Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

April 10, 2009

SUBJECT: PEDESTRIAN TUNNEL
Project M-HPP-HD-8003(609)
Section 06-00041-00-GS (Winfield)
DuPage County
Contract No. 83977
Item 164
April 24, 2009 Letting
Addendum (A)

TO PROSPECTIVE BIDDERS:

Due to clarify information necessary to revise the following:

Proposal – Revised page 9 of the special provisions. Added Geotechnical Investigation Report to the special provisions.

Plans – Sheet S15

Prime contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

Charles Ingersoll
Engineer of Design and Environment

By: Ted B. Walschleger
Engineer of Project Development
and Implementation

ROUTE: Pedestrian Underpass
COUNTY: DuPage
LOCAL AGENCY: Village of Winfield
SECTION: 06-00041-00-GS

SWPP 100 - 107

Revised 4-9-09

In all cases, the directive of the Union Pacific flagger shall be closely adhered to. The cost of the FLAGGER shall be INCIDENTAL to the Contract.

PEDESTRIAN RAILING

Work on this item shall be according to Section 509 of the Standard Specifications and the Details and Sections shown on the Plans, at the locations shown on the Structural Plan Sheets. The pedestrian railing assembly shall be constructed of three (3) steel pipe rails with vertical posts bolted to the concrete structure per details. Posts shall be a maximum of four (4) foot spacing. Pedestrian railing shall be powder coat painted gloss brown over hot dip galvanized 2 oz. zinc coating prepared per I.D.O.T. Specifications. The contractor must submit I.D.O.T. Materials documentation and shop drawings for approval. Work will be paid for at the contract unit price per FOOT.

PIPE HANDRAIL, SPECIAL

Work on this item shall be according to Section 509 of the Standard Specifications and the Details and Sections shown on the Plans, at the locations shown on the Structural Plan Sheets. The pipe handrail assembly shall be constructed of one (1) steel pipe rail with supports bolted to the concrete structure per details. Pipe handrail shall be powder coat painted gloss brown over hot dip galvanized 2 oz. zinc coating prepared per I.D.O.T. Specifications. The contractor must submit I.D.O.T. Materials documentation and shop drawings for approval. Work will be paid for at the contract unit price per FOOT.

STATUS OF UTILITIES TO BE ADJUSTED

Utility companies involved in this project have provided the following estimated dates:

Name of Utility	Type	Location	Estimated Dates for Start and Completion Of Relocation or Adjustments
Sprint Cable	Cable	Along south ROW of UPRR at Crossing of Proposed Casing Pipe	To be Determined.

The above represents the best information available to the Department and is included for the convenience of the bidder. The applicable portions of Articles 15.07 and 107.31 of the Standard Specifications shall apply.

RESTRICTED WORK SCHEDULE

Construction schedule shall anticipate restricted work hours as 7:00 a.m. to 7:00 p.m. Monday through Friday; 8:00 a.m. to 7:00 p.m. Saturday; and 10:00 a.m. to 6:00 p.m. Sunday.

Revised 4-9-09

PATRICK
ENGINEERING INC.

Geotechnical Investigation

Winfield Metra Station

Winfield, Illinois

Prepared for
Village of Winfield

Project Number
20603.040

July 2006

Partnering to Build Better Infrastructure

4970 Varsity Drive : Lisle, IL 60532 : info@patrickengineering.com : www.patrickengineering.com

PHONE: 630-795-7200

Added 4-9-09

INTRODUCTION

At the request of the Village of Winfield, Patrick Engineering Inc. (Patrick) performed a subsurface investigation at the Winfield Metra Station on Jewell Street in Winfield, Illinois. The purpose of the investigation was to determine the subsurface soil conditions, estimate the elevation of the uppermost groundwater table, and provide recommended geotechnical design parameters for use in design and construction of the tunnel system.

This report documents the procedures used to obtain the site subsurface information and discusses the subsurface conditions encountered.

PROJECT DESCRIPTION

Proposed improvements include: 1) underground pedestrian tunnel (10-foot diameter), and 2) aboveground entrance/exit ramp structures. The proposed tunnel will run perpendicular to the railroad tracks to connect the north and south parking lots. An entrance ramp will be constructed on each end of the tunnel. The southern entrance will daylight into the existing parking lot near existing grade at the bottom of the railroad embankment. The northern entrance will extend eastward from the tunnel approximately 96 feet, and be approximately 12 feet wide, before doubling back to existing grade in the parking lot.

SCOPE OF INVESTIGATION

Patrick's scope of services included the following:

1. Subsurface exploration consisting of 4 borings – two on the north side of the tunnel and two on the south side of the tunnel. A fifth boring was planned, but could not be drilled due to site access restrictions and permitting requirements by the railroad.

2. Laboratory testing of select soil samples to provide information on the physical characteristics and engineering properties of the soils encountered.

3. Describing the site soil conditions and groundwater depth as encountered.

4. Providing recommended geotechnical design parameters for use by the project designer (Rempe Sharpe) to design the tunnel system.

