INVITATION TO BID

NKCC-03-2020

SOFTBALL FIELD RENOVATIONS

February 14, 2020

SOFTBALL FIELD RENOVATIONS
NKCC-03-2020

ATTENTION: This is not an order. Read all instructions, terms and conditions carefully.

Bids NO: NKCC-03-2020
Issue Date: 02/13/2020
Purchasing Officer: Holly C. Vasquez
Phone: 859.572.5171

RETURN ORIGINAL COPY OF BID TO:

Northern Kentucky University
Procurement Services
1 Nunn Drive
617 Lucas Administrative Center
Highland Heights, KY 41099

IMPORTANT: BIDS MUST BE RECEIVED BY: 03/09/2020 BEFORE 11:00 A.M. HIGHLAND HEIGHTS, KY time.

NOTICE OF REQUIREMENTS

1. The University's General Terms and Conditions and Instructions to Bidders, viewable at the NKU Procurement Website, apply to this Request for Bid.
2. Contracts resulting from this ITB must be governed by and in accordance with the laws of the Commonwealth of Kentucky.
3. Any agreement or collusion among Offerors or prospective Offerors, which restrains, tends to restrain, or is reasonably calculated to restrain competition by agreement to bid at a fixed price or to refrain from offering, or otherwise, is prohibited.
4. Any person who violates any provisions of KRS 45A.325 shall be guilty of a felony and shall be punished by a fine of not less than five thousand dollars nor more than ten thousand dollars, or be imprisoned not less than one year nor more than five years, or both such fine and imprisonment. Any firm, corporation, or association who violates any of the provisions of KRS 45A.325 shall, upon conviction, may be fined not less than ten thousand dollars or more than twenty thousand dollars.

AUTHENTICATION OF BID AND STATEMENT OF NON-COLLUSION AND NON-CONFLICT OF INTEREST

I hereby swear (or affirm) under the penalty for false swearing as provided by KRS 523.040:

1. That I am the offeror (if the offeror is an individual), a partner, (if the offeror is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the offeror is a corporation);
2. That the attached bids has been arrived at by the offeror independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other Contractor of materials, supplies, equipment or services described in the Request for Bids, designed to limit independent bidding or competition;
3. That the contents of the bid have not been communicated by the offeror or its employees or agents to any person not an employee or agent of the offeror or its surety on any bond furnished with the bid and will not be communicated to any such person prior to the official closing of the ITB:
4. That the offeror is legally entitled to enter into contracts with the Northern Kentucky University and is not in violation of any prohibited conflict of interest, including those prohibited by the provisions of KRS 45A.330 to .340, 164.390, and
5. That the Offeror, and its affiliates, are duly registered with the Kentucky Department of Revenue to collect and remit the sale and use tax imposed by Chapter 139 to the extent required by Kentucky law and will remain registered for the duration of any contract award
6. That I have fully informed myself regarding the accuracy of the statement made above.

SWORN STATEMENT OF COMPLIANCE WITH FINANACE LAWS

In accordance with KRS45A.110 (2), the undersigned hereby swears under penalty of perjury that he/she has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky and that the award of a contract to a bidder will not violate any provision of the campaign finance laws of the Commonwealth of Kentucky.

CONTRACTOR REPORT OF PRIOR VIOLATIONS OF KRS CHAPTERS 136, 139, 141, 337, 338, 341 & 342

The Contractor by signing and submitting a bids agrees as required by 45A.485 to submit final determinations of any violations of the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 that have occurred in the previous five (5) years prior to the award of a contract and agrees to remain in continuous compliance with the provisions of the statutes during the duration of any contract that may be established. Final determinations of violations of these statutes must be provided to the University by the successful Contractor prior to the award of a contract.

CERTIFICATION OF NON-SEGREGATED FACILITIES

The Contractor, by submitting a bids, certifies that he/she is in compliance with the Code of Federal Regulations, No. 41 CFR 60-1.8(b) that prohibits the maintaining of segregated facilities.

RECIPROCAL PREFERENCE

(1) Prior to a contract being awarded to the lowest responsible and responsive bidder on a contract by a public agency, a resident bidder of the Commonwealth shall be given a preference against a nonresident bidder registered in any state that gives or requires a preference to bidders from that state. The preference shall be equal to the preference given or required by the state of the nonresident bidder.
(2) A resident bidder is an individual, partnership, association, corporation, or other business entity that, on the date the contract is first advertised or announced as available for bidding:
(a) Is authorized to transact business in the Commonwealth; and
(b) Has for one (1) year prior to and through the date of the advertisement, filed Kentucky corporate income taxes, made payments to the Kentucky unemployment insurance fund established in KRS 341.490, and maintained a Kentucky workers' compensation policy in effect.
(3) A nonresident bidder is an individual, partnership, association, corporation, or other business entity that does not meet the requirements of subsection (2) of this section.
(4) If a procurement determination results in a tie between a resident bidder and a nonresident bidder, preference shall be given to the resident bidder.
(5) This section shall apply to all contracts funded or controlled in whole or in part by a public agency.
(6) The Finance and Administration Cabinet shall maintain a list of states that give to or require a preference for their own resident bidders, including details of the preference given to such bidders, to be used by public agencies in determining resident bidder preferences. The cabinet shall also promulgate administrative regulations in accordance with KRS Chapter 13A establishing the procedure by which the preferences required by this section shall be given.

(7) The preference for resident bidders shall not be given if the preference conflicts with federal law.
(8) Any public agency soliciting or advertising for bids for contracts shall make KRS 45A.490 to 45A.494 part of the solicitation or advertisement for bids

DEFINITIONS

As used in KRS 45A.490 to 45A.494: (1) "Contract" means any agreement of a public agency, including grants and orders, for the purchase or disposal of supplies, services, construction, or any other item; and

(2) "Public agency" has the same meaning as in KRS 61.805.

SIGNATURE REQUIRED: This bid cannot be considered valid unless signed and dated by an authorized agent of the offeror. Type or print the signatory's name, title, address, phone number and fax number in the spaces provided. Offers signed by an agent are to be accompanied by evidence of his/her authority unless such evidence has been previously furnished to the issuing office. Your signature is acceptance to the Terms and conditions above.

DELIVERY TIME:	**NAME OF COMPANY:**	**DUNS #**
BID FIRM THROUGH:	**ADDRESS:**	**Phone/Fax:**
PAYMENT TERMS:	**CITY, STATE & ZIP CODE:**	**E-MAIL:**
SHIPPING TERMS: F.O.B. DESTINATION - PREPAID AND ALLOWED	**FEDERAL EMPLOYER ID NO.:**	**WEB ADDRESS:**

READ CAREFULLY - SIGN IN SPACE BELOW - FAILURE TO SIGN INVALIDATES BID or OFFER

AUTHORIZED SIGNATURE: _____

NAME (Please Print Legibly): _____

TITLE: _____ DATE: _____

****

State of _____)

County of _____)

The foregoing statement was sworn to me this _____ day of_____, 20 _____, by _____.

_____

(Notary Public)
My Commission expires: _____

THIS DOCUMENT MUST BE NOTORIZED

Table of Contents

1.0 DEFINITIONS

The term “ITB” means Invitation to Bid or this document

The term "addenda" means written or graphic instructions issued by the Northern Kentucky University prior to the receipt of bids that modify or interpret the ITB documents by additions, deletions, clarifications and/or corrections.

The terms "offer" or “bid” mean the offeror’s/offerors’ response to this ITB.

The term "offeror" means the entity or contractor group submitting the bid.

The term "contractor" means the entity receiving a contract award.

The term "purchasing agent" means Northern Kentucky University appointed contracting representative.

The term "responsible offeror" means a person, company or corporation that has the capability in all respects to perform fully the contract requirements and the integrity and reliability that will assure good faith performance. In determining whether an offeror is responsible, the University may evaluate various factors including (but not limited to): financial resources; experience; organization; technical qualifications; available resources; record of performance; integrity; judgment; ability to perform successfully under the terms and conditions of the contract; adversarial relationship between the offeror and the University that is so serious and compelling that it may negatively impact the work performed under this ITB; or any other cause determined to be so serious and compelling as to affect the responsibility of the offeror.

The term "solicitation" means ITB.

The term "University" means Northern Kentucky University.

General Terms & Conditions Available to view / download at:

https://inside.nku.edu/content/dam/Procurement/docs/forms/General%20Terms%20%20Conditions_RS_jg11-1-18.pdf

An electronic version of the ITB, in .PDF format only, is available through Northern Kentucky University’s Plan Room at https://www.nkuplanroom.com/purchasing/View/Login.

2.0 GENERAL OVERVIEW

2.1 Intent and Scope

Northern Kentucky University is seeking a Contractor to provide all materials, labor, tools, supervision, and equipment required to: Provide services for renovation of the existing softball field area of play and foul territory. Repairs included but are not limited to replacement of irrigation system, improving planarity and grading of, fill work, turf and clay finish grades, and dugout concrete repairs. Work to begin on April 23, 2020 and must achieve Final Completion by August 14, 2020.

2.2 University Information

Information regarding Northern Kentucky University can be found at https://inside.nku.edu/

3.0 Special Conditions to Bidder

All work and cleaning to be completed by date outlined in 3.1 as Final Completion in order to allow adequate timing for replacement of owner furnishings before start of playable season.

Temporary Construction

Bidders to include temporary barricade, door, and draping as part of bid number in order to maintain construction area as for duration of Work. Refer to specifications and drawings for additional information for signage and safety throughout duration of Work.

Application made for Payment

Application for Payment shall be submitted with a schedule of values for the Work covered by the applications and certificate of payment that has been completed in accordance with the contract documents. Schedule of Values must be presented and reviewed by Owner's Project Manager and Owner representative before start of Work.

Change Orders

All change orders must be approved by the Owner's Project Manager and the Owner's Representative for revised/additional scope to the contract documents before requested Work may be completed. Description must be submitted with contractor pricing of proposed change.

3.1 Key Project Dates

Release of ITB	02/14/2020
Pre-Bid Conference	02/20/2020
Deadline for Written Questions	12 pm Eastern Time on 02/25/2020
Deadline for Written Response/Addenda	5 pm Eastern Time on 02/28/2020
BIDS DUE	11 am Eastern Time on 03/09/2020
Contract Award*	03/26/2020

***Project Dates:**
Work Start Date shall be April 23, 2020
Substantial Completion no later than August 1, 2020
Final Completion no later than August 14, 2020

3.2 Offeror Communication

Information relative to this project obtained from other sources, including other university administration, faculty or staff may not be accurate, will not be considered binding and could adversely affect the potential for selection of your bid. All requests for information, questions or comments relative to this project should be directed, in writing to:

Ryan Straus
Coordinator, Contracts & Bidding
Procurement Services
Lucas Administrative Center, Suite 617
Northern Kentucky University
Highland Heights, KY 41099
Strausr2@nku.edu

3.3 Pre-bid Conference

Pre-Bid conference will be held at Thursday, February 20th at 2:30 pm at Northern Kentucky University Softball Field. Please email Ryan Straus, Coordinator, Procurement Services strausr2@nku.edu with any questions.

3.4 Preparation of Offers

The offeror is expected to follow all specifications, terms, conditions and instructions in this ITB.

The offeror will furnish all information required by this solicitation.

Bids should be prepared simply and economically, providing a description of the offeror's capabilities to satisfy the requirements of the solicitation. Emphasis should be on completeness and clarity of content. All documentation submitted with the bids should be bound in the single volume except as otherwise specified.

3.5 Bid Submission and Deadline

The bidder shall submit, by the time and date specified via US Postal Service, courier or other delivery service, its bid response in a **sealed package** addressed to:

Holly C. Vasquez
Manager, Procurement Services
Lucas Administrative Center, Suite 617
1 Nunn Drive
Northern Kentucky University
Highland Heights, KY 41099

Both inner and outer envelopes/packages should bear respondent's name and address, and clearly marked on package(s) as follows:

ITB NKCC-03-2020
SOFTBALL FIELD RENOVATIONS

Note: Bids received after the closing date and time will not be considered. In addition, bids received via fax or e-mail are not acceptable.

3.6 Modification or Withdrawal of Offer

An offer and/or modification of offer received at the office designated in the solicitation after the exact hour and date specified for receipt will not be considered.

An offer may be modified or withdrawn by written notice before the exact hour and date specified for receipt of offers. An offer also may be withdrawn in person by an offeror or an authorized representative, provided the identity of the person is made known and the person signs a receipt for the offer, but only if the withdrawal is made prior to the exact hour and date set for receipt of offers.

3.7 Acceptance or Rejection and Award of bid

The University reserves the right to accept or reject any or all bids, to waive any informalities or technicalities, to clarify any ambiguities in bids in the bid. In case of error in extension or prices or other errors in calculation, the unit price shall govern. Further, the University reserves the right to make a single award, split awards, multiple awards or no award, whichever is in the best interest of the University.

3.8 Rejection

Grounds for the rejection of bids include (but shall not be limited to):

a) Failure of a bid to conform to the essential requirements of the ITB.

b) Imposition of conditions that would significantly modify the terms and conditions of the solicitation or limit the offeror's liability to the University on the contract awarded on the basis of such solicitation.

c) Failure of the offeror to sign the University ITB. This includes the Authentication of Bids and Statement of Non-Collusion and Non-Conflict of Interest statements. (pages 1 & 2)

d) Failure to sign the Bid Form / Form of Bids

e) Receipt of bid after the closing date and time specified in the ITB.

3.9 Addenda

Any addenda or instructions issued by the purchasing agent prior to the time for receiving bids shall become a part of this ITB. Such addenda shall be acknowledged on the bid form or form of bid. No instructions or changes shall be binding unless documented by a proper and duly issued addendum.

3.10 Disclosure of Offeror's Response

The ITB specifies the format, required information and general content of bids submitted in response to this ITB. The purchasing agent will not disclose any portions of the bids prior to contract award to anyone outside the Office of Procurement Services, the University's administrative staff, representatives of the state or federal government (if required) and the members of the committee evaluating the bids. After a contract is awarded in whole or in part, the University shall have the right to duplicate, use or disclose all bid data submitted by offerors in response to this ITB as a matter of public record.

Any submitted bid shall remain valid for 90 days after the bid due date.

3.11 Restrictions on Communications with University Staff

From the issue date of this ITB until a contractor is selected and a contract award is made, offerors are not allowed to communicate about the subject of the ITB with any University administrator, faculty, staff or members of the board of regents except: the purchasing agent representative, any University purchasing official representing the University administration, others authorized in writing by the Office of Procurement Services and University representatives during offeror presentations. If violation of this provision occurs, the University reserves the right to reject the offeror's bid.

3.12 Cost of Preparing Bid or Bids

Costs for developing the bids or bids and any subsequent activities prior to contract award are solely the responsibility of the offerors. The University will provide no reimbursement for such costs.

3.13 Questions

All questions should be submitted by either fax or e-mail to the purchasing agent listed in Section 3.2 no later than the date listed in Section 3.1.

3.14 No Contingent Fees

No person or selling agency shall be employed or retained or given anything of monetary value to solicit or secure this contract, except bona fide employees of the offeror or bona fide established commercial or selling agencies maintained by the offeror for the purpose of securing business. For breach or violation of this provision, the University shall have the right to reject the bids, annul the contract without liability, or, at its discretion, deduct from the contract price or otherwise recover the full amount of such commission, percentage, brokerage or contingent fee or other benefit.

3.15 Bids Addenda and Rules for Withdrawal

Prior to the date specified for receipt of offers, a submitted bids may be withdrawn by submitting a written request for its withdrawal to the University purchasing office, signed by the offeror. Unless requested by the University, the University will not accept revisions or alterations to bids after the bids due date.

3.16 Effective Date

The effective date of the contract shall be the date upon which the parties execute it and all appropriate approvals, including that of the (if applicable) Commonwealth of Kentucky Legislative Contracts Review Committee, have been received.

3.17 Contractor Cooperation in Related Efforts

The University reserves the right to undertake or award other contracts for additional or related work to other entities. The contractor shall fully cooperate with such other contractors and University employees and carefully fit its work to such additional work. The contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor or by University employees. This clause shall be included in the contracts of all contractors with whom this contractor will be required to cooperate. The University shall equitably enforce this clause to all contractors to prevent the imposition of unreasonable burdens on any contractor.

3.18 Governing Law

The contractor shall conform to and observe all laws, ordinances, rules and regulations of the United States of America, Commonwealth of Kentucky and all other local governments, public authorities, boards or offices relating to the property or the improvements upon same (or the use thereof) and will not permit the same to be used for any illegal or immoral purposes, business or occupation. The resulting contract shall be governed by Kentucky law and any claim relating to this contract shall only be brought in the Franklin Circuit Court in accordance with KRS 45A.245.

3.19 Kentucky's Personal Information Security and Breach Investigation Procedures and Practices Act

To the extent Company receives Personal Information as defined by and in accordance with Kentucky's Personal Information Security and Breach Investigation Procedures and Practices Act, KRS 61.931, 61.932 and 61.933 (the "Act"), Company shall secure and protect the Personal Information by, without limitation: (i) complying with all requirements applicable to non-affiliated third parties set forth in the Act; (ii) utilizing security and breach investigation procedures that are appropriate to the nature of the Personal Information disclosed, at least as stringent as University's and reasonably designed to protect the Personal Information from unauthorized access, use, modification, disclosure, manipulation, or destruction; (iii) notifying University of a security breach relating to Personal Information in the possession of Company or its agents or subcontractors within seventy-two (72) hours of discovery of an actual or suspected breach unless the exception set forth in KRS 61.932(2)(b)2 applies and Company abides by the requirements set forth in that exception; (iv) cooperating with University in complying with the response, mitigation, correction, investigation, and notification requirements of the Act , (v) paying all costs of notification, investigation and mitigation in the event of a security breach of Personal Information suffered by Company; and (vi) at University's discretion and direction, handling all administrative functions associated with notification, investigation and mitigation.

3.20 Termination for Convenience

Northern Kentucky University, Office of Procurement Services, reserves the right to terminate the resulting contract without cause with a thirty (30) day written notice. Upon receipt by the contractor of a "notice of termination," the contractor shall discontinue all services with respect to the applicable contract. The cost of any agreed upon services provided by the contractor will be calculated at the agreed upon rate prior to a "notice of termination" and a fixed fee contract will be pro-rated (as appropriate).

3.21 Termination for Non-Performance

a) Default

The University may terminate the resulting contract for non-performance, as determined by the University, for such causes as:

- Failing to provide satisfactory quality of service, including, failure to maintain adequate personnel, whether arising from labor disputes, or otherwise any substantial change in ownership or proprietorship of the Contractor, which in the opinion of the University is not in its best interest, or failure to comply with the terms of this contract;

- Failing to keep or perform, within the time period set forth herein, or violation of, any of the covenants, conditions, provisions or agreements herein contained;

- Adjudicating as a voluntarily bankrupt, making a transfer in fraud of its creditors, filing a petition under any section from time to time, or under any similar law or statute of the United States or any state thereof, or if an order for relief shall be entered against the Contractor in any proceeding filed by or against contractor thereunder. In the event of any such involuntary bankruptcy proceeding being instituted against the Contractor, the fact of such an involuntary petition being filed shall not be considered an event of default until sixty (60) days after filing of said petition in order that Contractor might during that sixty (60) day period have the opportunity to seek dismissal of the involuntary petition or otherwise cure said potential default; or

- Making a general assignment for the benefit of its creditors, or taking the benefit of any insolvency act, or if a permanent receiver or trustee in bankruptcy shall be appointed for the Contractor.

b) Demand for Assurances

In the event the University has reason to believe Contractor will be unable to perform under the Contract, it may make a demand for reasonable assurances that Contractor will be able to timely perform all obligations under the Contract. If Contractor is unable to provide such adequate assurances, then such failure shall be an event of default and grounds for termination of the Contract.

c) Notification

The University will provide ten (10) calendar days written notice of default. Unless arrangements are made to correct the non-performance issues to the University's satisfaction within ten (10) calendar days, the University may terminate the contract by giving forty-five (45) days notice, by registered or certified mail, of its intent to cancel this contract.

3.22 Funding Out

The University may terminate this contract if funds are not appropriated or are not otherwise available for the purpose of making payments without incurring any obligation for payment after the date of termination, regardless of the terms of the contract. The University shall provide the contractor thirty (30) calendar days' written notice of termination under this provision.

