NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building

Contents

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
LIST OF PROPOSED SUBCONTRACTORS
(Must be submitted with bid)

LIST OF SUBCONTRACTORS. The following list of proposed subcontractors is required by the owner to be executed, completed, and submitted with the Bid. All subcontractors are subject to approval by Northern Kentucky University (NKU). Failure to submit this list, completely filled out, will result in a bid rejection. **SUBCONTRACTORS MAY NOT BE CHANGED AFTER CONTRACT AWARD WITHOUT APPROVAL BY NKU.**

If certain branches of work are to be done by the Prime Contractor, so state. Review/evaluation of subcontractors will occur on the bid opening day. If NKU requests replacement of a subcontractor on bid opening day, then the apparent low bidder will provide a replacement subcontractor prior to close of NKU's business day on that day. Failure of the apparent low bidder to comply with the preceding sentence will result in bid rejection. If subcontractor review/evaluation is not completed on the bid opening day, then procedures for any replacement will be issued based on the uniqueness of each situation. The responsibility for selection of qualified, competent subcontractors to accomplish the work intended is solely the responsibility of the bidder.

BRANCH OF WORK	**NAME, ADDRESS AND TELEPHONE OF SUBCONTRACTORS**
SITEWORK	
Earthwork	_____
	_____
	_____
Site Concrete	_____
	_____
	_____
Field Turf Base Installer	_____
	_____
	_____
Field Turf Installer	_____
	_____
	_____
Fencing	_____
	_____
	_____
Segmental Wall	_____
	_____
	_____
Asphalt	_____
	_____
	_____

Landscape – Seed and Straw _____

Sewer Pipe Installer (Site Plumbing) _____

STRUCTURAL

Concrete Finisher _____

Concrete/Masonry Reinforcing Installer _____

Soil Testing _____

Concrete/Grout Testing _____

ARCHITECTURAL

Masonry _____

Roofing _____

Carpentry _____

MECHANICAL/ELECTRICAL

Mechanical _____

Plumbing _____

_____

_____

Sheet Metal _____

_____

_____

Electrical _____

_____

_____

END OF LIST OF PROPOSED SUBCONTRACTORS

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
LIST OF MATERIALS AND EQUIPMENT

Every item listed must be clearly identified so that the Owner will know what the Bidder proposes to furnish. Failure to submit a proper list may result in rejection of the Bidder's Proposal.

The use of the manufacturer or dealer name only, or stating "as per plans and specifications", will not be considered as sufficient identification. No material or equipment will be considered which is not in every respect equal to that specified. or shown on the drawings.

Item Description	Brand Name	Manufacturer
SITEWORK		
1. Pipe		
2. Synthetic Field Turf		
3. Infill Materials for Field Turf		
4. Aggregate Base for Field		
5. Field Drain Lines		
6. Concrete / Rebar / Joint Materials		
7. Chainlink Fencing and Gates		
8. Nylon Sports Netting		
9. 2x12 Backstop Lumber		
11. Segmental Wall Units		
12. Seed & Straw – disturbed areas		
13. Asphalt & Base		
14. ADA Truncated Domes at Ramp		
STRUCTURAL		
15. Concrete Batch Plant		
16. Grout		

17. Concrete Reinforcement

18. Wood Trusses

ARCHITECTURAL

19. Decorative CMU

20. Asphalt Shingles

21. Hollow Metal Doors & Frames

22. Coiling Counter Doors

23. Sectional Doors

24. Hardware - Locksets

25. Hardware - Closers

26. Hardware - Hinges

27. Visual Display Surfaces

27. Paint

MECHANICAL / ELECTRICAL

28. Plumbing Fixtures
(Water Closets, Urinals, & Lavatories)

29. Plumbing Accessories (Faucets)

30. Plumbing – Flush Valves

31. Domestic Water Heaters

32. Louvers

33. Dry-Type Transformers

34. Disconnect Switches

35. Telephone / Data Equipment

36. Chemical Grounding System		
37. Sprinkler Heads / Equipment		
38. Panelboards		
39. Wiring Devices		
40. Lighting Fixture Types: Attach list		
41. Sports Lighting Manufacture		

Include cut sheets, installation instructions and operational instructions as an attachment to the end of the form of proposal.

