005 Minnetonka Boulevard
St. Louis Park, MN 55416

Project # 94024

Date December 1, 1986

STS Consultants Ltd.
Consulting Engineers

2405 Annapolis Lane Suite 280
Minneapolis Minnesota 55441
(612) 559-1900

PROJECT DESCRIPTION

The proposed storm water retention pond is to be located southeast of Taft Avenue and West Lake Street in St. Louis Park, Minnesota. The retention pond is approximately 350 by 500 feet in plan dimension having a total area of 4.25 acres based on the 180.0 foot contour line. An existing man-made storm water retention pond exists to the south of the proposed pond. The purpose for constructing the second storm water retention pond is to provide additional storm water capacity during periods of increased precipitation. The extra capacity is needed because of changes of run-off patterns in the area. It is desired to construct a dry pond having a bottom elevation in the range of +174.0 feet, St. Louis Park City Datum. The existing ground surface elevations at the proposed pond location generally range from +179 to +181 feet. The most recent water level information obtained by STS shows the groundwater table between elevations 175.1 to 175.9 feet. The temporary storm water retention pond would gravity drain into the existing pond to the south. This existing pond had a surface water level of 175.07 feet on October 8, 1986 as shown on the Project 86-34 diagram, provided by the City of St. Louis Park. It is our understanding that the City plans to maintain the existing retention pond water level near elevation 174.0 feet. The existing pond water level control is provided by a lift station which pumps to Minnehaha Creek to the south. A diagram showing the preliminary configuration of the proposed storm water retention pond is included in the Appendix of this report.

An impermeable geomembrane is planned with sufficient cover material to depress the water table so that the majority of pond bottom will remain dry except from water due to storm water runoff and precipitation. Because of the elevation of

the hydrostatic water table it will not be possible to maintain the pond in a dry condition, except when the water table drops to an elevation consistent with the design requirements. The City has elected to use an impermeable geomembrane liner over other possible liner materials. It is our understanding that the proposed pond is to be constructed during March of 1987.

AVAILABLE INFORMATION

Included in our evaluation of this project is a review of the following items obtained from representatives of Orr-Schelen-Mayeron Associates. Item No. 5 was reviewed from materials in our in-house reference library.

1. Page 12, section 28 of the 1972 City of St. Louis Park Existing Pond Specification.

2. A Preliminary Foundation Investigation by Braun Engineering and Testing dated November 8, 1986, Project No. 85-539.

3. Soil Borings by Soil Exploration Company performed in 1974, Job No. 2070.

4. Two 11 x 17 inch diagrams of the existing pond and proposed pond configuration, undated, provided by OSM.

5. The recommended design criteria for stabilization ponds by the MPCA, dated January 1985.

Existing water level information from wells installed prior to 1986 around the site were not used in this evaluation. These wells may not reflect the groundwater table on this site. Wells TP-1A, 2W, 3W and 4W were used for this evaluation.

FIELD EXPLORATION

In order to determine the existing water table conditions in the proposed pond area, four, 4 inch diameter temporary piezometers were installed on October 8, 1986. The locations of the temporary piezometers were chosen by Mr. Bill Tepley of STS Consultants at selected locations which would reflect the hydrostatic water table within the proposed pond area, while also providing some information as to the direction of groundwater flow. The temporary piezometers were installed by representatives of the City of St. Louis Park using a backhoe to dig excavations or test pits in which the piezometers were installed. The City of St. Louis Park designed and provided the well construction materials utilized for the piezometers. Representatives of the St. Louis Park survey department provided horizontal and vertical control at each piezometer location. Mr. Bill Tepley of STS Consultants logged the soil conditions encountered and the piezometer configuration utilized at each test pit or piezometer location. The results of the soil conditions encountered at each test pit, as well as temporary piezometer construction diagrams and a location diagram of the temporary piezometers are provided with this report. The elevations of the top of PVC pipe shown in the Appendix represent the elevations obtained by the City on October 8, 1986. All water level information obtained from the piezometers is given relative to this data.

During the piezometer installation operations a layer of soil having a creosote like odor was encountered at test pit location No. 1 at a depth of 2.5 to 3.5 feet below the existing ground surface. A sample of the soil was sent to an analytical laboratory for chemical analysis. The results of that analysis are enclosed with this report. We would be happy to consult with you further regarding this information, if requested.

SOIL CONDITIONS

The soil conditions encountered at each of the test pit locations are shown on the test pit logs enclosed in the Appendix of this report. Please refer to the previous report and boring logs by others for additional soils information across the site. The generalized soil conditions encountered at the test pit locations are discussed below.

Fill Soils. Fill soils were observed extending from the ground surface to depths of 4 to 5 feet at the test pit locations. The upper 1 to 2 feet of fill soils observed at each test pit location generally consisted of a brown silty sand fill material. Underlying this surficial layer a mixture of fill soils consisting of sandy peat with interbedded silty sand layers was observed. Concrete rubble and wood was observed interbedded in the fill materials observed at test pits 1A and 3. At the location of test pits 1 and 2 concrete slabs were encountered at depths of 3-1/2 feet below the existing ground surface. The test pits performed at these locations were offset several times in an attempt to penetrate through the concrete slab material. Bucket refusal was encountered at each location were the concrete slabs were observed.

Peat Soils. Fibrous peat was encountered at depths of 5 and 7 feet below the existing ground surface at test pit locations 1A and 2, respectively. The peat at these locations was observed to extend beyond the termination depth of the test pit performed. A white lime sludge was observed above the peat in test pit 2 at a depth of 5 to 7 feet below the existing ground surface.

Natural Sand. Natural sands were observed below the fill soils in test pits 3 and 4 at a depth of 4 feet below the existing ground surface. The sands observed at test pit 3

consisted of a fine to coarse sand and extended to the termination depth of the pit at 8 feet below the ground surface. The silty sands observed in test pit 4 extended to a depth of 7.5 feet and were underlain by a silty clay containing trace fibers to the termination depth of the test pit at 8.5 feet.

GROUNDWATER TABLE CONDITIONS

Groundwater elevations were recorded by a representative of STS Consultants on two separate occasions at each of the temporary piezometer locations. At the locations of piezometer 1A, 2W, 3W and 4W the groundwater was recorded on October 17, 1986 at elevations 175.5, 174.7, 174.3, and 174.6 feet, respectively. On November 21, 1986 at piezometer locations 1A, 2W, 3W and 4W the groundwater was recorded at elevations 175.9, 175.1, 175.1 and 175.3 feet, respectively. Based on this information the apparent direction of groundwater flow is to the southeast.

Fluctuations in the level of the hydrostatic groundwater table can occur, depending upon variations in precipitation, evaporation, surface runoff and infiltration.

RECOMMENDATIONS

GENERAL

Based on meetings between the City of St. Louis Park, Orr-Schelen-Mayeron & Associates and STS Consultants, Ltd. on October 24 and November 14, 1986, it is likely that the proposed temporary storm water retention pond will be designed utilizing an impermeable geomembrane liner having a minimum of 1.5 feet of cover and which is underlain by a sand and fabric cushion placed directly over the on-site organic soils. Incorporated into the design of the pond are provisions to provide venting any gas generation produced by the underlying organic materials and from air pumping from a fluctuating groundwater table.

Evaluation of the settlement potential of the organic soils underlying the proposed geomembrane was not part of the scope of services for this project. Previous borings by others in the proposed pond area had standard penetration resistance "N" values in the peat ranging from 1 to 8 blows per foot. Since the fill soils overlying the peat and muck have been in-place for a number of years, it is likely that they have preconsolidated to some degree. In addition, because the pond bottom is to be constructed approximately 4 to 8 feet below the existing grade, a significant amount of stress relief will occur. For these reasons significant settlement is not anticipated. Because of the variable soil conditions encountered in the area of the proposed pond it is still possible that some long-term differential and total settlement could occur. If settlement damages the underlying geomembrane liner it should be repaired in accordance with the manufacturer's recommendations. Our specific recommendations regarding pond construction are discussed below.

POND CONSTRUCTION

Because of uplift considerations we recommend that the geomembrane elevation and weight of overlying cover materials (including pond water) be designed to resist the upward hydrostatic water pressure with a 1.5 factor of safety. For cover soils we recommend using a unit density of 120 pounds per cubic foot per foot of soil and for calculating the upward hydrostatic water pressure on the membrane we recommend using an upward force equal to 62.4 pounds per cubic foot times the depth in feet the geomembrane is to be installed below the water table. Water levels taken from the temporary piezometers on November 21, 1986 show the approximate groundwater table at the north end of the proposed retention pond at elevation 175.9 feet and at the south end of the proposed pond at 175.3 feet. Therefore, as a general recommendation the geomembrane should be designed with a sloped bottom having a membrane elevation of 174.0 feet on the north end and 172.5 feet on the south end of the proposed retention pond. A minimum of 1.5 feet of select cover fill and a pond surface water level of 175.3 feet (1.3 ft. water) would be required over the geomembrane to counteract the upward forces of the hydrostatic groundwater table and prevent the membrane from "floating". This recommendation includes a 1.5 factor of safety, assuming the water levels observed in the piezometers are indicative of the highest groundwater table conditions over time. Cattails and other similar types of vegetation can be expected where long-term water depths less than approximately 4.0 feet are maintained. We recommend that a minimum of 1.5 feet of cover material be maintained over the geomembrane at all locations to provide uplift resistance as well as to provide protection for the membrane itself. We recommend that permanent piezometers or groundwater monitoring devices be installed around the pond (and a minimum of quarterly readings taken) to monitor the groundwater table. The information obtained should be used

to determine the required amount of water in the pond for uplift protection. We would be pleased to assist the City with selection of monitoring locations and devices, if requested.

The cover material will likely consist of a minimum (from top to bottom) of 12 inches of on-site topsoil underlain by 6 inches of sand. The topsoil material utilized should be free of debris to minimize the possibility of damaging the underlying geomembrane. Samples of the proposed cover topsoil should be analyzed to determine if it is suitable for vegetation growth. The 6 inch sand layer should consist of a well graded free draining granular soil containing less than 8% fines passing the U.S. No. 200 sieve. We recommend that the topsoils on the pond bottom be sloped towards the center of the retention pond where a drainage pipe can collect runoff waters and allow them to drain to the existing pond to the south. It is our understanding that the topsoils will be sloped a minimum of 1/4%. The drainage pipe should be placed at the bottom of the grade over the membrane and in the sand layer. The pipe could consist of a 4 inch PVC pipe wrapped in an appropriate filter fabric to prevent intrusion and clogging with fines. The sand layer should be placed from the geomembrane to the top of the pond bottom and extend outward a minimum of 2 feet on both sides of the pipe.