3.23 Assignment and Subcontracting

The Contractor(s) may not assign or delegate its rights and obligations under any contract in whole or in part without the prior written consent of the University. Any attempted assignment or subcontracting shall be void.

3.24 Permits, Licenses, Taxes

The contractor shall procure all necessary permits and licenses and abide by all applicable laws, regulations and ordinances of all federal, state and local governments in which work under this contract is performed.

The contractor must furnish certification of authority to conduct business in the Commonwealth of Kentucky as a condition of contract award. Such registration is obtained from the Secretary of State, who will also provide the certification thereof. However, the contractor need not be registered as a prerequisite for responding to the ITB.

The contractor shall pay any sales, use, personal property and other tax arising out of this contract and the transaction contemplated hereby. Any other taxes levied upon this contract, the transaction or the equipment or services delivered pursuant hereto shall be the responsibility of the contractor.

The contractor will be required to accept liability for payment of all payroll taxes or deductions required by local and federal law including (but not limited to) old age pension, social security or annuities.

3.25 Attorneys' Fees

In the event that either party deems it necessary to take legal action to enforce any provision of the contract and in the event that the University prevails, the contractor agrees to pay all expenses of such action including attorneys' fees and costs at all stages of litigation.

3.26 Royalties, Patents, Copyrights and Trademarks

The Contractor shall pay all applicable royalties and license fees. If a particular process, products or device is specified in the contract documents and it is known to be subject to patent rights or copyrights, the existence of such rights shall be disclosed in the contract documents and the Contractor is responsible for payment of all associated royalties. To the fullest extent permitted by law the Contractor shall indemnify, hold the University harmless, and defend all suits, claims, losses, damages or liability resulting from any infringement of patent, copyright, and trademark rights resulting from the incorporation in the Work or device specified in the Contract Documents.

Unless provided otherwise in the contract, the Contractor shall not use the University's name nor any of its trademarks or copyrights, although it may state that it has a Contract with the University.

3.27 Indemnification

The contractor shall indemnify, hold and save harmless the University, its affiliates and subsidiaries and their officers, agents and employees from losses, claims, suits, actions, expenses, damages, costs (including court

costs and attorneys' fees of the University's attorneys), all liability of any nature or kind arising out of or relating to the Contractor's response to this ITB or its performance or failure to perform under the contract awarded from this ITB. This clause shall survive termination for as long as necessary to protect the University.

3.28 Insurance

If awarded, bidder / proposer must provide NKU with an insurance certificate listing NKU as a certificate holder and additionally insured.

Northern Kentucky University
617 Lucas Administrative Center
1 Nunn Drive
Highland Heights, KY 41099

The Contractor shall furnish the University the Certificates of Insurance and guarantee the maintenance of such coverage during the term of the contract. The Contractor shall provide an original policy endorsement of its CGL insurance naming Northern Kentucky University and the directors, officers, trustees, and employees of the University as additional insured on a primary and non-contributory basis as their interest appears. Additionally, the Contractor shall provide an original policy endorsement for Waiver of subrogation in favor of the Northern Kentucky University its directors, officers, trustees, and employees as additional insured.

Our basic insurance requirements are:

Workers' Compensation insurance with Kentucky's statutory limits and Employers' Liability insurance with at least $100,000 limits of liability.

Comprehensive General Liability (CGL) Insurance the limits of liability shall not be less than $500,000 each occurrence for bodily injury and $250,000 property damage.

Comprehensive Automobile Liability Insurance: To cover all owned, hired, leased or non-owned vehicles used on the Project. Coverage shall be for all vehicles including off the road tractors, cranes and rigging equipment and include pollution liability from vehicle upset or overturn. Policy limits shall not be less than $500,000 for bodily injury and $100,000 for property damage.

Excess liability insurance in an umbrella form for excess coverages shall have a minimum of $1,000,000 combined single limits for bodily injury and property damage for each.

If accessing NKU Student, Employee, or other personal records, vendor needs Security and Privacy Liability Insurance with limits no less than $1,000,000.

If accessing NKU Student, Employee, or other personal records, vendor needs Evidence Breach Response Services coverage with limits no less than $5,000,000.

3.29 Method of Award

It is the intent of the University to award a contract to the qualified offeror whose bid, conforming to the conditions and requirements of the ITB, is determined to be the lowest.

Notwithstanding the above, this ITB does not commit the University to award a contract from this solicitation. The University reserves the right to reject any or all offers and to waive formalities and minor irregularities in the bid received.

3.30 Reciprocal Preference

In accordance with KRS 45A.494, a resident offeror of the Commonwealth of Kentucky shall be given a preference against a nonresident offeror. In evaluating bids, the University will apply a reciprocal preference against an offeror submitting a bids from a state that grants residency preference equal to the preference given by the state of the nonresident offeror. Residency and non-residency shall be defined in accordance with KRS 45A.494(2) and 45A.494(3), respectively. Any offeror claiming Kentucky residency status shall submit with its bids a notarized affidavit affirming that it meets the criteria as set forth in the above reference statute.

An affidavit is provided and attached, for your convenience to this ITB.

3.31 Reports and Auditing

The University, or its duly authorized representatives, shall have access to any books, documents, papers, records or other evidence which are directly pertinent to this contract for the purpose of financial audit or program review.

3.32 Confidentiality

The University recognizes an offeror's possible interest in preserving selected information and data included in the bids; however, the University must treat such information and data as required by the Kentucky Open Records Act, KRS 61.870, et seq.

If the offeror declares information provided in their response to be proprietary in nature and not available for public disclosure, the offeror shall declare in their response the inclusion of proprietary information and shall noticeably label as confidential or proprietary each sheet containing such information. Bids containing information declared by the offeror to be proprietary or confidential, either wholly or in part, not excluded by the Kentucky Open Records Act, KRS 61.870 may be deemed non-responsive and may be rejected.

The University's General Counsel shall review each offeror's information claimed to be confidential and, in consultation with the offeror (if needed), make a final determination as to whether or not the confidential or proprietary nature of the information or data complies with the Kentucky Open Records Act.

3.33 Conflict of Interest

When submitting and signing a bids, an offeror is certifying that no actual, apparent or potential conflict of interest exists between the interests of the University and the interests of the offeror. A conflict of interest

(whether contractual, financial, organizational or otherwise) exists when any individual, contractor or subcontractor has a direct or indirect interest because of a financial or pecuniary interest, gift or other activities or relationships with other persons (including business, familial or household relationships) and is thus unable to render or is impeded from rendering impartial assistance or advice, has impaired objectivity in performing the proposed work or has an unfair competitive advantage.

Questions concerning this section or interpretation of this section should be directed to the University purchasing agent identified in this ITB.

3.34 Parking Permits

Contractor must obtain parking permits for all vehicles that will be parked on campus. Permits can be obtained at the Welcome Center for $80/month per vehicle.

http://parking.nku.edu/rules/guidelines.html

3.35 Tobacco Free Campus

Effective January 1st, 2014, NKU will be a tobacco free campus. The use of all tobacco products shall be prohibited in all campus buildings and outside areas on campus.

3.36 Statutory Authority

Selection of firms to provide professional services to Northern Kentucky University are governed by the provisions of the Kentucky Revised Statutes, KRS 45A.085, http://www.lrc.ky.gov/KRS/045A00/085.PDF

3.37 Foreign Corporations

Foreign corporations are defined as corporations that are organized under laws other than the laws of the commonwealth of Kentucky. Foreign corporations doing business within the commonwealth of Kentucky are required to be registered with the Secretary of State, New Capitol Building, Frankfort, Kentucky and must be in good standing.

The Foreign Corporate Proposer, if not registered with the Secretary of State at the time of the bid submittal, shall be required to become registered and be declared in good standing prior to the issuance or receipt of a contract.

3.38 Domestic Corporations

Domestic corporations are required to be in good standing

3.39 Occupational License

Northern Kentucky University was annexed by the city of Highland Heights in 2008. All contractors performing work for NKU must possess a Campbell County Occupational License and a city of Highland Heights Occupational License (administered by Campbell County) and must also pay applicable payroll taxes. For further information, call 859-572-6605.

3.40 Bid Bonds:

A 5% bid bond is required with submission of this ITB.

3.41 Payment and Performance Bonds

100% Payment and Performance Bonds will be required for work arising from this ITB.

3.42 Completion Dates or Liquidated Damages if applicable

It is understood and agreed that time is of the essence. The Contractor will efficiently, diligently, and expeditiously conduct the work in a manner that will satisfy compliance with approved project schedules and completion by the completion date appearing in the body of this bid.

Substantial Completion shall be August 1, 2020
Final Completion shall be August 14, 2020

All work and cleaning to be completed by August 14th in order to allow adequate timing for replacement of owner furnished equipment prior to start of the softball season.

3.43 Coordination of Work

The Vendor shall be responsible for coordinating all work with the **NKU Project Manager**. The Contractor shall cooperate completely with the Owner's security forces and measures.

3.44 Damage and Repairs

The Contractor shall exercise particular care to avoid damage to his own work, the Owner's property, and adjacent property of every description. He shall make good any damage resulting from or caused by the work under this contract at his sole expense in a manner satisfactory and without extra cost to the Owner including, but not limited to, finishes, furnishings, and landscaping.

3.45 Hazardous Materials

No asbestos containing materials, lead based paints, or other hazardous materials shall be furnished or installed in this work.

3.46 Examination of Site

Each vendor shall fully acquaint and familiarize themselves with the conditions as they exist and the character of the operation to be carried on under the proposed contract and has made such investigation as may be reasonably necessary so that the vendor shall fully understand the facilities, physical conditions and restrictions attending to the work under the contract. The specifications furnished represent a fair approximation of the material needed but all quotations submitted should take into account knowledge gained as a result of the above referenced visual inspection.

3.47 Examination of Contract

Each vendor shall also thoroughly examine and become familiar with the specifications and associated contract documents. By submitting a bid, the vendor agrees that they have carefully examined the specifications and have thereupon decided that from their own investigation Contractor has satisfied themselves as to the nature and location of work, the general and local conditions and all matters which may in any way affect the work or its performance and that as a result of such examination and investigation, vendor fully understands the intent and purpose of the documents and conditions of the bidding. Claims for additional compensation and/or extension of time because of the vendor's failure to follow the foregoing procedure and to familiarize themselves with the Contract Documents and all conditions which might affect work will not be allowed.

3.48 Field Verification

It is the Vendor's responsibility to verify all measurements.

3.49 Hours of Work

Working days at Northern Kentucky University are Monday through Friday, 8:00am to 4:30pm but can be adjusted. Review deviation of these working hours with owner's project manager.

3.50 Warranty

Offeror shall stand behind installed system for period of 1 year along with any above and beyond conditions stated in the contract documents from Date of Substantial Completion against all the conditions indicated below as part of but not limited to Description of Work outlined in 4.0. Offeror is not responsible for warranty of OFCI equipment or signage. When notified in writing from Owner, Offeror shall, promptly and without inconvenience and cost to Owner correct said deficiencies.

4.0 DESCRIPTION OF WORK

A. The Work of the Project is defined by the Contract Documents and consists of the following:
   1. The Work for Northern Kentucky University– softball field renovation and dugout repairs.
   2. Specific tasks for this renovation include but are not limited to the following:
      a. Demolition of existing infield, field, supporting systems and boundary fencing as outlined herein the work documents.
      b. Partial removal of cmu wall and concrete slab in dugout areas
      c. New irrigation/utility systems within project scope
      d. Correction of field compacting and new grading as outlined in the work documents.
      e. New concrete walls and concrete slab in dugout areas.

5.0 BID DOCUMENTS

5.1 References

5.2 Subcontractors (If Applicable)

5.3 List of Materials and Equipment

5.4 List of Unite Prices

5.5 Bid Bond

5.6 EEO Paperwork/Reporting Requirements (If Applicable)

5.7 Form of Bid

Appendices

Appendix 1 Geotechnical Exploration Report
Appendix 2 2020-02-11 NKU Softball Bid Set Drawings
Appendix 3 2020-02-11 NKU Softball Bid Project Manual Specification

5.1 REFERENCES

Bidder Qualifications: The bidder is required to submit a list of completed projects where he has performed **similar work** to that specified herein as well as adhere to qualifications as listed in the contract documents. Provide additional pages if needed.

Organization:_____

Contact Name:_____

Phone Number:_____

Date Work Completed:_____ **Value of Contract:**_____

Project Manager assigned to this project: _____

Brief Project Description: _____

_____

_____

Organization:_____

Contact Name:_____

Phone Number:_____

Date Work Completed:_____ **Value of Contract:**_____

Project Manager assigned to this project: _____

Brief Project Description: _____

_____

_____

Organization:_____

Contact Name:_____

Phone Number:_____

Date Work Completed:_____ **Value of Contract:**_____

Project Manager assigned to this project: _____

Brief Project Description: _____

_____

_____

5.2 SUBCONTRACTORS (IF APPLICABLE)

SUBCONTRACTORS: The following is a list of subcontractors proposed by the bidder to be used to complete the project. All subcontractors are subject to approval by Northern Kentucky University. Failure to submit this list completely filled out may invalidate bid**. SUBCONTRACTORS MAY NOT BE CHANGED AFTER CONTRACT AWARD WITHOUT APPROVAL BY NKU.**

BRANCH OF WORK	**NAME, ADDRESS AND TELEPHONE OF SUBCONTRACTORS**
Irrigation System Manufacturer	
Sod Farm/Supplier for base bid	
Sod Farm/Supplier for bid alternate	

5.3 List of Materials and Equipment
(Must be submitted within 24 hours after bid opening)

Every item listed under the different phases of this project must be clearly identified so that Northern Kentucky University will definitely know what the bidder proposes to furnish. Bidders be hereby advised that this list shall be required to be filled out completely by the apparent low bidder within twenty-four (24) hours from the close of the official reading of the bids.

The above requirement does not preclude any bidder from submitting this list, fully executed, at the time the bids are submitted.
The use of the manufacturers' dealer's name only, or stating "as per plans and specifications", will not be considered as sufficient identification. Where more than one "Make or Brand" is listed for any one item, the Owner has the right to select the one to be used.
Failure to submit a proper list may result in rejection of the Bidder's Bids.

5.4 List of Unite Prices

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 Trade Contractor and any Subcontractor involved, and shall be used uniformly without modification for either additions or deductions. The Unit Price 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. Failure to completely fill out the unit prices requested will result in Bid rejection.

ITEM DESCRIPTION	UNIT	UNIT PRICE
1. Unit Price No. 01 – Undercut for Unsuitable Soils a. Description: Cost for undercut of unsuitable soils and backfilled with suitable soil per Geotechnical Engineer's recommendations for an estimated total quantity of 1,200 cubic yards. All work is to be approved in advance by the Owner with quantities documents and approved by Engineer. b. Unit of Measure: Cubic Yard	C.Y.	$_____
2. Unit Price No. 02 – Import Topsoil c. Description: Cost for importing and grading of topsoil suitable for turf type specified and within the project documents recommendations for an estimated total quantity of 200 cubic yards. All work is to be approved in advance by the Owner with quantities documents and approved by Engineer. d. Unit of Measure: Cubic Yard	C.Y.	$_____

5.5

Bid Bond

5% of Contract Price

KNOW ALL MEN BY THESE PRESENTS, that we (here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and (here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of Kentucky as Surety, hereinafter called Surety, are held and firmly bound unto **Northern Kentucky University** as Obligee, hereinafter called Obligee, in the sum of :

_____ Dollars ($_____),

representing 5% of the Principal's total bid price and for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for (Here insert full name, address and description of project)

NOW THEREFORE, if the Obligee shall accept the bid of the Principal within the period specified, or if no period is specified, within 45 days after its opening, and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bid or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bonds or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this day of 2020

(Principal) (Seal) _____

_____ (Witness)

(Title)

(Surety) (Seal) _____

_____ (Witness)

(Title)

THIS DOCUMENT MUST BE NOTORIZED

This is only an example. Other forms may be used.

5.7 FORM OF BID

LUMP SUM BASE BID

The Bidder agrees to furnish all labor, materials, supplies, supervision and services required to perform this contract in a workmanlike manner. These services to be provided in accordance with Specifications and Contract Documents, and any duly issued Addenda for the **LUMP SUM BASE BID** set forth below:

_____Dollar_____Cents
(USE WORDS) (USE WORDS)

$ _____
(USE NUMBERS)

ADD – **Alternate 1** – (Tuckahoe Bluegrass Sod) $ _____

This offer is for, at minimum, _____ calendar days from the date this offer is opened. In submitting the above it is expressly agreed that upon proper acceptance by Northern Kentucky University of any or all items offered, a contract shall thereby be created with respect to the items accepted.

THIS BID SUBMITTED BY:

_____
(Name and Address of Bidder)

DATE: _____ AUTHORIZED SIGNATURE:_____

NOTE*: The Authentication of Bid and Statement of Non-Collusion and Non-Conflict of Interest must be properly executed for this Bid to be valid.*

This Bidder, in compliance with this Request for Bid, and having carefully examined the complete contract documents, as well as the specifications for the work as prepared by Northern Kentucky University, hereby

proposes to furnish all labor, supervision, materials, supplies and services required to perform the specifics of the Contract Documents, within the time set forth herein and for the final negotiated price.

The Bidder, hereby acknowledges receipt of the following Addenda:

ADDENDUM NO. _____ DATED _____ ADDENDUM NO. _____ DATE _____

Appendix 1 Geotechnical Exploration Report

GEOTECHNICAL EXPLORATION
NKU SOFTBALL FIELD RENOVATIONS
HIGHLAND HEIGHTS, KENTUCKY

Prepared for:

NORTHERN KENTUCKY UNIVERSITY
HIGHLAND HEIGHTS, KENTUCKY

Prepared by:

GEOTECHNOLOGY, INC.
ERLANGER, KENTUCKY

Date:

DECEMBER 9, 2019

Geotechnology Project No.:

J035590.01

SAFETY
QUALITY
INTEGRITY
PARTNERSHIP
OPPORTUNITY
RESPONSIVENESS

GEOTECHNOLOGY INC
FROM THE GROUND UP

December 9, 2019

Ms. Elizabeth Birkenhauer
Northern Kentucky University
729 Lucas Administrative Center
Highland Heights, Kentucky 41099

Re: Geotechnical Exploration
NKU Softball Field Renovations
Highland Heights, Kentucky
Geotechnology Project No. J035590.01

Dear Ms. Birkenhauer:

Presented in this report are the results of our geotechnical exploration completed for the softball field renovations on the campus of Northern Kentucky University (NKU) in Highland Heights, Kentucky. Our services were performed in general accordance with our Proposal P035590.01, which was dated October 21, 2019, which was authorized by NKU Purchase Order No. 4700002521, dated October 30, 2019.

We appreciate the opportunity to provide the geotechnical services for this project. If you have any questions regarding this report, or if we may be of any additional service to you, please do not hesitate to contact us.

Respectfully submitted,
GEOTECHNOLOGY, INC.

Michelle E. Casto, PE
Senior Engineer

STATE OF KENTUCKY
MICHELLE E. CASTO
24688
LICENSED PROFESSIONAL ENGINEER

Daniel A. Furgason, PE
Geotechnical Manager

MEC/DAF:mec/tmk

Copies submitted: Client (email/2 mail)

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GEOTECHNOLOGY INC
FROM THE GROUND UP

GEOTECHNICAL EXPLORATION
NKU SOFTBALL FIELD RENOVATIONS
HIGHLAND HEIGHTS, KENTUCKY
December 9, 2019 | Geotechnology Project No. J035590.01

1.0 INTRODUCTION

Geotechnology, Inc. (Geotechnology) prepared this geotechnical exploration report for Northern Kentucky University (NKU) for the softball field renovations on the campus of Northern Kentucky University (NKU) in Highland Heights, Kentucky. Our services documented in this report were provided in general accordance with the terms and scope of services described in our Proposal P035590.01, which was dated October 21, 2019, which was authorized by NKU Purchase Order No. 4700002521, dated October 30, 2019.

The purposes of our services were to explore the subsurface conditions and to provide geotechnical recommendations for the design and construction of the project with respect to grading and drainage. Our scope of services included a site reconnaissance, geotechnical borings, laboratory testing, engineering analyses, and preparation of this report.

