GEOTECHNICAL ENGINEERING REPORT
U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
BRIDGE NO. 06591
WESTBOUND EXIT 24 ON RAMP OVER MAD RIVER
STATE PROJECT NO. 151-273
WATERBURY, CONNECTICUT

by

Haley & Aldrich, Inc.
East Hartford, Connecticut

for

Berger, Lehman Associates, P.C.
Wethersfield, Connecticut

File 91313-100
Revised January 2003

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HALEY & ALDRICH

Revised 28 January 2003
19 July 2001
File No. 91313-100

Berger, Lehman Associates, P.C.
20-30 Beaver Road
Wethersfield, Connecticut 06109

Attention: Thomas J. Bulzak, P.E.

Subject: U.S. Interstate Route 84 Reconstruction
Bridge No. 06591, Westbound Exit 24 On-ramp Over Mad River
State Project No. 151-273
Waterbury, Connecticut

Ladies and Gentlemen:

This report presents our evaluation of subsurface conditions and geotechnical engineering recommendations for Bridge No. 06591, Westbound Exit 24 On-ramp Over Mad River, for the I-84 Reconstruction project. The work was conducted in accordance with our agreement dated 26 December 2000, and the negotiated work scope for Bridge No. 06591.

In summary, subsurface conditions consist of fill, glaciofluvial sand and glacial till overlying bedrock. Bridge No. 06591 will be a single-span bridge supported on two abutments. We recommend the structure be supported on steel H-Piles driven to end bearing. Our detailed recommendations follow.

PROPOSED CONSTRUCTION

Bridge No. 06591 (formerly referred to as Structure 10) Westbound Exit 24 On-Ramp over the Mad River is located in Waterbury, Connecticut, see Figure 1, Project Locus. Bridge No. 06591 will be a single-span bridge supported on two abutments. The bridge will be 8.92 m wide and 52.39 m long, between stations W24 12+407.94 and W24 12+460.33, as shown on Figure 2.

The abutments will have U-type wingwalls. Wingwall 1B will connect to a retaining wall to the west of Bridge No. 06591 (see Figure 2). Wingwalls will generally bear at the same elevation as the abutments (El. 111.5), except that Abutment 2 wingwalls will step up from El. 111.5 to El. 115.0. Grade at the face of each abutment will be at about El. 113.8.

The Mad River currently flows south immediately adjacent to the Abutment 2 footprint. The river will be relocated to the west and the current channel will be backfilled. The new channel location is shown on Figure 2.

The alignment of Bridge No. 06591 will follow the south side of the existing I-84 bridge over the Mad River. As discussed with Berger Lehman Associates, existing bridge foundations will be completely removed where they conflict with new Bridge No. 06591 foundations, and will be removed to 300 mm below the depth of required excavation associated with Mad River relocation work.

We understand that Bridge No. 06591 will be constructed after I-84 traffic has been rerouted onto a new highway embankment to the south. Therefore, traffic over the existing I-84 bridge and the Harpers Ferry Road off-ramp will not need to be maintained during construction of Bridge No. 06591.

Elevations in this report are in meters and refer to NGVD 29.

SITE CONDITIONS

Bridge No. 06591 will be located along the south side of the existing I-84 bridge, as shown on Figure 2. Abutment 1 will be located between the existing structures carrying I-84 and the Harpers Ferry off ramp to the south; Abutment 2 will be located within the footprint of the existing I-84 bridge.

The I-84 bridge over the Mad River, referred to on Department drawings as Waterbury Expressway Over Scovill Pond, is supported on two abutments founded on spread footings that bear at El. 108.5. A plan of the bridge is included in Appendix B.

A number of utilities are present in the vicinity of Bridge No. 06591. These include storm drains and catch basins along I-84, and two sanitary sewer lines that run north-south along Harpers Ferry Road through the footprint of Wingwall 2B. We understand that all existing utilities near Bridge No. 06591 will be removed prior to construction.

Ground surface at Bridge No. 06591 slopes down to the Mad River at about El. 111. Ground surface at Abutment 1 slopes downward to the north from El. 118.5 at the Harpers Ferry Road off-ramp to El. 116 on the I-84 highway embankment; ground surface at Abutment 2 slopes downward to the south and west from El. 116 on the I-84 highway embankment to the Mad River.

SUBSURFACE INVESTIGATIONS

Recent Explorations

General Borings, Inc of Prospect, Connecticut drilled four borings (S10-1, S10-2, S10-4 and S10-4A). Borings S10-1, S10-2, and S10-4 were drilled between 28 March 2001 and 17 April 2001 and boring S10-4A was drilled 8 June 2001. Borings S10-1 and S10-2 were drilled at Abutment 1; S10-4 and S10-4A were drilled south of Abutment 2 due to difficult access. The test borings were drilled with 76-mm I.D. casing to depths ranging from 15.73 to 25.44 m, including up to 6.1 m of rock coring. Bedrock was cored with a 55 mm I.D. NX core barrel. Standard Penetration Tests were conducted at maximum 1.5-m intervals in overburden soil.

Boring locations are shown on Figure 2, and test boring logs are included in Appendix A. Haley & Aldrich, Inc. monitored the drilling. As-drilled locations and elevations were surveyed by A-I Engineering of Middletown, Connecticut.

Previous Explorations

Subsurface explorations conducted in 1957 for the existing I-84 Bridge consisted of six test borings (S1 through S6). Explorations were terminated in soil and bedrock 13.10 to 22.25 m below ground surface. Borings S1, S2, S4, and S5 locations are shown on Figure 2 and test boring logs are included in Appendix B.

Subsurface explorations conducted in 1991 for the Harpers Ferry Road off ramp consisted of 13 borings (B3 through B15). Borings B-3, B-4, B-4A & B-4B, and B-5 are in the vicinity of Bridge No. 06591. These logs are included in Appendix B and their locations are shown on Figure 2.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in the explorations consist of fill, alluvial deposits, glaciofluvial deposits and glacial till overlying bedrock. Soil strata are described below, in order of increasing depth. Subsurface profiles at each abutment are shown in Figures 3A and 3B. Subsurface conditions are summarized in Table I.

Thickness (m)	Generalized Description
3.0 to 3.1	**Fill** – Medium dense to very dense, gray to brown, coarse to fine SAND, with varying amounts of gravel and silt, with occasional roots and brick fragments. Fill is present in each of the recent borings. A slight chemical odor was noted in boring S10-4.

Thickness (m)	Generalized Description
0.15	**Alluvial Deposits** – Brown and black SAND with varying amounts of silt and gravel, cobbles, boulders and leaves. Alluvial deposits were encountered in previous borings S1, S2, S4 and S5, and are not present in the recent explorations.
12.34 to 20.72	**Glaciofluvial Deposits** - Dense to very dense, brown to gray brown, SAND, trace silt with varying amounts of gravel and numerous cobbles and boulders. Glaciofluvial deposits are present in all borings. An organic odor was noted in boring S10-4 in the upper portion of the glaciofluvial deposits.
Up to 6.6	**Glacial Till** – Very dense, brown fine SAND, trace fine gravel with numerous cobbles and boulders. Glacial till is present in S10-2, S10-4, S10-4A, and S2.

Bedrock – Bedrock is described as very hard, fresh to slightly weathered, gray and white, biotite GNEISS. Bedrock is part of the Waterbury Gneiss formation. Bedrock is 15.85 m to 22.0 m deep, which ranges between El. 89.9 and El. 97.0. Elevations of the top of bedrock are listed in Table I and shown in profile on Figures 3A and 3B. Weathered rock was encountered in Borings S10-1 and S10-4A, 0.61 and 0.91 m thick, respectively.

Groundwater Conditions

Water was encountered in S10-4 and S10-4A, at EL. 111.5 and El. 111.6. Water levels in the previous borings were above ground surface, suggesting they were drilled from a barge within the Mad River, and water levels varied from El. 111.1 to El. 111.4. However, these water levels may not represent current groundwater conditions because the Scovill Pond was drained in the late 1990's. The current normal water level in the Mad River is about El 111.0 and the 100-yr. flood level is about El. 113.8. Groundwater levels will fluctuate with water levels in the Mad River, season, precipitation, and nearby construction activity.

Laboratory Testing

Three grain size analyses (ASTM D422) were performed on representative soil samples to confirm visual classification and to aid in determining engineering properties. Laboratory testing results are included in Appendix C.

GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Foundation Type

We recommend that abutments and wingwalls be founded on steel H-Piles driven to refusal. Our detailed recommendations follow.

Foundation Design Criteria – H-Piles

- H-piles should be HP310x1.079 (HP12x74) or HP360x1.295 (HP14x89), consisting of Grade 345 MPa (50 ksi) steel.

- IF LRFD design is used, HP310x1.079 H-piles should be designed for an ultimate capacity of 4,840 kN (544 tons) and a resistance factor of 0.35; HP360x1.295 H-piles should be designed for an ultimate capacity of 5,825 kN (655 tons) and a resistance factor of 0.35. The recommended resistance criteria consider hard driving conditions due to the dense soil with cobbles and boulders. We discussed this resistance factor with the Department and agreed that it results in an appropriate stress level in the piles for this application.

- If ASD design is used, HP310x1.079 H-piles should be designed for an allowable capacity of 1160 kN (130 tons); HP360x1.295 H-piles should be designed an allowable capacity of 1400 kN (157 tons).

- Point reinforcement is recommended for piles to assist in penetration and to protect pile tips during hard driving

- Lateral loads may be resisted by a combination of shear and bending at the tops of the piles, and the horizontal component of axial loads in batter piles. For maximum allowable horizontal deflection of 6 mm (1/4 in.) at the top of the pile, the allowable lateral load in the strong axis for a hinged condition is 40 kN (9 kips).

- Piles should have a minimum center to center spacing of 2.5 times the pile width in accordance with AASHTO requirements. Greater pile spacings are anticipated.

- Groundwater was measured in borings S10-4 and S10-4A at El. 111.5 and El. 111.6, at or 0.1 m above the proposed abutment subgrade level. The contractor may elect to place pile caps on a 300 mm thick layer of crushed stone (Form 815 M.01.01, No. 6) over geotextile fabric placed on existing fill or glaciofluvial deposits, to facilitate excavation dewatering and help to maintain a stable subgrade.

  Abutment 2 will be located within the footprint of the I-84 Bridge Over Scovill Pond. The portion of the bridge that conflicts with Bridge No. 06591 piles will be completely

removed to the foundation bearing grade (El. 108.5). Excavations to remove foundations should be backfilled with granular fill.

- Maximum total settlement is estimated at 6 mm. Maximum differential settlement between abutments will be less than 6 mm. This settlement will occur during construction.

- For frost protection, bottom of pile caps should be at least 1.2 m below the lowest proposed adjacent grade.

- Design bridge foundations for scour protection in accordance with Department guidelines.

Abutment No. 1

Abutment 1 will be located at Sta. W24 12+409.59. Bottom of pile cap is El. 111.5 and crushed stone or granular fill subgrade 0.3 m below the pile cap is at El. 111.2. Borings S10-1 and S10-2 indicate the subgrade at El. 111.2 will consist of existing fill. Bedrock is between El. 93.57 and El. 93.82, 17.93 to 17.68 m below bottom of the pile cap.

Abutment No. 2

Abutment 2 will be located at Sta. W24 12+458.98. Bottom of pile cap is El. 111.5 and crushed stone or granular fill subgrade 0.3 m below the pile cap is at El. 111.2. Borings S10-4, S10-4A, S4 and S5 indicate the subgrade at El. 111.2 will consist of glaciofluvial deposits. However, where removal of existing foundations is necessary, the subgrade will consist of granular fill placed after foundation removal. Bedrock is between El. 89.92 and El. 96.95, 14.55 to 21.58 m below bottom of pile cap.