An impermeable geomembrane is to be utilized under the sand layer. We recommend that the geomembrane selected consist of a high density polyethylene (HDPE), a chlorinated polyethelene (CPE) or a hypalon polymer having a thickness in the range of 40 mils or 0.04 inches. A liner with a thickness less than 40 mils may experience heat welding problems. It is our opinion that the above types of liners are the least temperature sensitive. A 30 to 40 mil PVC liner could be used; however, we do not recommend using a PVC liner because of the brittleness associated with them during cold weather.

Since this pond is to be maintained in a relatively dry condition it is likely that the frost zone will penetrate down below the bottom of the proposed liner at a temperature close to ambient temperature. This condition combined with long-term differential settlement of the underlying organic soils and our experience on other similar type jobs, in our opinion, make the risk of using a PVC liner unacceptable. We recommend that the final geomembrane liner chosen be installed in accordance with the manufacturer's recommendations. Some suppliers of pond liner geomembranes include Brock White Co., GeoCon, Poly America, Gundle and National Seal Company.

We recommend that the lining be laid loose so that any earth movements due to consolidation or temperature shrinkage of the membrane does not tear the lining or pull apart seams.

It is our opinion that two options exist for the design of the layer below the geomembrane and above the on-site soils at the bottom of the excavation. These options are as follows:

Option No. 1. Option No. 1 consists of placing a 6 inch select granular layer over a geotextile immediately over the on-site subgrade soils at the base of the pond excavation. The sand layer should consist of a soil having the Unified Soil Classification designation of SP and all grains of sand similar in size. The uniformity coefficient of the sand utilized should be between 1.3 to 3.0. This material would be indicative of a uniform coarse sand, uniform medium sand or a uniform medium to coarse sand. Because of constructability considerations we strongly recommend that a tensile reinforcement fabric be placed directly over the on-site soils prior to placing the sand layer. We recommend that a monofilament woven geotextile be used for this purpose. The following minimum fabric properties would be required.

- Mullen burst strength greater than 300 psi.
- Grab tensile strength greater than 250 lbs./in.
- Percent open area of 10-15%.
- EOS of 30-50 U.S. standard sieve size.

We recommend that light weight construction equipment be used in spreading the sand layer. Careful placement of the sand layer will be required. Dump trucks or other heavy equipment should not be allowed over the fabric and sand layer. Over the 6 inch sand layer we recommend placement of a light weight neddle punched separator fabric. The separator fabric should have a minimum grab tensile strength of 90 pounds, a minimum permativity of 0.3 $sec.^{-1}$ and an EOS of 50-100. To transmit or vent any gases generated by the underlying organic soils the separator fabric should be overlain by a geonet (3 dimensional plastic structure) followed by the geomembrane.

The geonet selected should be a three dimensional product and have a minimum compressive strength of 1650 $lb./ft.^2$. Included in this recommended strength is a safety factor of 3, based on the designed overburden pressure and the pressure due to water when the pond is fully loaded. A safety factor of 3 was used because of the long-term creep potential of the geonet material. Prior to choosing the geonet STS should review the product characteristics including long-term creep. Where practicable we recommend the geonet material be installed perpendicular to the slope of the geomembrane to assist in intercepting the gases generated from the underlying organic soils.

Some manufacturers/suppliers of the geonet structure include Conwed Industries-Plastics Division supplied by Fluid Systems, Inc. and Tensar supplied by Armco/Contech. The geonet material typically comes in 6.75 foot wide widths. The geonet material could be spaced at 15 foot intervals along

the pond bottom and continued up the side slopes of the pond and tied into a venting trench or system at the top of the embankment.

We recommend that the pond berms be designed with a 3:1 side slope in order to hold the soil cover in-place over the liner.

Option No. 2. Option No. 2 consists of placing monofilament woven fabric directly over the on-site soils at the excavation bottom. The fabric selected should have the same properties as discussed under option 1. Overlying the tensile reinforcement fabric a 6 inch layer of uniform sand should be placed. The sand should have the same properties as described under option 1. Two inch perforated or slotted drain pipes should be installed immediately below the geomembrane in the sand layer at 15 foot centers across the pond bottom and tied into the venting trench or system on top of the dike slopes. The slots or perforations selected for the vent pipe should be compatible with the size of the granular soil utilized so that clogging of the pipes will not occur. The vent pipe should be designed to withstand the anticipated loading conditions. Where practicable we recommend that the vent pipes be installed perpendicular to the slope of the geomembrane. The geomembrane should be installed immediately above the sand layer. The geomembrane selected should conform to the previously recommended specifications.

DEWATERING

Since the proposed excavation for construction of the storm water retention pond will extend approximately 2 to 3 feet below the hydrostatic groundwater table, dewatering will be necessary. Dewatering for a project of this magnitude is a major consideration. Because the construction will occur during March of 1987 it may be possible that the inflow of

water would be at a slow enough rate to dewater by typical dewatering procedures using sump pits and pumps. Consideration could be given to the use of diversion trenches and sump pit and pump procedures. Sumps may need to be left in-place until soil cover and pond water is present over the membrane to counteract the groundwater table. This type of dewatering program may be costly and difficult to install. Methods of dewatering could possibly be evaluated using test pits and visual observations to estimate the inflow rate of water to be expected prior to construction. If the inflow rate is large so that free standing water conditions exist at the bottom of the excavation during construction, wells and well points installed at appropriate spacing would be required. It is our understanding that any water generated from dewatering operations will need to be pumped to sanitary sewer for future treatment.

CONSTRUCTION CONSIDERATIONS

Proper site preparation for the synethic liner and venting system is essential. The subsoil bed should be sufficiently prepared so that all rocks, stumps, and other debris is eliminated from within 2 feet of the liner materials. Debris and rubble was noted in the fill materials sampled at some of the test pit locations. In addition, the contractor should be aware of the concrete slab which was encountered in the areas of two of the test pit locations. Difficulty in removing this slab may occur during the construction operations. Because of the soft and compressible organic soils observed at the proposed pond bottom elevation, the contractor may need to use special excavating procedures to prevent equipment from becoming stuck or mired in these soils. In addition, placement of the tensile reinforcement fabric and overlying 6 inch sand layer will need to be carefully performed. Extremely light weight construction equipment will need to be utilized in spreading the sand layer over the

fabric. The equipment utilized will be dependent on the shear strength of the underlying organic soils.

We strongly recommend that an STS soil engineer or technician under this direction be on-site during the excavating, fabric and geomembrane installation operations to determine if the recommendations outlined in this report are fulfilled during construction.

GENERAL QUALIFICATIONS

This report has been prepared in order to aid in the evaluation of this property and to assist the engineer in the design of this project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the storm water retention pond as outlined in this report are planned, we should be informed so that changes can be reviewed and the conclusions of this report modified or approved in writing by the soil and foundation engineer. AS A CHECK, WE RECOMMEND THAT WE BE AUTHORIZED TO REVIEW PROJECT PLANS AND SPECIFICATIONS TO CONFIRM THAT OUR REPORT RECOMMENDATIONS HAVE BEEN INTERPRETED IN ACCORDANCE WITH OUR INTENT. WITHOUT THIS REVIEW, WE WILL NOT BE RESPONSIBLE FOR MISINTERPRETATIONS OF OUR DATA, OUR ANALYSIS, AND/OR OUR RECOMMENDATIONS NOR HOW THESE ARE INCORPORATED INTO THE FINAL DESIGN.

It is recommended that all construction operations dealing with earthwork and foundations be reviewed by an experienced soil engineer to provide information on which to base a decision whether the design requirements are fulfilled in actual construction. If you wish, we would welcome the opportunity to provide field construction services for you during construction.

The analysis and recommendations submitted in this report are based on the data obtained from the test pits performed at the locations indicated on the location diagram and from any other information discussed in this report. This report does not reflect any variations which may occur between these test pits. In performance of the subsurface explorations, specific information is obtained at specific locations and at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between locations explored at specific times. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, it will be necessary for a re-evaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.

Because of the possibility of these unanticipated subsurface conditions occurring, we recommend that a "changed condition" clause be provided in the contract both with the general contractor and in contracts with subcontractors involved in the earthwork construction. It is felt the inclusion of this clause will permit contractors to give lower prices because they will not need to provide as much in contingencies as they normally would if equitable adjustment of changed conditions will minimize conflicts and litigation with the attendant delays and costs. Furthermore, by the immediate recognition and adjustment in contract price at the time any changed conditions are encountered, the immense problem of trying to recreate facts when litigation develops later is eliminated. A mediation/arbitration procedure is recommended in the event that the owner, contractor and professionals do not agree on the changed conditions at the moment they are disclosed. If you wish, we would be pleased to furnish additional information pertaining to this procedure.