2.0 PROJECT INFORMATION

The following project information was derived from:

- The Topographic Survey and the Grading Plan Option 1, which were prepared by the Kleingers Group, dated September 19, 2019;
- The original Grading Plan for the softball field, which was prepared by the Commonwealth of Kentucky, Division of Engineering, dated August 11, 1998;
- The 1963 GIS mapping in the vicinity of the project site; and
- Correspondence with Ms. Birkenhauer.

We understand that the existing softball field was constructed in 1999. Since then, areas of potential settlement have occurred in the form of “bird baths” in four locations within the field. Also, the area in the immediate vicinity of the first base dugout is low-lying and holds water. In addition, there has been erosion of the rip-rap from the warning track in the area of the storm sewer headwall. It is our understanding the NKU is planning to renovate the field, including re-grading the existing ground surface of the field and possibly installing a turf field. Site grading is anticipated to be minimal on the order of plus or minus 1 foot.

3.0 SITE CONDITIONS

The project site consists of the existing softball field located northwest of the intersection with Johns Hill Road and Kenton Drive on the campus of Northern Kentucky University in Highland Heights, Kentucky. The softball field is grass covered with the exceptions of the gravel covered warning track and the soil exposed for the dirt infield and dugout areas. The ground surface surrounding the softball field is also grass-covered with the exception of the rip rap along the northern boundary of the field. The ground surface is relatively flat within the playing field area, with an overall topographic relief of about 3 feet. The high point is in the infield and drainage is northwardly toward the outfield. The ground surface slopes downward to the north, west and south around the perimeter of the field, with a parking lot located along the east boundary of the field. The southern/western embankment is about 16 feet tall at the highest and the northern embankment is about 4 to 5 feet tall. The gradient of the embankments in on the order of 4 Horizontal to 1 Vertical (4H:1V) or flatter. According to the 1963 GIS mapping, a drainage valley existed across the southern half of the softball field, which has since been filled to current grades.

Small low lying areas, or “bird baths”, were observed as evidenced by distressed vegetation or “bald spots” in the grass and depressions in the ground surface. The soil in the vicinity of the first base dugout area appeared to be moist and softer than the rest of the infield area. Erosion of the rip rap and warning track gravel was observed in the vicinity of the drainage pipe near the central portion of the warning track by the scaffolding platform.

4.0 SUBSURFACE EXPLORATION

The subsurface exploration consisted of six borings, numbered B-1 through B-6. The boring locations were selected and staked in the field by us utilizing hand held GPS equipment. The locations of the borings are shown on our Boring Plan, which is included in Appendix B.

The borings were drilled between November 8 and 11, 2019, with a track-mounted drill rig advancing hollow-stem augers, as indicated on the boring logs presented in Appendix C. Sampling of the overburden soils and bedrock was accomplished ahead of the augers at the depths indicated on the boring logs, with either 2-inch-outside-diameter (O.D.) split-spoons or 3-inch-O.D., thin-walled Shelby tube samplers in general accordance with the procedures outlined by ASTM D1586 and ASTM D1587, respectively. Standard Penetration Tests (SPTs) were performed with the split-spoon sampler to obtain the standard penetration resistance or N-value[1] of the sampled material.

As each boring was advanced, the Drilling Foreman kept a field log of the subsurface profile noting the soil and bedrock types and stratifications, groundwater, SPT results, and other pertinent data.

[1] The standard penetration resistance, or N-value, is defined as the number of blows required to drive the split-spoon sampler 12 inches with a 140-pound hammer falling 30 inches. Since the split spoon sampler is driven 18 inches or until refusal, the blows for the first 6 inches are for seating the sampler, and the number of blows for the final 12 inches is the N-value. Additionally, “refusal” of the split-spoon sampler occurs when the sampler is driven less than 6 inches with 50 blows of the hammer.

Observations for groundwater were made in the borings during drilling and at the completion of drilling. The holes were backfilled immediately, such that long-term water readings were not taken.

Representative portions of the split-spoon samples were placed in glass jars with lids to preserve the in-situ moisture contents of the samples. The Shelby tubes were capped and taped at their ends to preserve the in-situ moisture contents and densities of the samples, and the tubes were transported and stored in an upright position. The glass jars and Shelby tubes were marked and labeled in the field for identification when returned to our laboratory.

5.0 LABORATORY REVIEW AND TESTING

Upon completion of the fieldwork, the samples recovered from the borings were transported to our Soil Mechanics Laboratory, where they were visually reviewed and classified by the Project Geotechnical Engineer.

Laboratory testing was performed on selected soil samples to estimate engineering and index properties. Laboratory testing of the selected soil samples included various combinations of the following tests: moisture content, Atterberg limits, and unconfined compression. The results of these tests are summarized in the Tabulation of Laboratory Tests in Appendix D, along with the corresponding laboratory test forms.

The boring logs, which are included in Appendix C, were prepared by the Project Geotechnical Engineer on the basis of the field logs, the visual classification of the soil and bedrock samples in the laboratory, and the laboratory test results. Soil and Rock Classification Sheets are also included in Appendix C, which describe the terms and symbols used on the boring logs. The dashed lines on the boring logs indicate an approximate change in strata as estimated between samples, whereas a solid line indicates that the change in strata occurred within a sample where a more precise measurement could be made. Furthermore, the transition between strata can be abrupt or gradual.

6.0 SUBSURFACE CONDITIONS

6.1 Stratification

Generally, the existing ground surface was underlain by 4 to 6 inches of topsoil, where encountered, followed by 1.5 to 17.2 feet of existing lean clay or shale fill, then by 2.5 to at least 6.0 feet of native fat or lean clay soils, where encountered, underlain by interbedded shale and limestone bedrock. The depth to the surface of the bedrock ranged from 2.0 to 14.5 feet below the ground surface, where encountered in Borings B-2 through B-6. More specific descriptions of the subsurface strata are provided below, and the boring logs containing detailed material descriptions are located in Appendix C.

6.1.1 Topsoil

Topsoil was encountered at the ground surface in Borings B-1 through B-5. The thickness of the topsoil in these borings varied from 4 to 6 inches thick.

6.1.2 Existing Fill

Existing fill was encountered beneath the ground surface or the topsoil in Borings B-1 through B-6. The existing fill in these borings varied from 1.5 to 17.2 feet thick and typically consisted of lean clay and/or shale sometimes containing topsoil, organics, roots, oxide stains, oxide concretions, cinders, metal pieces, limestone fragments, limestone floaters and shale fragments. An exception is that the surficial 1.2-foot-thick layer of fill in Boring B-6 consisted of loose sand and/or gravel. The fill was described as mixed brown, dark brown, gray, greenish gray and/or dark green in color and had variable consistencies ranging from soft to stiff. The N-values of the existing fill ranged from 5 to 13 bpf with no particular pattern regarding soil type or consistency.

Several moisture contents of the fill ranged from 20.1 to 28.3 percent. Two samples of the lean clay fill were classified as CL soils according to the Unified Soil Classification System (USCS) with liquid limits, plastic limits, and plasticity indices of 47, 23 and 24 percent and 45, 24, and 21 percent, respectively. One sample of the lean clay fill had an unconfined compressive strength of 4,790 pounds per square foot (psf) with a corresponding natural dry density of 106.5 pounds per cubic foot (pcf).

6.1.3 Native Overburden Soils

Native fat and lean clay soils were encountered beneath the fill at depths of 4.5 to 18.0 feet in Borings B-1, B-3, and B-6. The thickness of the native overburden soils, where penetrated in Borings B-3 and B-6 ranged from 2.5 to 4.8 feet. Boring B-1 was terminated in the native soil at a depth of 24.0 feet. The native overburden soils were described as brown, trace gray, moist, stiff to very stiff fat or lean clay with and without gravel, oxide stains, limestone fragments and traces of bedding planes. The N-values of the native soils ranged from 14 to 27 bpf.

The majority of the native overburden soils consisted of highly plastic fat clay soils with moisture contents ranging from 26.0 to 29.8 percent. One sample of the fat clay was classified as a CH soil according to the USCS with a liquid limit, plastic limit and plasticity index of 69, 28 and 41 percent. One sample of the lean clay had a moisture content of 18.6 percent.

6.1.4 Bedrock

The topsoil, existing fill, and native overburden soils at the site are underlain by bedrock consisting of interbedded shale and limestone layers. Bedrock was encountered at depths of 2.0 to 14.5 feet below the ground surface in all but Boring B-1.

According to the 1973 United States Geological Survey (USGS) Geologic Map of the Newport and Withamsville Quadrangle, Campbell and Kenton Counties, Kentucky, the bedrock underlying the overburden soils transitions between the Bull Fork Formation and the Grant Lake Limestone Formation.

The referenced USGS map describes the bedrock formations as follows:

- The Grant Lake Limestone Formation consists of rubbly weathering, mottled medium-light-gray and light-olive-gray, irregularly bedded to nodular limestone with irregular partings

and beds of shale. The limestone predominantly consists of whole and coarsely broken fossils in a fine-grained argillaceous limestone matrix. A portion of this formation consists of interbedded limestone and shale, where the limestone comprises 65 to 85 percent of the formation, and shale comprises the balance. In this portion, the limestone is medium-light-gray to medium-bluish-gray, fine- to coarse-grained, fossil fragmental, evenly thin- to medium-bedded, and medium to well sorted with minor thin, irregularly bedded argillaceous limestone. The shale is medium-gray, fissile, and calcareous in this portion of the formation.

- The Bull Fork Formation consists of interbedded limestone and shale. The limestone is more than 50 percent of formation and is described as medium-gray, irregularly to evenly bedded in mostly thin beds, but with beds locally more than 6 inches thick. The limestone contains abundant whole or broken fossils. The shale is mostly medium gray, calcareous, and less fossiliferous than the limestone.

Bedrock in the Northern Kentucky Area is typically categorized as highly weathered, weathered, or unweathered, based on the degree of weathering of the shale component. The highly weathered zone is typically the uppermost zone, wherein the shale is brown to olive brown in color and has almost weathered to a clay. In the intermediate weathered zone, the shale is typically olive brown with occasional gray and is stronger than the shale in the highly weathered zone. In the unweathered parent zone, the shale is gray and is stronger than the shale in the weathered zones. Each zone is interbedded with limestone. It is common for one or both of the weathered bedrock zones to be absent due to differential weathering, erosion, or prior excavation. The Rock Classification Sheet, which is included in Appendix C, describes the varying degrees of weathering along with the rock strength descriptions that are used on the appended boring logs.

Regarding the limestone, these layers are predominantly unweathered, and their strengths are estimated to range from medium strong to very strong (i.e., uniaxial compressive strengths ranging from 4,000 psi to upwards of 30,000 psi). Occasionally, layers are encountered within the bedrock profile where groundwater seepage is concentrated and weathering of the limestone layers is more advanced.

Interbedded highly weathered shale and limestone bedrock was encountered in all but Boring B-1. The depth to the top of the highly weathered bedrock, where encountered, ranged from 2.0 to 14.5 feet from the ground surface, and the thickness, where penetrated, varied from 2.5 to 5.2 feet. Borings B-2 and B-6 were terminated in this zone at depths of 19.0 and 12.8 feet, respectively. The strength of the highly weathered shale was described as extremely weak.

Interbedded weathered shale and limestone bedrock was encountered in Borings B-3 and B-5. The depth to the top of the weathered bedrock, where encountered, ranged from 4.5 to 14.5 feet from the ground surface. Borings B-3 and B-5 were terminated in the weathered bedrock at depths of 21.5 and 5.5 feet, respectively. The strength of the weathered shale was described as extremely weak.

Interbedded unweathered shale and limestone bedrock was encountered in Boring B-4 at a depth of 7.0 feet. The strength of the unweathered shale was described as very weak. Boring B-4 was terminated in the unweathered zone of bedrock at a depth of 7.8 feet.

6.2 Groundwater Conditions

The majority of the borings were noted to be dry during drilling, with the exception of Boring B-1, which encountered groundwater at a depth of 5.0 feet within the fill. Borings B-1 and B-2 were noted to cave to depths of 6.0 and 12.0 feet, respectively upon completion of drilling. Borings B-3 through B-6 were noted to be dry upon completion of drilling.

Based on the groundwater observations and our local experience, groundwater seepage is anticipated, along the fill/native soil interface, along the overburden soil/bedrock interface, along limestone layers within the bedrock, and in the saturated zones of fill or native soils that are within the perched groundwater zones, or that are below the groundwater table. Locally concentrated flow may occur due to saturated layers of fill or native soils or along fractures in the bedrock. Additionally, groundwater levels and seepage amounts are expected to vary with time, location, season of the year, and amounts of precipitation.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our engineering reconnaissance of the site, the borings, the visual examination of the recovered samples, the laboratory test results, our understanding of the proposed project, our engineering analyses, and our experience as Consulting Soil and Foundation Engineers in the Northern Kentucky Area, we have reached the following conclusions and make the following recommendations of this report.

7.1 Subsurface Conditions

As discussed in Section 3.0, the project site is an existing softball field that is relatively flat with periodic low-lying “bird bath” areas observed in the grass-covered outfield area and in the dirt infield near the first base dugout area. Generally, the existing ground surface was underlain by 4 to 6 inches of topsoil, where encountered, followed by 1.5 to 17.2 feet of existing lean clay or shale fill, then 2.5 to 4.8 feet of native fat or lean clay soils, underlain by interbedded shale and limestone bedrock. As discussed in Section 6.2, groundwater was only encountered in Boring B-1 at a depth of 5.0 feet within the fill. Refer to Section 6.1 and the boring logs in Appendix C for additional information on the subsurface strata.

7.2 General Discussion

The borings results indicate that 4.5 to 17.5 feet of fill was placed in the valley across the southern portion of the site in Borings B-1, B-2, B-3 and B-6. The overall consistency of the fill was variable with softer layers intermixed with stiffer layers. Borings B-3 and B-4 were drilled within “bird bath” areas and encountered 2.0 to 4.5 feet of fill, which contained limestone floaters. Boring B-5 was drilled in an area of the softball that was not low-lying and had a similar soil profile to that of Boring B-4, which was in a “bird bath”. Deeper fill of 9.5 feet was encountered in Boring B-6, which was drilled near the first base dugout in the low lying area.

In general, it is our opinion that the low-lying areas are occurring due to one or a combination of the following:

1) Minor settlement amounts of the existing fill material have likely occurred over the last 21 years since the field was constructed, which is typical for deeper valley fills.

2) Limestone floaters could be "nested" together below the surface, with voids resulting. Over time finer grained soil tends to migrate to the voids, resulting in surface depressions.

3) In areas where a crust of 2.0 to 4.5-feet of fill was encountered over the native soils or bedrock, low spots may have occurred due to limestone floaters within the fill that are close to subgrade level, which have been pushed up when the ground freezes and thaws, displacing the soil around the floaters.

In areas where relatively flat grades are developed, small amounts of settlement over the years can cause low spots to form, which will hold water and gradually worsen over repeated freeze/thaw cycles throughout the years. It is noted that highly plastic clay soils were not an issue within the top few feet of subgrade.

7.3 Site Preparation and Earthwork

As stated in Section 2.0, site grading is anticipated to be minimal on the order of plus or minus 1 foot. It is our opinion that the subsurface profile is suitable to support an artificial turf softball field provided that the following recommendations are implemented.

The initial preparation of the site for grading should include the removal of vegetation, heavy root systems, and topsoil from the proposed cut and fill areas. The topsoil may be stockpiled for future use in landscaped areas, if permitted by specification, whereas the vegetation, including the heavy root systems, should be disposed of off site in accordance with applicable regulations.

Following clearing the site of the existing vegetation and topsoil and after making the required excavations in the cut areas, the exposed subgrade should be thoroughly proofrolled using a heavily loaded piece of equipment under the review of the Project Geotechnical Engineer, or a representative thereof. Soft or yielding soils observed during the proofrolling should be undercut to stiff non-yielding cohesive soils or medium dense to dense well-graded cohesionless soils; the depth of undercut below proposed subgrade may be limited to 2 feet.

Where undercuts are performed, the excavations should be backfilled with new compacted fill satisfying the material and compaction requirements presented in this section. The undercut soils may be reused provided that they conform to the recommendations contained in this report regarding acceptable fill materials. We recommend that the Contract Documents include a bid item for the recommended undercutting, as deemed necessary, and their replacement with new compacted and tested fill on a "per cubic yard of in-place compacted fill" basis.

If soft or yielding soils are encountered at the maximum undercut depth specified above and the compaction requirements of the undercut backfill cannot be achieved at the bottom of the undercut, the subgrade may be stabilized at those depths using an approved biaxial or triaxial geogrid (e.g., Tensar BX-1200 or TriAx TX160) and an 8-inch lift of compacted crushed stone. The remainder of the undercut should be backfilled with clayey soils satisfying the material and compaction requirements presented in this section. An approved separation geotextile fabric should be provided at the interface between the crushed stone and the clayey soils.

Fill materials should consist of approved on-site, non-organic, clayey soils, bedrock, or approved borrow material that are relatively free of topsoil, vegetation, trash, construction or demolition debris, frozen materials, particles over 6 inches in maximum dimension, or other deleterious materials. Additionally, limestone floaters should be restricted from the fill within the top 2-feet of the subgrade.

The fill should be placed in shallow level lifts (or layers), 6 to 8 inches in loose thickness. Each lift should be moisture-conditioned to within the acceptable moisture content range provided in Table 1, and compacted with a sheepsfoot roller or self-propelled compactor to at least the minimum percent compaction indicated in the same table. Moisture-conditioning may include: aeration and drying of wetter soils; wetting drier soils; and/or thoroughly mixing wetter and drier soils into a uniform mixture.

Table 1. Percent compaction and moisture-conditioning requirements for fill.

Area	Minimum Percent Compaction[a,b]	Acceptable Moisture Content Range[b]
Softball field subgrade	98% of SPMDD	-2% to +3% of OMC

[a] SPMDD = standard Proctor maximum dry density determined from ASTM D698.
[b] OMC = optimum moisture content determined from ASTM D698 or ASTM D1557.

Groundwater is not expected to have a significant adverse effect on the proposed earthwork construction; however, the Contractor must be prepared to remove seepage that accumulates in excavations, on fill surfaces, or at subgrade levels.

Maintaining the moisture content of bearing and subgrade soils within the acceptable range provided in Table 1 is important during and after construction for the proposed softball field. The clayey subgrade soils should not be allowed to become excessively wet or dried during or after construction, and measures should be taken to prevent water from ponding on these soils and to prevent these soils from desiccating during dry weather.

Positive drainage should be established across and around the proposed softball field to promote the rapid drainage of surface water away from the field in order to prevent the ponding of water. Finish grading in the field areas should be sloped at a gradient of at least 2 percent. The final grades should direct the surface water to storm water collection systems.

We recommend that the earthwork operations be carried out during the drier season of the year and that a sufficient gradient be maintained at the ground surface to prevent ponding of surface water. In our experience, the weather conditions are historically more favorable for earthwork during the months of May through October in the Northern Kentucky Area. Regardless of the time of year, fill should not be placed over frozen or saturated soils, and frozen or saturated soils should not be used as compacted fill.

Best management practices (BMPs) should be implemented to reduce the effects of erosion and the siltation of adjacent properties. Upon completion of earthwork, disturbed areas should be stabilized. It is also recommended that riprap and/or suitable armoring be used at the outlets of storm sewers and headwalls to reduce flow velocities and protect against erosion. Excavation Support

Excavation support should be the responsibility of the Contractor. Excavation support should be designed and implemented such that excavations are adequately ventilated and braced, shored, and/or sloped in order to protect and ensure the safety of workers within and near the excavations and to protect adjacent ground, slopes, structures, and infrastructure. Federal, state, and local safety regulations should be satisfied. The analyses, discussions, conclusions, and recommendations throughout this report are not to be interpreted as pre-engineering compliance with any safety regulation.

8.0 RECOMMENDED ADDITIONAL SERVICES

The conclusions and recommendations given in this report are based on: Geotechnology's understanding of the proposed design and construction, as outlined in this report; site observations; interpretation of the exploration data; and our experience. Since the intent of the design recommendations is best understood by Geotechnology, we recommend that Geotechnology be included in the final design and construction process, and be retained to review the project plans and specifications to confirm that the recommendations given in this report have been correctly implemented. We recommend that Geotechnology be retained to participate in prebid and preconstruction conferences to reduce the risk of misinterpretation of the conclusions and recommendations in this report relative to the proposed construction of the subject project.