EXPLORATION AND TESTING

Field Exploration Program. The exploration program consisted of four borings to depths of 40 feet each. The approximate boring locations are shown on the Boring Location Plan, Exhibit 1. One boring was proposed between the railroad tracks, however due to accessibility and permit constraints, this boring was not completed. The goals of the exploration program were to:

1. Determine the composition of fill materials within the existing embankment.
2. Determine the thickness of ballast materials below the tracks. (This goal was not achieved due to the inability to access the tracks.)
3. Provide representative soil samples for geotechnical laboratory testing.
4. Estimate the engineering properties of the foundation soils relative to allowable bearing capacity and subgrade modulus.
5. Determine the depth to the uppermost water table, if encountered.

Drilling and Logging Procedures. After clearing utilities by calling JULIE, the borings were drilled with a truck mounted rotary drill rig. Boreholes were advanced using 3¼-inch I.D. hollow stem augers. Borings were selected by and marked in the field by Patrick project engineer. The elevations of the ground surface at the boring locations were obtained from a partial topographic survey provided by Rempe-Sharpe. The approximate locations of the borings are provided on the Boring Location Plan, Exhibit 1.

The soils encountered in each boring were sampled using a 2-inch O.D. split-spoon sampler as part of the Standard Penetration Test (ASTM D 1586). Borings were sampled at 2.5-foot intervals to 15 feet, and 5-foot intervals to the termination depth. Sampling depths and recovery for each sample obtained are shown on the boring logs, Appendix A.

Representative samples were placed in glass jars. Hand-held calibrated penetrometer tests and Rimac tests were performed in the field on cohesive samples to serve as a general measure of consistency and to estimate unconfined compressive strengths. Jar samples were sealed, labeled, and transported for laboratory testing.

The investigation was performed under the direction of an experienced geotechnical engineer. The engineer maintained the daily field record, logged the soils, and selected representative samples for laboratory testing. The field logs, together with laboratory test results, were used to develop the boring logs presented in Appendix A. The soils were logged according to the Soil Description Terminology and the locally adapted version of the Unified Soil Classification System, ASTM D 2487, as presented in Appendix A.

Water Level Measurements and Borehole Backfilling. Groundwater measurements were made during and immediately following completion of the borings by noting the depth at which water is observed on the drill rods or by observation of free water in the soil samples. After final water level measurement, the borings were backfilled with soil cuttings. At the conclusion of drilling operations, the asphalt parking lots were patched to match conditions existing prior to drilling.

Laboratory Testing. Laboratory testing was performed according to ASTM or other applicable procedures. The purpose of the geotechnical laboratory testing program was to classify and determine relative engineering properties of the soils encountered. Moisture content tests, ASTM D 2216, were performed on each sample. Results of the geotechnical laboratory program are presented on the boring logs.

SUBSURFACE CONDITIONS

Approximately 3 to 4 inches of bituminous concrete was encountered at the surface of Borings 1, 2 and 4, underlain by gravel and stone base course materials. Boring 5 was drilled in a gravel parking lot. (Boring 3 was not drilled.) Borings 1 and 2 (both near the bottom of the embankment) encountered 1.5 to 2.5 feet of fill below the pavement; Borings 4 and 5 (both near the top of the embankment) encountered fill depths up to 8 feet below grade. The fill materials

generally consisted of stiff clay soils, with trace amounts of sand and gravel. The native soils below the fill generally consisted of very stiff silty clay underlain by medium dense silts and sands at depths of about 10 to 18 feet below grade (El. 711 to 718). These soils were typically brown and gray grading to gray below depths of 15 to 22 feet (El. 714 to 710).

Groundwater was encountered during at a depth of about 18 feet in Borings 1 and 2 (approximate elevation 706 feet), and at a depth of about 33 feet in Borings 4 and 5 (approximate elevation 701 feet). Groundwater was not observed at the completion of drilling. The borings were backfilled with soil cuttings immediately after drilling and the surface was patched.

Detailed information on the soil conditions may be found on the Boring Logs in Appendix A. Photographs of the site are included in Appendix B.

RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS

The following geotechnical design parameters were requested for evaluation and design of the proposed improvements:

- Delineation of the soil strata within the investigation area.
- Engineering properties of the foundation soils relative to allowable bearing capacity and subgrade support.

Patrick was unable to perform a boring between the railroad tracks to determine the thickness of the ballast materials.

Current plans for the tunnel show the proposed crest of the tunnel three feet below the rail ties. It is not known if the crest will be in or near the ballast, and as such special consideration needs to be given to supporting the trackbed during construction. Based on the borings, the proposed tunnel will extend through predominantly very stiff clays however occasional silt and sand seams should be anticipated.

Site Preparation. In areas of the existing asphalt parking lot, the subgrade should be exposed by completely removing the pavement materials. Clearing and grubbing of trees and root systems in the areas of the tunnel entrances will also be necessary. The subgrade should be proof-rolled prior to placement of fill. Any soft areas exposed by proofrolling should be removed and replaced with approved structural fill.

New fill used at the Site should be approved inorganic soil, free of waste and debris. The fill should be placed where dry and stable conditions exist at design subgrade. If sufficient quantities of suitable soil from the onsite earthwork are not be available for general and structural fill, fill may be imported from a local source. Fill used at the Site should meet the following requirements.