Estimated vertical pile lengths, assuming top of pile is 0.3 m above the bottom of pile cap are provided in Table II.

Lateral Earth Pressures

Design abutments and wingwalls for active earth pressures as shown in Figure 4.

Seismic Design

Soils conditions at the site are AASHTO Soil Profile Type I. A seismic soil coefficient, S, equal to 1.0 is recommended. The soils at the site are not considered to be liquefaction susceptible under the design earthquake event. Seismically induced settlement should not be significant. Based on the Bridge Design Manual, single span structures do not need to be designed for seismic loads.

Environmental Observations

A slight chemical odor and organic odor was noted in S10-4 near Abutment 2. The environmental impacts of the possible contamination should be evaluated by the Department's environmental consultant, including whether excavated soils can be reused as fill, workers health and safety, and other issues.

Structure Backfill and Drainage

Pervious structure backfill should be placed behind the abutments and wingwalls above a line defined by a 1V:1.5H slope extending up from the heel of the footing and extending to the bottom of subgrade. Pervious backfill should meet the requirements of CONNDOT Form 815M.02.05.

We recommend the abutment and wingwalls be drained by 100-mm dia. weep holes installed according to CONNDOT specifications. Maximum spacing between weep holes should be 3m.

Reuse of Excavated Material

The existing fill and glaciofluvial deposits are not suitable for reuse as pervious structure backfill or granular fill. Excavated soils will generally be suitable for embankment fill, however, indications of contaminated soils (slight chemical and organic odors) were noted in S10-4 at Abutment 2. Depending on the nature and concentration of contaminants, these soils may not be suitable for reuse, and may require special offsite disposal.

CONSTRUCTION CONSIDERATIONS

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

Temporary Lateral Support

Excavations for Abutment 1 and portions of Abutment 2 outside the limits of existing foundations will be up to 8-m high and extend to El. 111.2. Open cut excavations appear feasible at these locations above groundwater, since traffic on the existing I-84 highway embankment and Harpers Ferry Road off-ramp will already have been shifted to a new embankment, and existing utilities will have been rerouted. However, temporary lateral support will likely be required below groundwater. Steel sheetpiling is expected to be the

preferred lateral support system since it will form a groundwater cutoff and facilitate excavation dewatering. However, boulders in the glaciofluvial deposits could obstruct installation of sheets. We anticipate that soldier piles and lagging will be feasible. However, boulders would obstruct installation of soldier piles and predrilling may be necessary at some locations.

Excavation geometry should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest edition. Temporary soil slopes above groundwater of 1V:1H (Soil Profile Type B), or flatter, appear appropriate but should be confirmed during construction based on conditions at the time of excavation.

Dewatering

Excavations for Abutment 1 and portions of Abutment 2 outside the limits of existing foundations will extend to El. 111.2, 0.3 m below the water level measured in the recent borings. Therefore, excavation dewatering will be required. We anticipate that excavation dewatering may be accomplished by pumping from filtered sumps.

Cofferdam and Dewatering at Abutment 2

Excavation for portions of Abutment 2 that are within the limits of existing foundations will extend to El. 108.5 to remove existing foundations, 3 m below groundwater level measured in the borings. Therefore, cofferdam and dewatering will be required. The glaciofluvial deposits are relatively pervious, and excavation dewatering quantities could be significant. We anticipate that a sheetpile cofferdam driven into the glaciofluvial deposits to form a groundwater cutoff, combined with pumping from wells inside the excavation, will be necessary for dewatering. We recommend that cofferdam and dewatering be specified for Abutment 2.

Excavation

Excavations will be in fill and glaciofluvial deposits. Conventional heavy construction equipment appears practical for excavation of overburden soils. However, chiseling or mechanical splitting may be necessary for removal of boulders.

Pile Installation

The maximum hammer energy should be determined by a wave equation analysis by the contractor based on specific hammer characteristics. Due to boulders in glaciofluvial deposits, predrilling or spudding will likely be required to advance piles at some locations.

Final Comments

This report has been prepared for specific application to Bridge No. 06591, as understood at this time, in accordance with generally accepted geotechnical engineering practice common to the local area. In the event that changes in the nature, design or location of the project elements are planned, the conclusions and recommendations contained in this report should not be considered valid, unless the changes are reviewed by Haley & Aldrich, Inc. and the conclusions of this report modified or verified in writing.

The analyses and recommendations are based, in part, upon data obtained from the referenced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations then appear, it may be necessary to reevaluate the recommendations of this report.

We appreciate the opportunity to provide engineering services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

for Kurtis E. Amidon
Engineer

Nathan L. Whetten, P.E., C.G.
Senior Engineer

John P. Dugan, Jr., P.E.
Senior Vice President

Enclosures:

- Table I - Summary of Subsurface Data
- Table II - Summary of Estimate Pile Quantities
- Figure 1 - Project Locus
- Figure 2 – Subsurface Exploration Plan
- Figure 3A – Abutment No. 1 Subsurface Profile
- Figure 3B –Abutment No. 2 Subsurface Profile
- Figure 4 – Recommended Lateral Loads on Unrestrained Abutments and Wingwalls
- Appendix A – Recent Test Borings Logs
- Appendix B – Previous Test Boring Logs
- Appendix C - Laboratory Results

TABLE I
SUMMARY OF SUBSURFACE DATA
STRUCTURE 10, WESTBOUND EXIT 24 ON RAMP OVER MAD RIVER (BRIDGE NO. 06591)
U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-0273
WATERBURY, CONNECTICUT

EXPLOR. NUMBER	ELEV. (m)	DEPTH (m)	THICKNESS OF SOIL STRATA (m)				WEATHERED BEDROCK THICKNESS (m)	BEDROCK LEVEL (m)		GROUNDWATER LEVEL (m)	
			FILL	ALLUVIUM	GLACIO FLUVIAL	GLACIAL TILL		DEPTH	ELEV.	DEPTH	ELEV.
Recent											
S10-1	115.61	25.44	3.00	--	18.79	--	0.61	21.79	93.82	NR	NR
S10-2	115.57	24.38	3.05	--	12.34	6.61	--	22.00	93.57	NR	NR
S10-4	112.10	15.73	3.00	--	12.50	>0.23	--	--	--	0.61	111.49
S10-4A	112.80	19.81		----------	See S10-4	----------	0.91	15.85	96.95	1.22	111.58
Previous											
S1	110.34	13.11	--	0.15	>12.96	--	--	--	--	--	111.13 (7)
S2	110.64	22.25	--	0.15	15.54	3.51	--	19.20	91.44	--	111.34 (7)
S4	110.64	13.10	--	0.15	>12.95	--	--	--	--	--	111.34 (7)
S5	110.79	22.25	--	0.15	20.72	--	--	20.87	89.92	--	111.44 (7)

NOTES:
1. "--" - indicates not encountered
2. ">" - indicates greater than
3. "NR" - indicates no record
4. Elevations are in meters and refer to the NGVD 29.
5. Refer to boring logs for detailed soil and rock descriptions.
6. Groundwater levels were measured shortly after drilling, and may not represent stabilized groundwater conditions.
7. Drilled within the former Scovill Pond, which was drained in the 1990'S. Therefore these water levels may not represent current groundwater conditions.

TABLE II
SUMMARY OF ESTIMATED PILE QUANTITIES
BRIDGE NO. 06591, WESTBOUND EXIT 24 ON RAMP OVER MAD RIVER
U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-0273
WATERBURY, CONNECTICUT

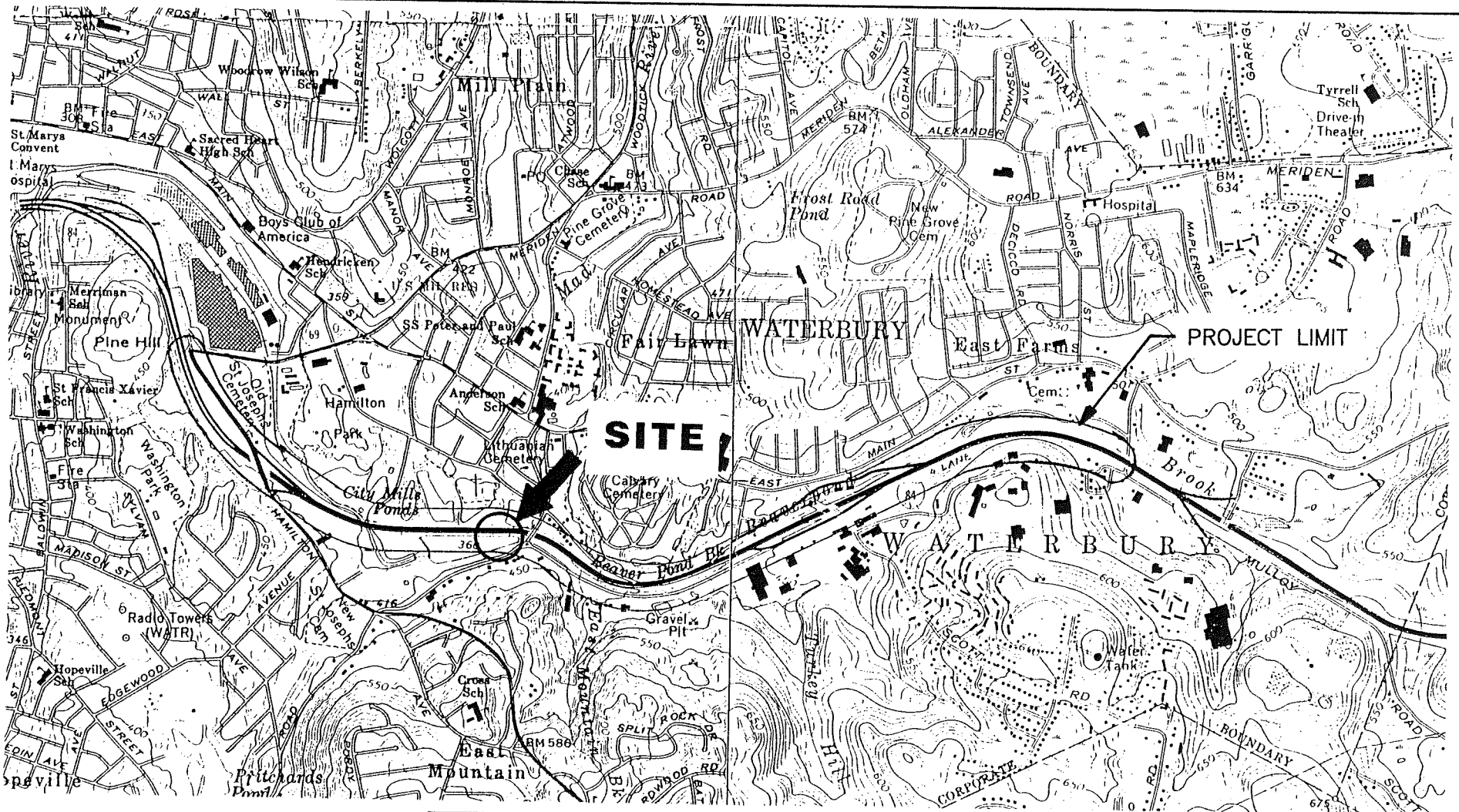
LOCATION	BOTTOM OF FOOTING ELEVATION	ASSUMED PILE CUT OFF ELEVATION	PILE TIP ELEVATION (RANGE)	PILE TIP ELEVATION (AVERAGE)	ESTIMATED AVERAGE PILE ORDER LENGTH, (m)	RECOMMENDED NUMBER OF TEST PILES	RECOMMENDED LENGTH TEST PILE (m)
Abutment No. 1	111.5	111.8	93.21 - 93.57	93.4	19.6	1	20
Abutment No. 2	111.5	111.8	89.92 - 96.04	92.98	20.0	1	23.1

NOTES:

Assume point rienforcement for all piles.
Elevations are in meters and refer to NGVD 29.
Estimated pile order lengths include a contingency of 1.2 m.