Since actual subsurface conditions between boring locations may vary from those encountered in the borings, our design recommendations are subject to adjustment in the field based on the subsurface conditions encountered during construction. Therefore, we recommend that Geotechnology be retained to provide construction observation services as a continuation of the design process to confirm the recommendations in this report and to revise them accordingly to accommodate differing subsurface conditions. Construction observation is intended to enhance compliance with project plans and specifications. It is not insurance, nor does it constitute a warranty or guarantee of any type. Regardless of construction observation, contractors, suppliers, and others are solely responsible for the quality of their work and for adhering to plans and specifications.

9.0 LIMITATIONS

This report has been prepared on behalf of, and for the exclusive use of, the client for specific application to the named project as described herein. If this report is provided to other parties, it should be provided in its entirety with all supplementary information. In addition, the client should make it clear that the information is provided for factual data only, and not as a warranty of subsurface conditions presented in this report.

Geotechnology has attempted to conduct the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. The recommendations and conclusions contained in this report are professional opinions. The report is not a bidding document and should not be used for that purpose.

Our scope for this phase of the project did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors noted or unusual or suspicious items or conditions observed are strictly for the information of our client.

Our scope did not include: any services to investigate or detect the presence of mold or any other biological contaminants (such as spores, fungus, bacteria, viruses, and the by-products of such organisms) on and around the site; or any services, designed or intended, to prevent or lower the risk of the occurrence of an infestation of mold or other biological contaminants.

The analyses, conclusions, and recommendations contained in this report are based on the data obtained from the subsurface exploration. The field exploration methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Consequently, subsurface conditions may vary gradually, abruptly, and/or nonlinearly between sample locations and/or intervals.

The conclusions or recommendations presented in this report should not be used without Geotechnology's review and assessment if the nature, design, or location of the facilities is changed, if there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if there is a substantial interruption or delay during work at the site. If changes are contemplated or delays occur, Geotechnology must be allowed to review them to assess their impact on the findings, conclusions, and/or design recommendations given in this report. Geotechnology will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the subsurface data or with reuse of the subsurface data or engineering analyses in this report.

The recommendations included in this report have been based in part on assumptions about variations in site stratigraphy that may be evaluated further during earthwork and foundation construction. Geotechnology should be retained to perform construction observation and continue its geotechnical engineering service using observational methods. Geotechnology cannot

assume liability for the adequacy of its recommendations when they are used in the field without Geotechnology being retained to observe construction.

A copy of "Important Information about This Geotechnical-Engineering Report" that is published by the Geotechnical Business Council (GBC) of the Geoprofessional Business Association (GBA) is included in Appendix A for your review. The publication discusses some other limitations, as well as ways to manage risk associated with subsurface conditions.

APPENDIX A – IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

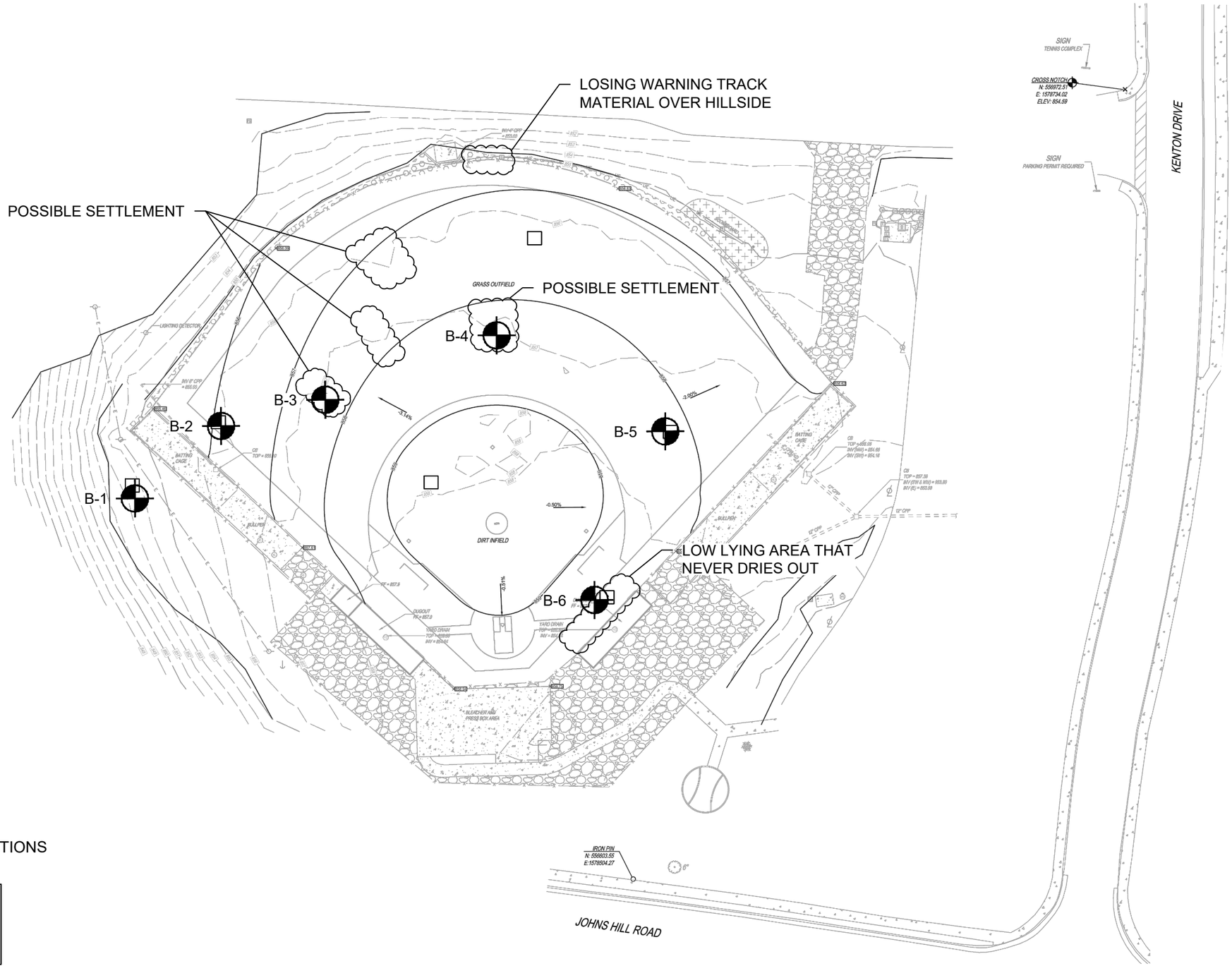
Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B – PLANS

Boring Plan, Sheet No. 1



INDICATES TEST BORING LOCATIONS

0 25 50 100
SCALE: 1" = 50'

NOTE: BASE MAP FROM GRADING PLAN (OPTION 1) BY KLEINGERS, DATED SEPTEMBER 2019.

GEOTECHNOLOGY INC
FROM THE GROUND UP

Project: Northern Kentucky University
Geotechnical Exploration
NKU Softball Field

Location: Highland Heights, Kentucky

Title: BORING PLAN

Client: Northern Kentucky University

Date: 12/9/2019

Project No.: J035590.01

Sheet No.: 1

APPENDIX C – BORING INFORMATION

Boring Logs

Soil Classification Sheet

Rock Classification Sheet

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-1
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
853.7	Ground Surface	0.0	0						
853.4	TOPSOIL	0.3		I	1A 1B	DS	6-5-8	14	78
851.7	Mixed brown, trace gray moist medium stiff to stiff FILL, lean clay, trace clay with roots, oxide stains and concretions, limestone fragments and shale fragments.	2.0							
	Mixed brown, trace gray moist stiff FILL, lean clay, trace roots with shale and limestone fragments and limestone floaters.			I	2	DS	4-2-4	16	89
848.9		4.8	5						
	Mixed brown, trace gray very moist soft FILL, lean clay, trace roots with oxide concretions and shale and limestone fragments.			I	3	DS	7-6-5	14	78
846.2		7.5							
	Mixed brown, trace gray moist stiff FILL, lean clay and shale with limestone fragments and floaters.			I	4	DS	11-4-8	14	78
843.9		9.8	10						
	Mixed brown, trace gray moist medium stiff FILL, lean clay, trace clay with shale fragments, limestone fragments and limestone floaters.			I	5	DS	2-2-4	16	89
841.7		12.0							
	Mixed brown, trace dark brown and greenish gray very moist medium stiff to stiff FILL, fat clay, trace topsoil and organics with shale and limestone fragments.			I	6	DS	8-4-3	14	78
839.2		14.5	15						
	Mixed brown, black and greenish gray, very moist medium stiff FILL, lean clay, some organics with limestone fragments.			I	7	DS	6-3-5	14	78
836.2		17.5							
835.7	TOPSOIL	18.0		I	8A 8B	DS	8-8-9	18	100
834.2	Brown, trace gray moist stiff FAT CLAY with oxide stains.	19.5							
	Brown, trace gray moist very stiff LEAN CLAY with limestone fragments, trace bedding planes (residual).		20	I	9	DS	8-12-15	18	100
831.7		22.0							
829.7	Brown, trace gray moist very stiff FAT CLAY with oxide stains and limestone fragments, trace bedding planes (residual).	24.0		I	10	DS	9-9-11	16	89
	Bottom of test boring at 24.0 feet.		25						
			30						

Datum: NAVD 88
Surface Elevation: 853.7 ft.
Date Started: 11/8/2019
Date Completed: 11/8/2019

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted 5.0 ft.
At Completion Caved in to 6.0 ft.
After --
Backfilled Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

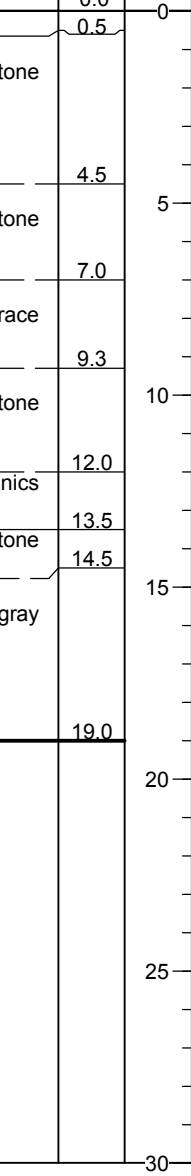
GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-2
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
856.3	Ground Surface	0.0						
855.8	TOPSOIL with roots, trace gravel.	0.5	I	1A 1B	DS	3-4-3	14	78
	Mixed brown, trace gray moist stiff FILL, lean clay with shale and limestone fragments, trace roots.		I	2	DS	2-3-2	16	89
851.8		4.5						
	Mixed brown, trace gray moist very stiff FILL, lean clay with shale and limestone fragments (CL).		U	3	PT		17	71
849.3		7.0						
	Mixed brown, trace gray and dark brown moist medium stiff FILL, lean clay, trace topsoil and organics with shale and limestone fragments.		I	4	DS	3-2-9	14	78
847.0		9.3						
	Mixed brown, trace gray moist stiff FILL, lean clay with shale and limestone fragments.		I	5	DS	6-5-3	16	89
844.3		12.0						
	Mixed brown, dark brown and gray moist very stiff FILL, fat clay, trace organics with oxide stains, shale fragments and limestone floaters, trace metal pieces.		I	6A 6B	DS	5-4-7	18	100
842.8		13.5						
841.8	Mixed dark brown and dark greenish gray moist soft FILL, lean clay with limestone fragments.	14.5						
	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).		I	7	DS	10-12-21	18	100
			L	8	DS	50/2"	0	0
837.3		19.0						
	Bottom of test boring at 19.0 feet.							



Datum: NAVD 88
Surface Elevation: 856.3 ft.
Date Started: 11/8/2019
Date Completed: 11/8/2019
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Caved in to 12.0 ft.
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-3
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
857.2	Ground Surface	0.0						
856.7	TOPSOIL with roots.	0.5	I	1	DS	4-4-3	16	89
	Mixed brown moist stiff FILL, lean clay with oxide stains and limestone fragments and floaters.		I	2	DS	4-4-9	18	100
852.7		4.5						
	Brown, trace gray moist stiff FAT CLAY, trace gravel with oxide stains (CH).		U	3	PT		10	42
850.2		7.0						
	Brown, trace gray moist very stiff FAT CLAY with oxide stains.		I	4	DS	6-6-8	18	100
847.9		9.3						
	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).		I	5	DS	10-13-22	18	100
			I	6	DS	22-50/5"	6	55
842.7		14.5						
	Interbedded olive brown and gray moist very weak weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).		I	7	DS	49-29-50/1"	10	77
			I	8	DS	50/3"	3	100
			I	9	DS	50/5"	5	100
835.7		21.5						
	Bottom of test boring at 21.5 feet.							

Depth Scale (feet): 0, 5, 10, 15, 20, 25, 30

Datum: NAVD 88
Surface Elevation: 857.2 ft.
Date Started: 11/8/2019
Date Completed: 11/8/2019
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-4
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
856.9	Ground Surface	0.0	0						
856.4	TOPSOIL with roots.	0.5							
854.9	Mixed brown, trace gray moist stiff FILL, lean clay, trace gravel with shale fragments (CL).	2.0		I	1A 1B	DS	3-3-2	16	89
	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).			I	2	DS	4-30-21	18	100
			5	I	3	DS	32-50/2"	4	50
849.9		7.0							
849.1	Interbedded gray moist very weak unweathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).	7.8		I	4	DS	60/4"	4	100
	Bottom of test boring at 7.8 feet.		10						
			15						
			20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 856.9 ft.
Date Started: 11/8/2019
Date Completed: 11/8/2019
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-5
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
857.7	Ground Surface	0.0	0						
857.3	TOPSOIL with roots, trace brick fragments.	0.4							
	Mixed brown moist stiff FILL, lean clay, trace gravel with shale fragments.			I	1A 1B	DS	2-3-4	18	100
855.7		2.0							
	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong unweathered LIMESTONE with fat clay seams (bedrock).			I	2	DS	16-15-21	18	100
853.2		4.5							
852.2	Interbedded olive brown moist very weak weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).	5.5	5	I	3	DS	66/6"	6	100
	Bottom of test boring at 5.5 feet.		10						
			15						
			20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 857.7 ft.
Date Started: 11/8/2019
Date Completed: 11/8/2019
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Northern Kentucky University
PROJECT: NKU Softball Field Renovations
Highland Heights, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-6
PROJECT #: J035590.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
859.2	Ground Surface	0.0	0						
858.2	Mixed red and brown moist loose FILL, fine sand, trace silt.	1.0		I	1A	DS	5-3-3	18	100
858.0	Mixed brown moist loose FILL, fine to coarse sand and gravel with piece of filter fabric.	1.2			1B				
857.2	Mixed brown, trace gray very moist soft FILL, lean clay with shale fragments.	2.0			1C				
				I	2	DS	5-4-7	18	100
854.7	Mixed brown, trace gray moist medium stiff to stiff FILL, lean and fat clay with shale fragments, trace roots.	4.5	5						
	Mixed dark green, trace black very moist soft FILL, lean clay, little topsoil, trace cinders.			I	3	DS	6-3-3	18	100
852.2		7.0							
	Mixed dark grayish brown moist medium stiff to stiff FILL, lean clay, little topsoil.			I	4	DS	3-3-5	15	83
849.7		9.5	10						
	Brown moist stiff FAT CLAY with oxide stains and limestone floaters.			I	5	DS	4-6-12	18	100
847.2		12.0							
846.4	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong unweathered LIMESTONE (bedrock).	12.8		I	6	DS	50/4"	4	100
	Bottom of test boring at 12.8 feet.		15						
			20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 859.2 ft.
Date Started: 11/11/2019
Date Completed: 11/11/2019
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: P. Pattison
Engineer: Michelle E. Casto

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

SOIL CLASSIFICATION SHEET

NON COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

Relative Properties

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

Particle Size Identification

Boulders	- 8 inch diameter or more	
Cobbles	- 3 to 8 inch diameter	
Gravel	- Coarse	- 3/4 to 3 inches
	- Fine	- 3/16 to 3/4 inches
Sand	- Coarse	- 2mm to 5mm (dia. of pencil lead)
	- Medium	- 0.45mm to 2mm (dia. of broom straw)
	- Fine	- 0.075mm to 0.45mm (dia. of human hair)
Silt		- 0.005mm to 0.075mm (Cannot see particles)

COHESIVE SOILS
(Clay, Silt and Combinations)

Consistency	Field Identification	Unconfined Compressive Strength (tons/sq. ft.)
Very Soft	Easily penetrated several inches by fist	Less than 0.25
Soft	Easily penetrated several inches by thumb	0.25 – 0.5
Medium Stiff	Can be penetrated several inches by thumb with moderate effort	0.5 – 1.0
Stiff	Readily indented by thumb but penetrated only with great effort	1.0 – 2.0
Very Stiff	Readily indented by thumbnail	2.0 – 4.0
Hard	Indented with difficulty by thumbnail	Over 4.0

Classification on logs are made by visual inspection.

Standard Penetration Test – Driving a 2.0" O.D., 1 3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the drill log (Example – 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8+9=17 blows/ft.). Refusal is defined as greater than 50 blows for 6 inches or less penetration.

Strata Changes – In the column "Soil Descriptions" on the drill log, the horizontal lines represent strata changes. A solid line (————) represents an actually observed change; a dashed line (— — — —) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

GEOTECHNOLOGY INC
FROM THE GROUND UP

ROCK CLASSIFICATION SHEET

ROCK WEATHERING

Descriptions	Field Identification
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than it its fresh condition.
Highly Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Residual Soil	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact with bedding planes visible, and the soil has not been significantly transported.

ROCK STRENGTH

Descriptions	Field Identification	Uniaxial Compressive Strength (psi)
Extremely Weak	Indented by thumbnail	40-150
Very Weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife.	150-700
Weak	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.	700-4,000
Medium Strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single blow of a geological hammer.	4,000-7,000
Strong	Specimen requires more than one blow of a geological hammer to fracture.	7,000-15,000
Very Strong	Specimen requires many blows with a geological hammer to fracture.	15,000-36,000
Extremely Strong	Specimen can only be chipped with geological hammer.	>36,000

BEDDING

Descriptive Term	Bed Thickness
Massive	> 4 ft.
Thick	2 to 4 ft.
Medium	2 in. to 2 ft.
Thin	< 2 in.