APPENDIX

1. STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS
2. LOCATION DIAGRAM OF TEMPORARY PIEZOMETERS
3. PRELIMINARY CONFIGURATION DIAGRAM OF THE PROPOSED STORM WATER RETENTION POND
4. GENERAL NOTES
5. FIELD AND LABORATORY PROCEDURES
6. TEST PIT SOIL CONDITIONS LOGS
7. TEMPORARY PIEZOMETER CONSTRUCTION DIAGRAMS
8. CHEMICAL ANALYSIS - SAMPLE FROM TEST PIT NO. 1
9. LABORATORY PROCEDURES
10. UNIFIED SOIL CLASSIFICATION SYSTEM

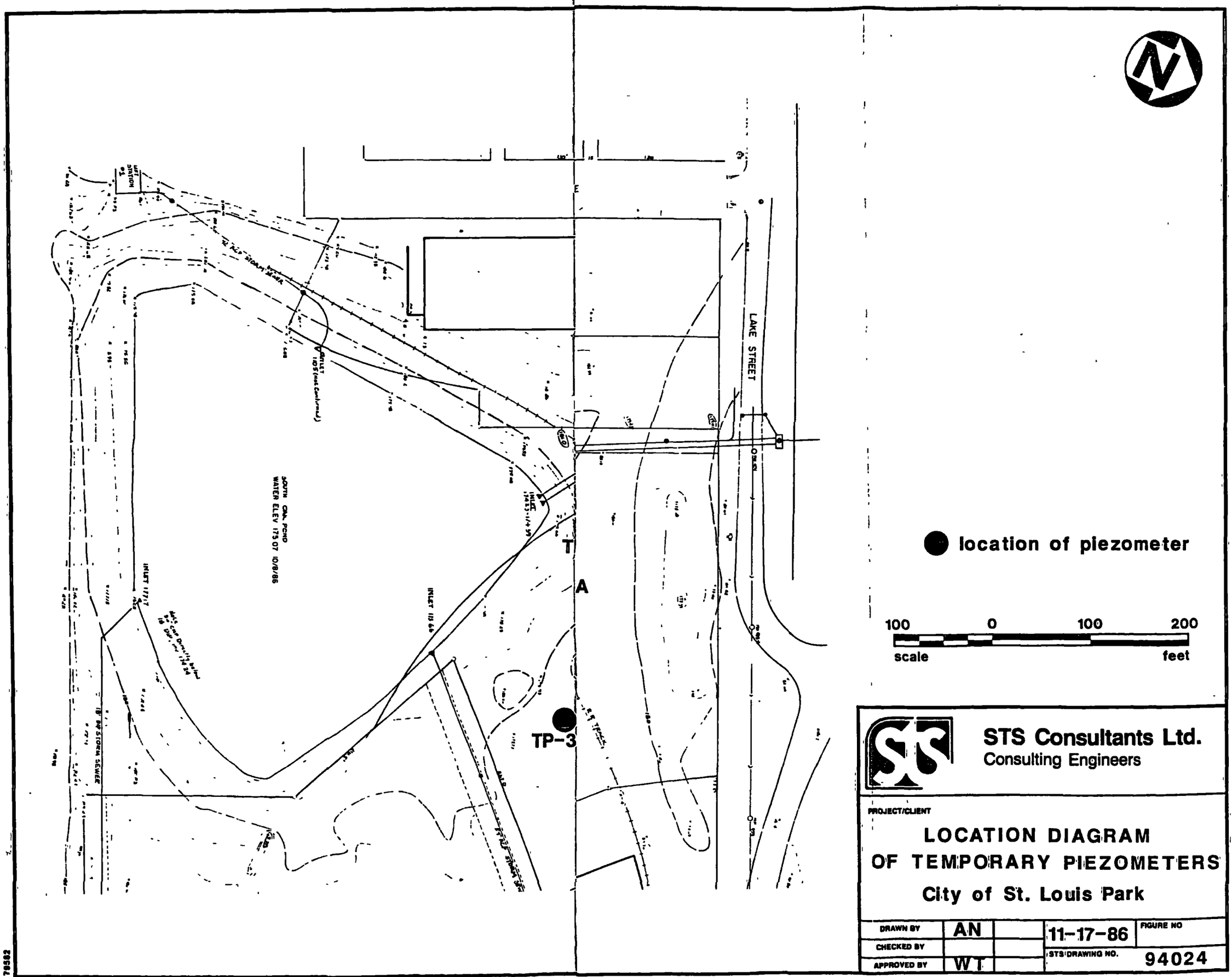
STS CONSULTANTS, LTD.

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

"The owner has had a subsurface exploration performed by a foundation consultant, the results of which are contained in the consultant's report. The consultant's report presents his conclusions on the subsurface conditions based on his interpretation of the data obtained in the exploration. The contractor acknowledges that he has reviewed the consultant's report and any addenda thereto, and that his bid for earthwork operations is based on the subsurface conditions, as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions, between the time of subsurface exploration and the time of earthwork operations. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

At any time during earthwork, paving and foundation construction operations that the contractor encounters conditions that are different than those anticipated by the foundation consultant's report, he shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the foundation consultant's report, he shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor to arrive at a change in contract price for additional work or reduction in work because of the unanticipated conditions. The contractor agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions for which unit prices are not provided, the additional work shall be paid for on a time and material basis."

Another example of a changed conditions clause can be found in paper No. 4035 by Robert F. Borg, published in ASCE Construction Division Journal, No. CO2, September 1964, page 37.



STS Consultants Ltd.
Consulting Engineers

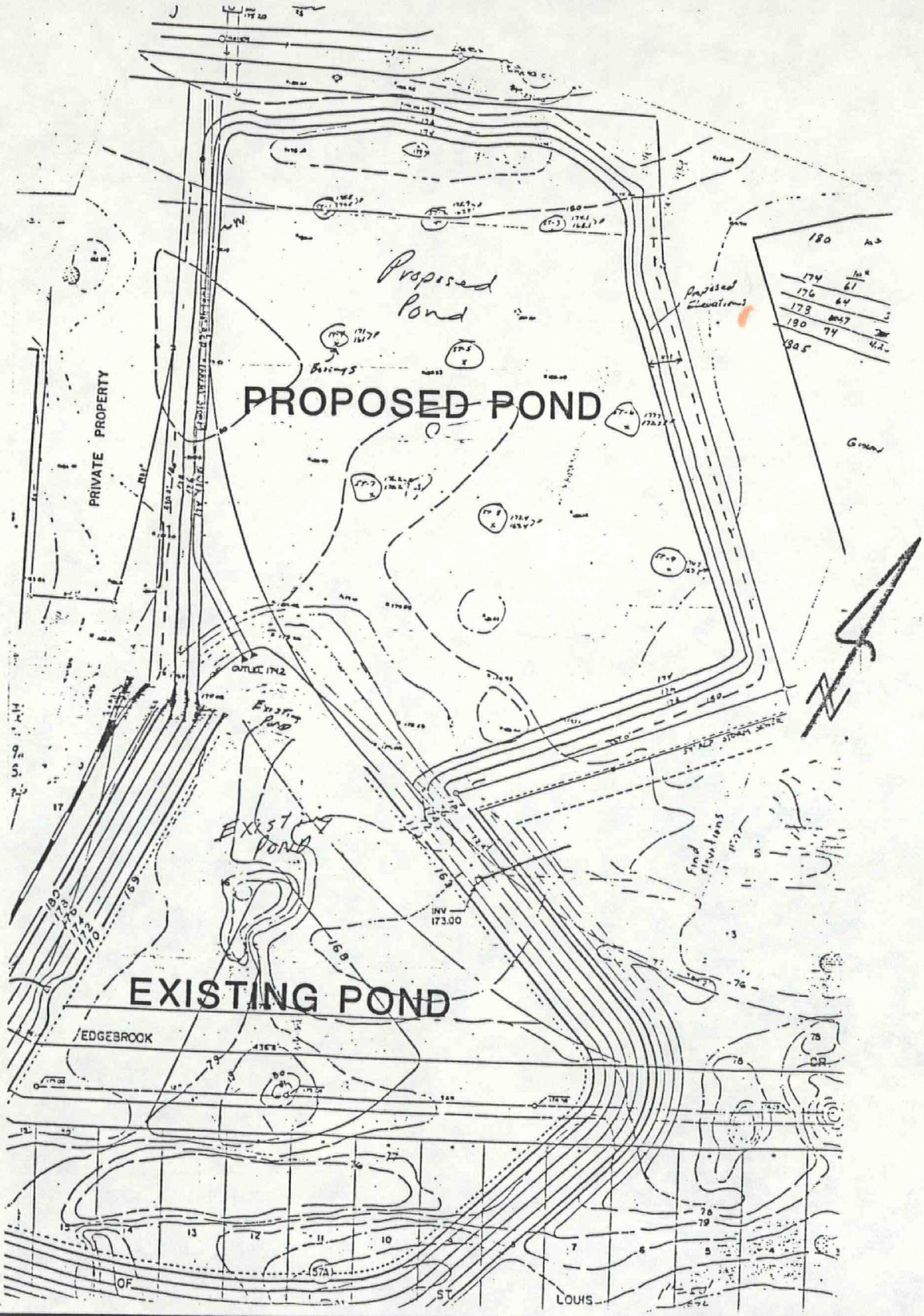
PROJECT/CLIENT

LOCATION DIAGRAM OF TEMPORARY PIEZOMETERS

City of St. Louis Park

DRAWN BY	AN		11-17-86	FIGURE NO
CHECKED BY			STS DRAWING NO.	94024
APPROVED BY	WT			

78552



STS Consultants Ltd.
Consulting Engineers

PROJECT/CLIENT

PRELIMINARY CONFIGURATION DIAGRAM OF THE PROPOSED STORM WATER RETENTION POND FOR THE CITY OF ST. LOUIS PARK, MN

Modified by STS 11-10-86

DRAWN BY	WT	
CHECKED BY	JHO	
APPROVED BY	WT	
SCALE None	FIGURE NO.	
STS DRAWING NO. 94024		

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS	:	Split Spoon - 1 3/8" I.D., 2" O.D. Unless otherwise noted	OS	:	Osterberg Sampler - 3" Shelby Tube
ST	:	Shelby Tube - 2" O.D., Unless otherwise noted	HS	:	Hollow Stem Auger
PA	:	Power Auger	WS	:	Wash Sample
DB	:	Diamond Bit - NX, BX, AX	FT	:	Fish Tail
AS	:	Auger Sample	RB	:	Rock Bit
JS	:	Jar Sample	BS	:	Bulk Sample
VS	:	Vane Shear	PM	:	Pressuremeter Test, In-Situ
			GS	:	Giddings Sampler

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler, except where otherwise noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL	:	Water Level	WCI	:	Wet Cave In
WS	:	While Sampling	DCI	:	Dry Cave In
WD	:	While Drilling	BCR	:	Before Casing Removal
AB	:	After Boring	ACR	:	After Casing Removal

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of ground water elevations may not be possible, even after several days of observations; additional evidence of ground water elevations must be sought.

GRADATION DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency and their plasticity.

Major Component Of Sample	Size Range	Descriptive Term Of Components Also Present in Sample	Percent Of Dry Weight
Boulders	Over 8 in. (200 mm)	Trace	1 - 9
Cobbles	8 inches to 3 inches (200 mm to 75 mm)	Little	10 - 19
Gravel	3 inches to #4 sieve (75 mm to 4.76 mm)	Some	20 - 34
Sand	#4 to #200 sieve (4.76 mm to 0.074 mm)	And	35 - 50
Silt	Passing #200 sieve (0.074 mm to 0.005 mm)		
Clay	Smaller than 0.005 mm		

CONSISTENCY OF COHESIVE SOILS:

Unconfined Compressive Strength, Qu, tsf	Consistency
< 0.25	Very Soft
0.25 - 0.49	Soft
0.50 - 0.99	Medium (Firm)
1.00 - 1.99	Stiff
2.00 - 3.99	Very Stiff
4.00 - 8.00	Hard
> 8.00	Very Hard

RELATIVE DENSITY OF GRANULAR SOILS:

N - Blows per ft.	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense
80+	Extremely Dense

STS Field and Laboratory Procedures

STS CONSULTANTS, LTD.