Signed By:_____

Company Name:_____

Date:_____

END OF LIST OF MATERIALS AND EQUIPMENT

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
LIST OF UNIT PRICES

Unit prices shall include the furnishing of all labor, materials, suppliers, services, and shall include all items of cost, overhead and profit for the Contractor and any Subcontractor involved, and shall be used uniformly without modification for either additions or deductions. The Unit Prices as established shall be used to determine the equitable adjustment of the Contract Price in connection with changes or extra work performed under the Contract (both additions and subtractions). Failure to completely fill out all unit prices requested will result in bid rejection.

	ITEM DESCRIPTION	UNIT	UNIT PRICE
SITEWORK			
1.	Storm Sewer Pipe, 6”	L.F.	$
2.	Storm Sewer Pipe, 12”	L.F.	$
3.	Storm Sewer Pipe, 15”	L.F.	$
4.	Storm Sewer Pipe, 24”	L.F.	$
5.	Forcemain, 3”	L.F.	$
6.	Catch Basin	EA	$
7.	Manhole	EA	$
8.	Headwall	EA	$
9.	Excavation/Earthwork	C.Y.	$
10.	Synthetic Turf	S.F.	$
11.	Sythetic Turf Infill Material	C.Y.	$
12.	Aggregate Base for Fields	C.Y.	$
13.	Drainlines under Field	L.F.	$
14.	Site Concrete	C.Y.	$
15.	Concrete Retaining Wall & Foundation	S.F. of wall	$
16.	Segmental Retaining Wall & Foundation	S.F. of wall	$
17.	8’ ht Vinyl Coated Chainlink Fence	L.F.	$
18.	14’ Sports Netting	L.F.	$
19.	Softball Backstop	LUMP SUM	$
20.	Asphalt & Base	C.Y.	$
21.	Seed & Straw	S.F.	$

STRUCTURAL

(Not Applicable)

ARCHITECTURAL

22.	3’ x 7’ Hollow Metal Door #1, Frame & Hardware Set #1, Painted	EA	$ _____

MECHANICAL AND ELECTRICAL

23.	½” Insulated Copper Water Line installed	L.F.	$ _____
24.	¾” Copper Water Line installed under grade including trenching and backfill	L.F.	$ _____
25.	½” Ball Valve installed in piping	L.F.	$ _____
26.	2” PVC Conduit installed underground	L.F.	$ _____
27.	Duplex Convenience Outlet installed complete with 50 ft. of ¾” conduit and 3#12	EA	$ _____
28.	GFI Duplex Convenience Outlet installed complete with 50 ft. of ¾” conduit and 3#12	EA	$ _____
29.	Data Outlet Rough-in installed complete with 50 ft of ¾” conduit and pull string	EA	$ _____
30.	Exit Light installed complete with 50 ft. of ¾” conduit with 3#12	EA	$ _____
31.	120V, 15A Duplex Outlet	EA	$ _____
32.	120V, 20A Duplex Outlet	EA	$ _____
33.	120V, 20A Ground Fault Outlet	EA	$ _____
34.	120V, 20A Floor Outlet	EA	$ _____
35.	Quadraplex Outlet installed complete with 50 ft. of ¾” conduit and 3#12	EA	$ _____
36.	Quadraplex Outlet with Surge Protection installed complete with 50 ft. of ¾” conduit and 3#12	EA	$ _____
37.	Single Pole Light Switch	EA	$ _____
38.	Conduit (¾”)	L.F.	$ _____
39.	Conduit (1”)	L.F.	$ _____
40.	2, #12 Type THWN Conductor	L.F.	$ _____
41.	3, #12 Type THWN Conductor	L.F.	$ _____
42.	2, #10 Type THWN Conductor	L.F.	$ _____
43.	3, #10 Type THWN Conductor	L.F.	$ _____

END OF LIST OF UNIT PRICES

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
AFFIDAVIT OF ASSURANCE

The General Contractor shall be required to complete the attached affidavit of assurances and to submit prior to beginning work to the Kentucky Department of Housing, Buildings and Construction at "Award of Contract":

The Kentucky Department of Housing, Buildings and Construction
Division of Building Codes Enforcement
101 Sea Hero Road, Suite 100
Frankfort, Kentucky 40601
502-573-0373

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building

When submitting plan for a construction permit, the Affidavit of Assurances Form, as shown below, shall be submitted with plans to the Building Code Official. No form other than the one shown below shall be accepted.