APPENDIX D – LABORATORY TEST DATA

Tabulation of Laboratory Tests

Soil Unconfined Compressive Strength Test Forms

TABULATION OF LABORATORY TESTS

Boring No.	Sample No.	Depth (ft.)		Moisture Content (%)	Dry Unit Weight (pcf)	Atterberg Limits (%)			USCS Classification	Unconfined Compressive Strength (psf)
		From	To			LL	PL	PI		
B-1	2	2.5	4.0	20.1						
B-1	3	5.5	7.0	26.7						
B-1	8B	18.0	19.0	26.2						
B-1	9	20.0	21.5	18.6						
B-1	10	22.5	24.0	26.3						
B-2	1B	0.5	1.5	21.6						
B-2	2	2.5	4.0	23.3						
B-2	PT-3	5.9	6.4	22.6	106.5	47	23	24	CL	4,790
B-3	1B	0.5	1.5	24.7						
B-3	2	2.5	4.0	22.0						
B-3	PT-3	5.3	5.8	28.4	96.7	69	28	41	CH	3,960
B-4	1B	0.5	1.5	25.5		45	24	21	CL	
B-5	1B	0.4	1.5	24.5						
B-6	1C	1.2	1.5	22.8						
B-6	2	2.5	4.0	25.5						
B-6	3	5.0	6.5	28.3						
B-6	5	10.0	11.5	29.8						

GEOTECHNOLOGY INC
FROM THE GROUND UP

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS
ASTM D2166

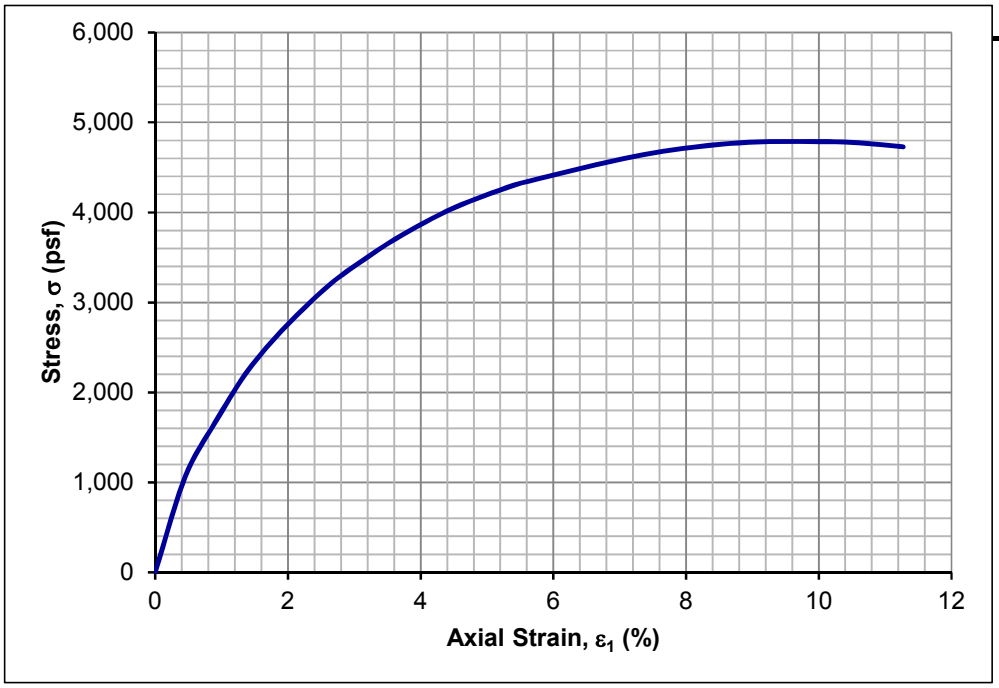
CLIENT : Northern Kentucky University
DATE: 11/27/2019
PROJECT NO.: J035590.01
PROJECT: NKU Softball Field
LOCATION: Highland Heights, KY

BORING NO.: B-2
SAMPLE NO.: PT-3
DEPTH (ft.): 5.9-6.4
SAMPLE OBTAINED BY: Shelby Tube
CONDITION: Undisturbed
SAMPLE DESCRIPTION: Mixed brown, trace gray moist very stiff FILL, lean clay with shale and limestone fragments.

LIQUID LIMIT (%): 47
PLASTIC LIMIT (%): 23
PLASTICITY INDEX (%): 24
USCS: CL
GRAVEL (%):
SAND (%):
SILT (%):
CLAY (%):
SPECIFIC GRAVITY OF SOLIDS: 2.75 (Assumed)
LOAD CELL NO.: 1059

SAMPLE DATA	
DIAMETER (in.):	2.84
HEIGHT (in.):	5.55
HEIGHT TO DIAMETER RATIO:	1.96
WET UNIT WEIGHT (pcf):	130.6
DRY UNIT WEIGHT (pcf):	106.5
VOID RATIO:	0.61
MOISTURE CONTENT (%)*:	22.6
DEGREE OF SATURATION (%):	100

FAILURE DATA	
AVERAGE RATE OF AXIAL STRAIN TO FAILURE (%/min.):	**1.0**
AXIAL STRAIN AT FAILURE (%):	**9.5**
TIME TO FAILURE (min.):	**9.4**
UNCONFINED COMPRESSIVE STRENGTH, q_u (psf):	**4,790**
UNDRAINED SHEAR STRENGTH, s_u (psf):	**2,395**
SENSITIVITY, S_t:	**-**



FAILURE SHAPES


FRONT VIEW


SIDE VIEW

REMARKS :

*Moisture content determined after shear from entire sample.

GEOTECHNOLOGY INC
FROM THE GROUND UP

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS
ASTM D2166

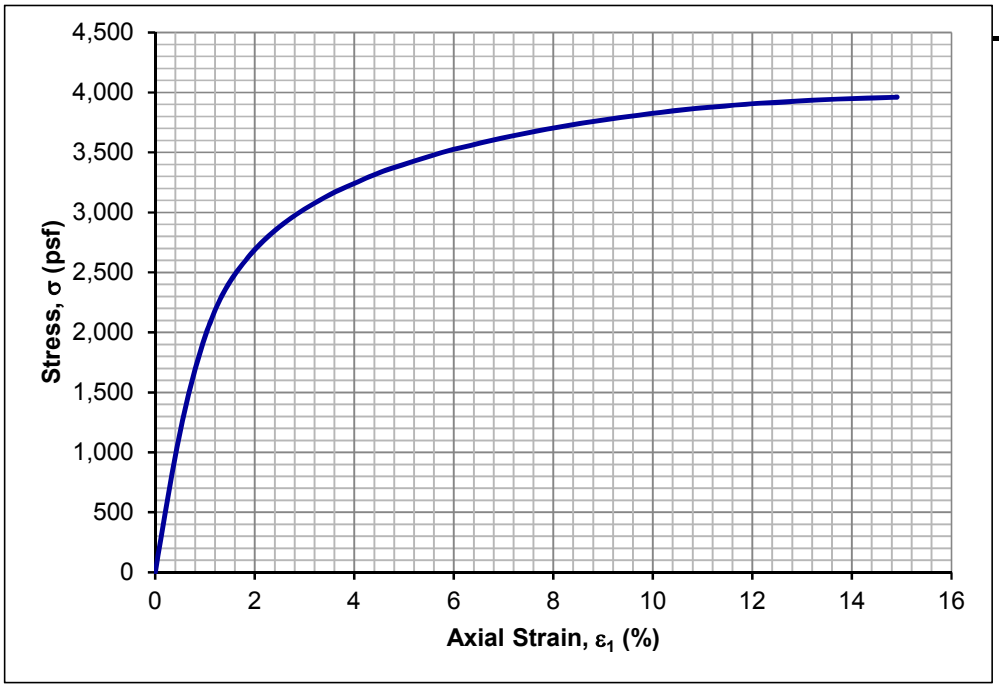
CLIENT : Northern Kentucky University
DATE: 11/26/2019
PROJECT NO.: J035590.01
PROJECT: NKU Softball Field
LOCATION: Highland Heights, KY

BORING NO.: B-3
SAMPLE NO.: PT-3
DEPTH (ft.): 5.3-5.8
SAMPLE OBTAINED BY: Shelby Tube
CONDITION: Undisturbed
SAMPLE DESCRIPTION: Brown, trace gray moist stiff FAT CLAY, trace gravel with oxide stains.

LIQUID LIMIT (%): 69
PLASTIC LIMIT (%): 28
PLASTICITY INDEX (%): 41
USCS: CH
GRAVEL (%):
SAND (%):
SILT (%):
CLAY (%):
SPECIFIC GRAVITY OF SOLIDS: 2.75 (Assumed)
LOAD CELL NO.: 1059

SAMPLE DATA	
DIAMETER (in.):	2.84
HEIGHT (in.):	5.53
HEIGHT TO DIAMETER RATIO:	1.95
WET UNIT WEIGHT (pcf):	124.1
DRY UNIT WEIGHT (pcf):	96.7
VOID RATIO:	0.78
MOISTURE CONTENT (%)*:	28.4
DEGREE OF SATURATION (%):	100

FAILURE DATA	
AVERAGE RATE OF AXIAL STRAIN TO FAILURE (%/min.):	**1.0**
AXIAL STRAIN AT FAILURE (%):	**14.9**
TIME TO FAILURE (min.):	**14.7**
UNCONFINED COMPRESSIVE STRENGTH, q_u (psf):	**3,960**
UNDRAINED SHEAR STRENGTH, s_u (psf):	**1,980**
SENSITIVITY, S_t:	**-**



FAILURE SHAPES


FRONT VIEW


SIDE VIEW

REMARKS :

*Moisture content determined after shear from entire sample.

Appendix 2 2020-02-11 NKU Softball Bid Set Drawings

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES

NORTHERN KENTUCKY UNIVERSITY
CAMPBELL COUNTY
SOFTBALL FIELD RENOVATIONS
LOUIE B NUNN DR.
HIGHLAND HEIGHTS, KENTUCKY 41099

SITE DATA:

OWNER:
NORTHERN KENTUCKY UNIVERSITY
LOUIE B NUNN DR,
HIGHLAND HEIGHTS, KY 41099
CONTACT: MARY PAULA SCHUH
(859)-572-5120

SITE ENGINEER:
SPORTWORKS FIELD DESIGN
6219 CENTRE PARK DRIVE
WEST CHESTER, OH 45069
CONTACT: BRAD D'AGNILLO
513-779-7851

TOPOGRAPHIC:
PER SURVEY BY THE KLEINGERS GROUP
DATED SEPTEMBER 2019 COMPILED
WITH RECORD DRAWINGS DATED
01/28/2020

Know what's below. Call before you dig.

SHEET INDEX

VICINITY MAP:

NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL
FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE:

SHEET NAME:
TITLE SHEET

SHEET NO.
C000

INSPIRED PEOPLE ▸ CREATIVE DESIGN ▸ TRANSFORMING COMMUNITIES

GENERAL NOTES

1. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH LOCAL, STATE, & FEDERAL REGULATIONS.

2. THE CONTRACTOR IS TO PERFORM ALL INSPECTIONS AS REQUIRED BY THE KENTUCKY EPA FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (KPDES) PERMIT AND FURNISH OWNERS REPRESENTATIVE WITH WRITTEN REPORTS. OWNER WILL OBTAIN PERMITS.

3. ITEM NUMBERS REFER TO THE KENTUCKY TRANSPORTATION CABINET CONSTRUCTION AND MATERIAL SPECIFICATIONS, AND ALL CONSTRUCTION WORK SHALL BE DONE ACCORDING TO SAID SPECIFICATIONS AND IN ACCORDANCE WITH APPLICABLE STANDARDS OF THE CITY OF HIGHLAND HEIGHTS AND CAMPBELL COUNTY. WHEN IN CONFLICT, THE KYTC REQUIREMENTS SHALL PREVAIL.

4. PROTECTION OF EXISTING TREES AND VEGETATION: PROTECT EXISTING TREES AND OTHER VEGETATION AGAINST UNNECESSARY CUTTING, BREAKING OR SKINNING OF ROOTS, SKINNING OR BRUISING OF BARK, SMOTHERING OF TREES BY STOCKPILING CONSTRUCTION MATERIALS OR EXCAVATED MATERIALS WITHIN DRIP LINE, EXCESS FOOT OR VEHICULAR TRAFFIC, OR PARKING OF VEHICLES WITHIN DRIP LINE. PROVIDE TEMPORARY GUARDS TO PROTECT TREES AND VEGETATION TO BE LEFT STANDING.

5. ALL ELEVATIONS SHOWN ARE FINISHED GRADE ELEVATIONS, UNLESS OTHERWISE NOTED.

6. SUBGRADE EXCAVATION AND CONSTRUCTION TO BE PER GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. SUBGRADE PREPARATION SHALL BEGIN BY CLEARING & STRIPPING UNSUITABLE MATERIAL FROM SITE, THEN PLACE & COMPACT BACKFILL MATERIAL AT GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. ALL BACKFILL MATERIAL MUST BE ACCEPTABLE TO THE GEOTECHNICAL ENGINEER.

7. COMPACTED FILLS ARE TO BE MADE TO A MINIMUM OF THREE FEET ABOVE THE CROWN OF ANY PROPOSED SEWER PRIOR TO CUTTING OF TRENCHES FOR PLACEMENT OF SAID SEWERS. ALL FILLS SHALL BE CONTROLLED, COMPACTED, AND INSPECTED BY AN APPROVED TESTING LABORATORY OR AN INSPECTOR FROM THE APPROPRIATE GOVERNMENTAL AGENCY.

8. ADJUST ALL EXISTING CASTINGS AND CLEANOUTS WITHIN PROJECT AREA TO GRADE AS REQUIRED.

9. CONTRACTOR SHALL IMPLEMENT ALL SOIL AND EROSION CONTROL, PRACTICES REQUIRED BY CAMPBELL COUNTY AND SD1.

10. ALL GROUND SURFACE AREAS THAT HAVE BEEN EXPOSED OR LEFT BARE AS A RESULT OF CONSTRUCTION SHALL BE SEEDED AS SOON AS PRACTICAL IN ACCORDANCE WITH SPECIFICATIONS.

11. ALL PROPOSED STORM SEWERS, SURFACE OR OTHER DRAINAGE FACILITIES ARE PRIVATE AND MAINTAINED BY THE OWNER.

12. THE CONTRACTOR IS TO CONSTRUCT CURBS, CATCH BASINS, DOWNSPOUTS, PIPING AND CONNECTION ETC. AS REQUIRED TO CONVEY THE PAVED SURFACE DRAINAGE TO THE EXISTING DRAINAGE SYSTEM.

13. THE CONTRACTOR IS RESPONSIBLE FOR BALANCING THE SITE EARTHWORK BY IMPORTING OR EXPORTING AS NECESSARY TO ACHIEVE DESIGN GRADES AND SPECIFICATIONS.

14. ANY FIELD TILE CUT MUST BE TIED INTO THE STORM DRAINAGE SYSTEM.

15. THE CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION OR EARTH MOVING OPERATIONS.

16. ALL DIMENSIONS ARE TO THE OUTSIDE FACE OF BUILDING, EDGE OF PAVEMENT AND/OR FACE OF CURB, UNLESS OTHERWISE NOTED.

17. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES WILL BE DISPOSED OF AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. TRAPPED SEDIMENT AND OTHER DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES WILL BE PERMANENTLY REMOVED OR STABILIZED TO PREVENT EROSION AND SEDIMENTATION.

18. ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL MEASURES WILL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

19. DANDY BAGS TO BE USED AT ALL STORM INLETS FOR EROSION CONTROL

20. SANITATION DISTRICT NO. 1 IS TO BE CONTACTED 72 HOURS PRIOR TO ANY CONSTRUCTION ACTIVITY AT (859)578-6880.

UTILITY NOTES

1. ALL CLEAR WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.

2. ALL STORM STRUCTURES ARE KYTC TYPES UNLESS OTHERWISE INDICATED.

3. STORM SEWER PIPE LABELED "STM" SHALL BE ONE OF THE FOLLOWING: PVC SDR-35, OR HIGH DENSITY POLYETHYLENE. STORM SEWER PIPE LABELED "RCP" SHALL BE REINFORCED CONCRETE PIPE. ALL STORM PIPE USED MUST HAVE A MANUFACTURER SPECIFIED FRICTION FACTOR OF 0.013 (n=0.013) OR LESS.

4. STEPS SHALL BE PROVIDED IN ALL CATCH BASINS AND MANHOLES OVER 4' DEEP.

5. CONTRACTOR SHALL SECURE ALL PERMITS AND FURNISH ALL DRAWINGS REQUIRED FOR UTILITY TAPS PRIOR TO STARTING CONSTRUCTION.

6. PROVIDE MANUFACTURERS RECOMMENDED COVER OVER TOP OF STORM PIPE DURING CONSTRUCTION, UNTIL PAVING OPERATIONS BEGIN.

7. SITE UTILITY CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED VERTICAL SEPARATION BETWEEN UTILITIES BY VARYING DEPTH OF UNDERGROUND ELECTRIC, TELEPHONE, WATER AND GAS.

9. A MINIMUM OF 1.5' OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN UTILITIES AT ALL TIMES.

13. FORTY-EIGHT HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTOR SHALL NOTIFY THE KENTUCKY UNDERGROUND PROTECTION SERVICE, AND ALL OTHER AGENCIES WHICH MAY HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NON-MEMBERS OF THE KENTUCKY UNDERGROUND PROTECTION SERVICE.

14. EXISTING UNDERGROUND UTILITIES AND SERVICES ARE SHOWN IN THEIR APPROXIMATE LOCATIONS ACCORDING TO THE BEST INFORMATION AVAILABLE. THE LOCATIONS SHOWN ARE INTENDED ONLY AS A GUIDE AND CANNOT BE GUARANTEED ACCURATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR:
A. CONTACTING THE INDIVIDUAL UTILITY OWNERS TEN DAYS PRIOR TO CONSTRUCTION AND ADVISING THEM OF THE WORK TO TAKE PLACE.
B. SOLICITING THEIR AID IN LOCATING AND PROTECTING ANY UTILITY WHICH MAY INTERFERE WITH CONSTRUCTION.
C. EXCAVATING AND VERIFYING THE HORIZONTAL AND VERTICAL LOCATION OF EACH UTILITY.
D. ALL DAMAGE TO ANY EXISTING UTILITY.

GRADING & EROSION CONTROL NOTES

1. THE NPDES PERMIT REQUIRES THAT ALL AREAS WHICH ARE AT OR NEAR FINAL GRADE, OR WHICH REMAIN DORMANT FOR MORE THAN 21 DAYS OR LONGER BE STABILIZED WITHIN 7 DAYS OF LAST ACTIVITY. VELOCITY DISSIPATION DEVICES SHOULD BE PLACED AT THE OUTFALL OF ALL DETENTION OR RETENTION STRUCTURES AND ALONG THE LENGTH OF ANY OUTFALL CHANNEL AS NECESSARY TO PROVIDE A NON-EROSIVE FLOW VELOCITY FROM THE STRUCTURE TO THE WATER COURSE.

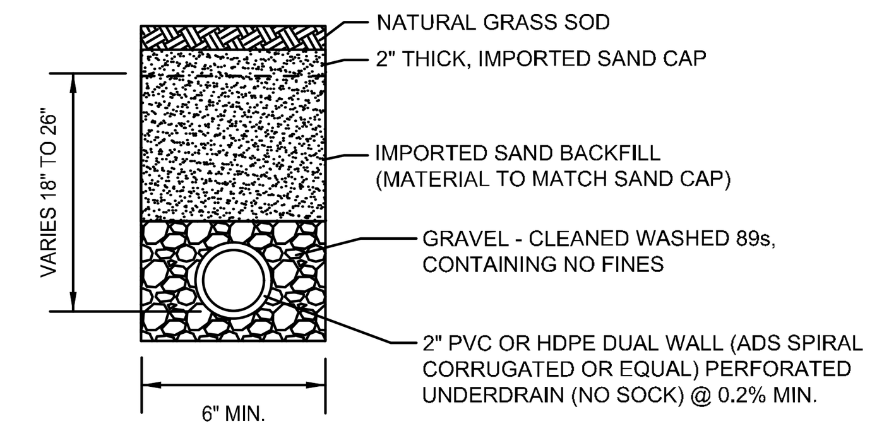
2. THE NPDES PERMIT REQUIRES THAT SEDIMENT AND EROSION CONTROLS BE INSPECTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF 0.5" OR GREATER RAINFALL. A WRITTEN LOG SHOULD INDICATE THE DATE OF INSPECTION NAME OF INSPECTOR, WEATHER CONDITIONS, OBSERVATIONS, ACTIONS TAKEN TO CORRECT ANY PROBLEMS AND THE DATE ACTION WAS TAKEN.

3. SOLID, SANITARY AND TOXIC WASTE MUST BE DISPOSED OF IN A PROPER MANNER IN ACCORDANCE WITH STATE, LOCAL AND FEDERAL REGULATIONS.