In the process of obtaining and testing samples and preparing this report, standard procedures are followed regarding field logs, laboratory data sheets and samples.

Specifically, field logs are prepared during performance of the drilling and sampling operations which are intended to portray essentially field occurrences, sampling locations and other information.

Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory by more experienced soil engineers, and differences between the field logs and the final logs exist.

The engineer preparing the report reviews the field and laboratory logs, classifications and test data, and in his judgement in interpreting this data, may make further changes.

Samples taken in the field, some of which are later subjected to laboratory tests, are retained in our laboratory for sixty days and are then destroyed unless special disposition is requested by our client. Samples retained over a long period of time, even in sealed jars, are subject to moisture loss which changes the apparent strength of cohesive soil, generally increasing the strength from what was originally encountered in the field. Since they are then no longer representative of the moisture conditions initially encountered, an inspection of these samples should recognize this factor.

It is common practice in the soil and foundation engineering profession that field logs and laboratory data sheets not be included in engineering reports, because they do not represent the engineer's final opinions as to appropriate descriptions for conditions encountered in the exploration and testing work. On the other hand, we are aware that perhaps certain contractors and subcontractors submitting bids or proposals on work might have an interest in studying these documents before submitting a bid or proposal. For this reason, the field logs will be retained in our office for inspection by all contractors submitting a bid or proposal. We would welcome the opportunity to explain any changes that have and typically are made in the preparation of our final reports, to the contractor or subcontractors, before the firm submits its bid or proposal, and to describe how the information was obtained to the extent the contractor or subcontractor wishes. Results of laboratory tests are generally shown on the boring logs or are described in the text of the report, as appropriate.

The descriptive terms and symbols used on the logs are described on the attached sheet, entitled, General Notes.

STS Consultants Ltd.

OWNER: City of St. Louis Park	LOG OF: TP-1
PROJECT NAME: Proposed Storm Water Retention Pond	ARCHITECT-ENGINEER: OSM
SITE LOCATION: St. Louis Park, Minnesota	

UNCONFINED COMPRESSIVE STRENGTH TONS FT.² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/FT

10 20 30 40 50

Depth in feet	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS FT³
					SURFACE ELEVATION 180.0 feet	
	1	BH			Fine to medium sand, little silt - brown - moist - (SM) - (fill)	
	2	BH			Organic silty sand - black - (SM - OL) - (fill)	
3.5	3	BH			Pea gravel, trace silt, cresote odor - black - (SP - GP)	
5					End of test pit at 3.5 ft. Hit concrete slab. Offset (2) twice to northwest (max 20 feet). No cresote odors noted at other test pit location. Both pits to northwest hit concrete slab at 3.0 ft.	
10						
15						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN SITU, THE TRANSITION MAY BE GRADUAL

WL Dry WS OR WD	STARTED 10/8/86	STS OFFICE Minnesota	
WL BCR ACR	COMPLETED 10/8/86	DRAWN BY AN	SHEET NO. 1 OF 1
WL	RIG FOREMAN	APP'D BY WBT	STS JOB NO 94024

BL 1-983

STS Consultants Ltd.

OWNER: City of St. Louis Park	LOG OF: TP-3
PROJECT NAME: Proposed Storm Water Retention Pond	ARCHITECT ENGINEER: OSM
SITE LOCATION: St. Louis Park, Minnesota	

UNCONFINED COMPRESSIVE STRENGTH TONS FT.² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/FT

10 20 30 40 50

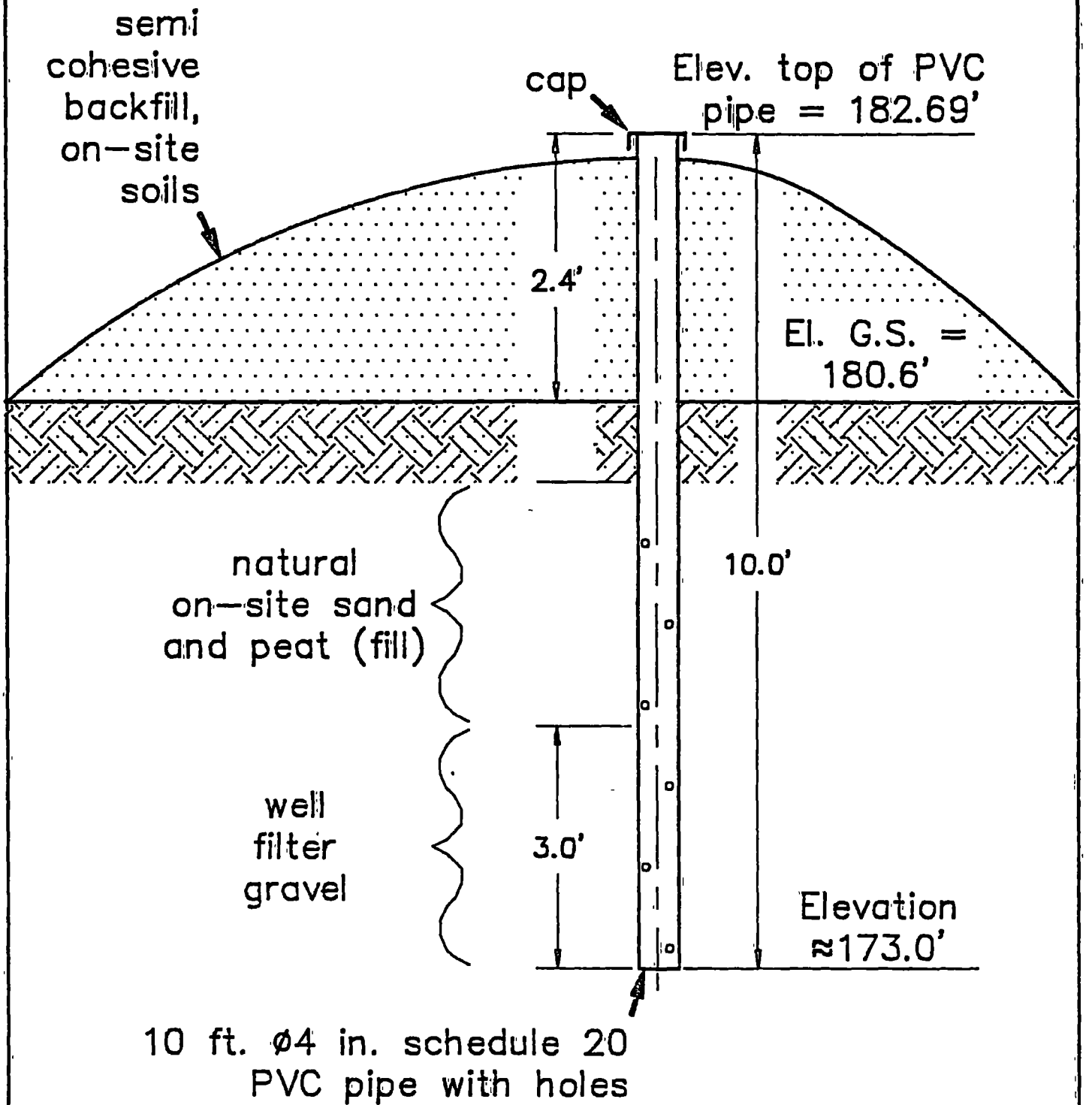
Depth in feet	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS FT.³
					SURFACE ELEVATION 180.6 feet	
	1	BH			Silty sand, little gravel - brown - moist - (SM) - (fill)	
	2	BH			Sandy peat, trace to little tree roots at 4.0 feet, trace gravel with concrete rubble - black - moist - (Pt and SM) - (fill)	
5	3	BH			Fine to coarse sand, trace gravel, trace silt - gray - wet to saturated - (SW)	
8.0					End of test pit at 8.0 ft. Installed 10 foot 4 inch diameter perforated PVC to approximately 7.0 feet.	
10						
15						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 6.5 ft. WD — WS OR WD	STARTED 10/8/86	STS OFFICE Minnesota	
WL — BCR — ACR	COMPLETED 10/8/86	DRAWN BY AN	SHEET NO 1 OF 1
WL	RIG — FOREMAN	APP'D BY WBT	STS JOB NO 94024