Haley & Aldrich, Inc. 19-July-01
G:\Projects\91313\100\Reports\Structure10\boring data 10.xls

91313-100 STRUCT10/A03



SITE COORDINATES: 041°32'21.62"N 073°00'40.32"W

U.S.G.S. QUADRANGLES: WATERBURY & SOUTHINGTON, CONNECTICUT

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

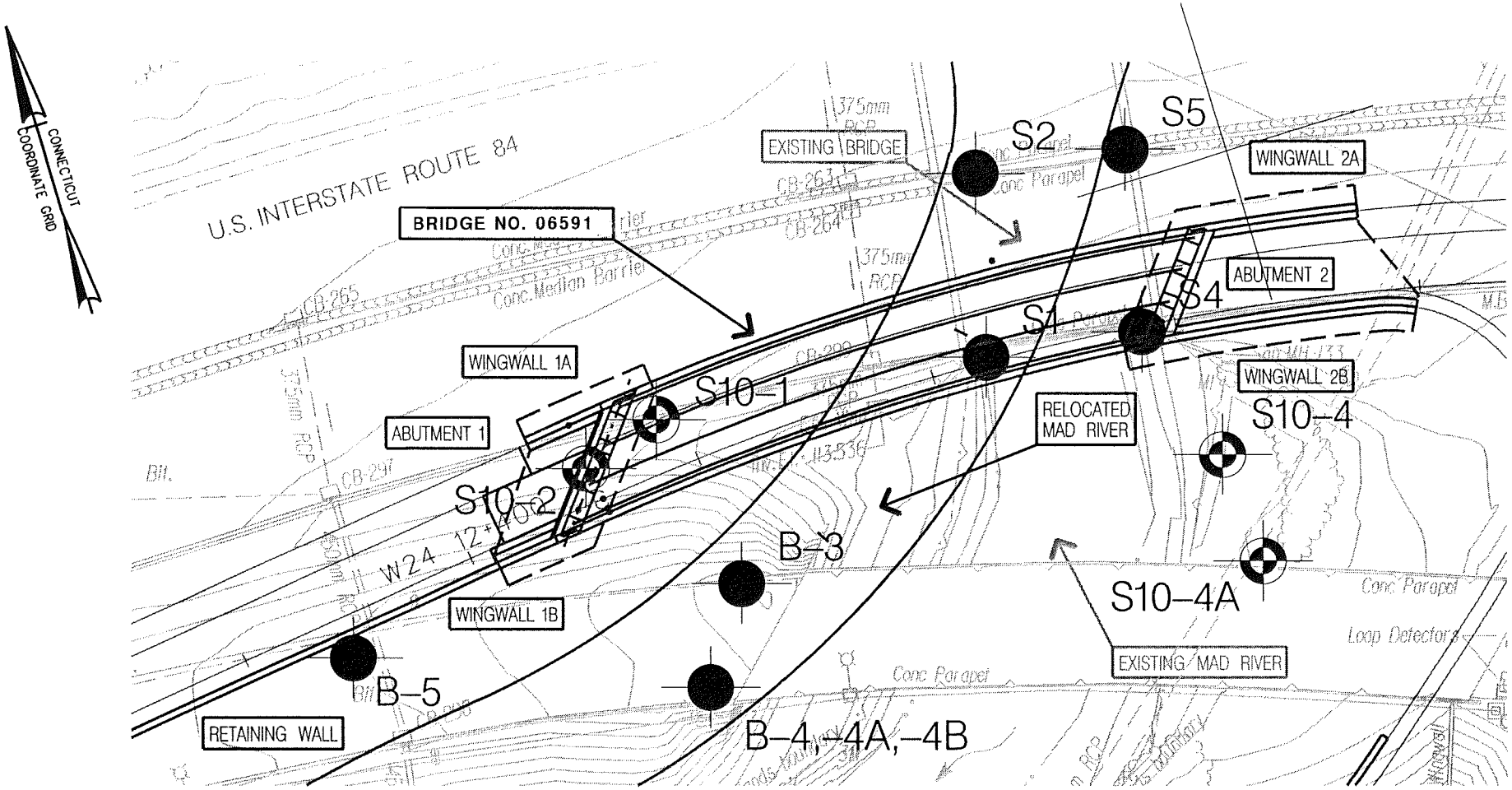
U.S. INTERSTATE 84 RECONSTRUCTION
STATE PROJECT NO. 151-0273
WATERBURY, CONNECTICUT

PROJECT LOCUS

SCALE: 1:24,000

JULY 2001

FIGURE 1



PLAN LEGEND

LOCATION OF RECENT TEST BORING DRILLED BY GENERAL BORINGS, INC. OF PROSPECT, CONNECTICUT.

LOCATION OF PREVIOUS TEST BORING

NOTES:

1. BASE PLAN PROVIDED BY BERGER, LEHMAN ASSOCIATES. BORING LOCATIONS WERE SURVEYED BY A-I ENGINEERS.
2. ELEVATIONS ARE IN METERS, REFER TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. REFER TO THE TEXT AND APPENDICES FOR MORE INFORMATION.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-273
WATERBURY, CONNECTICUT

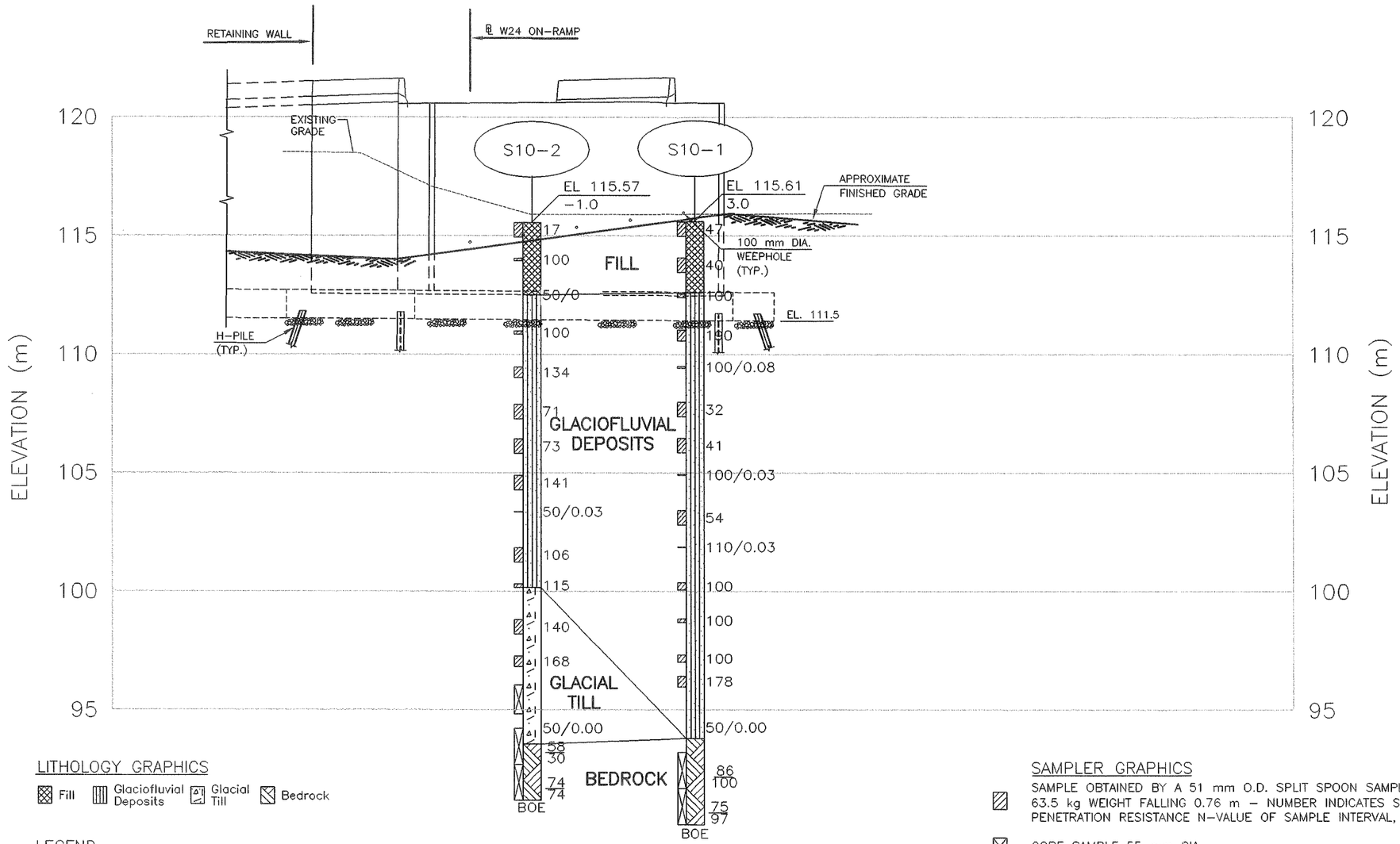
BRIDGE NO. 06591
SUBSURFACE EXPLORATION PLAN

SCALE: 1:500

JUNE 2001

91313-100

FIGURE 2



LITHOLOGY GRAPHICS

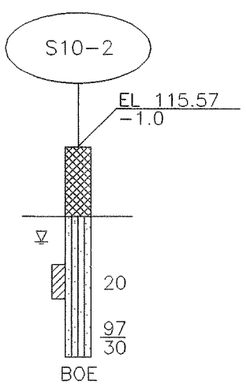
Fill | Glaciofluvial Deposits | Glacial Till | Bedrock

SAMPLER GRAPHICS

SAMPLE OBTAINED BY A 51 mm O.D. SPLIT SPOON SAMPLER WITH A 63.5 kg WEIGHT FALLING 0.76 m – NUMBER INDICATES STANDARD PENETRATION RESISTANCE N-VALUE OF SAMPLE INTERVAL, IN BLOWS PER 0.3 m

CORE SAMPLE 55 mm DIA.

ABUTMENT 1 AT SKEW CENTER LINE STATION W24 12+409.59 (LOOKING WEST)



LEGEND

EXPLORATION DESIGNATION.

SURVEYED GROUND SURFACE ELEVATION (METERS) AT EXPLORATION

APPROXIMATE OFFSET FROM PROFILE BASELINE IN METERS. POSITIVE NUMBER INDICATES UPSTATION. NEGATIVE NUMBER INDICATES DOWNSTATION.

MAJOR STRATUM BOUNDARY BETWEEN DIFFERENT SOIL TYPES

WATER LEVEL NOTED DURING OR SHORTLY AFTER DRILLING

SAMPLE LOCATION AND INTERVAL. SEE SAMPLER GRAPHIC LEGEND FOR SAMPLE TYPE

RECOVERY (%)
ROCK QUALITY DESIGNATION (%)

BOTTOM OF EXPLORATION

NOTES:

1. SEE FIGURE 2, SUBSURFACE EXPLORATION PLAN, FOR TEST BORING AND FOUNDATION LOCATIONS.
2. FOR DETAILED DESCRIPTION OF SUBSURFACE MATERIAL REFER TO TEST BORING LOGS CONTAINED IN APPENDIX A OF THIS REPORT.
3. LINES REPRESENTING CHANGES IN STRATA ARE BASED UPON INTERPOLATION BETWEEN SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT OTHER THAN SPECIFIED EXPLORATION LOCATIONS.
4. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIALS IS APPROXIMATE.