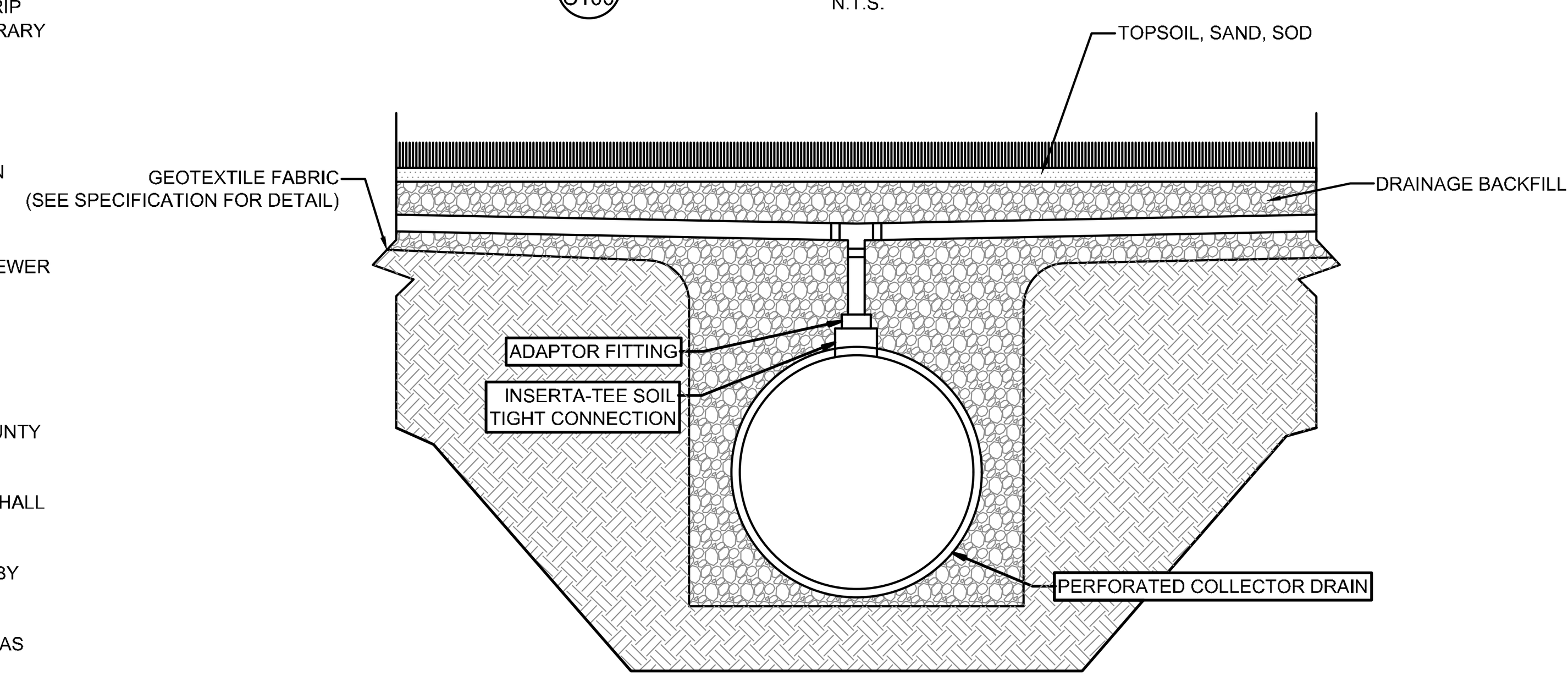
4. TEMPORARY SEEDING TYPES-
A.) TALL FESCUE--SEED AT A RATE OF 50 LBS./ACRE (1 LB./100 SQ. FT.) AND MULCH WITH STRAW AT A RATE OF 2 TONS PER ACRE (90 LBS./1000 SQ. FT.). ESTABLISH BETWEEN MARCH 15 AND SEPTEMBER 30. COVER THE SEED 1/4-1/2 INCH BY RAKE OR SIMILAR TOOL. THIS IS THE MOST WIDELY USED AND BEST ADAPTED GRASS FOR STREAMBANK SEEDINGS. IT HAS GOOD TOLERANCE TO WET SOILS AND FLOODING. IT IS ALSO WELL ADAPTED TO WELL DRAINED SOILS.

B.) REED CANARYGRASS (PHALARIS ARUNDINACAE) PLUS TALL FESCUE--SEED THE REED CANARYGRASS AT A RATE OF 15LBS./ACRE (1/3 LB./1000 SQ. FT.), PLUS 10 LBS./ACRE (1/4LB./1000 SQ. FT.) OF TALL FESCUE. MULCH WITH STRAW AT A RATE OF 2 TONS/ACRE (90 LBS./1000 SQ. FT.). THIS MIXTURE SHOULD ONLY BE SEEDED FROM MARCH 1 TO MAY 15, OR AUGUST 1 TO SEPTEMBER 30. COVER THE SEED 1/4-1/2 INCH BY RAKING OR SIMILAR TOOL. THIS MIXTURE IS ADAPTABLE TO SOILS THAT ARE VERY WET AS WELL AS WELL DRAINED SOIL CONDITIONS. REED CANARYGRASS CAN WITHSTAND EXTENDED PERIODS OF FLOODING. IT IS EXCELLENT FOR EROSION CONTROL. REED CANARYGRASS CAN ALSO BE ESTABLISHED BY SOD STRIPS, USING RHIZIMES, OR FRESHLY CUT CULMS. THE LOCAL CONSERVATION SERVICE OFFICE CAN PROVIDE THE SPECIFIC DETAILS REQUIRED TO USE ONE OF THE ALTERNATIVE ESTABLISHMENT METHODS.

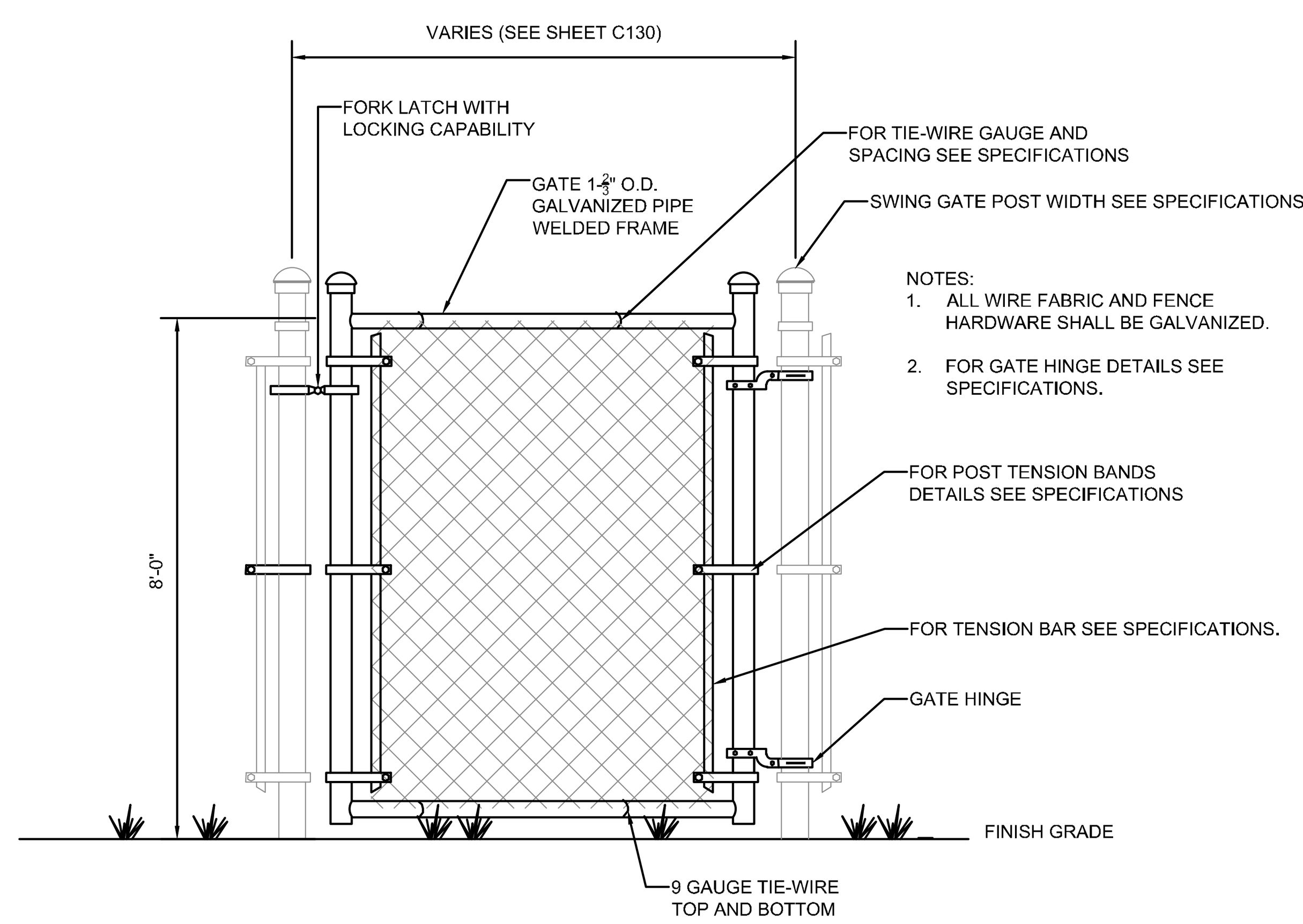
811 Know what's below. Call before you dig.



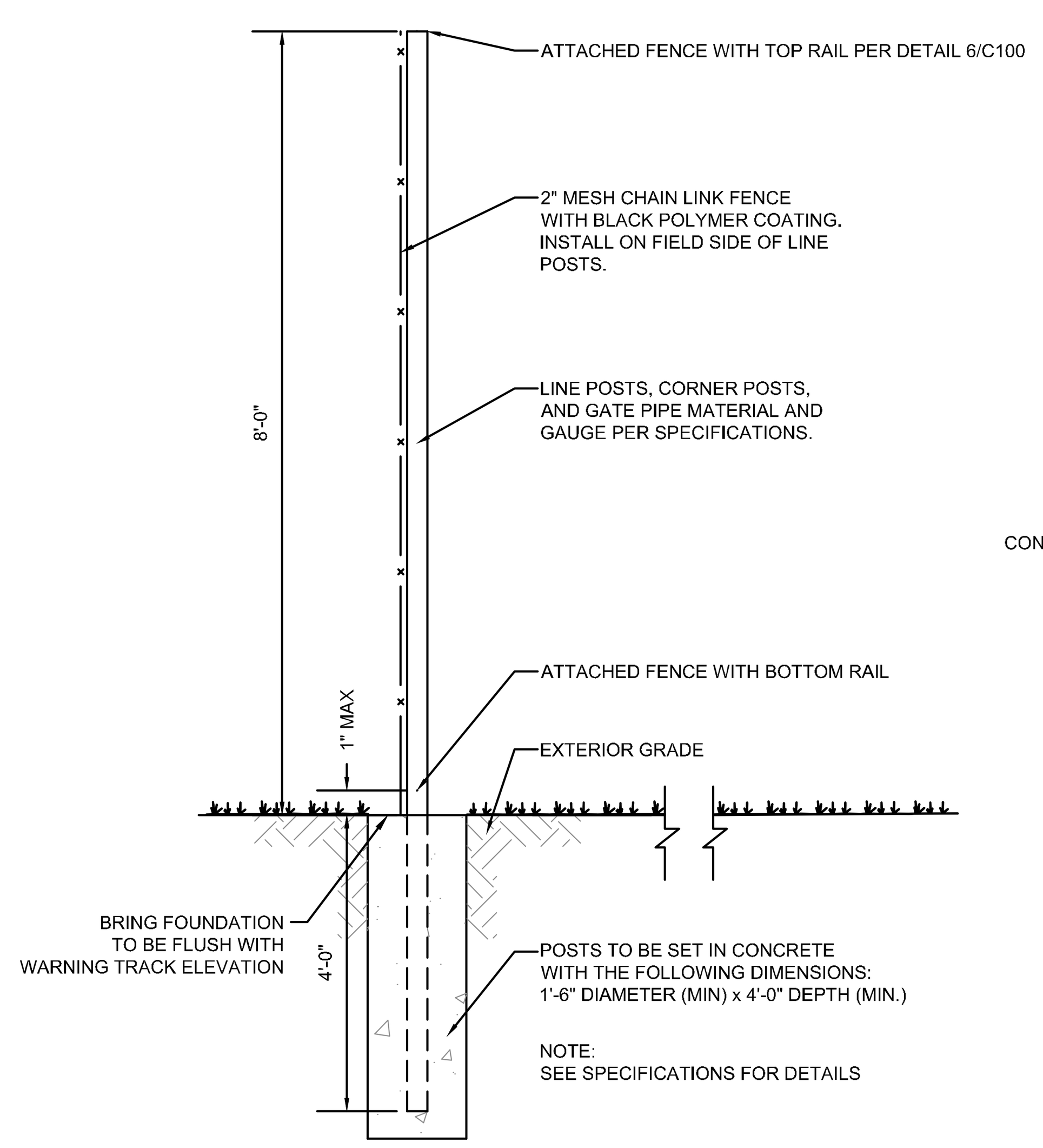
1/C100 UNDERDRAIN DETAIL
N.T.S.



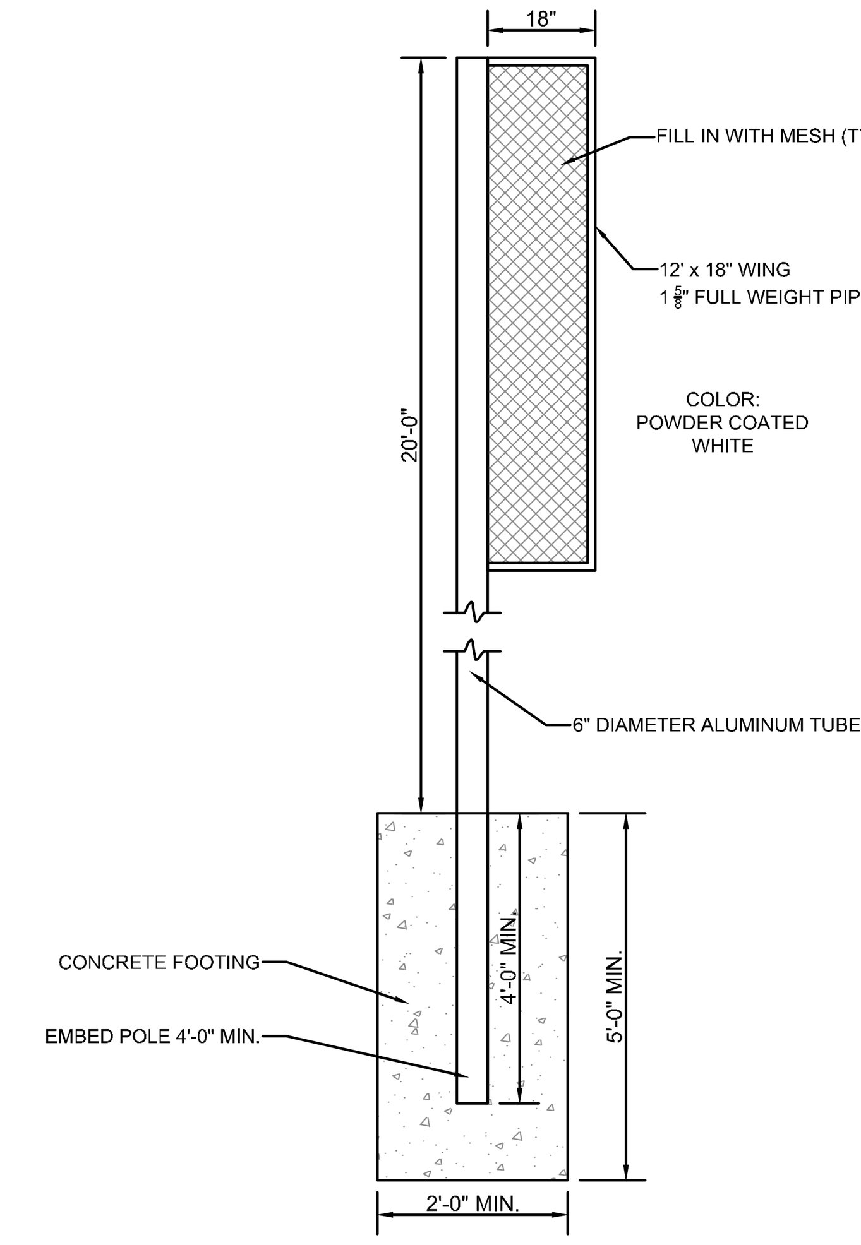
2/C100 NATURAL TURF COLLECTOR PIPE
N.T.S.



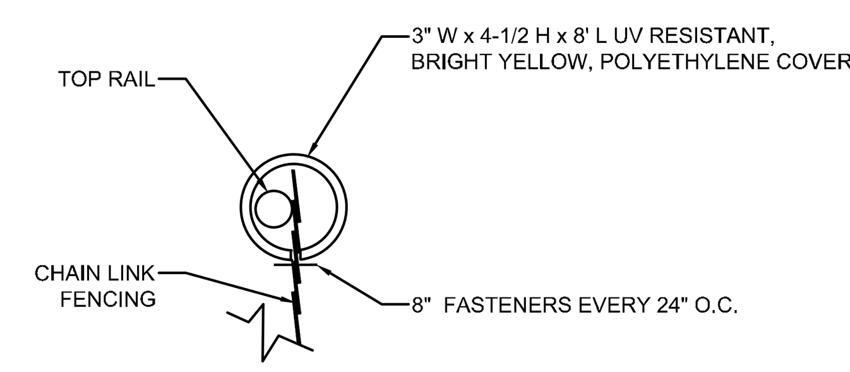
3/C100 8' VINYL COATED CHAIN LINK FENCE GATE DETAIL
N.T.S.



4/C100 8' VINYL COATED CHAIN LINK FENCE
N.T.S.

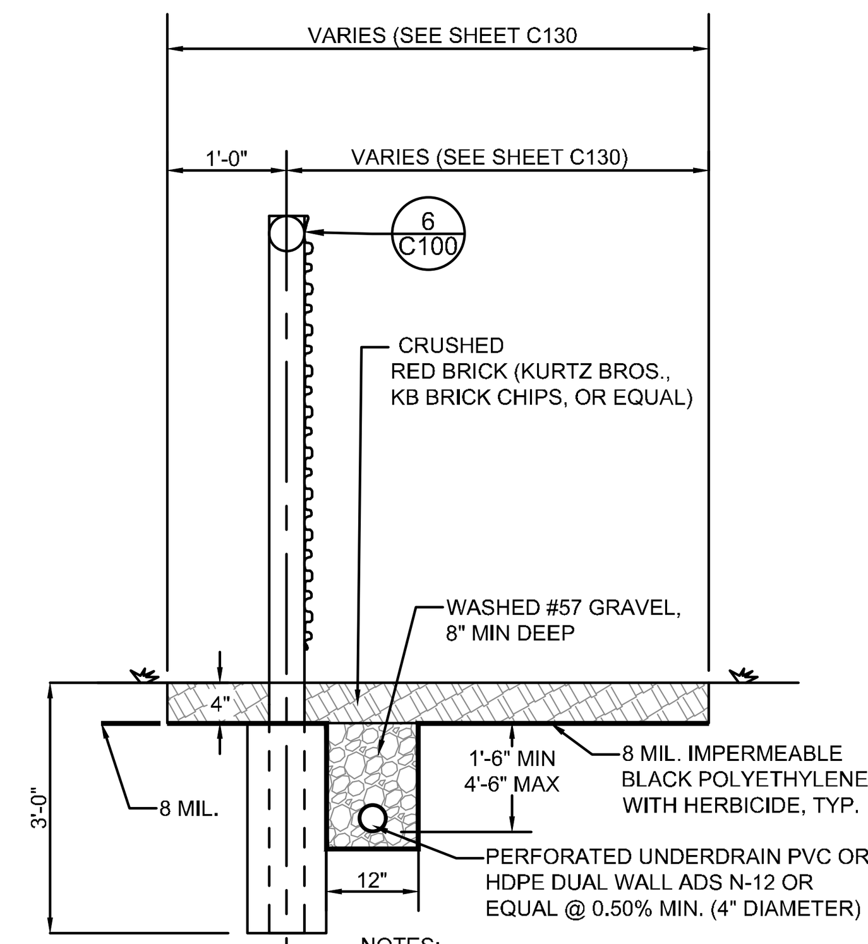


5/C100 FOUL POLE
N.T.S.