- Fill shall have a maximum dry density greater than 100 pounds per cubic foot (pcf) when determined in accordance with ASTM D 1557.
- Proposed fill material shall not contain organic material in excess of 5 percent when tested in accordance with AASHTO T-194. The fill shall also be free of waste, debris, and frozen material.
- Fill shall have a liquid limit less than 45 and a plasticity index greater than 12.

Compaction of fill below foundations and behind foundation walls should be at least 95 percent of the Modified Proctor (ASTM D-1557) dry density. Compaction of all structural fill within non-structural areas requiring structural fill should be at least 93 percent of the Modified Proctor dry density.

Subgrade support parameters. Based on the conditions encountered in the soil borings, the tunnel and ramp system can be supported by the existing native soils. For the purposes of these recommendations, it is assumed that all foundations for the entrance ramps will bear on stiff silty clays. Strip foundations should be designed with a net allowable bearing pressure equal to 3,000 pounds per square foot (psf). (The recommended bearing pressure includes a Factor of Safety of 3.0.)

Earth-supported slabs should be designed with a subgrade modulus of 80 pci. Flexible pavement should be designed using a CBR of 2.5. Granular subbase is recommended to provide drainage below all pavement sections and the subgrade should be sloped to drain so that was is not trapped on the subgrade, which could promote subgrade failure and reflective cracking of the pavement section.

Lateral Earth Pressure. Earth pressure values for walls are provided in Table 1. Walls may be classified as yielding or non-yielding depending on their support conditions. Yielding walls are fixed at the base and move away from the retained soil at their top, allowing active earth pressures to develop. Non-yielding walls do not move and prevent the mobilization of shear strength within the retained soil mass and result in at-rest earth pressure. At-rest earth pressures are greater than active earth pressures. Backfill and/or drainage provisions also have a strong influence on the design earth pressures for walls. A high permeability backfill, such as clean crushed stone combined with a drainage outlet adequate to prevent the buildup of water behind the wall, will allow the use of design earth pressures which do not include hydrostatic pressure. The following table presents equivalent fluid pressures (EFP) for different materials and wall conditions. (Values assume horizontal backfill conditions. If backfill will slope above the wall, higher values will need to be used for design.)

TABLE 1
EARTH PRESSURES FOR WALL BACKFILL

Soil/Backfill Type	*EFP Active Condition No Hydrostatic Forces (pcf)	*EFP Active Condition with Hydrostatic Forces (pcf)	*EFP At-Rest Condition No Hydrostatic Forces (pcf)	*EFP At-Rest Condition with Hydrostatic Forces (pcf)
Silty Clay (CL)**	65	100	90	110
Subangular Gravel or Sand***	45	90	65	100
Crushed Granular, 1.5-Inch FD****	35	80	55	95

*Does not include surcharge loads that may be present during construction or facility operations. Also assumes that material compaction does not increase earth pressure coefficients.

****Values based on $\gamma = 125$ pcf.**

*****Values based on $\emptyset = 34$ degrees.**

******Values based on $\emptyset = 36$ degrees.**

FD – Free Draining.

Tunnel Design Parameters. The preliminary design indicates the tunnel will have an invert of 719 for the entire length. Assuming 1 foot for installation of the tunnel, the excavation invert will be near El. 718 and the crown near El. 730. Based on these dimensions, the excavation will be will be located within fill and native soil. Based on the borings made at the ends of the tunnel (B-2 and B-4), the excavation will encounter: random fill having an unconfined compressive strength near 1.5 tsf, loose silt, and silty to sandy clay with unconfined compressive strengths ranging from 1.5 tsf to 4.0 tsf.

The following parameters are recommended for design of the tunnel:

Soil Type	Moist Unit Weight	Short-Term Strength (Total Strength Parameters)	Long-Term Strength (Effective Strength Parameters)
Clay Fill	135 pcf	C=1000 psf	Ø=28°
Silt	130 pcf	Ø=25°	Ø=25°
Native Clay	135 pcf	C=1500 psf	Ø=28°

Based on the borings, it is unlikely that groundwater is located above the tunnel invert. Even so, it is recommended that a means be provided in the design to provide drainage of the soils outside tunnel lining. Providing drainage will negate the potential for hydrostatic pressures to exist against the tunnel lining.

Construction Considerations. Construction will likely be accomplished using standard construction and tunneling equipment. Although the embankment materials were predominantly clay, some granular and silt seams were encountered in the borings. Therefore, a protective casing may be necessary during tunneling prior to placement of the concrete pipe. Consideration should also be given to the potential for ballast to be encountered near the crown, and the potential for the silt layer to cause raveling into the excavation.

For ramp construction, subgrade exposed to adverse weather and/or construction traffic is likely to loosen requiring improvement before construction of foundations.

Excavations should follow OSHA guidelines. Piles of excavated soil and heavy construction equipment should not be permitted closer to the top of excavation than a distance equal to two times the depth of the excavation in order to reduce the possibilities of slope failure.

Excavations should have a maximum slope as required to provide stable side slopes. The bottom of excavations should extend a minimum of 1 foot beyond the plan dimension of the footings to allow for adequate working space.

OTHER CONSIDERATIONS

This investigation was performed to provide general information on the site conditions for construction of the proposed tunnel. The data contained in this report are based on the soils encountered in four widely spaced borings. If conditions differ from those encountered in the borings, Patrick should be notified so that this report can be reviewed and revised as necessary.

