SJB SERVICES, INC.

Contract Drilling and Testing

**ROCHESTER OFFICE**
535 Summit Point Drive
Henrietta, New York 14467
Phone: (585) 359-2730
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Matthew Billy

# SITE OF INVESTIGATION
# NEW YORK STATE CANAL AT CULVERT NO. 70
# MURRAY, NEW YORK

**Prepared For:**

**New York State Thruway Authority**
**New York State Canal Corporation**
**200 Southern Boulevard, P.O. Box 189**
**Albany, New York 12201-0189**

**BD-02-088**
**June 24, 2002**

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**SITE OF INVESTIGATION**
**NEW YORK STATE CANAL AT CULVERT NO. 70**
**MURRAY, NEW YORK**

SJB Services, Inc. is pleased to present this summary of our investigation for New York State Canal at culvert No. 70, located west of Hulberton Road and south of Canal Road in the Town of Murray, New York.

The test drilling was requested and authorized by Mr. Robert Grimm of the New York Thruway Authority, New York State Canal Corporation, 200 Southern Boulevard, P.O. 189, Albany, New York 12201-0189. A total of four (4) test borings were located in the field by a representative of SJB Services at locations designated by Mr Grimm. See attached drawing in Appendix A for the approximate location of each test borehole.

Standard drilling techniques were used to advance the hollow stem augers through the overburden soils. As the boring was advanced, soil samples were obtained in the materials below the augers using the Standard Penetration Test (SPT), in general accordance with the procedures set forth in ASTM D1586. A total of two (2) bedrock cores 1.5 meters in length were obtained from boreholes B-1 and B-3. All recovered soil samples were visually

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classified in our office by an Associate Engineer. The test boring logs are presented in Appendix B.

A detailed description of the subsurface conditions encountered at each of the borehole locations are presented on the subsurface logs in Appendix A. A rock core, 5.1 centimeters in diameter by 1.5 meters long, was obtained at borehole B-1, from 5.55 to 7.07 meters and at borehole B-3, from 5.15 to 6.68 meters. The recovered rock cores consisted of a reddish brown sandstone. The stratification lines shown on the boring logs in Appendix B are approximate, where as in-situ, the changes between the strata may be more gradual. The subsurface information represented by the attached logs indicates the conditions present at the time of exploration.

No free standing water was encountered at boring completion at boreholes B-2 and B-4. No free standing water was encountered to top of rock at borehole B-1 and B-3, after the rock cores were obtained at these locations, the water used to obtain the rock cores was encountered at 2.74 meters at B-1 and 0.6 meters at B-3. It should be noted that post drilling free water observations after boring completion may not accurately represent groundwater levels as a result of the short time allowed for stabilization of the water levels. Groundwater levels will be influenced by seasonal and construction related fluctuations.

Ms. Dianne Denniston of the New York State Thruway Authority

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requested that all recovered samples from Borehole B-1, B-2, B-3 and B-4 have the following laboratory tests perform on them: Moisture Content and Mechanical Grain Size. The results of the laboratory tests are presented in Appendix C.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact our office. All recovered samples will be retained for a maximum of sixty (60) days, at which time they will be destroyed unless otherwise noted.

Respectfully submitted,
**VAN DER HORST GEOTECHNICAL ENGINEERING P.C.**

Matthew J. Billy
Associate Engineer

MJB/SJB/sjb

# APPENDIX B: SUBSURFACE LOGS

SJB Services, Inc.

HOLE NO. B-1 SURF. ELEV. _____

PROJECT _____ LOCATION _____

_____ _____

CLIENT _____ DATE STARTED _____ COMPLETED _____

| DEPTH (FEET) | Sample | Sample No. | BLOWS ON SAMPLE 0-6 | 6-12 | 12-18 | 18-24 | N | GRAPHIC LOG | DESCRIPTION & CLASSIFICATION | WATER TABLE & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 2 | 2 | 3 | 5 | 10 | | 3" TOPSOIL 0.33 | Water was encountered at 2.0' |
| | | | | | | | | | Brown SILT, some Sand, trace clay (moist, loose) 3.2 | |
| | | 1 | 2 | 2 | 3 | 5 | 10 | | Gray SHALE, medium hard weathered thin bedded some fractures (medium) | Run #1 2.5' to 5.0' Recovery 95% RQD 50% |
| 5 | | | | | | | | | | |