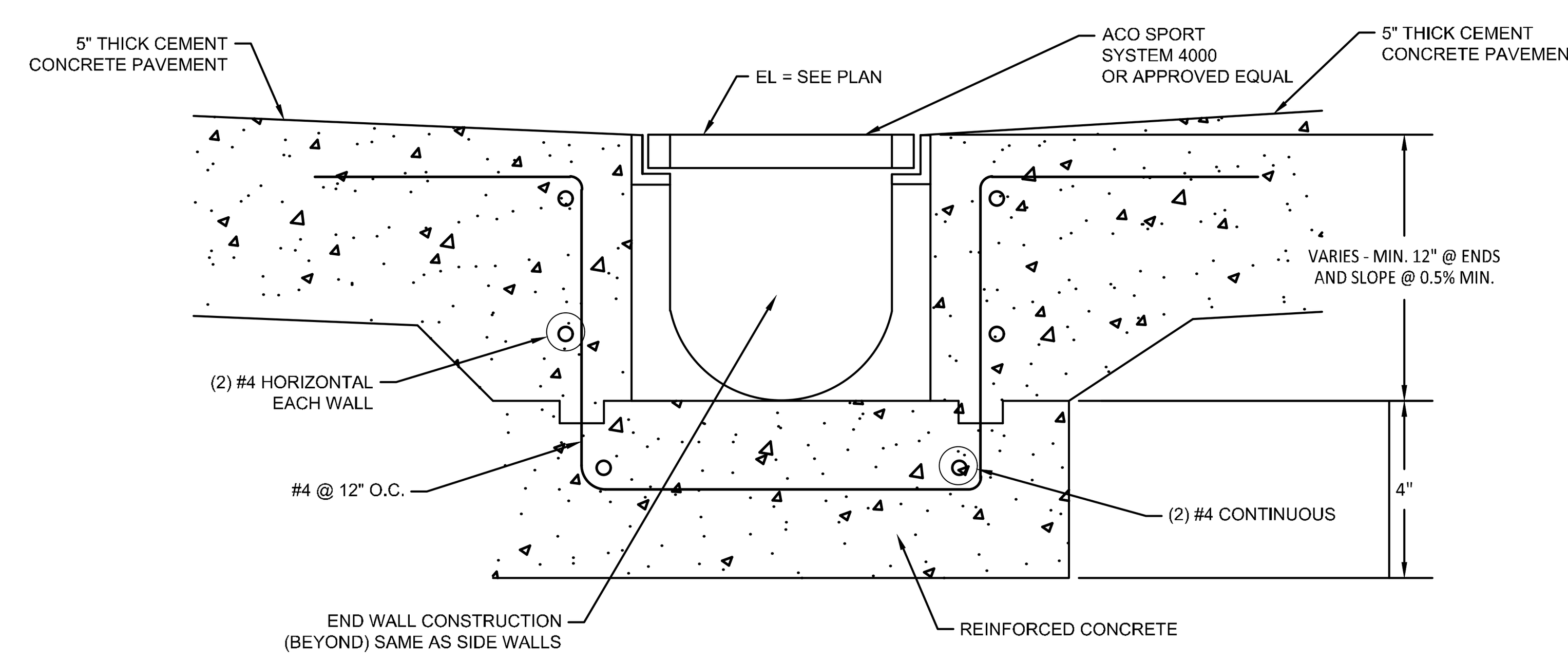
NOTE:
1. PROVIDE AT ALL FENCES ADJACENT TO WARNING TRACK.
2. 4" DIAMETER CORRUGATED COVERS ARE PROHIBITED.

6/C100 TOP RAIL COVER
N.T.S.

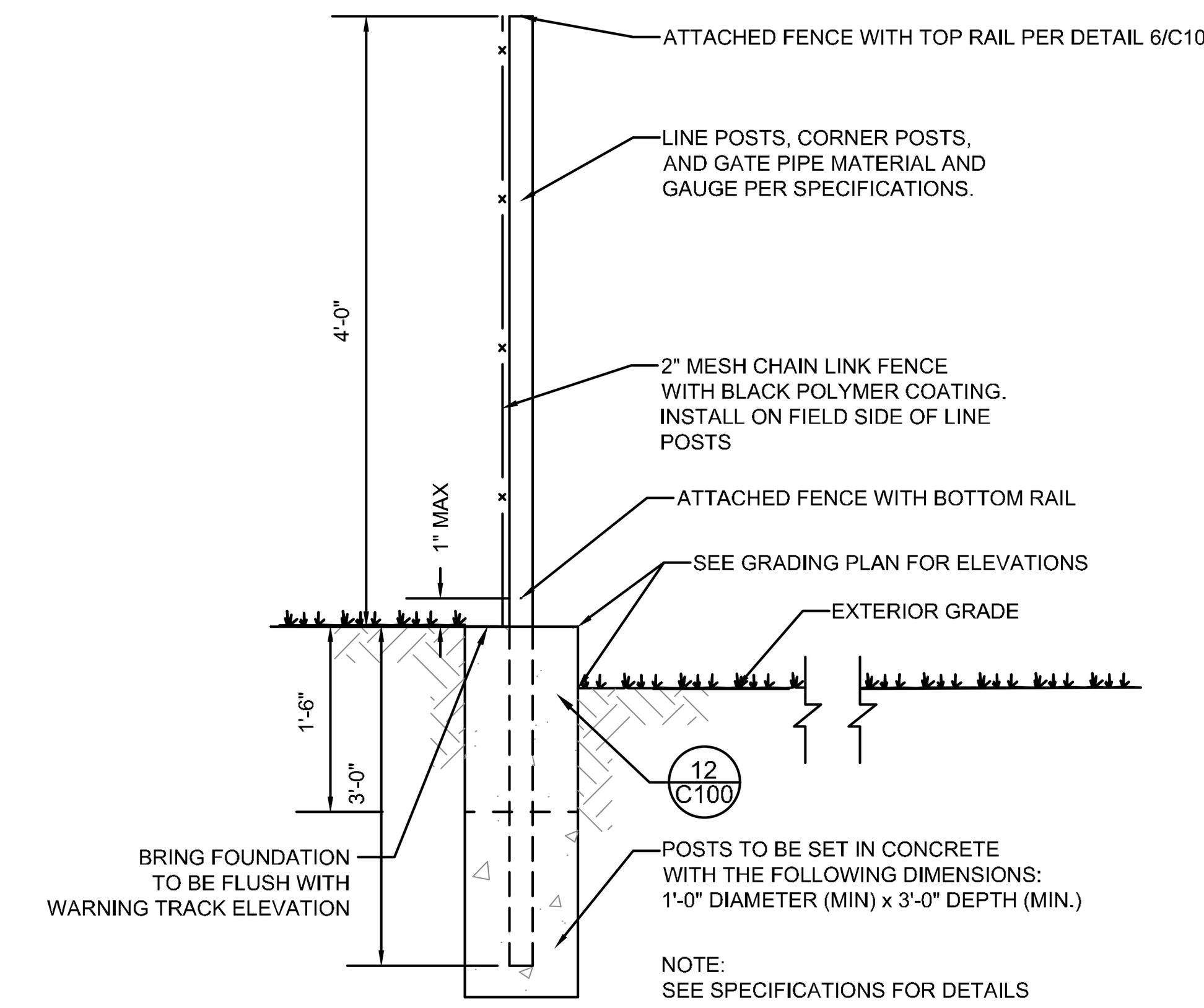


NOTES:
1. ALL ATHLETIC FIELDS AND DETAILS SHALL COMPLY WITH MOST CURRENT DESIGN GUIDELINES, RECOMMENDATIONS, AND SPECIFICATIONS OF THE NCAA.
2. FENCE FABRIC TO BE PLACED ON INSIDE FACE AT ALL ATHLETIC FIELDS (TYP). SEE SHEET C130 FOR LOCATIONS.

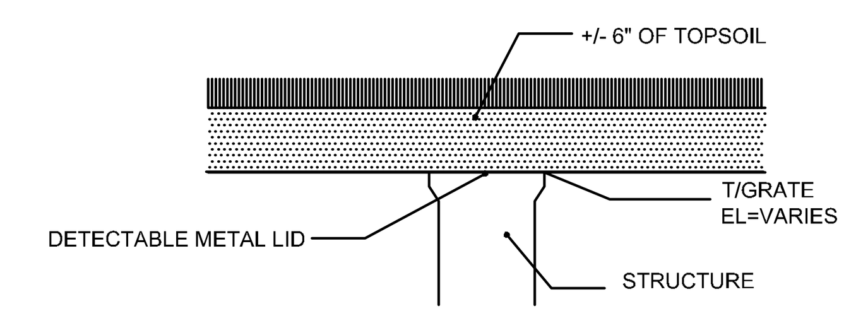
7/C100 WARNING TRACK
N.T.S.



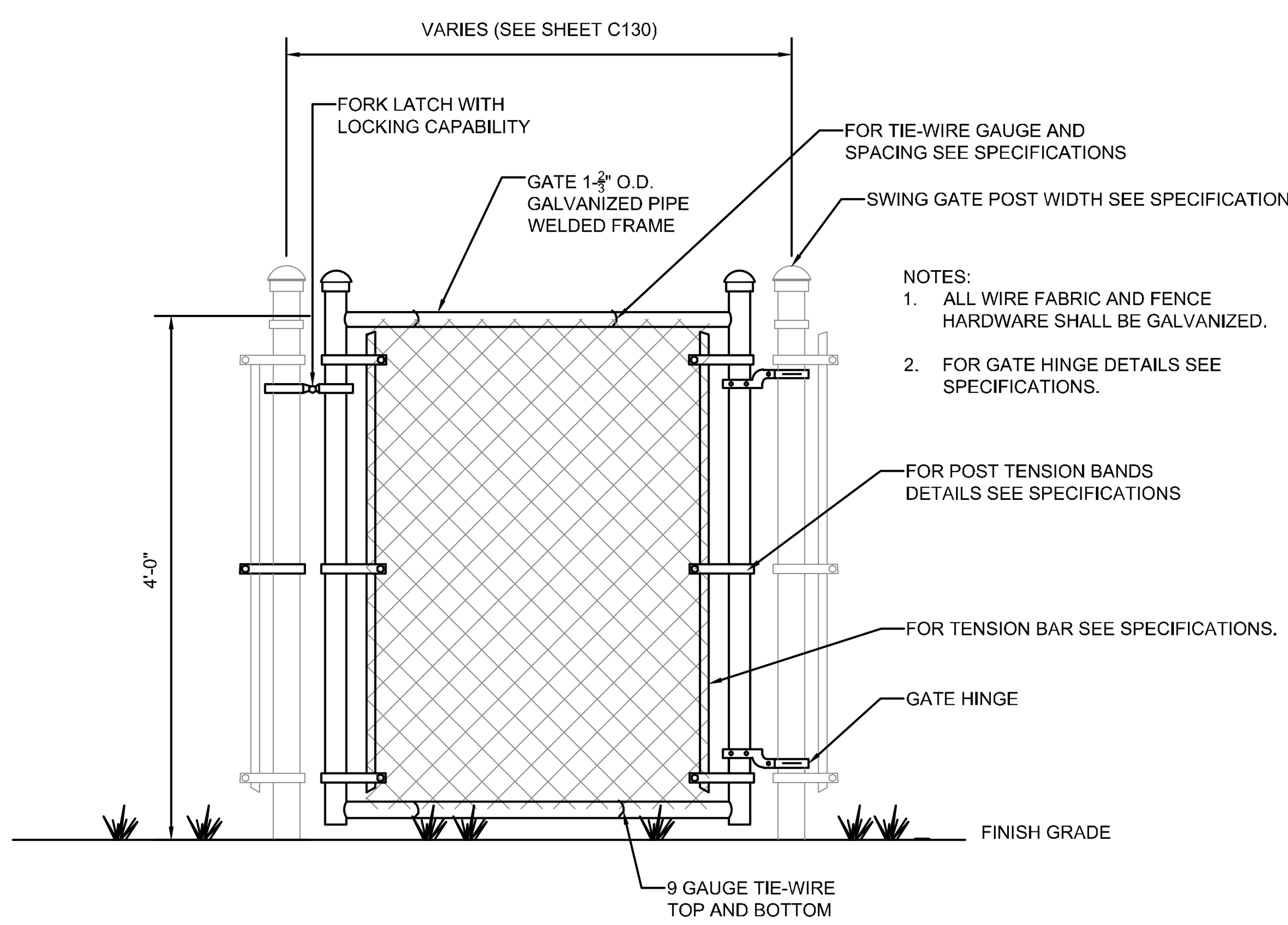
8/C100 TRENCH DRAIN DETAIL
N.T.S.



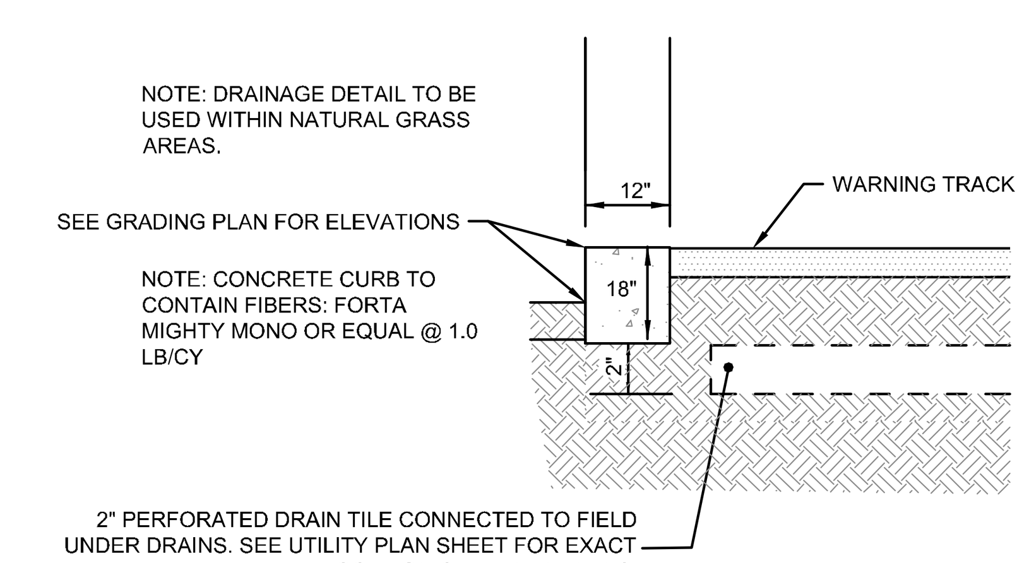
9/C100 4' VINYL COATED CHAIN LINK FENCE
N.T.S.



10/C100 MANHOLE SETTING WITHIN FIELD LIMITS
N.T.S.



11/C100 4' VINYL COATED CHAIN LINK FENCE GATE DETAIL
N.T.S.



12/C100 PERIMETER CURB
N.T.S.

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NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL
FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

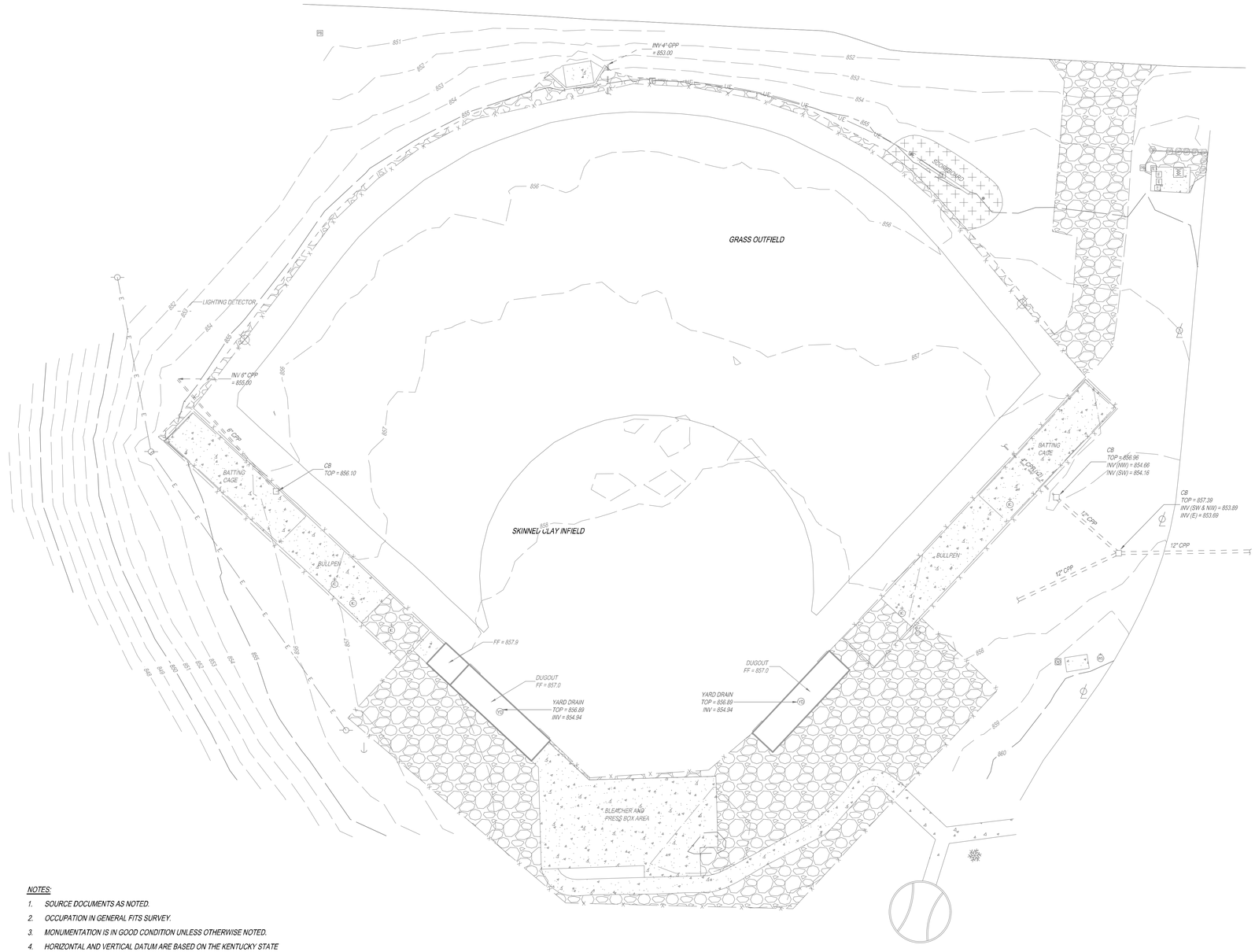
PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE:

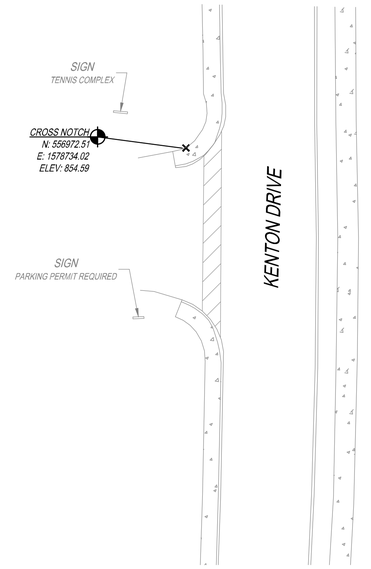
SHEET NAME:
GENERAL NOTES & DETAILS

SHEET NO.
C100

H:\Engineering2007-2008\P\080115\036_DWG_Sheets\080115GEN036.dwg, 2/13/2020 12:57:20 PM, cponting

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES





LEGEND

- SITE BENCHMARK
- ELECTRIC BOX
- ELECTRIC METER
- PULL BOX
- UNDERGROUND TRANSFORMER
- LIGHT POLE
- UTILITY POLE
- GUY WIRE
- CATCH BASIN
- STORM MANHOLE
- YARD DRAIN
- IRRIGATION CONTROL VALVE
- SPRINKLER HEAD
- WATER METER
- WATER SERVICE
- WATER FOUNTAIN
- GUARD POST
- CONIFEROUS TREE
- FENCE LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- WATER
- STORM SEWER
- CONCRETE AREA
- GRAVEL AREA
- LANDSCAPED AREA
- RIP RAP AREA

NOTES:

1. SOURCE DOCUMENTS AS NOTED.
2. OCCUPATION IN GENERAL FITS SURVEY.
3. MONUMENTATION IS IN GOOD CONDITION UNLESS OTHERWISE NOTED.
4. HORIZONTAL AND VERTICAL DATUM ARE BASED ON THE KENTUCKY STATE PLANE COORDINATE SYSTEM NORTH ZONE (KSPC) AS DERIVED FROM THE KENTUCKY DEPARTMENT OF TRANSPORTATION'S VIRTUAL REFERENCE STATIONING (VRS) (NAD83) (NAVD88)
5. SITE BENCHMARK AS SHOWN HEREON.