This investigation was performed in accordance with accepted geotechnical engineering practice for determining soil conditions for the referenced Site improvements only. In the event that any changes in the nature, design, or location of the proposed construction are made, the information contained in this report should not be considered valid until the changes are reviewed and the conclusions in this report have been modified or verified in writing.

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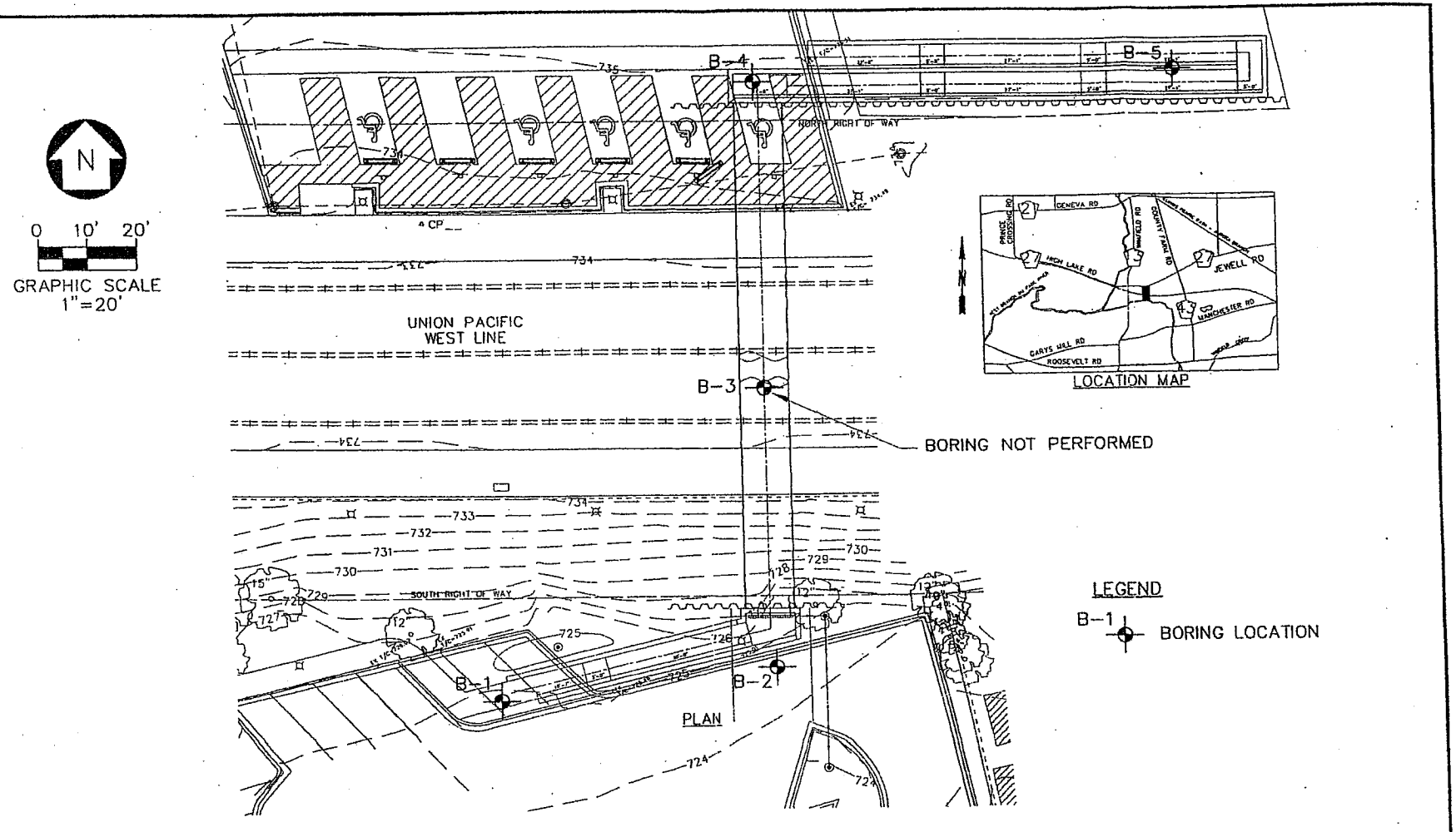
EXHIBIT 1

BORING LOCATION PLAN



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PATRICK
ENGINEERING INC.
LISLE, ILLINOIS

BORING LOCATION PLAN
VILLAGE OF WINFIELD
PEDESTRIAN UNDERPASS
WINFIELD, ILLINOIS

DATE: MAY 2006
PROJ. NO.: 20603.040
APP. BY: DE

APPENDIX A

BORING LOGS

PATRICK ENGINEERING INC.