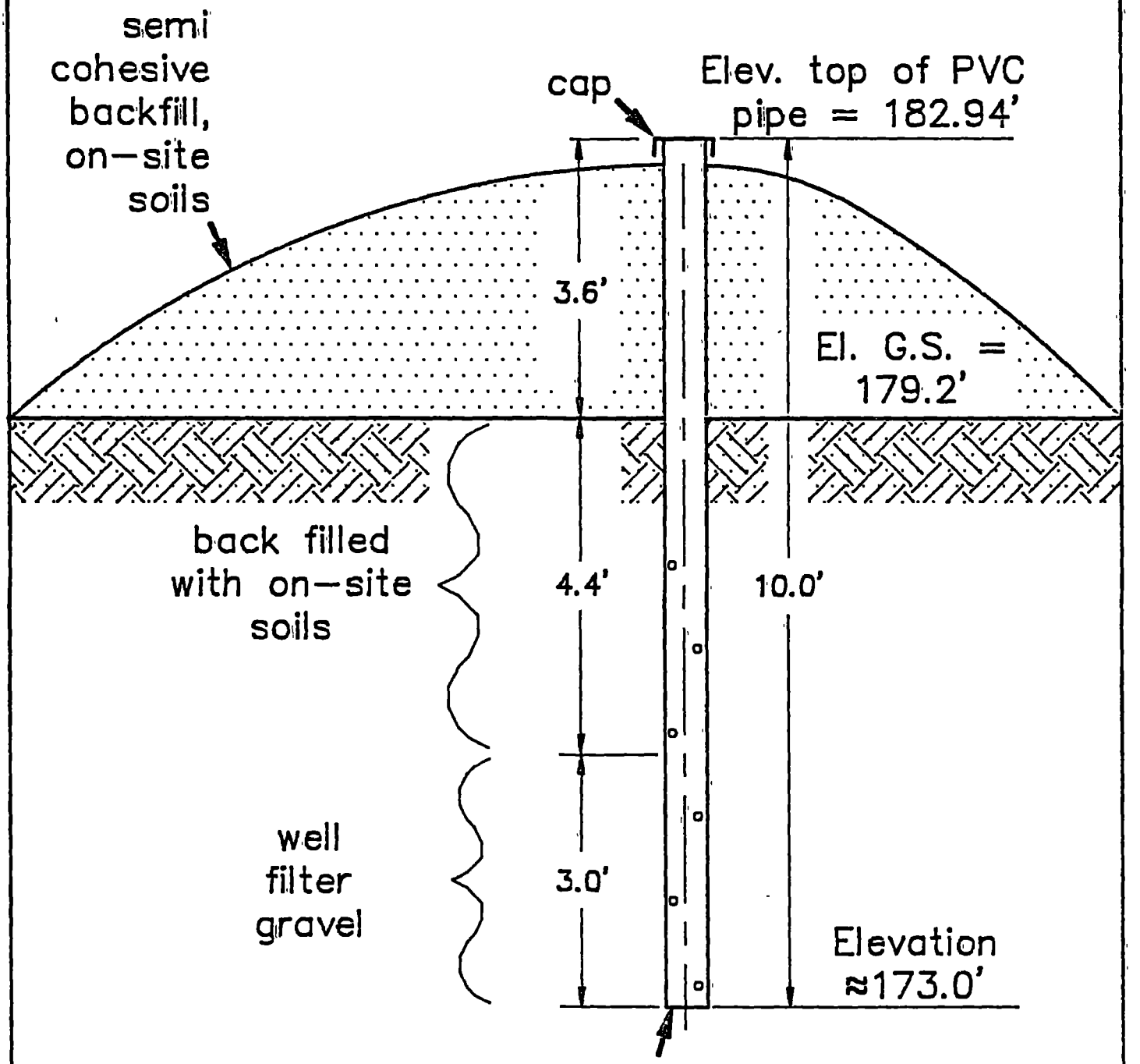
BL 1 983

TEMPORARY PIEZOMETER
TP-3W



STS	WT	AN	10-10-86	94024

TEMPORARY PIEZOMETER
TP-4W



WT	AN	10-10-86	94024

interpoll

INTERPOLL INC
4500 BALL ROAD N E
CIRCLE PINES, MINNESOTA 55014
612/786-6020

STS Consultants
2405 Annapolis Lane
Suite 280
Minneapolis, Minnesota 55441

LABORATORY REPORT: #4087 October 24, 1986
SAMPLES COLLECTED: October 8, 1986
SAMPLES RECEIVED: October 10, 1986

Sample Identification:	94029
	94024
	TP-1 S-3
Laboratory Log Number:	4087-01

Parameter	Units	
Total Phenolic	ug/kg	2300
Benzene extractables	mg/kg	9100
Total solids	% w/w	98.0

Respectfully submitted,

Richard R. Dahl
Director of Analytical Services

RRD/ke
Invoice Enclosed

LABORATORY PROCEDURES

Water Content (Wc)

The water content of a soil is the ratio of the weight of water in a given soil mass to the weight of the dry soil. Water content is generally expressed as a percentage.

Hand Penetrometer (Qp)

In the hand penetrometer test, the unconfined compressive strength of a soil is determined to a maximum value of 4.5 tons per square foot (tsf), by measuring the resistance of the soil sample to penetration by a small, spring-calibrated cylinder. The hand penetrometer test has been carefully correlated with unconfined compressive strength tests, and thereby provides a useful and a relatively simple testing procedure in which soil strength can be quickly and easily estimated.

Unconfined Compression Tests (Qu)

In the unconfined compression strength test, a soil is loaded axially until failure or until 20% strain has been reached, whichever occurs first. This test is performed on undisturbed samples obtained from the shelby tube sampling procedure.

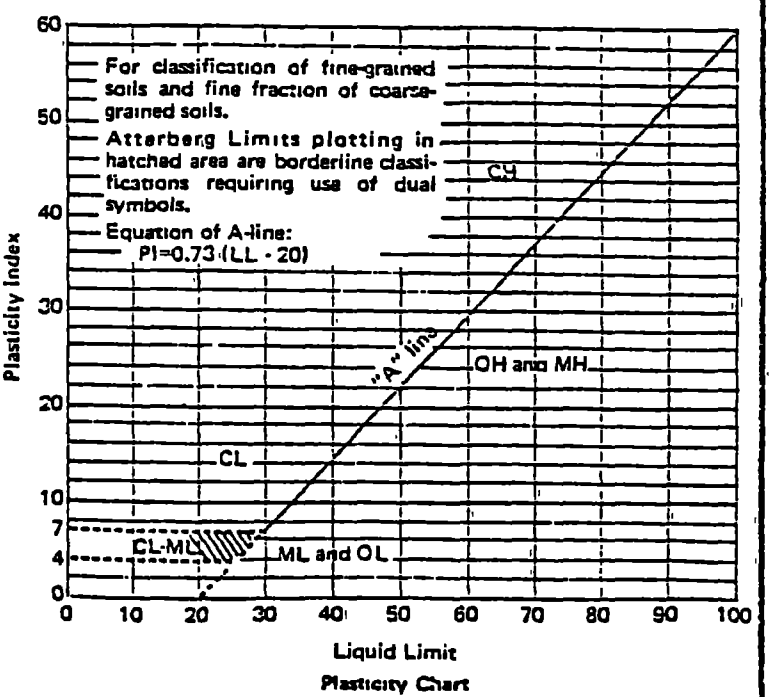
Classification of Samples

In conjunction with the sample testing program, all soil samples are examined in our laboratory and classified on the basis of their texture and plasticity in accordance with the Unified Soil Classification System (USCS). The soil descriptions on the boring logs are in conformance with this system and the estimated group symbols according to this system are included in parentheses following the soil descriptions on the boring logs. Included on a separate sheet is a brief explanation of this system of soil classification.

UNIFIED SOIL CLASSIFICATION SYSTEM

Major divisions			Group symbols	Typical names	Laboratory classification criteria	
Coarse-grained soils (More than half of material is *larger* than No. 4 sieve size)	Gravels (More than half of coarse fraction larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM d / u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM d / u	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
Highly organic soils			Pt	Peat and other highly organic soils		

Determine percentages of sand and gravel from grain-size curve.
Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows.
Less than 5 per cent . . . . . GW, GP, SW, SP
More than 12 per cent . . . . . GM, GC, SM, SC
5 to 12 per cent . . . . . *Borderline* cases requiring dual symbols



Plasticity Chart

85-539 PRELIMINARY FOUNDATION
INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

CITY OF ST. LOUIS PARK

November 8, 1985

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Reply To:

P.O. Box 35108
Mpls., MN 55435
(612) 941-5600

November 8, 1985

City of St. Louis Park
Attn: Mr. Jim Grube
5005 Minnetonka Blvd.
St. Louis Park, MN 55416-2290

RE: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

Mr. Grube:

As you authorized on October 10, 1985, we have completed a preliminary foundation investigation for the above referenced project. The purpose of the investigation was to assist in evaluating subsurface soil and ground water conditions with regard to foundation support of the proposed structure.

Nine standard penetration test borings (ST-1 through ST-9) were completed.

The soil borings encountered a subsurface profile consisting of between 2 and 12 feet of silty sand and clayey sand fill including pieces of broken concrete; soft peat and muck below the fill to depths ranging from 7 to 19 feet, and loose to medium dense silty sand and poorly graded sands were encountered below the organic soils to the termination depths of the borings.

Ground water was encountered in the borings within 2 to 3 feet of the surface.

Based on an analysis of information obtained during the investigation, the following is a summary of our recommendations. The soils profile encountered by the borings is generally on the eco-

nomic border between excavation replacement of poor soils and a piling foundation for support of buildings. If a cheap source of sand is available, the excavation replacement method would likely be cheapest at all borings except ST-4 and ST-9. At ST-4 and ST-9, a piling foundation will likely be cheaper.

Additional borings are recommended to provide better estimates of excavation and backfill quantities at proposed building sites or for estimates of pile lengths for deep foundation designs considered on the site.

It has been a pleasure performing these services for you. Should you have any questions regarding these data or wish construction or materials testing as the project progresses, please contact us at your convenience.

Very truly yours,

BRAUN ENGINEERING TESTING, INC.

Paul D. Burley
Project Engineer

C. G. Kruse, P.E.
Vice President - Engineering

PDB/CGK:gec

Attachments

BRAUN

November 8, 1985

85-539 PRELIMINARY FOUNDATION
INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

A. INTRODUCTION

A.1. Purpose: The purpose of the investigation was to evaluate the subsurface soil and ground water conditions of a four-acre site which has been used for disposal of soil, street sweepings, and other fill materials. The information is to be used to plan potential development of the site into two, two-acre sites.

A.2. Scope: A total of nine standard penetration test borings were performed in the proposed building area. With the results of the investigation this engineering report was prepared addressing our preliminary analysis and recommendations.

A.3. Available Information: Site plans drawn by the City of St. Louis Park, depicting the site, including setback lines within which building layouts must be placed, were received on September 30, 1985. An arial photograph of the site was received from the City on October 14, 1985. We understand that the City has not made definite development plans for the site at this time.

B. TESTING

B.1. Boring Locations and Elevations: The borings were located with regard to anticipated fill depths and existing site conditions. The locations are shown on the attached sketch. Locations of the borings were referenced to base lines as indicated on the attached sketch. Surface elevations of the borings were received from the City of St. Louis Park.

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B.2. Boring Methods and Procedures: The penetration test borings were performed on October 21 and 22, 1985, with a track-mounted core and auger drill. Sampling for the borings was conducted in accordance with ASTM D1586 "Penetration Test and Split Barrel Sampling of Soils." Using this method, we advanced the bore hole with the hollow-stem auger to the desired test depth. Then a 140-pound hammer falling 30 inches drove a standard, 2-inch OD, split barrel sampler a total penetration of 1 1/2 feet below the tip of the hollow-stem auger. The blows for the last foot of penetration were recorded and are an index of soil strength characteristics. Samples were taken at 2 1/2-foot vertical intervals to the 15-foot depth and then at 5-foot intervals to the termination depth of the borings.