0 5 10
SCALE IN METERS

HALEY & ALDRICH
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

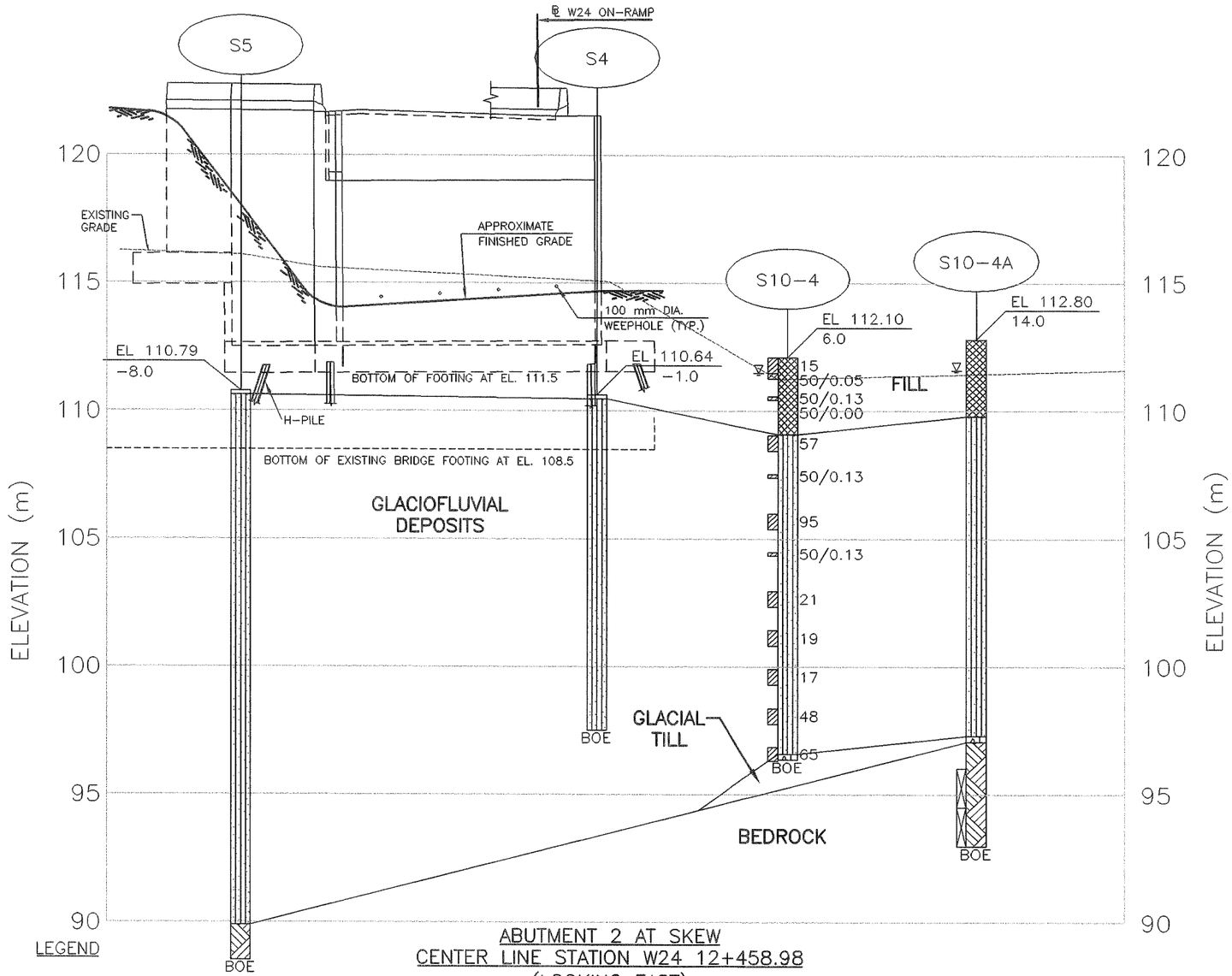
U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-273
WATERBURY, CONNECTICUT

ABUTMENT NO. 1
BRIDGE NO. 06591
WESTBOUND EXIT 24
ON-RAMP OVER MAD RIVER

SCALE: AS SHOWN JULY 2001

91313-100 STRUCT 10/B01

FIGURE 3A



ABUTMENT 2 AT SKEW
CENTER LINE STATION W24 12+458.98
(LOOKING EAST)

SAMPLER GRAPHICS

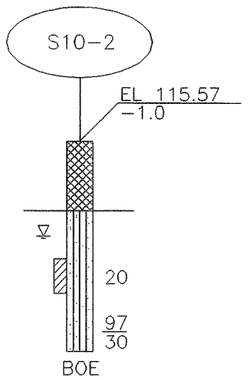
SAMPLE OBTAINED BY A 51 mm O.D. SPLIT SPOON SAMPLER WITH A 63.5 kg WEIGHT FALLING 0.76 m – NUMBER INDICATES STANDARD PENETRATION RESISTANCE N-VALUE OF SAMPLE INTERVAL, IN BLOWS PER 0.3 m

CORE SAMPLE 55 mm DIA.

LITHOLOGY GRAPHICS

Fill | Glaciofluvial Deposits | Glacial Till | Bedrock

LEGEND



EXPLORATION DESIGNATION.

SURVEYED GROUND SURFACE ELEVATION (METERS) AT EXPLORATION

APPROXIMATE OFFSET FROM PROFILE BASELINE IN METERS. POSITIVE NUMBER INDICATES UPSTATION. NEGATIVE NUMBER INDICATES DOWNSTATION.

MAJOR STRATUM BOUNDARY BETWEEN DIFFERENT SOIL TYPES

WATER LEVEL NOTED DURING OR SHORTLY AFTER DRILLING

SAMPLE LOCATION AND INTERVAL. SEE SAMPLER GRAPHIC LEGEND FOR SAMPLE TYPE

RECOVERY (%)
ROCK QUALITY DESIGNATION (%)

BOTTOM OF EXPLORATION

NOTES:

1. SEE FIGURE 2, SUBSURFACE EXPLORATION PLAN, FOR TEST BORING AND FOUNDATION LOCATIONS.
2. FOR DETAILED DESCRIPTION OF SUBSURFACE MATERIAL REFER TO TEST BORING LOGS CONTAINED IN APPENDIX A OF THIS REPORT.
3. LINES REPRESENTING CHANGES IN STRATA ARE BASED UPON INTERPOLATION BETWEEN SUBSURFACE EXPLORATIONS AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS AT OTHER THAN SPECIFIED EXPLORATION LOCATIONS.
4. THE STRATIFICATION LINES SHOWN ON THE GRAPHIC REPRESENTATION OF THE TEST BORINGS REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL OR ROCK TYPES. THE TRANSITION BETWEEN MATERIALS IS APPROXIMATE.

0 5 10
SCALE IN METERS

HALEY & ALDRICH
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-273
WATERBURY, CONNECTICUT

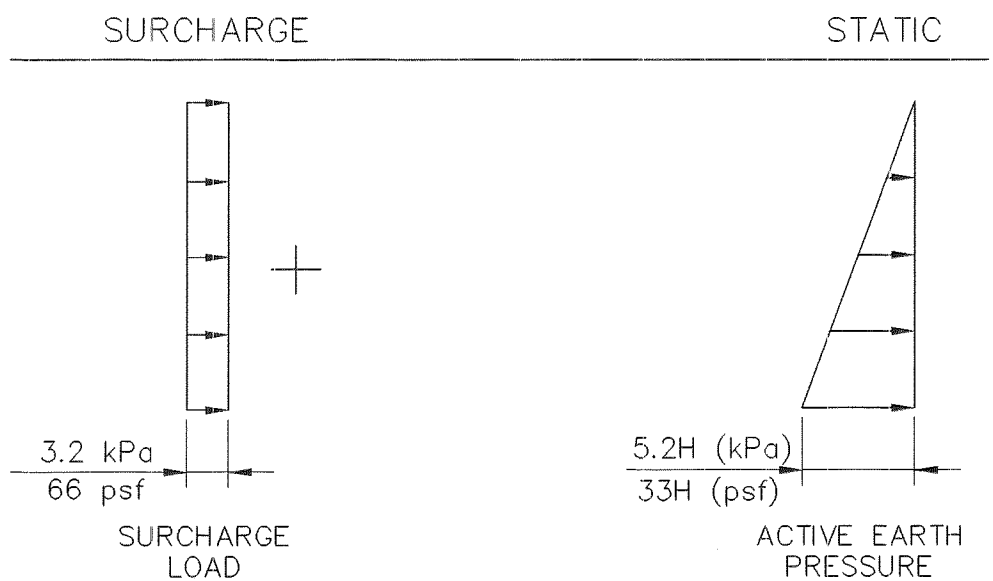
ABUTMENT NO. 2
BRIDGE NO. 06591
WESTBOUND EXIT 24
ON-RAMP OVER MAD RIVER

SCALE: AS SHOWN
JULY 2001

91313-100 STRUCT 10/B01

FIGURE 3B

91313-100 A02



NOTES:

1. H IS IN METERS FOR S.I. CALCULATIONS AND FEET FOR ENGLISH CALCULATIONS.
2. THE WALL SHOULD BE DRAINED BY PERVIOUS STRUCTURE BACKFILL AND A STRUCTURE UNDERDRAIN OR WEEPHOLES, THEREFORE A HYDROSTATIC PRESSURE DIAGRAM IS OMITTED FROM THIS FIGURE.
3. THESE PRESSURE DISTRIBUTIONS ASSUME A HORIZONTAL BACKFILL BEHIND THE WALL.
4. SLIDING:
   COEFF. OF FRICTION BETWEEN FOOTING AND BASE = 0.60
   FS≥1.5 (STATIC)
   FS≥1.1 (SEISMIC)
5. OVERTURNING:
   FS≥2.0 (STATIC)
   FS≥1.1 (SEISMIC)
6. IGNORE PASSIVE RESISTANCE IN FRONT OF FOOTING.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

BRIDGE NO. 06591, WESTBOUND EXIT 24 ON-RAMP
OVER MAD RIVER
U.S. INTERSTATE ROUTE 84 RECONSTRUCTION
STATE PROJECT NO. 151-273
WATERBURY, CONNECTICUT

RECOMMENDED LATERAL LOADS ON UNRESTRAINED ABUTMENTS AND WINGWALLS

SCALE: AS SHOWN

JULY 2001

FIGURE 4

APPENDIX A

Recent Test Borings Logs

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-1**
DRILLER	STATE OF CONNECTICUT	Line & Station
J. Miller	DEPARTMENT OF TRANSPORTATION	Offset **1.98 m. E**
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230892.80**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283049.80**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **115.61**	Utilized		X						X					
Date Started: **9 April 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Date Finished: **11 April 2001**	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
Groundwater Observations	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ ____ m after ____ days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	
@ ____ m after ____ days														

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./ DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		0.00-0.61	1	0.61	0.10	D	4	6	41	23	115.11	Very dense coarse GRAVEL
											0.50	Dense gray coarse to fine SAND, little coarse to fine gravel, trace silt, no odor, moist
		1.52-2.13	2	0.61	0.10	D	13	17	23	67		Dense gray-brown coarse SAND, little coarse to fine gravel, trace fine sand and silt, no odor, moist
											112.61	-FILL-
		3.05-3.20	3	0.15	0.09	D	100				3.00	Split spoon refusal at 3.2 m., no recovery
5		4.57-5.02	4	0.45	0.00	D	81	75	115			No Recovery
												Split spoon refusal at 5.02 m.
		6.10-6.18	5	0.08	0.00	D	100/0.08					Note: Split spoon drove through dark gray cobble No recovery
		7.62-8.23	6	0.61	0.45	D	18	18	14	17		Split spoon refusal at 6.18 m. Dense gray-brown coarse to fine SAND, little coarse to fine gravel, trace silt, no odor, moist
10		9.14-9.75	7	0.61	0.30	D	17	21	20	23		Dense gray brown coarse to fine SAND, little medium gravel, trace silt, no odor, moist
		10.67-10.70	8	0.03	0.03	D	100/0.03					Very dense light brown coarse to fine SAND, trace silt
												Split spoon refusal at 10.7 m.
		12.19-12.80	9	0.61	0.33	D	13	21	33	38		Note: Drill action suggests boulders Very dense gray-brown coarse to fine SAND, little medium to fine gravel, trace silt, no odor, moist
		13.72-13.75	10	0.03	0.00	D	110/0.03					No Recovery
15												-GLACIOFLUVIAL DEPOSITS-