DOH-BCE-04 CASE NO.
_____ 7/90

PROJECT NAME: _____

CITY/COUNTY: _____

* AFFIDAVIT OF ASSURANCES
PURSUANT TO KRS 198B.060(10)

Comes to the Applicant, _____ and states,
(print name)
pursuant to KRS 198B.060(10), that all contractors and subcontractors employed or that will be employed on any activity under the above project shall be in compliance with the Commonwealth of Kentucky requirements for Workers' Compensation Insurance (according to KRS Chapter 342) and Unemployment insurance (according to KRS Chapter 341).

THIS the _____day of _____, 200____.

_____
CONTRACTOR, OWNER OR OWNER'S AGENT

SUBSCRIBED AND SWORN to before me by _____, Applicant, on this the _____ day of _____, 200____.

_____
NOTARY PUBLIC
STATE AT LARGE

MY COMMISSION EXPIRES: _____

_____

* [ ] The Affidavit of Assurances is not required because the local building code official was, or will be presented the assurances upon issuance o the local building permit.

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
ALLOWANCE FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Intramural Fields and Support Building

C. Project Location: Highland Heights, Kentucky

D. Owner: Northern Kentucky University

E. Architect: Omni Architects

F. Architect Project Number: 1119.01

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2012.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF ALLOWANCES

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
PERMIT APPLICATIONS

The following documents indicate the status of permit applications for the NKU Intramural Fields and Support Building project.

Listing: Pages

1. Relocation of Duke Energy overhead power line and easement — Required By Owner
2. Electrical (Duke Energy) — Required By Contractor
3. Sanitary Line - Sanitary District 1 (SD-1) — Required By Contractor
4. Storm Water – Santiary District 1 (SD-1) — Required By Contractor

Northern Kentucky University's construction activity is reviewed by the Commonwealth of Kentucky Department for Housing, Buildings, & Construction with regards to all building code enforcement, building plan review/approval during design, and building inspections during construction. Local building permits are not required and university property is exempt from compliance with local zoning regulations. During construction, the assigned state building inspector is considered the fire marshal until the Certificate of Occupancy is issued. At that time, the building is then referred to the state fire marshal's control. As of Spring 2012, the following state inspectors are assigned to all construction projects at NKU:

State Building Inspector:	State Electrical Inspector:	State Plumbing Inspector:
Bill Amato	Ken Leathers	Don Miller
(606) 538-0566	(502) 573-1797	John "Tom" Boone
william.amato@ky.gov	ken.leathers@ky.gov	johnt.boone@ky.gov

NORTHERN KENTUCKY UNIVERSITY
Intramural Fields & Support Building
GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Soil-boring data for Project, obtained by Alt and Witzig Engineering, Inc., dated April 9, 2012, is available for viewing as appended to this Document.

C. A geotechnical investigation is appended to this Document.

D. Related Requirements:

1. "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.

Alt & Witzig Engineering, Inc.
6205 Schumacher Park Drive • West Chester, Ohio 45069
Phone: (513) 777-9890 • www.altwitzig.com

April 9, 2012

Northern Kentucky University, Inc.
726 Lucas Administrative Center
Highland Heights, Kentucky 41099
ATTN: Mr. Rob Knarr, P.E.

RE: Subsurface Investigation &
Foundation Recommendations
Northern Kentucky University
Intramural Fields Reconstruction
Highland Heights, Kentucky
Alt & Witzig File: 12CN0043

Gentlemen:

In accordance with your authorization, we have completed soil borings in the area of the proposed Intramural Fields Reconstruction. The purpose of this subsurface investigation was to determine the various soils profile components, the engineering characteristics of the subsurface materials and to provide information for use with improvements to be considered with the existing athletic fields.

Field Services

Field investigations to determine the engineering characteristics of the foundation materials included a reconnaissance of the project site and drilling two (2) borings. Standard penetration tests with soil samples retained in the standard split-spoon sampler were also performed during drilling operations. The apparent groundwater level at each boring location was also determined.

The soil borings were performed with a conventional drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM Procedure D-1586.

During the sampling procedure, standard penetration tests were performed at regular intervals to obtain the standard penetration value of the soil. The standard penetration value is defined as the number of blows of a 140-pound hammer, falling thirty (30) inches, required to advance the split-spoon sampler one (1) foot into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Laboratory Testing

The types of soils encountered in the borings were visually classified and are described in detail on the boring logs. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory. Unless notified to the contrary, all samples will be disposed of after thirty (30) days.