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

## TABLE I

Split-Spoon Sample

Shelby Tube Sample

Auger

Rock core

## TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.

| Soil Type | Soil Particle Size | |
|---|---|---|
| Boulder | > 12" | Coarse Grained (Granular) |
| Cobble | 3" - 12" | |
| Gravel - Coarse | 3" - 3/4" | |
| - Fine | 3/4" - #4 | |
| Sand - Coarse | #4 - #10 | |
| - Medium | #10 - #40 | |
| - Fine | #40 - #200 | |
| Silt-Non Plastic (Granular) Clay-Plastic (Cohesive) | <#200 | Fine Grained |

## TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.

| Term | Percent of Total Sample |
|---|---|
| "mostly" | 50-100 |
| "some" | 30-45 |
| "little" | 15-25 |
| "few" | 5-10 |
| "trace" | less than 5% |

(When sampling gravelly soils with a standard split-spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)

## TABLE IV

The reletive compactness or consistnecy is described in accord with the following terms

| Granular Soils Term | Blows per Foot, N | Cohesive Soils Term | Blows per Foot, N |
|---|---|---|---|
| Loose | < 11 | Very Soft | < 3 |
| Firm | 11-30 | Soft | 3-5 |
| Compact | 31-50 | Medium | 6-15 |
| Very Compact | > 51 | Stiff | 16-25 |
| | | Hard | >26 |

(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)

## TABLE V

| | |
|---|---|
| Varved | -Horizontal uniform layers or seams of soil(s). |
| Layer | -Soil deposit more than 6" thick. |
| Seam | -Soil deposit less than 6" thick. |
| Parting | -Soil deposit less than ⅛" thick. |
| Laminated | -Irregular, horizontal and angled seams and partings of soil(s). |

## TABLE VI

| Rock Classification Terms Term | | Meaning |
|---|---|---|
| Hardness | Soft | Scratched by fingernail |
| | Medium Hard | Scratched easily by penknife |
| | Hard | Scratched with difficulty by penknife |
| | Very Hard | Cannot be scratched by penknife |
| Weathering | Very Weathered | Judged from the relative amounts of disintegration iron staining, core recovery, clay seams etc. |
| | Weathered | |
| | Sound | |
| Bedding | Laminated | Natural breaks in Rock Layers (<1") |
| | Thin Bedded | (1" - 4") |
| | Bedded | (4" - 12") |
| | Thick bedded | (12" - 36") |
| | Massive | (>36") |

(Fracturing refers to natural breaks in the rock oriented at some angle to the rock layers.)

# GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The Subsurface Logs attached to this report present the observations and mechanical data collected by the driller at the site, supplemented by classification of the material removed from the boring as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the boring represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Subsurface Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the project. The evaluation must consider all the recorded details and their significance relative to each other. Often analyses of standard boring data indicate the need for additional testing or sampling procedures to more accurately evaluate the subsurface conditions. Any evaluation of the contents of this report and the recovered samples must be performed by Professionals. The information presented in the following defines some of the procedures and terms used on the Subsurface Logs to describe the conditions encountered.

1. The figures in the Depth column defines the scale of the Subsurface Log.

2. The sample column shows, graphically, the depth range from which a sample was recovered. See Table I for a description of the symbols used to signify the various types of samples.

3. The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.

4. Blows on Sampler—shows the results of the "Penetration Test", recording the number of blows required to drive a split spoon sampler into the soil. The number of blows required for each six inches of penetration is recorded. The first 6 inches of penetration is considered to be a seating drive. The number of blows required for the second and third 6 inches of penetration is termed the penetration resistance, N. The outside diameter of the sampler, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log.