Casing Size	From	To	Meters of Earth	Rock
HW	**0.0**	**22.4**	**22.40** m	**2.40** m
			No. of Samples	
			15D,2C	

NOTES: **Bombadier mounted Diedrich D-120 with wire winch to drive safety hammer. Borehole backfilled with drill cuttings**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-1**
Sheet **1** of **2**

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-1**
DRILLER	STATE OF CONNECTICUT	Line & Station
J. Miller	DEPARTMENT OF TRANSPORTATION	Offset **1.98 m. E**
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230892.80**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283049.80**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **115.61**	Utilized		X						X					
Date Started: **9 April 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Date Finished: **11 April 2001**	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
Groundwater Observations	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ _____ m after _____ days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	
@ _____ m after _____ days														

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		15.24-15.54	11	0.30	0.10	D	108	100				Split spoon refusal at 13.75 m.
												Note: Driller noted common boulders and cobbles
		16.76-16.91	12	0.15	0.10	D	100					Very dense gray-brown medium to fine GRAVEL and coarse to fine SAND, trace silt, no odor, moist
												Split spoon refusal at 15.54 m.
		18.29-18.59	13	0.30	0.22	D	40	100				Very dense gray-brown coarse to fine SAND, some medium to fine gravel, trace silt, no odor, wet
20		19.18-19.63	14	0.45	0.41	D	38	74	104			Split spoon refusal at 16.91 m.
												Very dense light brown medium to fine GRAVEL and coarse to fine SAND, little silt, no odor, wet
		21.34-21.34	15	0.00	0.00	D	50/0.00					Split spoon refusal at 18.59 m.
											93.82	Very dense gray-brown coarse to fine SAND, little medium to fine gravel, trace silt, no odor, wet
											21.79	
											93.21	
		22.40-23.92	1	1.52	1.31	C		[RQD = 100%]			22.40	Split spoon refusal at 19.63 m.
												-GLACIOFLUVIAL DEPOSITS-
		23.92-25.44	2	1.52	1.14	C		[RQD = 97%]				Split spoon refusal at 21.34
25												Note: Possible weathered bedrock at 21.79 m. to 22.40 m.
											90.17	Very hard fresh to slightly weathered gray and white BIOTITE GNEISS. Foliation is high angle to vertical, extremely to very close. No joints
											25.44	
												Same as C1, except joints are low angle to moderately dipping, moderately spaced tight to partly open
												-BEDROCK-
												Bottom of Exploration at 25.44 m.
30												

Casing Size	From	To	Meters of Earth	Rock
HW	**0.0**	**22.4**	**22.40** m	**2.40** m
			No. of Samples	
			15D,2C	

NOTES: **Bombadier mounted Diedrich D-120 with wire winch to drive safety hammer. Borehole backfilled with drill cuttings**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-1**
Sheet **2** of **2**

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-2**
DRILLER	STATE OF CONNECTICUT	Line & Station
P. Carrera	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230890.65**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283043.22**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

Surface Elevation: **115.57**		Casing				Auger		Mud	Sampler		Core Barrel			
Date Started: **16 April 2001**	Utilized			X					X					X
Date Finished: **17 April 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Groundwater Observations	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
@ _____ m after _____ days	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ _____ m after _____ days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		0.00-0.61	1	0.61	0.08	D	11	7	10	15		Medium dense red-brown coarse to fine SAND, little silt, trace gravel with cobbles
		1.52-1.62	2	0.10	0.00	D	100					No recovery Boulder 3.05 m. to 3.66 m.
											112.52	-FILL-
		3.05-3.05	3	0.00	0.00	D	50/0.00				3.05	No recovery
5		4.57-4.72	4	0.15	0.08	D	43	100				Very dense gray coarse to fine GRAVEL and coarse to fine SAND, trace silt
		6.10-6.55	5	0.45	0.15	D	19	34	100			Very dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt
		7.67-8.28	6	0.61	0.00	D	15	36	35	51		Piece of coarse gravel in spoon tip
10		9.14-9.75	7	0.61	0.15	D	35	52	21	22		Very dense gray-brown fine SAND, some gravel, little silt, trace coarse sand
		10.67-11.28	8	0.61	0.15	D	12	100	41	39		Very dense brown coarse to fine SAND
		12.19-12.22	9	0.03	0.00	D	50/0.03					No recovery, on boulder
15		13.72-14.33	10	0.61	0.15	D	13	31	75	64		Very dense gray-brown coarse to fine SAND and fine GRAVEL, trace silt

Casing Size	From	To	Meters of Earth	Rock
HW	**0.0**	**18.3**	**22.00** m	**2.38** m
			No. of Samples	
			14D,3C	

NOTES: **Bomb mounted Diedrich D-50 with wire winch to drive safety hammer. Borehole backfilled with drill cuttings upon completion**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-2**
Sheet **1** of **2**

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-2**
DRILLER	STATE OF CONNECTICUT	Line & Station
P. Carrera	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230890.65**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283043.22**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **115.57**														
Date Started: **16 April 2001**	Utilized			X					X					X
Date Finished: **17 April 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Groundwater Observations	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
@ _____ m after _____ days	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ _____ m after _____ days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
											100.18 / 15.39	Very dense gray-brown coarse to fine SAND and fine GRAVEL, trace silt
												-GLACIOFLUVIAL DEPOSITS-
		15.24-15.39	11	0.15	0.10	D	115					
		16.76-17.37	12	0.61	0.61	D	71	58	82	100		Very dense brown fine SAND and SILT, some gravel
		18.29-18.74	13	0.45	0.30	D	43	68	100			Very dense brown coarse to fine SAND, some silt, gravel
20		19.51-20.73	1	1.22		C						Cored boulders from 19.51 m. to 21.345 m. No recovery Split spoon refusal at 21.34 m.
		21.34-21.34	14	0.00	0.00	D	50/0.00	[RQD = -%]			94.23 / 21.34	Cored boulders from 21.34 m. to 22.0 m.
		21.34-22.86	2	1.52	0.88	C		[RQD = 30%]			93.57 / 22.00	-GLACIAL TILL-
		22.86-24.38	3	1.52	1.12	C		[RQD = 74%]				Very hard, fresh gray and white coarse to fine grained BIOTITE GNEISS. Foliation is vertical, extremely close. Joints are high angle to low angle, close, rough, undulating, discolored, open
25											91.19 / 24.38	Same as C1, except foliation is high angle. Joints are close to wide. -BEDROCK- Bottom of Exploration at 24.38 m.
30												

Casing Size	From	To	Meters of Earth	Rock
HW	**0.0**	**18.3**	**22.00** m	**2.38** m
			No. of Samples	
			14D,3C	

NOTES: **Bomb mounted Diedrich D-50 with wire winch to drive safety hammer. Borehole backfilled with drill cuttings upon completion**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-2**
Sheet **2** of **2**

J. Ouellette	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-4**
DRILLER	STATE OF CONNECTICUT	Line & Station
C. White	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230876.80**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283092.60**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **112.10**	Utilized		X						X					
Date Started: **28 March 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Date Finished: **28 March 2001**	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
Groundwater Observations	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ **0.61** m after **0** days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	
@ m after days														

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		0.00-0.61	1	0.61	0.25	D	3	5	10	17	111.49	Medium dense brown coarse to fine SAND, trace medium to fine gravel, trace roots
		0.61-0.82	2	0.21	0.08	D	16	50/0.05			0.61	Very dense brown coarse to fine GRAVEL, some brick fragments, little coarse to fine sand, wet
		1.52-1.65	3	0.13	0.13	D	50/0.13				110.58 1.52	Very dense black coarse to fine SAND, trace fine gravel, trace organics, slight chemical odor
		2.10-2.10	4	0.00	0.00	D	50/0.00					No recovery
		3.05-3.66	5	0.61	0.46	D	32	27	30	29	109.10 3.00	-FILL- Very dense black and gray-brown coarse to fine SAND, trace medium to fine gravel, trace rock fragments, organic odor
5		4.57-4.70	6	0.13	0.13	D	50/0.13					Very dense gray coarse to fine GRAVEL, little coarse fine sand
		6.10-6.71	7	0.61	0.51	D	42	48	47	48		Very dense brown coarse to fine SAND, little coarse to fine gravel
		7.62-7.75	8	0.13	0.00	D	50/0.13					No recovery
											102.96	
10		9.14-9.75	9	0.61	0.61	D	10	11	10	10	9.14	Medium dense brown coarse SAND, little fine sand, trace medium to fine gravel
		10.67-11.28	10	0.61	0.61	D	11	10	9	11		Medium dense brown coarse to fine SAND, trace fine gravel, trace rock fragments
											99.91	
		12.19-12.80	11	0.61	0.61	D	11	8	9	12	12.19	Medium dense brown coarse to fine SAND, little coarse to fine gravel
		13.72-14.33	12	0.61	0.61	D	18	23	25	25		Medium dense brown coarse to fine SAND, trace medium to fine gravel
15												-GLACIOFLUVIAL DEPOSITS-

Casing Size	From	To	Meters of Earth	Rock
NW	**0.0**	**15.2**	**15.73** m	**-** m
			No. of Samples	
			13D	

NOTES: **Bombadier Diedrich D-120 with wire winch to drive safety hammer. Borehole backfilled upon completion**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-4**
Sheet **1** of **2**

J. Ouellette	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-4**
DRILLER	STATE OF CONNECTICUT	Line & Station
C. White	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230876.80**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283092.60**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **112.10**														
Date Started: **28 March 2001**	Utilized		X						X					
Date Finished: **28 March 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Groundwater Observations	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
@ **0.61** m after **0** days	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ m after days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		15.24-15.77	13	0.53	0.46	D	16	32	33	50/0.08	96.60	Very dense brown coarse to fine SAND, trace fine gravel
											15.50	-GLACIOFLUVIAL DEPOSITS-
											15.73	Very dense brown fine SAND, trace coarse sand, trace fine gravel
												-GLACIAL TILL-
												Bottom of Exploration at 15.73 m.
20												
25												
30												

Casing Size	From	To	Meters of Earth	Rock
NW	**0.0**	**15.2**	**15.73** m	**-** m
			No. of Samples	
			13D	

NOTES: **Bombadier Diedrich D-120 with wire winch to drive safety hammer. Borehole backfilled upon completion**

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-4**
Sheet **2** of **2**

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-4A**
DRILLER	STATE OF CONNECTICUT	Line & Station
P. Carrera	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230867.50**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283093.10**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

		Casing				Auger		Mud	Sampler		Core Barrel			
Surface Elevation: **112.80**														
Date Started: **6 June 2001**	Utilized		X						X					X
Date Finished: **7 June 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Groundwater Observations	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
@ **1.22** m after **.5** days	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ m after days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./ DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
												Note: Spun casing to 15.2 m.
												Cored 16.76 m. to 19.81 m.
5												
10												
15												

Casing Size	From	To	Meters of Earth	Rock
NW	**0.0**	**15.2**	**16.76** m	**3.05** m
			No. of Samples	
			2C	