Project Description

It is anticipated that the proposed construction will consist of the reconstruction of the turf field and the construction of a single-story support building. The support building will be a 2,000 s.f. lightly loaded structure. Proposed grading for the field has not been provided to us, however, it is anticipated that the turf field and structure will be constructed at or slightly above existing site grades.

Subsurface Discussions

The borings encountered fill consisting of reworked shale mixed with clay and some limestone fragments to a depth of eighteen (18) feet below grade. At this depth possible fill soils having a medium stiff consistency was encountered to the termination depth of our borings at twenty (20) feet below grade. The borings indicated dry conditions during and upon completion of operations and were backfilled prior to leaving the site. The fill appeared to have a medium stiff consistency with moisture contents ranging from 11.4% to 18.9%. This would seem to indicate that the fill was placed in a controlled manner, however, construction testing for this fill was not provided to us. If construction testing and monitoring of the fill was performed, please provide reports to AWEI for review and consideration of these recommendations.

Foundation Recommendations

Due to the presence of undocumented fills construction on these soils carries some risks. These include possible differential settlement of the structure which could cause cracking in the walls and floor slab and doors and windows which do not close properly. To minimize these risks a low bearing pressure and designing the structure for some future movement would be recommended. Also, using wood frame or a pre-engineered structure with concrete foundations would be strongly recommended. If these risks are not acceptable to the owner use of deep foundations or ground modification would be required. Further discussion of these foundation types can be presented to the owner if requested, however, it will be necessary to extend the holes to bedrock and perform a minimum of one rock core if this foundation type will be used. Conventional shallow foundations are presented in this report.

Shallow Spread Footings A net allowable soil bearing pressure of 1500 psf is recommended to design conventional spread footings and continuous wall footings. The above-recommended bearing pressure assumes the footings will be founded within the existing fill soils and that the owner is willing to accept that differential settlement could occur.

To reduce the impact differential settlement could have, we suggest the addition of reinforcement into the foundation. It is suggested that a minimum of four (4) no. 5 rebar be added to the foundation. Also, it is recommended that footings should not be less than thirty (30) inches wide for walls or thirty-six (36) inches square for columns. However, minimum-footing sizes and reinforcement requirements must also be in compliance with the actual building loads and all local

building code requirements. Thus, the foundation designer may decide that larger foundations or additional reinforcement will be required.

The above recommended bearing pressure is a "net allowable soil pressure". In utilizing the net allowable pressure for dimensioning footings, it is necessary to consider only those loads applied above the finished floor elevations.

In order to alleviate the effects of seasonal variation in moisture content on the behavior of the footings and eliminate the effects of frost action, all foundations in unheated areas should be founded a minimum of thirty (30) inches or greater below the final grade.

Floor Slab

The ground floor for the building can be constructed as a slab-on-grade supported by the existing soils. However, it should be noted that undocumented fill would remain in the floor slab area. It is recommended that a proofroll inspection be observed by a representative of AWEI. Areas that fail this proofroll must be stabilized using geogrid, geogrid/stone, or chemical stabilization, or undercut and replaced with suitable soils. The exact method of repair will depend on the soils encountered and should be determined by the soil engineer, owner, and contractor at the time of the proofroll. These measures will minimize risks to the owner. However, cosmetic failures (some cracking, etc...) could occur and additional future maintenance will most likely be required. If the risk of cosmetic failures or increased maintenance is not acceptable it is recommended that the floor slab be constructed as a structural slab or the fills be removed from the building area.

After the building area has been prepared to the proper elevation, a four (4) to six (6) inch compacted granular fill should be placed immediately beneath the floor slab. This compacted granular fill will provide a uniform surface for construction of the slab and minimize capillary rise of groundwater from the subgrade into the slab.

Seismic Requirements

Seismic design consideration based on the information obtained in our subsurface investigation and the Kentucky Building Code guidelines indicates that the site will be classified with a site class C.

Turf Field Reconstruction

Conditions in our borings were fairly consistent. As mentioned, fill was encountered across the area. In addition eight (8) to nine (9) inches of topsoil was noted with our borings. No groundwater was encountered with our investigation.