B.3. Soil Classification: Soils encountered in the borings were visually and manually classified in the field by the crew chief in accordance with ASTM D2487 "Unified Soils Classification System" and ASTM D2488 "Recommended Practice for Visual and Manual Description of Soils." A copy of ASTM D2487 is attached. All samples were then returned to the laboratory for review of the field classifications by an Engineering Assistant. Representative samples will remain in our Minneapolis office for a period of 60 days to be available for your examination.

B.4. Ground Water Measurements: Immediately after taking the final sample in the bottom of a boring, the bore hole was probed through the hollow-stem auger to check for the presence of ground water. Immediately after withdrawal of the auger, the bore hole was again probed and the depth to water or cave-in was noted. The boring was finally checked and then backfilled just prior to leaving the site.

C. RESULTS

C.1. Logs: Log of Boring sheets indicating the depth and identification of the various soil strata, the penetration resistances, and water level information are attached. It should be noted that the depths shown as boundaries between the strata are only approximate. The actual change may be more of a transition and the depth of change likely varies horizontally.

C.2. Summary of Soils Encountered: The borings generally encountered between 2 and 12 feet of fill, consisting of silty sand and clayey sand with pieces of broken concrete. Peat was encountered mixed into the fill. A fibrous material, possibly consisting of street sweepings, was also noted in the fill. Recorded penetration resistances in the fill ranged from 4 BPF to 100 blows per 6 inches of penetration. The high blow counts were due to concrete pieces encountered in the fill. Based on the remaining penetration resistances, the silty sand fill generally appears to be in a very loose to medium dense condition.

Peat and muck were encountered below the fill to depths ranging from 7 to 19 feet at the boring locations. These organic soils were in a wet to waterbearing condition and had penetration resistances ranging from 2 to 7 BPF.

Silty sand and poorly graded sands with fine to coarse gravel were generally encountered beneath the organic soils. These coarse alluvial deposits and glacial outwash were waterbearing and had a loose to medium dense relative density.

C.3. Ground Water Elevations: Ground water was encountered in the borings within 2 to 3 feet of the surface. The pond located

immediately south of the site indicate that a high water table exists throughout the site.

Ground water levels should be expected to show annual and seasonal variations.

D. PRELIMINARY ANALYSIS AND RECOMMENDATIONS

D.1. Analysis: The borings encountered fill and swamp deposits not suitable for support of typical spread footing foundation systems. It appears that there are two alternatives available for this site -- excavation and replacement of the compressible soils or a piling foundation. The actual choice will be dependent on an economic analysis. The depth of marginal soils is on the border between an economic choice for excavation and refilling versus piling foundation. The availability of a source of sand and of a place to dispose of the excavated materials will probably be the key to determining which alternative is least expensive. It should be noted that either alternative will be relatively expensive, compared to the typical cost of developing one or two-story structures. If zoning permits multiple story structures, the cost of preparation would be reduced per square foot of usable space.

D.2. Excavation-Replacement: It appears that this alternative would be most suitable for areas except borings ST-4 and ST-9. The fill and organic soils should be excavated from within the area of the building plus an oversizing area determined by extending the excavation 1 foot horizontally for each foot of depth from the bottom of the footings to the bottom of the excavation (1:1 oversizing). It appears that it would be necessary to dewater the excavation to reduce the risk of incomplete removal of compressible soils before filling.

The existing fill materials are not considered suitable for support of a structure. However, they could be somewhat reused in parking areas if the general site is to be raised 2 to 3 feet.

Clean sand is recommended for backfill materials in the building areas. This should be uniformly compacted to densities ranging from 90 to 95% of modified Proctor density, depending on the foundation loadings and bearing capacity desired.

For this alternative, it is recommended that additional soil borings be taken when the building locations are determined to better define the excavation quantities and provide more information for evaluating the adequacy of the excavation. During the excavation and backfilling, a soils engineer should be on the site to observe the operation of the contractor and conduct density tests in the fill.

D.3. Piling Foundation: If the excavation-replacement process is too expensive, a piling foundation can be used to support the building and the floor slab. It appears that the organic depths are limited enough to allow use of timber piles for capacities in the range of 10 to 25 tons. However, deeper soil borings are necessary to better estimate the required length of piles. If high capacities piles are desired other pile types can be considered.

If this approach appears to be the most economical, it is recommended that deep borings be taken at proposed building locations to allow estimating pile lengths and capacities. At the time of construction, a Soils Engineer should be on the site to observe the pile driving operations and evaluate the capacities of the piles as they are driven.

E. GENERAL REMARKS

The preliminary analysis and recommendations submitted in this report are based upon the data obtained from the nine soil borings performed at the locations indicated on the attached sketch. Variations may occur between these borings, the nature and extent of which will not become evident until additional borings are taken or until construction. If variations are encountered, it will be necessary to make a re-evaluation of the recommendations of this report. Such variations may result in additional foundation costs and it is suggested that a contingency be provided for this purpose.

To permit correlation of the soil data obtained to date with the actual soil conditions encountered during construction and to provide continuing professional responsibility for the conformance of the construction to the concepts originally contemplated in this report and to the plans and specifications, it is recommended that we be retained to develop and perform the necessary observation and testing program for the excavation and foundation phases of the project.

If others perform the recommended observations and/or testing of construction, professional responsibility becomes divided since in doing so, they assume responsibility for verifying that the soil conditions throughout the construction areas are similar to those encountered in the borings or recognizing variations which would require a change in recommendations.

Services performed by the geotechnical and material engineers for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the

profession currently practicing in this area under similar budget and time restraints. No other warranty, expressed or implied, is made.

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-1

LOCATION:
See Attached Location Sketch.

DATE: 10/22/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
179.5	0	SM	FILL: SILTY SAND, fine to medium-grained, with pieces of broken CONCRETE, black, moist to waterbearing.	44*	▽	*High BPF due to broken concrete.
175.5	4	PT	PEAT, fibrous, dark brown, waterbearing, rather soft. (Swamp Deposit)	5		Surface elevations provided by City.
172.5	7	PT	PEAT and MUCK, with shells, black, wet, rather soft. (Swamp Deposit)	4		
170.5	9	ML	SILT, gray, wet, moist. (Fine Alluvium)	7		
167.5	12	SW	SAND, fine to coarse-grained, with fine to medium Gravel, gray and brown, waterbearing, loose to medium dense. (Coarse Alluvium)	22		
160.5	19			10		
159.0	20.5	SW	SAND, fine to coarse-grained, with medium to coarse Gravel, **	13		**gray and brown, waterbearing, medium dense. (Coarse Alluvium)
			END OF BORING.			

Water level down 4' with 5' of hollow-stem auger in the ground.

Water level down 2' with 20' of hollow-stem auger in the ground.

Water level down 2' immediately after withdrawal of auger.

Water level down 2'5 hours after completion of boring.

Boring then backfilled.

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION 7221 West Lake Street St. Louis Park, MN	BORING: ST-2 LOCATION: See Attached Location Sketch. DATE: 10/21/85 SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
179.9	0	SM	FILL: SILTY SAND, fine to medium-grained, with pieces of broken CONCRETE, black, moist to water-bearing.	57*	▽	*High BPF due to broken concrete.
175.9	4	PT	PEAT, fibrous, black, rather soft to medium, wet. (Swamp Deposit)	6		
170.9	9			5		
167.9	12	PT	PEAT and MUCK, with some SILTY CLAY and SHELLS, black and gray, wet, rather soft. (Swamp Deposit)	4		
165.9	14	SM	SILTY SAND, fine to medium-grained, with fine to medium Gravel, brown and gray, **	22		**waterbearing, medium dense. (Coarse Alluvium)
160.9	19	SW	SAND, fine to coarse-grained, with fine to medium Gravel, brown, waterbearing, medium dense. (Coarse Alluvium)	15		
159.4	20.5	SM	SILTY SAND, medium to coarse-grained, with medium to coarse***	18		***Gravel, brown, waterbearing, medium dense. (Coarse Alluvium)
			END OF BORING. Water level down 4' with 5' of hollow-stem auger in the ground. Water level down 9' with 20' of hollow-stem auger in the ground. Water level down 2" immediately after withdrawal of auger. Water level down 2' 1 day after completion of boring. Boring then backfilled.			

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-3

LOCATION:
See Attached Location Sketch.

DATE: 10/21/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
180.1	0	SC-SM	FILL: SILTY CLAYEY SAND, fine to medium-grained, with large pieces of broken CONCRETE, black and gray, moist to waterbearing.	53*	▽	*High BPF due to broken concrete.
174.1	6			100/5'	*	
		PT	FILL: PEAT, fibrous, with pieces of broken CONCRETE, dark brown, wet.	4		
168.1	12			4		
		SP	SAND, fine to medium-grained, with fine to medium Gravel, gray and brown, waterbearing, loose to medium dense. (Coarse Alluvium)	6		
				12		Jetting water used to clear the auger below the 16' depth.
161.1	19					
159.6	20.5	SP	SAND, medium to coarse-grained, with fine to medium Gravel, gray**	17		**and brown, waterbearing, medium dense. (Coarse Alluvium)
			END OF BORING.			
			Water level down 4' with 5' of hollow-stem auger in the ground.			
			Water level down 2' immediately after withdrawal of auger.			
			Water level down 2' 1 day after completion of boring.			
			Boring then backfilled.			

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-4

LOCATION:
See Attached Location Sketch.

DATE: 10/21/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
180.0	0					
		SC	FILL: CLAYEY SAND, fine to medium-grained, with broken CONCRETE, black, moist to wet.	26	▽	
				50/.5'		
174.0	6					
		SP-SM	FILL: POORLY GRADED SAND with SILT and GRAVEL, fine to medium-grained, fibrous, black, wet.	6		
171.0	9					
		PT	PEAT and MUCK with SHELLS, black and brown, wet, soft to rather soft. (Swamp Deposit)	4		
				2		
				3		
161.0	19					
		SP	SAND, fine to medium-grained, with layers of lacustrine SILT, brown and gray, waterbearing, medium dense. (Coarse Alluvium)	20		Jetting water used to clear the auger below the 20' depth.
156.0	24					
		SP	SAND, medium to coarse-grained, with fine to medium Gravel, *	18		*brown, waterbearing, medium dense. (Glacial Outwash)
154.5	25.5					
			END OF BORING.			Water level down 2' 1 day after completion of boring.
			Water level down 4' with 5' of hollow-stem auger in the ground.			
			Water level down 4' with 25' of hollow-stem auger in the ground.			Boring then backfilled.
			Water level down 1' immediately after withdrawal of auger.			