NOTES: **Bombadier Diedrich D-50 with wire winch to drive safety hammer.**
Borehole backfilled upon completion

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

Hole No. **S10-4A**
Sheet **1** of **2**

E. Del Priore	SM - 001 - M REV. 1/94 BORING REPORT	Hole No. **S10-4A**
DRILLER	STATE OF CONNECTICUT	Line & Station
P. Carrera	DEPARTMENT OF TRANSPORTATION	Offset
INSPECTOR	TOWN: **Waterbury, Connecticut**	N. Coordinate **230867.50**
Haley & Aldrich, Inc.	PROJECT NAME: **Reconstruction of I-84**	E. Coordinate **283093.10**
SOILS ENGINEER	PROJECT NUMBER: **State: 151-273/H&A: 91313-100**	**Berger, Lehman Associates, P.C.**
	BORING CONTRACTOR: **General Borings, Inc.**	PRIME DESIGNER

Surface Elevation: **112.80**		Casing				Auger		Mud	Sampler		Core Barrel			
Date Started: **6 June 2001**	Utilized		X						X					X
Date Finished: **7 June 2001**	Type	BW	NW	HW	Pipe	Solid	Hollow		SS		B(st)	B(dt)	NX(st)	NX(dt)
Groundwater Observations	Size I.D. (mm)	60	76	100	64				35	X	35	35	55	55
@ **1.22** m after **.5** days	Hammer (kg)	136	136	136	136			Bit	63.5		Type		Diamond	
@ m after days	Fall (m)	0.6	0.6	0.6	0.6				0.76		of bit		Carbide	

DEPTH	Casing blows per half meter	SAMPLE DEPTH IN METERS FROM - TO	NO.	PEN. m	REC m	Type	BLOWS PER 0.15 METERS ON SAMPLER 0-0.15	0.15-0.30	0.30-0.45	0.45-0.60	STRATA CHANGE ELEV./DEPTH (m)	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
											96.95	
											15.85	Possible weathered bedrock at 15.85 m.
											96.04	
		16.76-18.28	1	1.52	1.05	C		[RQD = 49%]			16.76	Very hard fresh gray and white coarse to fie grained biotite GNEISS. Foliation is moderately dipping, extremely close to close. Joints are moderately dipping to high angle, close to moderate, rough, fresh to discolored, open Same as C1
		18.29-19.81	2	1.52	1.36	C		[RQD = 78%]				
20											92.99	-BEDROCK-
											19.81	Bottom of Exploration at 19.81 m.
25												
30												

Casing			Meters of	
Size	From	To	Earth	Rock
NW	**0.0**	**15.2**	**16.76** m	**3.05** m
			No. of Samples	
			2C	

NOTES: **Bombadier Diedrich D-50 with wire winch to drive safety hammer.**
Borehole backfilled upon completion

SAMPLE TYPE CODING: D=Driven C=Core A=Auger UP=Undisturbed Piston V=Vane Test SS=Split Spoon
PROPORTIONS USED: Trace=1-10% Little=10-20%, Some=20-35%, And=35-50%

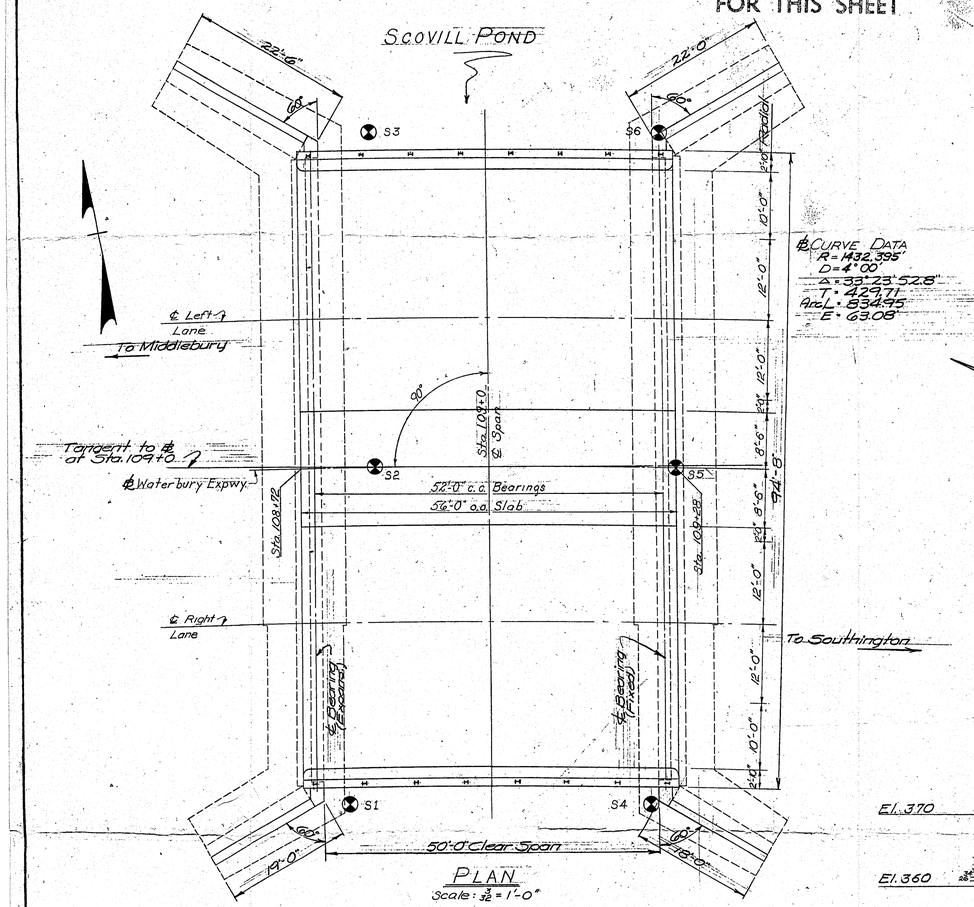
Hole No. **S10-4A**
Sheet **2** of **2**

APPENDIX B

Previous Test Boring Logs

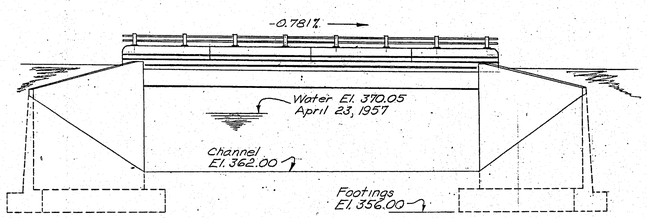
PUB. ROAD DIV. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	Waterbury	I-138(9)	182-20	1958		41	94

NO REVISIONS SUBMITTED FOR THIS SHEET



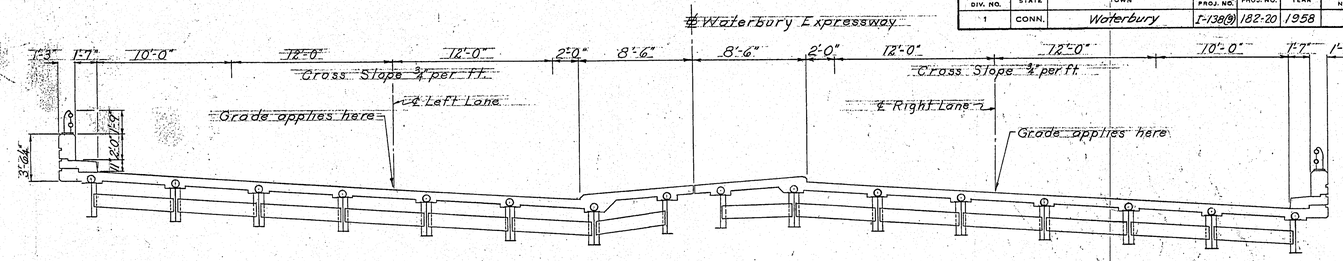
PLAN

Scale: 1/32" = 1'-0"



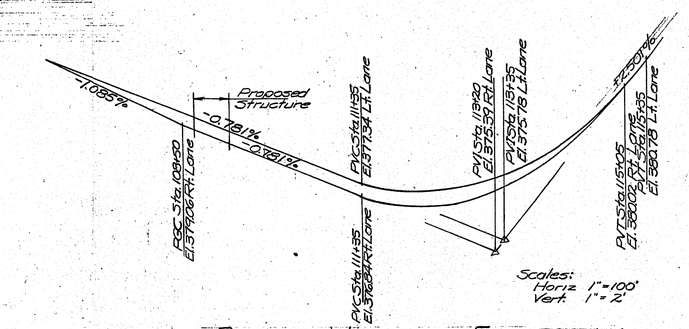
ELEVATION

Scale: 3/32" = 1'-0"



TYPICAL RADIAL CROSS SECTION

Scale: 3/16" = 1'-0"

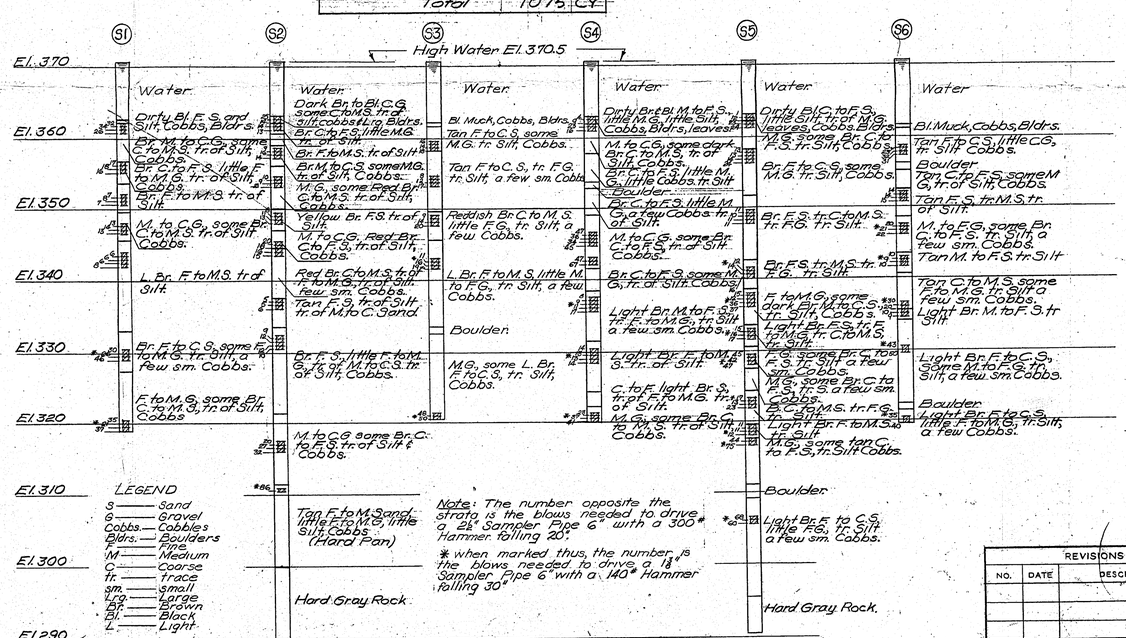


PROFILE WATERBURY EXPRESSWAY

CONCRETE DISTRIBUTION		
Footings	372	CY.
Substructure	549	CY.
Superstructure	154	CY.
Total	1075	CY.