BORING NUMBER **B1-06** SHEET **1** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **725.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
~~725.0~~	~~0.0~~		3" asphalt pavement	AU-1 0.0-1.0		
724.0	1.0		Brown fine gravel, coarse to medium sand, base -Fill-	SS-2 1.0-2.5 R=12"	2 2 4	qu=2.0* tsf
722.5	2.5		Brown and gray silty clay, fine gravel -Fill-			
			Brown silty clay, trace fine gravel, trace coarse to fine sand, very stiff, low plasticity, dry CL	SS-3 3.5-5.0 R=18"	3 5 8	qu=2.7** tsf
				SS-4 6.0-7.5 R=18"	3 8 10	qu=3.75** tsf
			Moist at 9.5'	SS-5 8.5-10.0 R=12"	5 8 11	qu=2.75** tsf
			Medium stiff at 11.0'	SS-6 11.0-12.5 R=0"	2 2 4	NT
						Collected cuttings, possibly coarse gravel pushed down
711.0	14.0		Light brown fine silty sand, well graded, medium dense, moist to wet SW	13.5-15.0 R=0"	5 6 10	
				SS-7 15.0-16.5 R=18"	7 7 7	
~~707.0~~	~~18.0~~	▽	Gray silt, very loose, saturated ML	SS-8 18.5-20.0 R=15"	1 1 3	

Water Content: PL 10 20 30 40 50 LL
Unconfined Compressive Strength (TSF) ✳: 1 2 3 4 5

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **18** While drilling
▼ **N/A** After drilling
▼ **N/A** 24 hrs. after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **B1-06** SHEET **2** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **725.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) * (1 2 3 4 5)	NOTES & TEST RESULTS
705.0	20.0		Trace clay Gray silt, very loose, saturated ML				
702.5	22.5		Gray coarse to fine gravel, coarse to fine sand, poorly graded, trace silt, dense, saturated GP	SS-9 23.5-25.0 R=16"	11 12 16		
				SS-10 28.5-30.0 R=15"	16 16 8		
693.0	32.0		Gray silty clay, trace fine gravel, trace coarse to fine sand, medium plasticity, very stiff CL	SS-11 33.5-35.0 R=18"	5 7 10		qu=2.5** tsf
				SS-12 38.5-40.0 R=1"	18 29 29		NT
685.0	40.0		End of Boring at 40.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **18** While drilling
▽ **N/A** After drilling
▼ **N/A** 24 hrs. after drilling

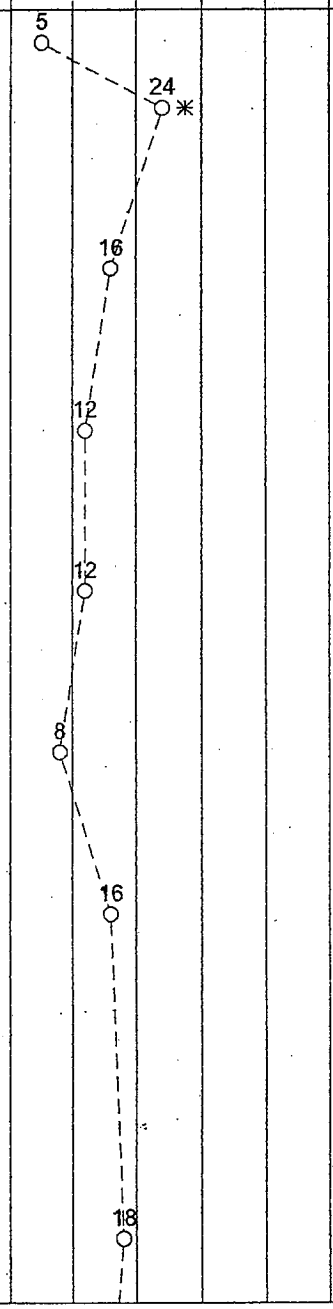
PATRICK ENGINEERING INC.

BORING NUMBER **B2-06** SHEET **1** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **724.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
724.5	0.0		3.5" asphalt pavement	AU-1 0.0-1.0		
			Brown fine gravel, coarse to fine sand, base -Fill-			
723.1	1.4		Dark brown silty clay, trace coarse to fine gravel, trace coarse to fine sand, stiff CL	SS-2 1.0-2.5 R=7"	2 4 5	qu=2.75** tsf
				SS-3 3.5-5.0 R=0"	4 9 6	NT Pushed coarse gravel
718.5	6.0		Brown sandy clay, trace coarse to fine gravel, medium dense, dry CL	SS-4 6.0-7.5 R=10"	7 7 9	
				SS-5 8.5-10.0 R=0"	10 10 5	NT Collected cuttings
714.0	10.5		Light brown fine sand, well graded, medium dense, dry SW	SS-6 11.0-12.5 R=16"	4 7 11	
711.5	13.0		Brown silt, medium dense, wet ML	SS-7 13.5-15.0 R=18"	4 5 6	
709.7	14.8					
709.5	15.0		▽ Gray silt, loose, saturated ML	SS-8 18.5-20.0 R=18"	1 1 2	

Water Content: PL □ ---○--- △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)



DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **15** While drilling
▽ **N/A** After drilling
▽ **N/A** 24 hrs. after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **B2-06** SHEET **2** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **724.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS
704.5	20.0		Gray silt, loose, saturated ML		
702.5	22.0		Gray coarse to fine gravel, coarse to fine sand, dense, saturated GP	SS-9 23.5-25.0 R=16"	7 17 6
696.5	28.0		Gray medium to fine sand, some coarse sand, trace fine gravel, loose, saturated SP	SS-10 28.5-30.0 R=10"	3 4 4
690.5	34.0		Gray silty clay, trace fine gravel, medium plasticity, stiff, moist CL	SS-11 33.5-35.0 R=15"	4 5 8
				SS-12 38.5-40.0 R=18"	4 5 7
684.5	40.0		End of Boring at 40.0'		

Water Content: PL ☐ ○ △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

NOTES & TEST RESULTS
Auger grinding on coarse gravel at 22.0'
qu=1.75** tsf
qu=2.0** tsf

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
15 While drilling
N/A After drilling
N/A 24 hrs. after drilling

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PATRICK ENGINEERING INC.