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-5

LOCATION: See Attached Location Sketch.

DATE: 10/21/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
179.4	0	SM	FILL: SILTY SAND, fine to medium-grained, with fine to medium Gravel, and layers of ORGANIC SILT and PEAT, brown and black, moist to wet.	23	▽	
				8		
				3		
170.4	9					
167.4	12	SP	FILL: SAND, fine to medium-grained, with fine to coarse Gravel and Peat, dark brown and gray, waterbearing.	11		
		SP	SAND, medium to coarse-grained, with fine to medium Gravel, grayish-brown, waterbearing, medium dense. (Glacial Outwash)	16		
				18		
158.9	20.5			17		
			END OF BORING.			

Water level down 6.5' with 10' of hollow-stem auger in the ground.

Water level down 8' with 20' of hollow-stem auger in the ground.

Water level not encountered to cave-in depth of 3' immediately after withdrawal of auger.

Water level down 2' 1 day after completion of boring.

Boring then backfilled.

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-6

LOCATION:
See Attached Location Sketch.

DATE: 10/22/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
179.3	0	SM	FILL: SILTY SAND, fine to medium-grained, black, moist.		▼	
177.3	2	PT	PEAT, fibrous, with layers of lacustrine SILT, black and gray, wet, rather soft to medium. (Swamp Deposit)	5 7		
172.3	7	SP	SAND, fine to medium-grained, with a trace of fine to medium Gravel, gray, waterbearing, medium dense. (Coarse Alluvium)	23 25		
167.3	12	SP	SAND, fine to medium-grained, with a trace of fine to medium Gravel, gray, waterbearing, medium dense. (Coarse Alluvium)	22 21		
160.3	19	SP	SAND, fine to medium-grained, with a trace of medium to **	21		**coarse-grained Gravel, gray, waterbearing, medium dense. (Coarse Alluvium)
158.8	20.5		END OF BORING. Water level down 6' with 10' of hollow-stem auger in the ground. Water level down 4' with 20' of hollow-stem auger in the ground. Water level down 2'immediately after withdrawal of auger. Water level down 2' 4 hours after completion of boring. Boring then backfilled.			

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

BORING: ST-7

LOCATION:
See Attached Location Sketch.

DATE: 10/22/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
179.2	0					
177.2	2	SP	FILL: POORLY GRADED SAND, fine to medium-grained, brown and black, moist.			
176.2	3	SM	FILL: SILTY SAND, fine to medium-grained, with medium to coarse*	4	▽	*Gravel, brown, moist.
172.2	7	PT	PEAT, fibrous, brown, wet, rather stiff. (Swamp Deposit)	5		
170.2	9	PT	PEAT, with medium-grained SAND throughout, black, wet, medium. (Swamp Deposit)	8		
167.2	12	SP	POORLY GRADED SAND, fine to medium-grained, black, waterbearing, medium. (Coarse Alluvium)	10		
165.2	14	ML	SILT, with a trace of medium-grained SAND, gray and brown, waterbearing, moist. **	7		**(Fine Alluvium)
160.2	19	SM	SILTY SAND, fine to medium-grained, with medium to coarse Gravel, brown, waterbearing, medium dense. (Coarse Alluvium)	12		
158.7	20.5	SP	POORLY GRADED SAND, fine to medium-grained, with fine to ***	23		*** medium Gravel, brown, waterbearing, medium dense. (Coarse Alluvium)
			END OF BORING.			

Water level down 6' with 10' of hollow-stem auger in the ground.

Water level down 6' with 20' of hollow-stem auger in the ground.

Water level down 3' immediately after withdrawal of auger.

Water level down 3' 4 hours after completion of boring.

Boring then backfilled.

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION 7221 West Lake Street St. Louis Park, MN	BORING: ST-8 LOCATION: See Attached Location Sketch. DATE: 10/22/85 SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
180.4	0	SM	FILL: SILTY SAND, fine-grained, black, moist.			
178.4	2	PT	PEAT, fibrous, black, moist, wet, medium. (Swamp Deposit)	7	▽	
175.9	4.5	SP	POORLY GRADED SAND, fine to medium-grained, with some PEAT and Gravel, gray and brown, water-bearing, loose. (Coarse Alluvium)	9		
173.4	7	PT	PEAT, fibrous, black and brown, wet, medium. (Swamp Deposit)	7		
169.4	11	SM	SILTY SAND, with medium to coarse Gravel, grayish-brown, waterbearing, medium dense. (Coarse Alluvium)	6 13		
166.4	14	SP	SAND, fine to medium-grained, with medium to coarse Gravel, grayish-brown, waterbearing, medium dense. (Coarse Alluvium)	11		
159.9	20.5		END OF BORING. Water level down 5' with 5' of hollow-stem auger in the ground. Water level down 3' with 20' of hollow-stem auger in the ground. Water level down 3' immediately after withdrawal of auger. Water level down 3' 2 hours after completion of boring. Boring then backfilled.	15		

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING

BRAUN ENGINEERING TESTING

PROJECT: 85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, MN

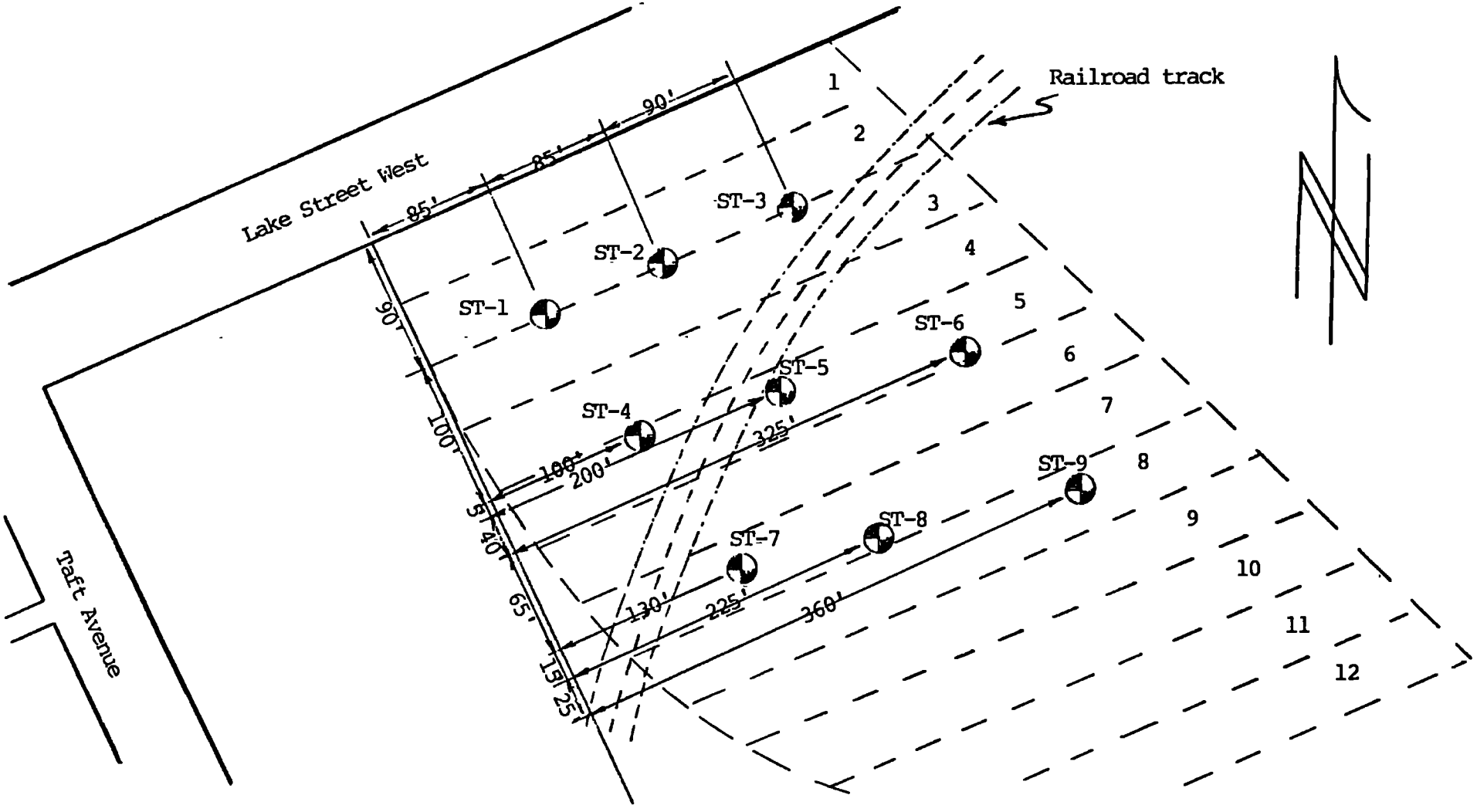
BORING: ST-9

LOCATION:
See Attached Location Sketch.

DATE: 10/22/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
181.8	0	CL-ML	FILL: SILTY CLAY, with some SILTY SAND, black and brown, damp		▽	
179.8	2	SM	FILL: SILTY SAND, fine to medium-grained, brown, waterbearing.	5		
177.8	4	SM	FILL: SILTY SAND, fine to medium-grained, with medium to coarse-Gravel, brown, moist to water-bearing.	13		
174.3	7.5	PT	PEAT, fibrous, dark brown, wet to waterbearing, rather soft. (Swamp Deposit)	7		
				4		
				5		
167.8	14	CL-ML	SILTY CLAY, gray, wet, rather soft. (Fine Alluvium)	5		
165.8	16	SP	POORLY GRADED SAND, fine to medium-grained, with some medium to coarse Gravel, brown, waterbearing, loose to medium dense. (Coarse Alluvium)			
				10		
156.3	25.5			27		
			END OF BORING.			
			Water level down 6' with 10' of hollow-stem auger in the ground.			Water level down 2' 1 hour after completion of boring.
			Water level down 4' with 25' of hollow-stem auger in the ground.			Boring then backfilled.
			Water level down 2' immediately after withdrawal of auger.			



— Denotes location of standard penetration test boring.

Boring elevations were referenced by the city of St. Louis Park.