5. All recovered soil samples are reviewed in the laboratory by an engineering technician, geologist or geotechnical engineer, unless noted otherwise. The visual descriptions are made on the basis of a combination of the driller's field descriptions and observations and the sample as received in the laboratory. The method of visual classification is based primarily on the Unified Soil Classification (ASTM D 2487-83) with regard to the particle size and plasticity. (See table No. II) Additionally, the relative portion, by weight, of two or more soil types is described for granular soils in accordance with "Suggested Methods of Test for Identification of Soils" by D.M. Burmister, ASTM Special Technical Publication 479, June 1970. (See Table No. III) the description of the relative soil density or consistency is based upon the penetration records as defined on Table No. IV. The description of the soil moisture is based upon the relative wetness of the soil as recovered and is described as dry, moist, wet and saturated. Water introduced in the boring either naturally or during drilling may have affected the moisture condition of the recovered sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and samplers blows or through the "action" of the drill rig as reported by the driller.

6. The description of the rock shown is based on the recovered rock core and the driller's observations. The terms frequently used in the description are included in Table VI.

7. The stratification lines present the approximate boundary between soil types and the transition may be gradual. Solid stratification lines are based on the driller's field observations.

8. Miscellaneous observations and procedures noted by the driller are shown in this column, including water level observations. It is important to realize the reliability of the water level observations depends upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the boring may have influenced the observations. the groundwater level typically will fluctuate seasonally. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or water observation wells.

9. The length of core run is defined as the length of penetration of the core barrel. Core recovery is the length of core recovered divided by the core run. The RQD (Rock quality designation) is the total pieces of NX core exceeding 4 inches in length divided by the core run. The size core barrel used is also noted.

# KEY TO SYMBOLS

Symbol Description

Strata symbols

 FILL

 Sand & Gravel

 Sandstone

 Rock fragments

Misc. Symbols

 Water table at date indicated

Soil Samplers

 Auger

 Standard penetration test

 Rock core

Notes:

1. These subsurface logs form a part of the geotechnical report and should not be seperated from the report.

2. The information presented on these subsurface logs are subject to the limitations, discussions and conclusions presented in the report.

3. The subsurface conditions between the subsurface exploration locations, including topsoil and fill thicknesses, will vary.

4. The subsurface logs should not be used as the sole means of estimating material quantities, including fill, topsoil and/or organic subsoils, for bidding purposes. Discussions presented in this report of subsurface conditions may aid in estimating quantities. The contractor is ultimately responsible for performing any additional site observations/explorations to aid in bidding.

SERVICES, INC.

HOLE NO.: B-1 SURF. ELEV. _____

PROJECT: NYS Canal Culvert 70 LOCATION: Murray, New York

BD-02-088

CLIENT: NYS Thruway Authority DATE STARTED: 6/7/02 COMPLETED: 6/7/02

| DEPTH (M) | Sample | Sample No. | BLOWS ON SAMPLE 0-15 | 15-30 | 30-45 | 45-60 | N | GRAPHIC LOG | DESCRIPTION & CLASSIFICATION | WATER TABLE & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.6 | | 1 | 4 | 8 | 10 | 10 | 18 | | Brown fine SAND, some Gravel, little Silt, trace clay (moist, firm) grades to some Silt, little Gravel FILL | |
| 1.2 | | 2 | 9 | 11 | 10 | 10 | 21 | | | |
| 1.8 | | 3 | 7 | 21 | 10 | 8 | 31 | | 1.52 Dark brown SILT, little fine Sand, little Gravel (moist, compact) FILL | |
| 2.4 | | 4 | 6 | 6 | 7 | 8 | 13 | | 2.13 Brown Clayey SILT, little Gravel, little fine Sand (moist, firm) FILL | |
| 3 | | 5 | 4 | 5 | 4 | 6 | 9 | | 2.74 Brown fine SAND and SILT, some Gravel (moist, loose) FILL | |
| 3.6 | | | | | | | | | | |
| 4.2 | | | | | | | | | 4.57 | |
| 4.8 | | 6 | 2 | 3 | 3 | | 6 | | Brown SAND and GRAVEL, trace silt (wet, loose) | Ref.-Sample Refusal |
| 5.4 | | 7 | 50/0 | | | | Ref. | | 5.55 Reddish brown with light gray mottling, SANDSTONE, medium hard to hard, sound, laminated to bedded Fractured from 6.18m to 6.28m and 6.34m to 6.40m | NX Core Run No.1 5.55 to 7.07m Recovery 90% RQD 36% |
| 6 | | | | | | | | | | |
| 6.6 | | | | | | | | | 7.07 | |
| 7.2 | | | | | | | | | Boring complete at 7.07 meters. | Free standing water was encountered at 2.74 meters after rock core was obtained. |
| 7.8 | | | | | | | | | | |
| 8.4 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 9.6 | | | | | | | | | | |
| 10.2 | | | | | | | | | | |
| 10.8 | | | | | | | | | | |
| 11.4 | | | | | | | | | | |
| 12 | | | | | | | | | | |