BORING NUMBER **B4-06** SHEET **1** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **735.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
~~735.0~~ ~~734.9~~	~~0.0~~		4" asphalt pavement	AU-1 0.0-1.0		
734.0	1.0		Crushed stone base course -Fill-			
			Dark brown, black silty clay, trace fine gravel, trace coarse to fine sand, trace organics -Fill-	SS-2 1.0-2.5 R=10"	3 3 4	qu=1.5** tsf
				SS-3 3.5-5.0 R=18"	3 3 3	qu=1.5** tsf
				SS-4 6.0-7.5 R=1"	5 4 4	
727.0	8.0		Lt, brn. silt, tr. clay, tr. coarse gravel, moist ML			
726.0	9.0		Light brown silty clay, trace fine gravel, trace coarse sand, very stiff, low plasticity, dry CL	SS-5 8.5-10.0 R=18"	3 4 5	qu=4.0** tsf
				SS-6 11.0-12.5 R=5"	5 10 12	NT Coarse gravel
721.5	13.5		Brown sandy clay, coarse gravel, moist CL	SS-7 13.5-15.0 R=12"	4 8 6	qu=1.5** tsf
718.0	17.0		Light brown silt, trace fine sand, dense ML			
			Wet at 18.5'	SS-8 18.5-20.0 R=18"	17 22 22	

Water Content: PL ☐---○---△ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **33.5** While drilling
▼ **N/A** After drilling
▼ **N/A** 24 hrs. after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **B4-06** SHEET **2** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **735.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
715.0	20.0		Light brown silt, trace fine sand, dense ML				
713.0	22.0		Gray silt, loose, saturated ML	SS-9 23.5-25.0 R=18"	5 3 5	16	
			Trace fine sand				
707.5	27.5		Gray silty clay, trace coarse gravel, trace coarse to fine sand, medium plasticity, stiff, moist CL	SS-10 28.5-30.0 R=18"	3 5 5	16 ✳	qu=1.5** tsf
702.0	33.0						
701.5	33.5		▽ Brown and gray coarse gravel, coarse to fine sand, silt, trace silty clay, saturated GP	SS-11 33.5-35.0 R=16"	8 14 14	9	
				SS-12 38.5-40.0 R=2"	5 4 4	13	
695.0	40.0		End of Boring at 40.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **33.5** While drilling
▼ **N/A** After drilling
▼ **N/A** 24 hrs. after drilling

PATRICK ENGINEERING INC.

BORING NUMBER **B5-06** SHEET 1 OF 2
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **736.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL–LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) * (1 2 3 4 5)	NOTES & TEST RESULTS
~~736.0~~	~~0.0~~		5" crushed limestone, crushed concrete, gravel -Fill-	AU-1 0.0-1.0		3	
			Brown and gray silty clay, trace fine gravel, trace coarse to fine sand, trace organics -Fill-	SS-2 1.0-2.5 R=4"	3 5 7	16	NT
				SS-3 3.5-5.0 R=80"	7 6 7	15	NT
730.5	5.5		Brown lean clay, trace fine gravel, trace coarse to fine sand, low plasticity, very stiff to hard, dry CL	SS-4 6.0-7.5 R=18"	11 13 17	13 *	qu=4.5+** tsf
				SS-5 8.5-10.0 R=16"	9 11 14	13 *	qu=4.5+** tsf
				SS-6 11.0-12.5 R=17"	11 10 14	15 *	qu=4.5+** tsf
				SS-7 13.5-15.0 R=18"	10 15 16	17 *	qu=4.5+** tsf
719.0	17.0		Light brown fine sand, well graded, medium dense, dry SW	SS-8 18.5-20.0 R=16"	6 10 13	10	

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **32.5** While drilling
▼ **29** After auger removal
▼ **N/A** 24 hrs. after drilling

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PATRICK ENGINEERING INC.

BORING NUMBER **B5-06** SHEET **2** OF **2**
CLIENT **Village of Winfield**
PROJECT & NO. **20603.040**
LOCATION **Metra Station Winfield**

LOGGED BY **MPG**
GROUND ELEVATION **736.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	NOTES & TEST RESULTS
716.0	20.0		Light brown fine sand, well graded, medium dense, dry SW			
714.0	22.0		Gray silt, trace clay, trace fine sand, loose, wet ML	SS-9 23.5-25.0 R=18"	2 2 4	
708.5	27.5		Gray silty clay, trace coarse to fine gravel, trace coarse to fine sand, medium stiff, wet CL	SS-10 28.5-30.0 R=12"	3 4 4	qu=1.5* tsf
707.0	29.0		▽			
703.5	32.5		Lens of saturated gravel between SS-10 and SS-11 ▽	SS-11 33.5-35.0 R=18"	7 6 7	qu=1.0* tsf
			Soft at 38.5'	SS-12 38.5-40.0 R=18"	2 2 2	qu=0.25* tsf
696.0	40.0		End of Boring at 40.0'			