NOTES

Specifications: Connecticut State Highway Department Form 808-January, 1955 and Special Provs.
Design Specifications: - A.A.S.H.O.-1953, as supplemented by Conn. State Highway Department "Standard Bridge Details for Contracting Engineers", dated Feb. 1956.
Live Load: H20-S16-44
Composite Construction: No temporary intermediate supports shall be used during construction. Superimposed loads on slab shall be placed when directed by the Engineer, but not less than 7 days after slab has been poured.
Class "A" Concrete: Class "A" Concrete shall be used throughout. See Special Provisions.
Exposed Edges shall be bevelled 1"x1" unless otherwise dimensioned.
Joint Seal: Joint Seal shall be included in item for Class "A" Concrete See Special Provisions for Class "A" Concrete.
Tar Paper: The cost of furnishing 2 layers of 3 ply tarpaper at backwalls shall be included in item for Class "A" Concrete.
Painting: For shop and field painting of Structural Steel and Metal Bridge Rail see Spec. Provs.
Quantities: Quantities are approximate only and do not relieve the Contractor of the responsibility of checking them when preparing his bid.
Riprap to be placed at all wings as directed by the Engineer.
Shear Connectors to be either Spiral Shear Connetor Bars (Alt. "A") or Welded Stud Shear Connector (Alt. "B") Contract items for Alternates A & B are shown in the quantities. See Special Provisions.
Structural Steel shall conform to the requirements of ASTM Spec. A-373 except for Bearing Plates.



BORINGS

Scale: 1" = 10'-0"

QUANTITIES		
Structure Excavation (Complete)	C.Y.	800
Class "A" Concrete	CY	1075
½ Prem. Bit. Jt. Filler for Bridges	S.F.	400
Deformed Steel Bars	Lb.	80000
Structural Steel	Lb.	125000
Dampproofing	SY	550
Metal Bridge Rail	LF	111
Pervious Structure Backfill	CY	3300
Alternate A		
Spiral Shear Connector Bars	Lb	3150
Alternate B		
Welded Stud Shear Connector 6"	Ea.	1952
Welded Stud Shear Connector 7"	Ea.	1280
Riprap	Ton	100

REVISIONS		
NO.	DATE	DESCRIPTION

CONNECTICUT
STATE HIGHWAY DEPARTMENT
TOWN OF WATERBURY
WATERBURY EXPRESSWAY
OVER
SCOVILL POND
STA. 109+00
GENERAL PLAN

DESIGNED BY MQJ
SCALES As Noted
MADE BY B.F.D. DATE 5-2-57
CHECKED BY D.C.K. DATE 8-22-57
APPROVED [signature] DATE 8/22/57
PROJECT NO. 182-0703F
BRIDGE SHEET NO. 1 of 5

182-20 210-02 01225

Daniel Tuccillo, Jr. BORING CREW LEADER Chris Harriman Sheila Gleason INSPECTOR	FORM SM-1 REV. 8/83 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS BORING REPORT	SHEET 1 OF 2 LOCATION See Figure 2
Haley & Aldrich, Inc. SOILS ENGINEER	TOWN Waterbury PROJECT NAME Relocation I-84 Exit Ramp PROJECT NO. 151-207	General Borings, Inc. BORING CONTRACTOR A-N Consulting Engineers DESIGN ENGINEER

LOCATION

SURFACE ELEV. 370.3		AUGER	CASING	SAMPLER	CORE BAR	HOLE NO. B-3
DATE FINISHED 10/7/91	TYPE		HW	D	NO	LINE & STATION 107+48 I84 Exit Ramp
GROUND WATER OBSERVATIONS	SIZE I.D.		4	1-3/8"	2-1/8"	OFFSET 16 L
AT 1 FT. AFTER 0 HRS.	HAMMER WT.		300	140	BIT	N. COORDINATE 257.433
AT 2 FT. AFTER 60 HRS.	HAMMER FALL		24"	30"	Diamond	E. COORDINATE 528.521

DEPTH	CASING BLOWS PER FOOT	SAMPLE DEPTHS IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
	P	0'-2.0'	1	24	6	D	1	1	1/12"		1) Tan-brown fine-coarse SAND, trace little pebbles. Wet/Very Loose
	U	2.0'-4.0'	2	24	6	D	1	1	1		
	S						1				2) (same as S-1) Wet/Very Loose
	H	4.0'-6.0'	3	24	10	D	1	1/12"			
5	↓									5.5'	3) Tan-brown fine-coarse SAND, trace little pebbles, last 2" organic silt Wet/Very Loose
	WOH	6.0'-8.0'	4	24	7	D	8	4	3		
	5						3				
	18	8.0'-10.0'	5	24	12	D	5	1	11		4) Black fine-medium SAND, trace fin medium gravel, trace silt. Slight oil odor. Wet/Loose
	24						34				
10	31	10.0'-12.0'	6	24	12	D	23	21	18	10.0'	
	52						17				5) Black fine-medium SAND, trace medium gravel, layers of organic sil Moderate oil odor. Wet/Medium/Dense
	64										
	34										
	52										
15	135	15.0'-17.0'	7	24	12	D	20	21	24		6) Brown fine-coarse SAND, with fine-medium gravel. Wet/Dense
	57						20				
	57										7) Tan-brown fine-coarse SAND, with fine-medium gravel. Wet/Dense
	63										
	82										
20	89	20.0'-22.0'	8	24	12	D	12	10	14		8) Brown very fine SAND, little silt Wet/Medium
	45						18				
	63										
	90										
	104										
25	181	25.0'-27.0'	9	24	18	D	11	19	14		9) Red-brown fine-medium SAND, with fine gravel, trace silt. Wet/Dense
	69						17				
	70										
	86										
	100										
30	85	30.0'-32.0'	10	24	10	D	15	19	29		10) Brown-black-red fine-medium SAND, trace gravel, little silt. Wet/Dense
	66						39				
	100										
	137										
	144										
35	200	35.0'-37.0'	11	24	24	D	11	17	15		11) Brown fine-medium SAND, trace fin gravel. Wet/Dense
	84						11				12) Brown fine SAND, with fine-medium GRAVEL, some silt, trace weathered rock. Wet/Very Dense
	104										
	84										
	90										
	100	40.0'-42.0'	12	24	7	D	30	36	60	63	

FROM GROUND SURFACE TO 50 FEET USED 4 INCH CASING THEN 3 INCH CASING FOR 9 FEET

FOOTAGE IN EARTH 59' FOOTAGE IN ROCK 8.5 NO. OF SAMPLES 14 HOLE NO. B-3

SAMPLE TYPE CODING: D=DRIVE C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST

PROPORTIONS USED: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Daniel Tuccillo, Jr. BORING CREW LEADER Chris Harriman Sheila Gleason INSPECTOR	FORM SM-1 REV. 8/83 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS BORING REPORT	SHEET 2 OF 2 LOCATION See Figure 2 General Borings, Inc. BORING CONTRACTOR
Haley & Aldrich, Inc. SOILS ENGINEER	TOWN Waterbury PROJECT NAME Relocation I-84 Exit Ramp PROJECT NO. 151-207	A-N Consulting Engineers DESIGN ENGINEER

LOCATION

SURFACE ELEV. 370.3		AUGER	CASING	SAMPLER	CORE BAR	HOLE NO. B-3
DATE FINISHED 10/7/91	TYPE		HW	D	NQ	LINE & STATION 107+48 I84 Exit Ramp
GROUND WATER OBSERVATIONS	SIZE I.D.		4	1-3/8"	2-1/8"	OFFSET 16 L
1 FT. AFTER 0 HRS.	HAMMER WT.		300	140	BIT	N. COORDINATE 257,433
2 FT. AFTER 60 HRS.	HAMMER FALL		24"	30"	Diamond	E. COORDINATE 528,521

CASING BLOWS PER FOOT	SAMPLE DEPTHS IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
134	40.0-42.0	12	24	7	D	30	36	60		Note: Hit Boulder at 45.1' Cored to 46.0'-48.0'.
180						63				
240										1' Boulder
323										
260	45.0'-45.0'		0	0	D	100/0"			45.1'	
106	46.0'-48.0'	13	24	7	D	9	11	13	46.1'	13) Brown fine-medium SAND, with fine-medium gravel. Wet/Medium
118						24				
124										
141									50.0'	Split Spoon refused at 50.0'
241	50.0'-50.0'		0	0	D	100/0"			50.7'	Roller Bit to 51.0'
										Started to core at 51.0' Cored through boulder 8" Roller Bit ahead to 55.0'
	55.0'-55.08'	14	1	1	D	100/0"				Note: Could not drive 4" pipe down put 3" in the hole spinning down to 55.0'.
										14) Piece of fractured BOULDER.
									59.0'	Note: Roller Bit from 55.0'-57.0' Spun 3" Casing to 59.0' cleaned out hole to 59.5' Started coring at 59.5'.
								7		
								9		
								11		
	59.5'-63.5'	1	48	41	C			11		Run#1-Cored Rock 59.5'-63.5' Recovered 41" gray-white GNEISS, some fractured layers. RQD=33%
								9		
								8.5		
								10		
	63.5'-67.5'	2	48	48	C			15	67.5'	Run#2-Cored Rock 63.5'-67.5 Recovered 48" RQD=80%
										END OF BORING 67.5'

FROM GROUND SURFACE TO 50 FEET USED 4 INCH CASING THEN 3 INCH CASING FOR 9 FEET

FOOTAGE IN EARTH 59. FOOTAGE IN ROCK 8.5' NO. OF SAMPLES 14 HOLE NO. B-3

SAMPLE TYPE CODING: D=DRIVE C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST

PROPORTIONS USED: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Daniel Tuccillo, Jr. BORING CREW LEADER	FORM SM-1 REV. 8/83 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS BORING REPORT	SHEET 1 OF 2
Sheila Gleason INSPECTOR	TOWN Waterbury	LOCATION See Figure 2
		General Borings, Inc. BORING CONTRACTOR
Haley & Aldrich, Inc. SOILS ENGINEER	PROJECT NAME Relocation I-84 Exit Ramp	A-N Consulting Engineers DESIGN ENGINEER
	PROJECT NO. 151-207	

		AUGER	CASING	SAMPLER	CORE BAR	
LOCATION						HOLE NO. B-4
SURFACE ELEV. 370.4	TYPE		NW	D-3	NQ	LINE & STATION 107+37 I84 Exit Ramp
DATE FINISHED 10/1/91	SIZE I.D.		3"	1-3/8"	2-1/8"	OFFSET 11 R
GROUND WATER OBSERVATIONS	HAMMER WT.		300	140	BIT	N. COORDINATE 257,409
1 FT. AFTER 0 HRS.	HAMMER FALL		24"	30"	Diamond	E. COORDINATE 528,505
FT. AFTER HRS.						