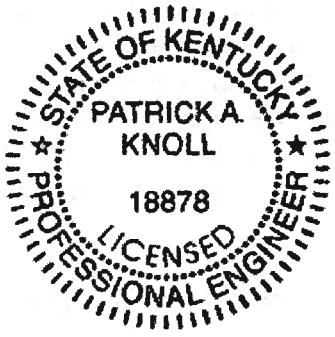
With respect to construction, provided that the surface is not saturated at the start of construction and light tracked equipment is used to strip the topsoil, the subgrade should be sufficient to place the new field. However, due to instability caused by the existing fills stabilization by means of either undercutting and replacing or installation of a geogrid and stone section to bridge the material could

be required. The actual method to be used should be determined in the field based on the extent of any soft or yielding areas encountered during the proofroll evaluation of the subgrade prior to placement of any new fill or the turf.

For the field, the proofroll phase should be performed after the surface has been stripped. A moderately loaded dump truck (minimum GVW of 35,000-lbs) should be used to evaluate the subgrade condition before any new fill or the turf is placed. Manufacturer's specifications should be followed for construction of the field to support the turf but we suggest at least 5-inches of sand and gravel below the turf to allow for grading and drainage. The fields should include positive drainage away from playing surface (typically no less than 1%). We are not aware if the field has a system of underdrains to enhance drainage across the fields. Underdrains would improve drainage across the field, especially due to the very flat nature of the grading required to construct the playing surface. We suggest underdrains be considered if there are none present.

If there are questions concerning these matters, please feel free to contact our office.