Water Content: PL ☐ ---○--- △ LL (10 20 30 40 50)
Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **3 1/4" HSA**
DRILLING EQUIPMENT **CME 75**
DRILLING STARTED **4/28/06** ENDED **4/28/06**

REMARKS
Borehole backfilled with cuttings upon completion

WATER LEVEL (ft.)
▽ **32.5** While drilling
▼ **29** After auger removal
▼ **N/A** 24 hrs. after drilling

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UNIFIED SOIL CLASSIFICATION SYSTEM

TABLE 1 SOIL CLASSIFICATION CHART

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification Group Symbol	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]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [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]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand
			$Cu < 6$ and/or $1 > Cc > 3$ [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 passes 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	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. (75mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" 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] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or 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.

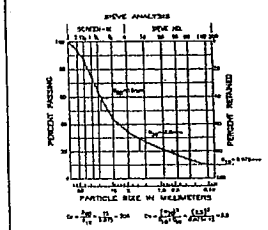
[N] PI ≥ 4 and plots on or above "A" line.

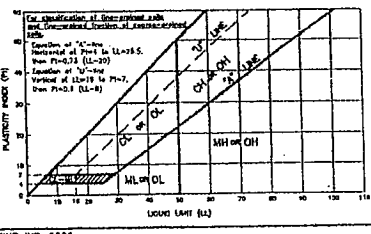
[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.

* See Local Soil Description Terminology.





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LOCAL SOIL DESCRIPTION TERMINOLOGY

Soils are visually identified and classified on the boring logs and described in this report according to the Unified Soil Classification System with the following modifications:

RELATIVE DENSITY OF GRANULAR SOILS

Description	Blows/Foot
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	50 to 80
Extremely Dense	80+

CONSISTENCY OF COHESIVE SOILS

Description	N	q_u (tsf)
Very Soft	2	0 to 0.25
Soft	2-4	0.25 to 0.50
Medium Stiff	4-8	0.5 to 1.0
Stiff	8-15	1.0 to 2.0
Very Stiff	15-30	2.0 to 4.0
Hard	30	4.0 to 8.0
Very Hard		8.0+

PARTICLE SIZES

Components		Size or Sieve No.
Boulders	--	Over 12 in.
Cobbles	--	3 to 12 in.
Gravel	-- Coarse	3/4 to 3 in.
	-- Fine	No. 4 to 3/4 in.
Sand	-- Coarse	No. 10 to No. 4
	-- Medium	No. 40 to No. 10
	-- Fine	No. 200 to No. 40
Fines (Silt and Clay)	--	Below No. 200

SOIL MOISTURE

Descriptive Term	
Dry	-- Dry of Standard Proctor Optimum
Moist	-- Near Standard Proctor Optimum
Wet	-- Wet of Standard Proctor Optimum
Saturated	-- Free Water in Sample

* RELATIVE PROPORTIONS (IN LIEU OF "WITH")

Descriptive Term	% By Weight
Trace/Occ.	1 to 10
Little	10 to 20
Some	20 to 30
And**	30 to 50

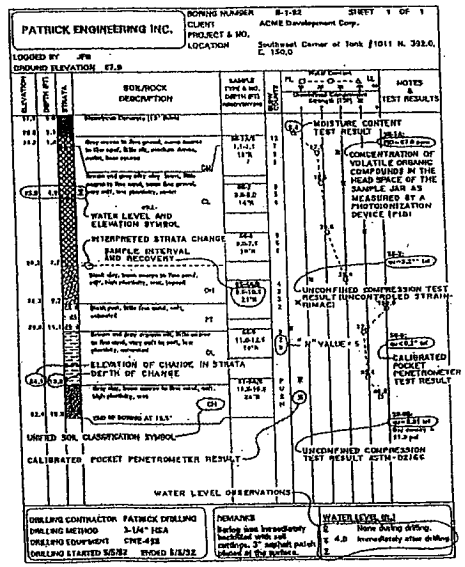
* RELATIVE PLASTICITY

Descriptive Term		Liquid Limit
Low	(Lean)	0 to 30
Medium	(Lean)	30 to 50
High	(Fat)	>50

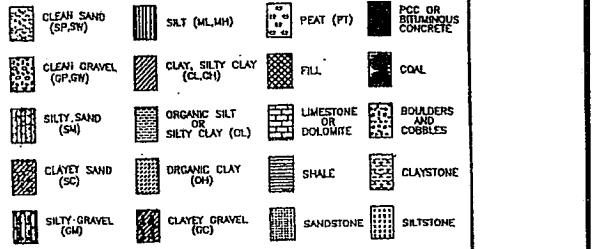
**Alternatively "sandy" or "gravelly." "Silty clay" may be utilized in lieu of "Lean" or "Fat" Clay with the appropriate plasticity modifier.

NOTE: Visual classifications are approximate.

EXAMPLE BORING LOG



GRAPHIC LOG SYMBOLS (OPTIONAL)



NOTE: Graphic log symbols may or may not be shown on the logs. Graphic symbols are shown for convenience. The typed soil descriptions and typed water level data are considered more exact than the graphic symbols.