N=NUMBER OF BLOWS TO DRIVE 5.08 cm SPOON 30.48 cm WITH 63.5 kg WT. FALLING 76.2 cm PER BLOW

LOGGED BY Matthew Billy SHEET 1 OF 1

SJB SERVICES, INC.

HOLE NO.: B-2 SURF. ELEV. _____

PROJECT: NYS Canal Culvert 70 LOCATION: Murray, New York

BD-02-088

CLIENT: NYS Thruway Authority DATE STARTED: 6/7/02 COMPLETED: 6/7/02

| DEPTH (M) | Sample | Sample No. | BLOWS ON SAMPLE 0-15 | 15-30 | 30-45 | 45-60 | N | GRAPHIC LOG | DESCRIPTION & CLASSIFICATION | WATER TABLE & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.6 | | 1 | 6 | 10 | 5 | 8 | 15 | | Reddish brown SAND and GRAVEL, little Silt (moist, firm) | |
| 1.2 | | 2 | 7 | 8 | 6 | 8 | 14 | | | |
| 1.8 | | 3 | 5 | 9 | 8 | 8 | 17 | | | |
| 2.4 | | 4 | 7 | 8 | 9 | 8 | 17 | | FILL | |
| 3 | | 5 | 4 | 2 | 2 | 2 | 4 | | 2.74 Dark brown Clayey SILT, trace sand, trace organics (moist, soft) | |
| 3.6 | | | | | | | | | | |
| 4.2 | | | | | | | | | | |
| 4.8 | | 6 | 6 | 10 | 50/3 | | Ref. | | grades to little Gravel 4.91 | Ref.-Sample Refusal |
| 5.4 | | | | | | | | | Boring complete with auger refusal at 4.91 meters. | No free standing water was encountered at boring completion. |
| 6 | | | | | | | | | | |
| 6.6 | | | | | | | | | | |
| 7.2 | | | | | | | | | | |
| 7.8 | | | | | | | | | | |
| 8.4 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 9.6 | | | | | | | | | | |
| 10.2 | | | | | | | | | | |
| 10.8 | | | | | | | | | | |
| 11.4 | | | | | | | | | | |
| 12 | | | | | | | | | | |

N=NUMBER OF BLOWS TO DRIVE 5.08 cm SPOON 30.48 cm WITH 63.5 kg WT. FALLING 76.2 cm PER BLOW

LOGGED BY Matthew Billy SHEET 1 OF 1

SERVICES, INC.