Respectfully Submitted,

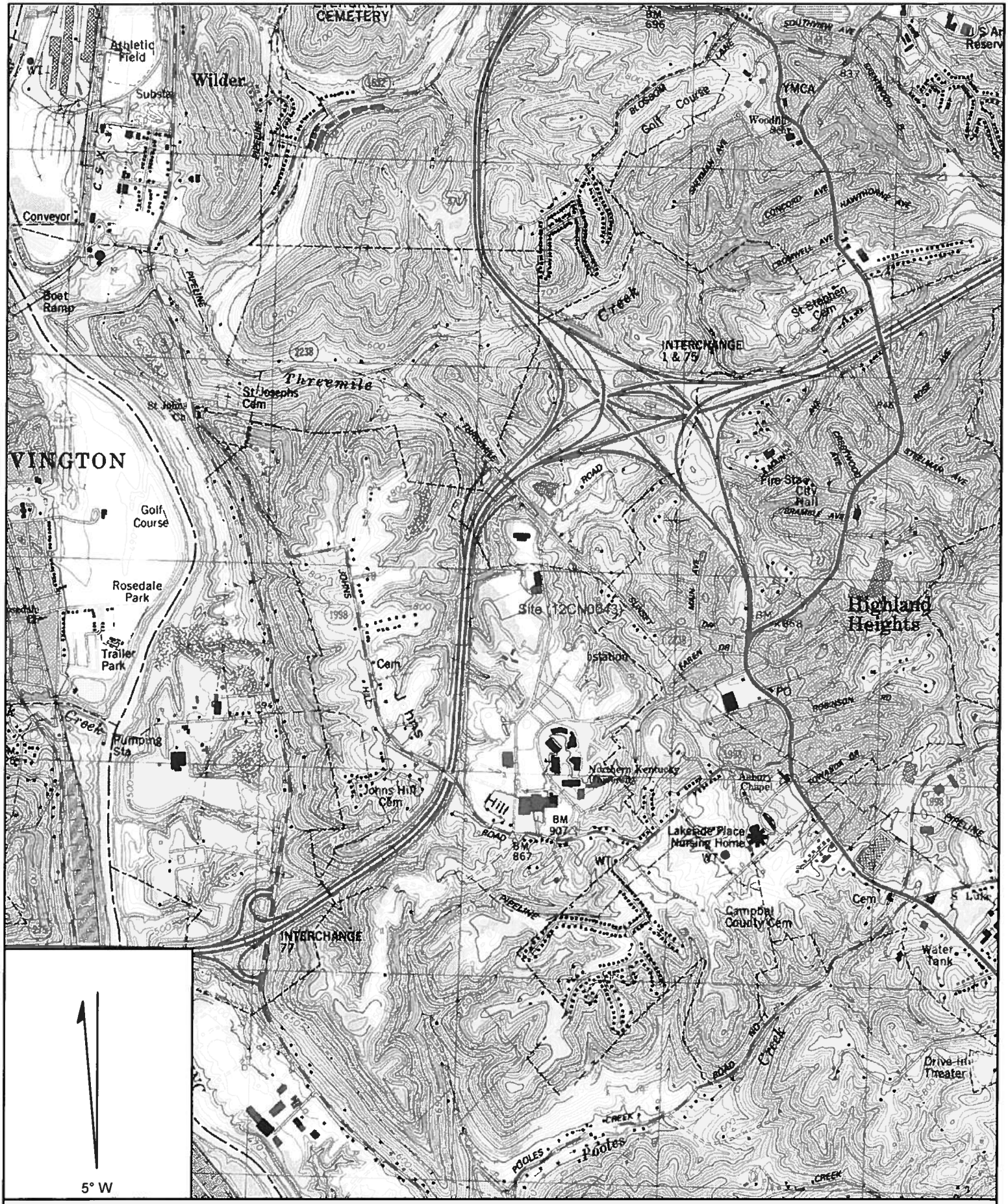


ALT & WITZIG ENGINEERING, INC.

Robert Smith, P.E.
Project Engineer

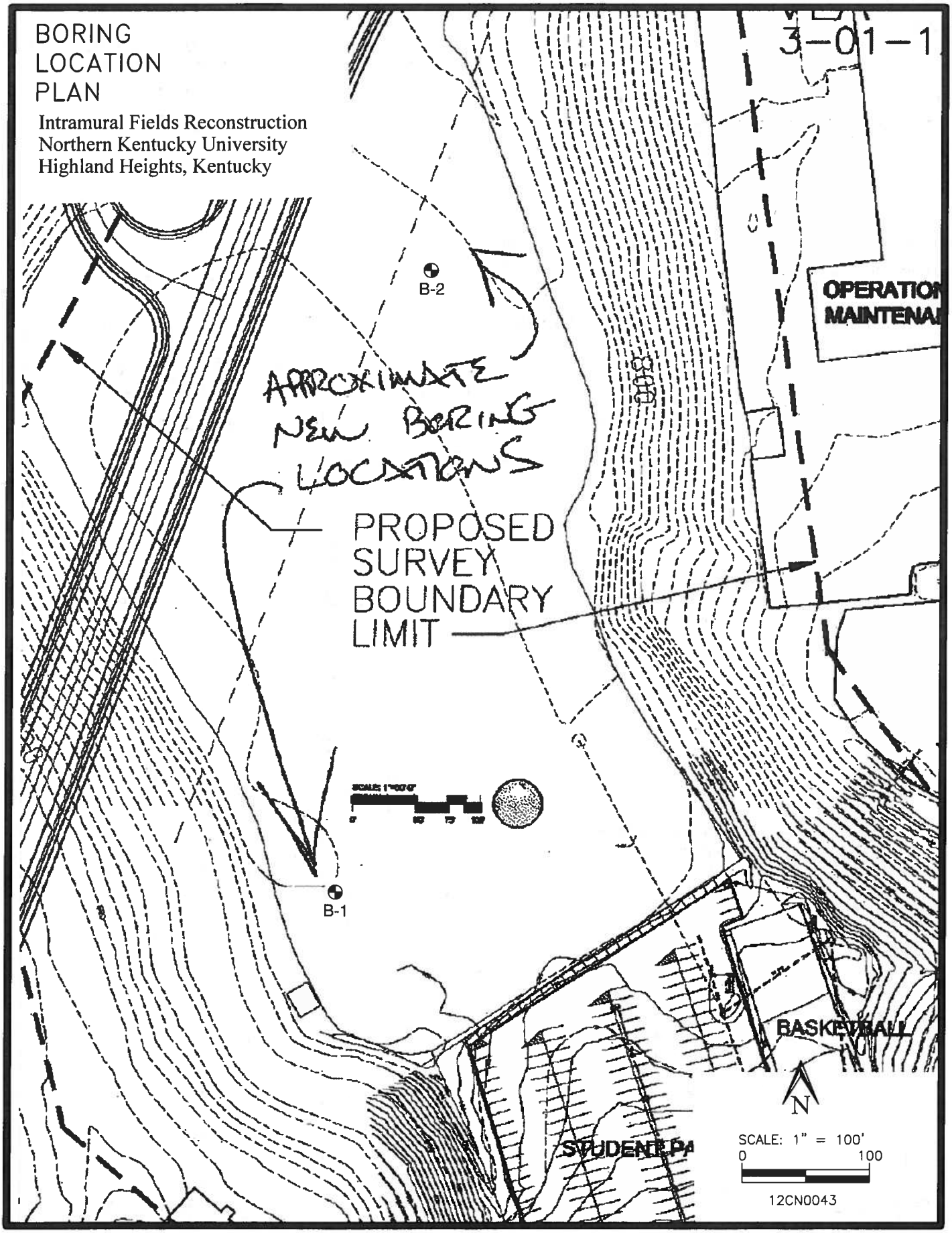
Patrick A. Knoll, P.E.