WATER LEVEL SYMBOLS

▽ Water Level, During Drilling
▽ Water Level, After Drilling
▽ Water Level, After 24 Hours

SOIL COLORS

Soils are described in accordance with the:
MUNSELL SOIL COLOR CHARTS
1975 Edition, Kollmorgen Corporation
2441 North Calvert Street
Baltimore, Maryland 21218

Abbreviations for colors vary between loggers. In general the following abbreviations are used:

BLK	= Black	GR	= Gray	BL	= Blue
BRN	= Brown	GRN	= Green	PK	= Pink
YEL	= Yellow	DK	= Dark	STR	= Strong
OLV	= Olive	ORG	= Orange		

Mottling is a rust colored staining usually observed along cracks and fissures and resulting from the depositing or precipitation of iron and other natural materials. Mottling is typically found within the zone where groundwater levels have fluctuated in the past.

ROCK QUALITY DESIGNATION

The Rock Quality Designation (Deere, et. al., 1969) method of determining rock quality as reported here was obtained by summing up the total length of core recovered in each run, counting only those pieces of core which are four inches (10 cm) in length or longer and which are hard and sound. The sum is then represented as a percentage over the length of the run. If the core is broken by handling or by the drilling process, the fresh broken pieces are fitted together and counted as one piece provided that they form the requisite length of four inches (10 cm). RQD is reported as a percentage.

Relation of RQD and Rock Quality

RQD (%)	Description of Rock Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

NOTE: Recovery denoted as REC=, is the length of core recovered in a run divided by the length of the run, reported as a percentage.

ABBREVIATIONS USED ON BORING LOG

AU	= Sample from Auger	SPT	= Standard Penetration Test, ASTM D 1586
SS	= Split-Spoon Sampler, ASTM D 1586	N	= Summation of Last 2 SPT Values Reported on Log
ST	= Thinwall Tube Sample	q_u	= Unconfined Compressive Strength Test, ASTM D 2166
2T	= Thinwall Tube Sample 2" O.D. by 1-7/8" I.D.	$q_p = q_u$*	= Estimated Unconfined Compressive Strength (Pocket Penetrometer)
3T	= Thinwall Tube Sample 3" O.D. by 2-7/8" I.D.	γ_d	= Dry Unit Weight
CA	= Continuous Flight Auger	WC%=w	= Natural Water Content, ASTM D 2216
HA	= Hand Auger	HW	= Steel Casing, 4" Inside Diameter
HSA	= Hollow Stem Continuous Flight Auger	occ.	= Occasional
W	= Partial Sample of Cuttings, Washed	V.	= Very
S	= Bag Sample from Test Pit, Excavation, Etc.	med.	= Medium
BX	= Rock Core 1-5/8" Diameter	RECOV.=REC.=	Sample Recovery: For SPT, 100% Recov.=18" For ST, 100% Recov.=24"
NX	= Rock Core 2-1/8" Diameter	q_u**	= Estimated Unconfined Compressive Strength Using Rimac® Tester
CS	= Sample from Continuous Sampler		
O.D.	= Outside Diameter		
I.D.	= Inside Diameter		

SOIL DESCRIPTION TERMINOLOGY

UNIFIED SOIL CLASSIFICATION SYSTEM
KEY TO GRAPHIC LOG SYMBOLS
KEY TO ROCK CORE DATA
EXAMPLE BORING LOG

PATRICK ENGINEERING INC.

G:\CAD\Soil-Des-Term\Soil-Des-Term.dwg, WRM 02/03/04

APPENDIX B

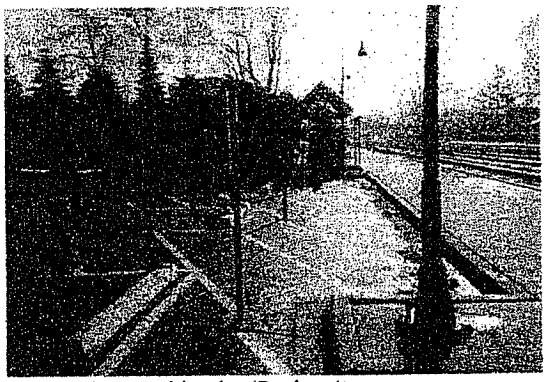
PHOTO LOG

1. Southern parking lot (Boring 2)

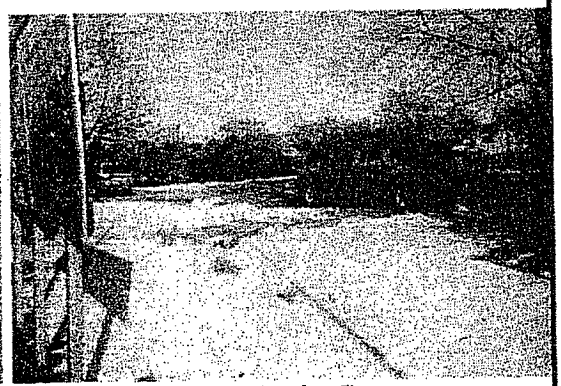
2. Looking east, top of slope above Boring 2

3. Southern parking lot (Borings 1 & 2)

4. Looking east along Metra tracks



5. Northern parking lot (Boring 4)



6. Northern parking lot (Boring 5)