DEPTH	CASING BLOWS PER FOOT	SAMPLE DEPTHS IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
	P	0'-2.0'		24	0	D	2	2	1	1	0-2.0' Brown fine-coarse SAND and fine-coarse GRAVEL.
	U	2.0'-4.0'	1	24	10	D	1	1	1		
	S						1				1) Brown fine-coarse SAND, some fine medium gravel. Wet/Very Loose
	H										
	1	5.0'-7.0'	2	24	15	D	2	2	2		
	6						2			6.5'	2) (same as S-1) Wet/Very Loose
	6										Bottom 6" Dark gray organic SILT, trace peat.
	6										
	7									9.0'	
10	24	10.0'-12.0'	3	24	16	D	44	27	36		3) Brown coarse-fine SAND, some gravel. Wet/Very Dense
	40						25				
	64										
	128										
	42										
	34	15.0'-17.0'	4	24	19	D	18	12	22		4) Brown-gray fine-coarse SAND, trace silt. Wet/Dense
	18						18				
	30										Note: Cored small boulders and cobbles 3'-5'
	32										
	26										
20	29	20.0'-22.0'	5	24	24	D	9	12	16		5) Brown fine-medium SAND, trace silt. Wet/Medium/Dense
	25						23				
	30										
	55										
	69										
	79	25.0'-27.0'	6	24	24	D	26	17	18		6) Brown fine-coarse SAND, trace fine gravel. Wet/Dense
	30						21				
	22										Note: Running sand at 30'
	46										
	57										
	56	30.0'-32.0'	7	24	24	D	8	10	15		7) Brown medium-fine SAND. Wet/Medium Dense
	27						33				
	76										
	94										
	103										
35	80	35.0'-37.0'	8	24	24	D	9	9	21		8) Brown fine-medium SAND. Wet/Medium/Dense
	30						27				
	64										
	94										
	101										
	115	40.0'-42.0'	9	24	24	D	10	13	24	39	9) (same as S-8) Wet/Dense

FROM GROUND SURFACE TO 45 FEET USED 3 INCH CASING THEN - INCH CASING FOR - FEET

FOOTAGE IN EARTH 47 FOOTAGE IN ROCK 0 NO. OF SAMPLES 10 HOLE NO. B-4

SAMPLE TYPE CODING: D=DRIVE C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST

PROPORTIONS USED: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Daniel Tuccillo, Jr. BORING CREW LEADER	FORM SM-1 REV. 8/83 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS BORING REPORT	SHEET 1 OF 1
Sheila Gleason INSPECTOR	TOWN Waterbury	LOCATION See Figure 2
		General Borings, Inc. BORING CONTRACTOR
Haley & Aldrich, Inc. SOILS ENGINEER	PROJECT NAME Relocation I-84 Exit Ramp PROJECT NO. 151-207	A-N Consulting Engineers DESIGN ENGINEER

:ATION

		AUGER	CASING	SAMPLER	CORE BAR	
FACE ELEV. 370.4						HOLE NO. B-4A & 4B
E FINISHED 10/8/91	TYPE		NW	D	NQ	LINE & STATION 107+37 I84 Exit Rar
GROUND WATER OBSERVATIONS	SIZE I.D.		3	1-3/8"	2-1/8"	OFFSET 11 R
1 FT. AFTER 0 HRS.	HAMMER WT.		300	140	BIT	N. COORDINATE 257,409
FT. AFTER HRS.	HAMMER FALL		24"	30"	Diamond	E. COORDINATE 528,505

CASING BLOWS PER FOOT	SAMPLE DEPTHS IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
										B-4A Casing refused at 13' moved 2' South 46.0'-48.0'
										B-4B Advanced Casing to 45.5'
									45.5'	Roller Bit 45.5'-46.0'
										Cored 46.0'-48.0'
								5		Boulder 45.5'-48.0'
	46.0'-48.0'	1	24	17	C			2	48.0'	
	49.0'-49.08'	1	19	15	D				49.5'	1) Brown fine-medium SAND, little silt, trace medium-fine gravel, trace weathered gravel.
								12		
								13.5		Note: Sample at 47.5' 6" Wash in hole.
								10	54.3'	
								8		Casing refused at 49.5'
	49.5'-56.0'	2	78	32	C			15.5	56.0'	Cored from 49.5'-56.0'
								7		Boulder from 49.5'-54.3'
								9		Sand and gravel 54.25'-56.0'
								9		
								16		Removed casing drive shoe bent spun casing back down hole to 56.0'
	56.0'-61.0'	3	60	53	C			10	61.0'	
										Run#1-Cored Rock 56.0'-61.0' Recovered 53" gray-white GNEISS RQD=85%
										END OF BORING 61.0'
										Note: Water varies with pond elevatior

IOM GROUND SURFACE TO 56 FEET USED 3 INCH CASING THEN INCH CASING FOR FEET

OTAGE IN EARTH 69' FOOTAGE IN ROCK 5' Boulder 7.3' NO. OF SAMPLES 1 HOLE NO. B4A&4B

MPLE TYPE CODING: D=DRIVE C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST

OPORTIONS USED: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Daniel Toccillo, Jr. BORING CREW LEADER	FORM SM-1 REV. 8/83 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS BORING REPORT	SHEET 1 OF 1
Sheila Gleason INSPECTOR	TOWN Waterbury	LOCATION See Figure 2
		General Borings, Inc. BORING CONTRACTOR
Haley & Aldrich, Inc. SOILS ENGINEER	PROJECT NAME Relocation I-84 Exit Ramp	A-N Consulting Engineers DESIGN ENGINEER
	PROJECT NO. 151-207	

LOCATION

		AUGER	CASING	SAMPLER	CORE BAR	
SURFACE ELEV. 367.6						HOLE NO. B-5
DATE FINISHED 9/25/91	TYPE		NW	D		LINE & STATION 106+46 I84 Exit Ramp
GROUND WATER OBSERVATIONS	SIZE I.D.		3"	1-3/8"		OFFSET 9 L
AT * FT. AFTER HRS.	HAMMER WT.		300	140	BIT	N. COORDINATE 257,444
AT FT. AFTER HRS.	HAMMER FALL		24"	30"		E. COORDINATE 528,417

DEPTH	CASING BLOWS PER FOOT	SAMPLE DEPTHS IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
	WOH	0'-2.0'	1	24	6	D	WOH	18"	6		1) Brown-black fine SAND and SILT, trace miscellaneous vegetation. Wet Very Loose
	1	2.0'-4.0'	2	24	7	D	2	3	5		2) Gray-black-brown fine-coarse SAND and SILT. Wet/Loose
	1						4				
	1/12"	4.0'-6.0'	3	24	10	D	3	2	6		
5							1				
	1	6.0'-8.0'	4	24	12	D	9	30	34	6.0'	
	3						54				
	9	8.0'-10.0'	5	24	10	D	22	29	29		3) Gray-brown fine SAND, little silt, trace vegetation. Wet/Loose
	29						25				
10	47										4) Gray-brown fine-coarse SAND and fine-coarse GRAVEL, trace silt. Wet/Very Dense
	45										
	41										
	45	13.0'-15.0'	6	24	15	D	10	9	10	12.5'	5) (same as S-4) Wet/Very Dense
							10				
15		15.0'-17.0'	7	24	10	D	6	47	53		6) Brown fine-medium SAND. Wet/Medium
							61				7) Brown fine SAND, some weathered gravel, trace silt. Wet/Very Dense
										17.0'	END OF BORING 17.0' Soil
20											Note: Moved boring 6 times Refusal at 2.0' on spoon each time.
25											*Boring drilled from barge, water 2.0 ft deep on 9/25/91.
30											
35											Water Boring 2.0'

FROM GROUND SURFACE TO 13 FEET USED 8 INCH CASING THEN _ INCH CASING FOR _ FEET

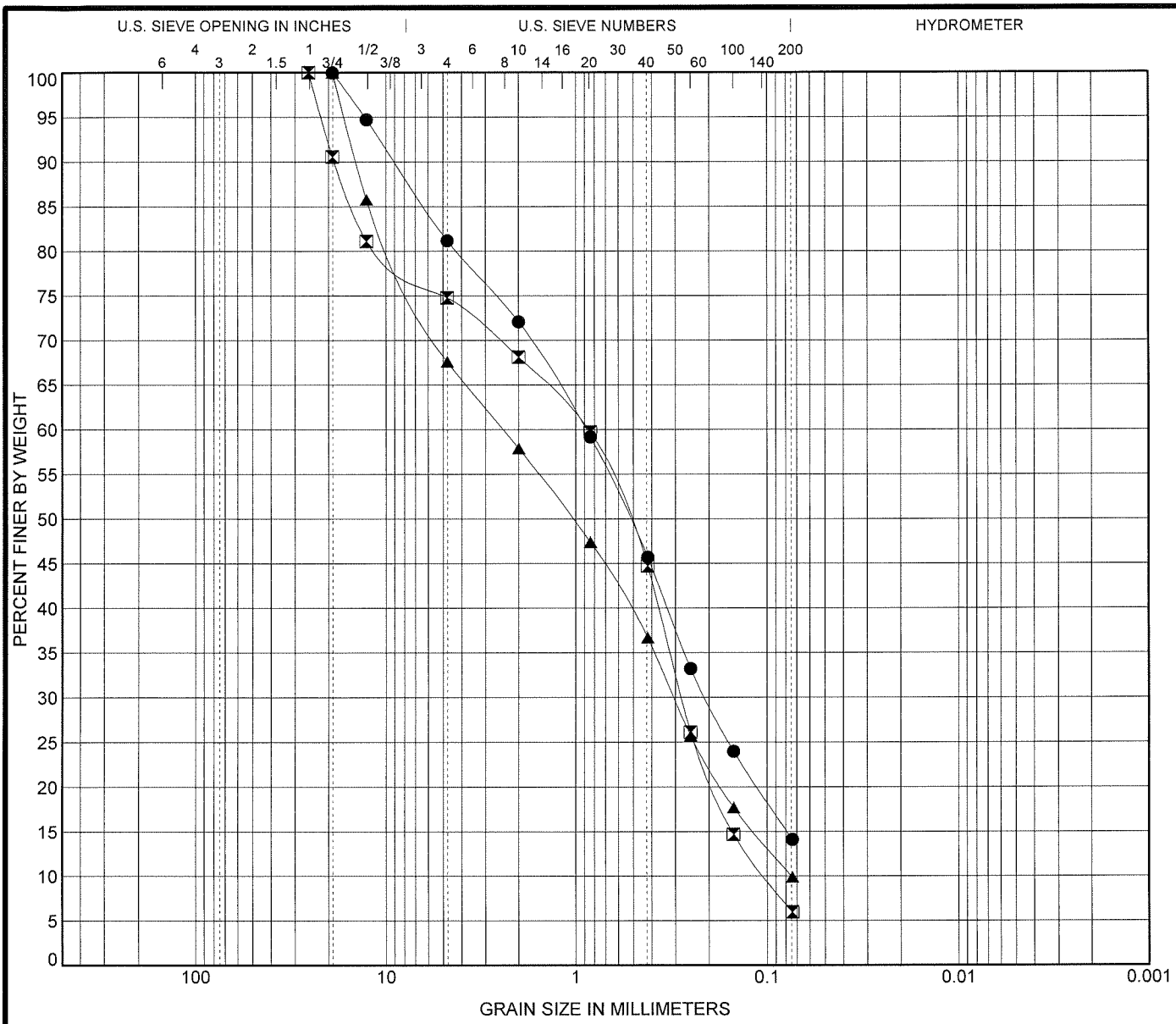
FOOTAGE IN EARTH 29.0' FOOTAGE IN ROCK 0 NO. OF SAMPLES 7 HOLE NO. B-5

SAMPLE TYPE CODING: D=DRIVE C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST

PROPORTIONS USED: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

APPENDIX C

Laboratory Results



	COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	% SILT	% CLAY
●		0.0	18.8	9.1	26.4	31.6	14.1	
⧗		9.4	15.8	6.7	23.4	38.7	6.0	
▲		0.0	32.4	9.7	21.2	26.8	9.9	

	Expl. No.	Sample No.	Depth (ft.)	LL	PL	PI	Water Content (%)	Cc	Cu
●	S10-2	D4	4.57-4.72				14.86		
⧗	S10-4	D1	0-0.6				9.61	0.88	8.45
▲	S10-4	D5	3.05-3.66				8.06	0.52	32.35

Sample Description

●	Grey-Brown, coarse to fine SAND, some medium to fine gravel, little silt (GLACIOFLUVIAL)
⧗	Medium Brown coarse to fine SAND, some medium to fine gravel, trace silt (FILL)
▲	Light Brown coarse to fine SAND and medium to fine GRAVEL, little silt (GLACIOFLUVIAL)

Remarks:

HALEY & ALDRICH
Glastonbury, Connecticut

I-84 Reconstruction
Waterbury, Connecticut
State Project # 151-273

GRAIN SIZE DISTRIBUTION

Date: 6/27/2001 File No.: 91313-100

H&A SIEVE USCS 91313S.GPJ LABTEMP.GDT 7/19/01