APPENDIX



Name: NEWPORT
Date: 3/30/2012
Scale: 1 inch equals 2000 feet

Location: 039° 02' 17.0" N 084° 28' 04.5" W
Caption: Site Location Map 12CN0043
NKU Intramural Fields Reconstruction
Highland Heights, Kentucky


BORING
LOCATION
PLAN
Intramural Fields Reconstruction
Northern Kentucky University
Highland Heights, Kentucky
3-01-1
B-2
APPROXIMATE
NEW BORING
LOCATIONS
PROPOSED
SURVEY
BOUNDARY
LIMIT
B-1
BASKETBALL
N
SCALE: 1" = 100'
0
100
12CN0043

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Northern Kentucky University** BORING # **B-1**

PROJECT NAME **Intramural Fields Re-Construction** Alt & Witzig File No. **12CN0043**

PROJECT LOCATION **Highland Hieghts, KY**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/12** Hammer Wt. **140** lbs.

Date Completed **3/29/12** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **J.Roark** Rig Type **D-50 Truck**

STRATA ELEV. / SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % *Unit Weight (pcf)*	Remarks
TOPSOIL	0.8										
Brown and Gray CLAY with Shale and Some Limestone Fragments (Fill)			1	SS			19		3.0	14.9	
		5	2	SS			8		2.0	16.9	
	7.0		3	SS			36		4.5	11.4	
Gray Shale and Brown CLAY Some Limestone Fragments (Fill)		10	4	SS			14		2.5	15.2	
		15	5	SS			30		4.0	14.2	
	18.0										
Gray Highly Weathered Shale (Possible Fill)		20	6	SS			19		4.5		
	21.0										
End of Boring at 21 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Northern Kentucky University** BORING # **B-2**

PROJECT NAME **Intramural Fields Re-Construction** Alt & Witzig File No. **12CN0043**

PROJECT LOCATION **Highland Hieghts, KY**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/12** Hammer Wt. **140** lbs.

Date Completed **3/29/12** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **J.Roark** Rig Type **D-50 Truck**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	TOPSOIL	0.9										
				1	SS			26		4.3	15.2	LL=37% PL=22% PI=15%
			5	2	SS			15		4.5	12.6	
				3	SS			11		3.0	18.9	
	Brown and Gray CLAY with Shale and Limestone Fragments (Fill)		10	4	SS			12		3.0	15.7	
			15	5	SS			37		3.5	14.3	
		18.0										
	Brownish Gray CLAY and Limestone (Possible Natural)		20	6	SS			50/3		3.5	11.5	
		21.0										
	End of Boring at 21 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N:	Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.
Qu:	Unconfined compressive strength, TSF
Qp:	Penetrometer value, unconfined compressive strength, TSF
Mc:	Water content, %
LL:	Liquid limit, %
PL:	Plastic limit, %
Dd:	Natural dry density, PCF
▼ :	Apparent groundwater level at time noted after completion

DRILLING AND SAMPLING SYMBOLS

SS:	Split-spoon - 1 3/8" I.D., 2" O.D., except where noted
ST:	Shelby tube - 3" O.D., except where noted
AU:	Auger sample
DB:	Diamond bit
CB:	Carbide bit
WS:	Washed sample

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	BLOWS PER FOOT
Very loose	0 - 4
Loose	5 - 10
Firm	11 - 30
Dense	31 - 50
Very Dense	Over 50

TERM (COHESIVE SOILS)	Qu (TSF)
Very soft	0 - 0.25
Soft	0.25 - 0.50
Medium	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.(+)	Coarse Sand	5 mm-0.6 mm	Silt	0.075 mm - 0.005 mm
Cobbles	8 in. - 3 in.	Medium Sand	0.6mm-0.2 mm	Clay	0.005mm(-)
Gravel	3 in. - 5 mm	Fine Sand	0.2mm-0.075 mm		