HOLE NO.: B-3 SURF. ELEV. _____

PROJECT: NYS Canal Culvert 70 LOCATION: Murray, New York

BD-02-088

CLIENT: NYS Thruway Authority DATE STARTED: 6/7/02 COMPLETED: 6/7/02

| DEPTH (M) | Sample | Sample No. | BLOWS ON SAMPLE 0-15 | 15-30 | 30-45 | 45-60 | N | GRAPHIC LOG | DESCRIPTION & CLASSIFICATION | WATER TABLE & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.6 | | 1 | 10 | 8 | 8 | 9 | 16 | | Brown fine to medium SAND, some Gravel, little Silt (moist, firm) | |
| 1.2 | | 2 | 6 | 6 | 7 | 8 | 13 | | grades to "and" GRAVEL (very moist) | |
| 1.8 | | 3 | 6 | 4 | 5 | 4 | 9 | | grades to some Gravel, some Silt (loose) | |
| 2.4 | | 4 | 4 | 6 | 5 | 6 | 11 | | (firm) | |
| 3 | | 5 | 5 | 6 | 5 | 8 | 11 | | grades to trace organics | |
| 3.6 | | | | | | | | | FILL | |
| 4.2 | | | | | | | | | | |
| 4.8 | | 6 | 6 | 8 | 9 | | 17 | | 4.57 Reddish brown fine SAND and GRAVEL, some Silt (very moist, firm) | No split-spoon recovery for sample No.7 |
| 5.4 | | 7 | 50/0 | | | | Ref. | | 5.15 Reddish brown with light gray mottling, SANDSTONE, medium hard to hard, sound, laminated to bedded Fractured from 5.88m to 5.94m | Ref.-Sample Refusal NX Core Run No.1 5.15 to 6.68m Recovery 98% RQD 20% |
| 6 | | | | | | | | | | |
| 6.6 | | | | | | | | | 6.68 Boring complete at 6.68 meters. | Free standing water was encountered at 0.6 meters after rock core was obtained. |
| 7.2 | | | | | | | | | | |
| 7.8 | | | | | | | | | | |
| 8.4 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 9.6 | | | | | | | | | | |
| 10.2 | | | | | | | | | | |
| 10.8 | | | | | | | | | | |
| 11.4 | | | | | | | | | | |
| 12 | | | | | | | | | | |

N=NUMBER OF BLOWS TO DRIVE 5.08 cm SPOON 30.48 cm WITH 63.5 kg WT. FALLING 76.2 cm PER BLOW

LOGGED BY Matthew Billy SHEET 1 OF 1

SJB SERVICES, INC.

HOLE NO.: B-4 SURF. ELEV.

PROJECT: NYS Canal Culvert 70 LOCATION: Murray, New York

BD-02-088

CLIENT: NYS Thruway Authority DATE STARTED: 6/7/02 COMPLETED: 6/7/02

| DEPTH (M) | Sample | Sample No. | BLOWS ON SAMPLE 0-15 | 15-30 | 30-45 | 45-60 | N | GRAPHIC LOG | DESCRIPTION & CLASSIFICATION | WATER TABLE & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.6 | | 1 | 4 | 6 | 5 | 5 | 11 | | Brown fine SAND and SILT, some Gravel, trace clay (moist, firm) | |
| 1.2 | | 2 | 5 | 6 | 5 | 7 | 11 | | grades to "and" GRAVEL | |
| 1.8 | | 3 | 4 | 5 | 8 | 10 | 13 | | grades to some Gravel | |
| 2.4 | | 4 | 7 | 8 | 10 | 10 | 18 | | grades to little Gravel, trace organics FILL | |
| 3 | | 5 | 11 | 6 | 8 | 9 | 14 | | 3.20 Dark brown Clayey SILT, trace sand, trace gravel, trace organics (moist, medium) FILL | |
| 3.6 | | | | | | | | | | |
| 4.2 | | | | | | | | | | |
| 4.8 | | 6 | 50/5 | | | | Ref. | | 4.57 4.63 Reddish brown ROCK fragments Boring complete with auger refusal at 4.63 meters. | Ref.-Sample Refusal No free standing water was encountered at boring completion. |
| 5.4 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 6.6 | | | | | | | | | | |
| 7.2 | | | | | | | | | | |
| 7.8 | | | | | | | | | | |
| 8.4 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 9.6 | | | | | | | | | | |
| 10.2 | | | | | | | | | | |
| 10.8 | | | | | | | | | | |
| 11.4 | | | | | | | | | | |
| 12 | | | | | | | | | | |

N=NUMBER OF BLOWS TO DRIVE 5.08 cm SPOON 30.48 cm WITH 63.5 kg WT. FALLING 76.2 cm PER BLOW

LOGGED BY Matthew Billy SHEET 1 OF 1