BRAUN

85-539 PRELIMINARY FOUNDATION INVESTIGATION
7221 West Lake Street
St. Louis Park, Minnesota

Date	10/30/85
Revised	-
Drawn.	PDB
Scale.	1"=100'

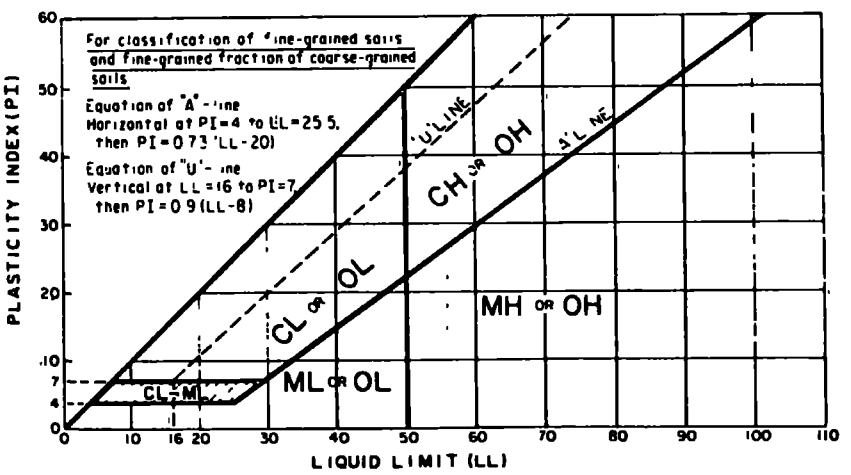
Descriptive Terminology

Designation D 2487 — 83

Standard Test Method for CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

			CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS [a]	SOIL CLASSIFICATION: GROUP SYMBOL	SOIL CLASSIFICATION: GROUP NAME [b]
COARSE-GRAINED SOILS, more than 50% retained on No 200 sieve	GRAVELS More than 50% of coarse fraction retained on No 4 sieve	CLEAN GRAVELS Less than 5% fines [c]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [e]	GW	Well-graded gravel [f]
			$C_u < 4$ and/or $1 > C_c > 3$ [e]	GP	Poorly graded gravel [f]
		GRAVELS WITH FINES More than 12% fines [c]	Fines classify as ML or MH	GM	Silty gravel [f,g,h]
			Fines classify as CL or CH	GC	Clayey gravel [f,g,h]
	SANDS 50% or more of coarse fraction passes No 4 sieve	CLEAN SANDS Less than 5% fines [d]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [e]	SW	Well-graded sand [i]
			$C_u < 6$ and/or $1 > C_c > 3$ [e]	SP	Poorly graded sand [i]
		SANDS WITH FINES More than 12% fines [d]	Fines classify as ML or MH	SM	Silty sand [g,h,i]
			Fines classify as CL or CH	SC	Clayey sand [g,h,i]
FINE-GRAINED SOILS, 50% or more passed the No 200 sieve	SILTS AND CLAYS Liquid limit less than 50%	inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k,l,m,n] Organic silt [k,l,m,o]
	SILTS AND CLAYS Liquid limit 50% or more	inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k,l,m,p] Organic silt [k,l,m,q]
HIGHLY ORGANIC SOILS			Primarily organic matter, dark in color, and organic odor	PT	Peat

[a] Based on the material passing the 3-in (75-mm) sieve
[b] If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name
[c] Gravels with 5 to 12% fines require dual symbols
GW-GM well graded gravel with silt
GW-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[d] Sands with 5 to 12% fines require dual symbols
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
[e] $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[f] If soil contains ≥ 15% sand, add "with sand" to group name
[g] If fines classify as CL-ML, use dual symbol GC-GM, SC-SM
[h] If fines are organic, add "with organic fines" to group name
[i] If soil contains ≥ 15% gravel, add "with gravel" to group name
[j] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay
[k] If soil contains 15 to 29% plus No 200, add "with sand" or "with gravel" whichever is predominant
[l] If soil contains ≥ 30% plus No 200, predominantly sand, add "sandy" to group name
[m] If soil contains ≥ 30% plus No 200, predominantly gravel, add "gravelly" to group name
[n] PI > 4 and plots on or above "A" line
[o] PI < 4 or plots below "A" line
[p] PI plots on or above "A" line
[q] PI plots below "A" line



LABORATORY TESTS

DD	Dry Density, pcf	OC	Organic Content, %
WD	Wet Density, pcf	S	Percent of Saturation, %
MC	Natural Moisture Content, %	SG	Specific Gravity
LL	Liquid Limit, %	C	Cohesion
PL	Plastic Limit, %	Ø	Angle of Internal Friction
PI	Plasticity Index, %	qu	Unconfined Compressive Strength

PARTICLE SIZE IDENTIFICATION

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	¾" — 3"
Fine	No 4 — ¾"
Sand	
Coarse	No 4 — No 10
Medium	No 10 — No 40
Fine	No 40 — No 200
Silt	No 200 — 005 mm
Clay	less than 005 mm

RELATIVE DENSITY OF COHESIONLESS SOILS

very loose	0 — 4 BPF
loose	5 — 10 BPF
medium dense	11 — 30 BPF
dense	31 — 50 BPF
very dense	50+ BPF

CONSISTENCY OF COHESIVE SOILS

very soft	0 — 1 BPF
soft	2 — 3 BPF
rather soft	4 — 5 BPF
medium	6 — 8 BPF
rather stiff	9 — 12 BPF
stiff	13 — 16 BPF
very stiff	17 — 30 BPF
hard	30+ BPF

DRILLING NOTES

Standard penetration test borings were advanced by 3¼" or 6¼" I D hollow-stem augers unless noted otherwise Jetting water was used to clean out auger prior to sampling only where indicated on logs Standard penetration test borings are designated by the prefix "ST" (Split Tube)

Power auger borings were advanced by 4" or 6" diameter, continuous-flite, solid stem augers Soil classification and strain depths are inferred from disturbed samples augered to the surface and are therefore somewhat approximate Power auger borings are designated by the prefix "B"

Hand probings were advanced manually with a 1½" diameter probe and are limited to the depth from which the probe can be manually withdrawn Hand probings are indicated by the prefix "H"

SAMPLING — All samples are taken with the standard 2" O D split tube sampler, except where noted TW indicates thin-wall (undisturbed) sample

BPF — Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value The sampler is set 6" into undisturbed soil below the hollow-stem auger Driving resistances are then counted for second and third 6" increments and added to get BPF Where they differ significantly, they are reported in the following form — 2/12 for the second and third 6" increments respectively

WH — WH indicates that sampler penetrated soil under weight of hammer and rods alone, driving not required

NOTE — All tests run in accordance with applicable ASTM standards

BRAUN

CITY OF ST. LOUIS PARK, MINNESOTA
PROPOSAL FOR
SOUTH OAK POND EXPANSION

PROJECT NO: 86-11

BIDS CLOSE: 11:00 A.M., April 14, 1987

TO THE CITY COUNCIL OF THE CITY OF ST. LOUIS PARK, MINNESOTA:

The undersigned has examined the Contract Documents, including Advertisement for Bids, Instructions to Bidders, General Contract Conditions for Construction, Special Provisions, Form of Contract, Detailed Specifications, including drawings and plans on file in the office of the Director of Public Works of the City of St. Louis Park, Minnesota, and is familiar with the site and location of the project, the work to be done and local conditions affecting the cost of the work under which it must be performed, and hereby proposes to furnish all labor, materials and equipment for the complete construction of the projects as described in the contract documents for the following prices:

MnDOT SPEC. NUMBER	ITEM	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
02101	Clearing and Grubbing	LUMP SUM	1		_____
02105	Pond Excavation and Disposal (Estimated 50,000 Cubic Yards)	LUMP SUM	1		_____
02105	Rubble	C.Y.	200	_____	_____
02105	Contaminated Material For Re-use On Site	C.Y.	250	_____	_____
02105	Contaminated Material Not Suitable for Re-Use	C.Y.	150	_____	_____
02105	Dewatering	LUMP SUM	1		_____
02250	Select Granular Material	TON	24,000	_____	_____
02250	Tensile Reinforcement Fabric	S.F.	213,500	_____	_____
02250	Venting Media	S.F.	85,500	_____	_____
02250	Geomembrane	S.F.	213,500	_____	_____
02503	15" R.C.P. Class V with R-4 Joint	L.F.	32	_____	_____

MnDOT SPEC. NUMBER	ITEM	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
02503	27" R.C.P. Class II with R-4 Joint	L.F.	32	_____	_____
02503	15" R.C.P. Flared End Section	EACH	1	_____	_____
02503	27" R.C.P. Flared End Section	EACH	1	_____	_____
02511	Class II Rip Rap	C.Y.	6	_____	_____
02575	Seeding as Specified	LUMP SUM	1		_____
02575	Furnish and Spread Topsoil	C.Y.	4,000	_____	_____
TOTAL BASE BID				_____	_____

The Contractor understands that the quantities of work as shown herein are approximate only and are subject to increase or decrease and further understands that the quantities of work performed (whether increase or decrease) are to be performed at the unit prices bid.

Bid security in the amount of $_____, being 5% of the total bid amount accompanying this proposal, the same being subject to forfeiture at the option of the City in the event of default by failure of the successful bidder to execute the written contract, and supply contractors bond and proper insurance documents as specified in the Instructions to Bidders and General Contract Conditions.

It is understood by the undersigned that the right is reserved by the City Council of St. Louis Park, Minnesota, to reject any and all bids or to accept any bid, and that these bids may not be withdrawn until thirty (30) days after the time the bids are opened. If this bid is accepted, the undersigned agrees to furnish contractors bond and execute the contract form or forms provided by the City within seven (7) days after receiving notice of acceptance of bid and further agrees that if awarded such contract, work shall be commenced and be fully performed as provided in the special provisions.

The Contractor shall pay to the City as liquidated damages for failure to complete the contract within the stipulated time, the sum of Two Hundred Dollars ($200) per day until the date of final completion.

This is to acknolwedge receipt of addenda numbered _____, _____, _____, _____, and _____.

Acknowledgement: _____
(Signature)

State Whether Bidder is:

Partnership_____

Individual_____

Corporation_____

Name of Partner_____

State in Which Incorporated:

_____

Respectfully submitted:

_____
Firm Name

_____
By

_____
Title

_____
Address

_____
Telephone Number