NOTE:
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE KENTUCKY UTILITY PROTECTION SERVICE AT 1-800-752-6007 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

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NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL
FIELD RENOVATIONS

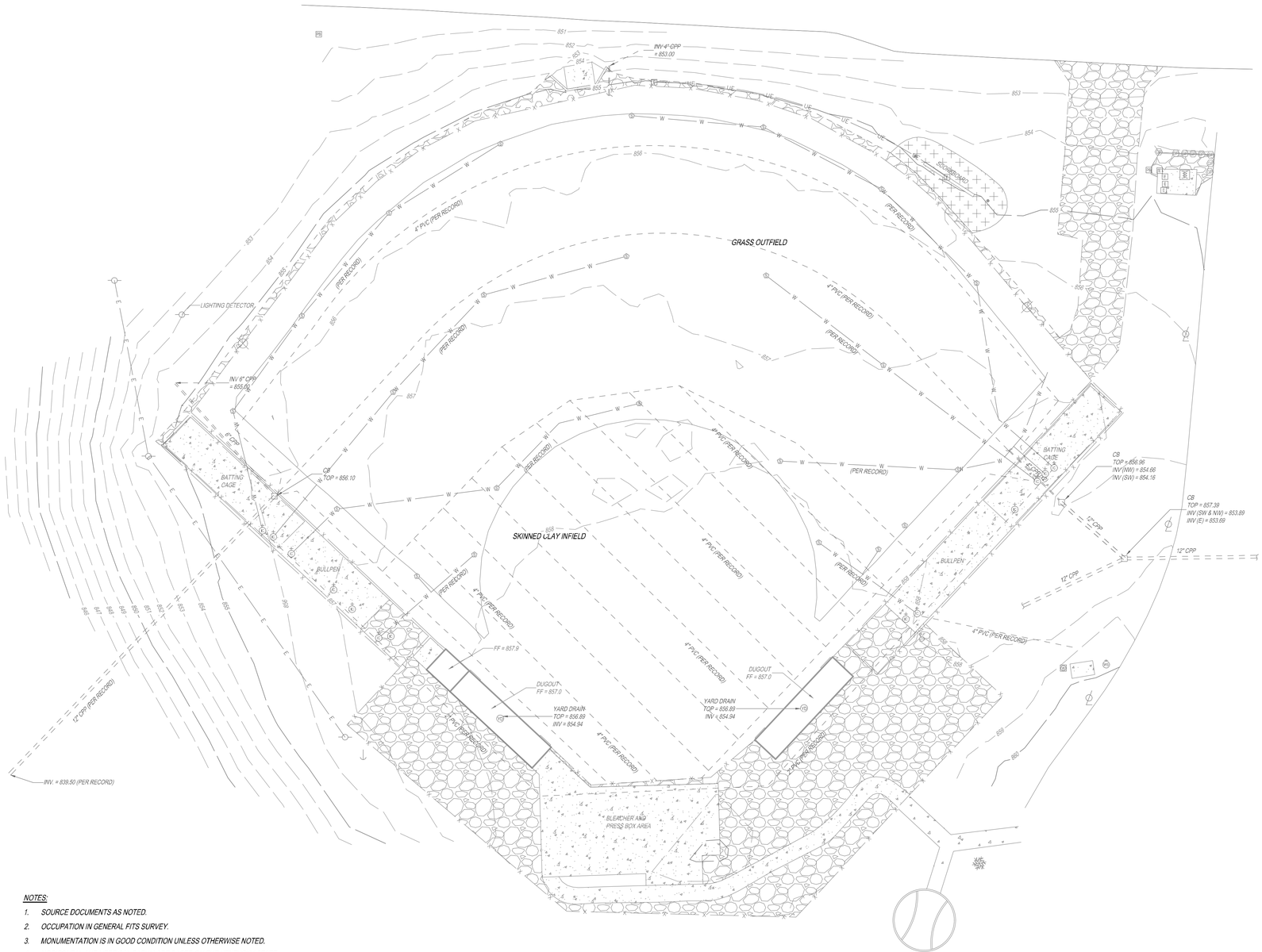
SEAL:
STATE OF KENTUCKY · CRAIG A. HONKOMP · 30485 · LICENSED PROFESSIONAL ENGINEER

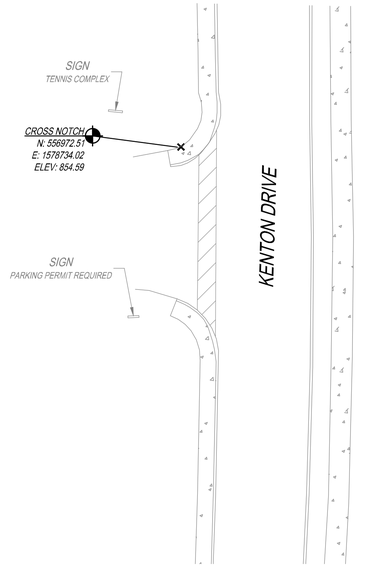
NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: 0 10 20 40
SHEET NAME: SURVEY BASEMAP
SHEET NO. C110

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES





LEGEND

- SITE BENCHMARK
- ELECTRIC BOX
- ELECTRIC METER
- PULL BOX
- UNDERGROUND TRANSFORMER
- LIGHT POLE
- UTILITY POLE
- GUY WIRE
- CATCH BASIN
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- WATER FOUNTAIN
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- FENCE LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- WATER
- STORM SEWER
- CONCRETE AREA
- GRAVEL AREA
- LANDSCAPED AREA
- RIP RAP AREA

NOTES:

1. SOURCE DOCUMENTS AS NOTED.
2. OCCUPATION IN GENERAL FITS SURVEY.
3. MONUMENTATION IS IN GOOD CONDITION UNLESS OTHERWISE NOTED.
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5. SITE BENCHMARK AS SHOWN HEREON.

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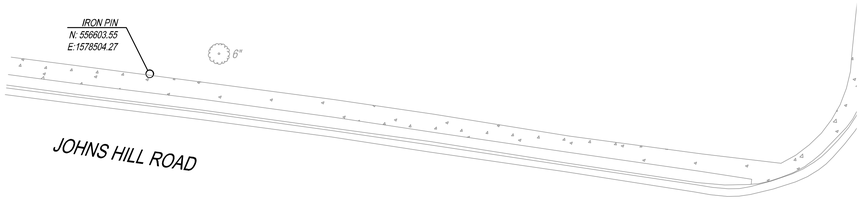

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NORTHERN KENTUCKY UNIVERSITY FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS

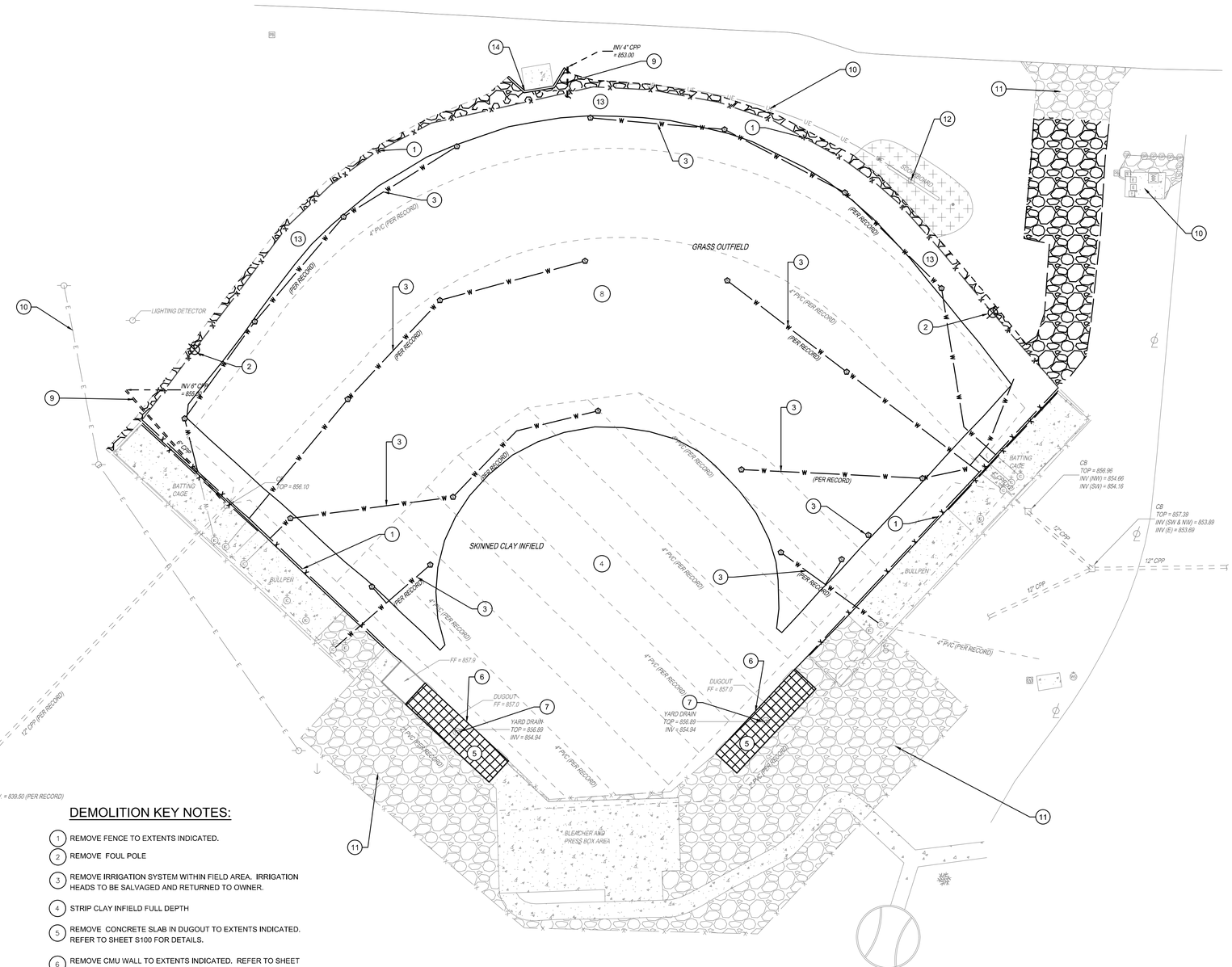
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: 0 10 20 40

SHEET NAME:
SUPPLEMENTARY SURVEY BASEMAP

SHEET NO.
C111

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



DEMOLITION KEY NOTES:

1. REMOVE FENCE TO EXTENTS INDICATED.
2. REMOVE FOUL POLE
3. REMOVE IRRIGATION SYSTEM WITHIN FIELD AREA. IRRIGATION HEADS TO BE SALVAGED AND RETURNED TO OWNER.
4. STRIP CLAY INFIELD FULL DEPTH
5. REMOVE CONCRETE SLAB IN DUGOUT TO EXTENTS INDICATED. REFER TO SHEET S100 FOR DETAILS.
6. REMOVE CMU WALL TO EXTENTS INDICATED. REFER TO SHEET S100 FOR DETAILS.
7. PROTECT EXISTING STORM STRUCTURE
8. STRIP SOD $\frac{3}{4}$" DEEP ACROSS THE EXISTING PLAYING AREA
9. REMOVE STORM SEWER SYSTEM TO EXTENTS INDICATED.
10. PROTECT EXISTING UTILITIES
11. REMOVE AND REPLACE IN KIND ANY GRAVEL PAVEMENT DAMAGED BY CONSTRUCTION ACTIVITY.
12. PROTECT EXISTING SCOREBOARD
13. REMOVE WARNING TRACK
14. REMOVE WALL AND PROTECT EXISTING SLAB

NOTES

REMOVE CONCRETE

REMOVE GRAVEL

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NORTHERN KENTUCKY UNIVERSITY FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:

STATE OF KENTUCKY
CRAIG A. HONKOMP
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LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS

CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036

DATE: FEBRUARY 2020

SCALE: 0 10 20 40

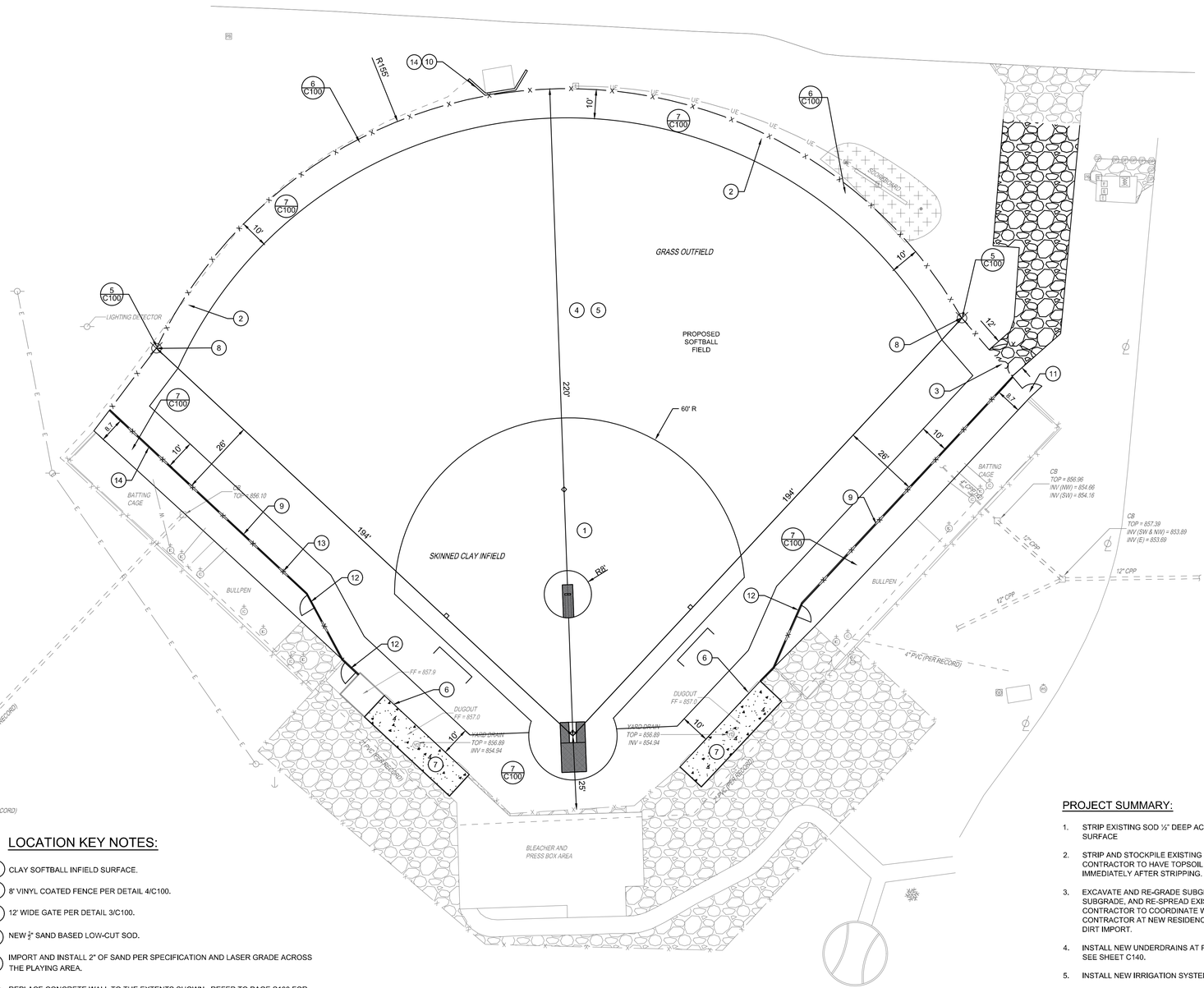
SHEET NAME:

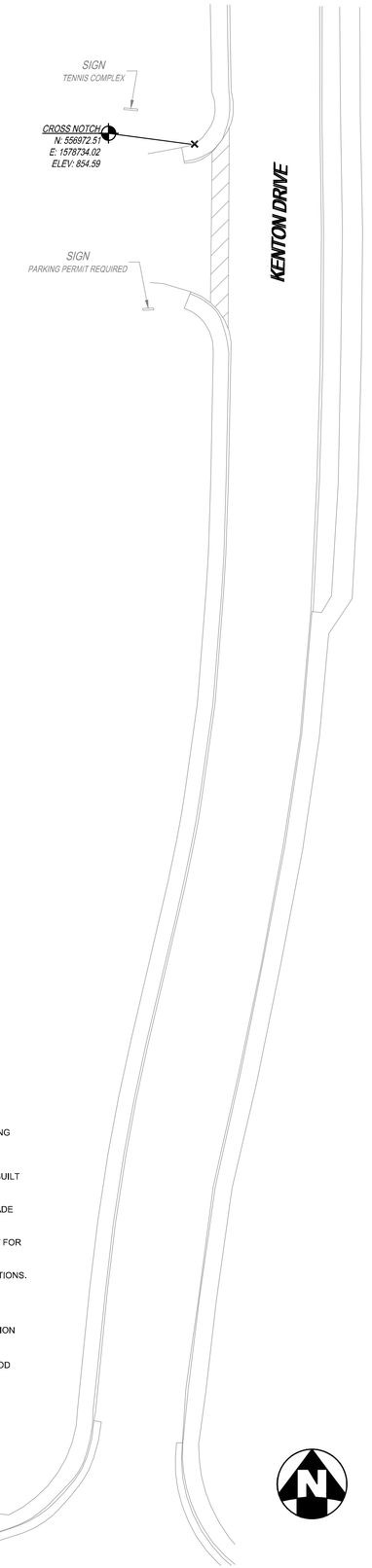
DEMOLITION PLAN

SHEET NO.

C120

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES





LOCATION KEY NOTES:

1. CLAY SOFTBALL INFIELD SURFACE.
2. 8' VINYL COATED FENCE PER DETAIL 4/C100.
3. 12' WIDE GATE PER DETAIL 3/C100.
4. NEW ½" SAND BASED LOW-CUT SOD.
5. IMPORT AND INSTALL 2" OF SAND PER SPECIFICATION AND LASER GRADE ACROSS THE PLAYING AREA.
6. REPLACE CONCRETE WALL TO THE EXTENTS SHOWN. REFER TO PAGE S100 FOR DETAILS.
7. 4" CONCRETE SLAB. REFER TO SHEET S100 FOR DETAILS.
8. CONTRACTOR TO INSTALL NEW FOUL POLES PER DETAIL 5/C100
9. 4' VINYL COATED FENCE PER DETAIL 9/C100.
10. PROPOSED WALL. SEE GRADING PLANS FOR HEIGHT.
11. 4' WIDE GATE PER DETAIL 3/C100.
12. 4' WIDE GATE PER DETAIL 11/C100.
13. STOP CURB/BEGIN WALL.
14. SEE STRUCTURAL PLANS FOR WALL DETAIL.

NOTES

- PROPOSED CONCRETE
- PROPOSED GRAVEL
- PROPOSED CLAY BRICKS. SEE SPECS FOR DETAILS

PROJECT SUMMARY:

1. STRIP EXISTING SOD ½" DEEP ACROSS THE PLAYING SURFACE
2. STRIP AND STOCKPILE EXISTING TOP SOIL. CONTRACTOR TO HAVE TOPSOIL STOCK PILE AS-BUILT IMMEDIATELY AFTER STRIPPING.
3. EXCAVATE AND RE-GRADE SUBGRADE LASER GRADE SUBGRADE, AND RE-SPREAD EXISTING TOP SOIL. CONTRACTOR TO COORDINATE WITH SITE CONTRACTOR AT NEW RESIDENCE HALL PROJECT FOR DIRT IMPORT.
4. INSTALL NEW UNDERDRAINS AT PROPOSED LOCATIONS. SEE SHEET C140.
5. INSTALL NEW IRRIGATION SYSTEM.
6. IMPORT AND INSTALL 2" OF SAND PER SPECIFICATION AND LASER GRADE ACROSS THE PLAYING AREA.
7. BASE BID: INSTALL ½" OF SAND BASED, LOW CUT SOD PER SPECIFICATIONS
   BID ALTERNATE: INSTALL ½" OF TUCKAHOE, SAND BASED, LOW-CUT SOD PER SPECIFICATIONS.
8. INSTALL WARNING TRACK PER DETAIL 7/C100
9. INSTALL NEW INFIELD CLAY PER SPECIFICATION

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NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A HONKOMP 30485 LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

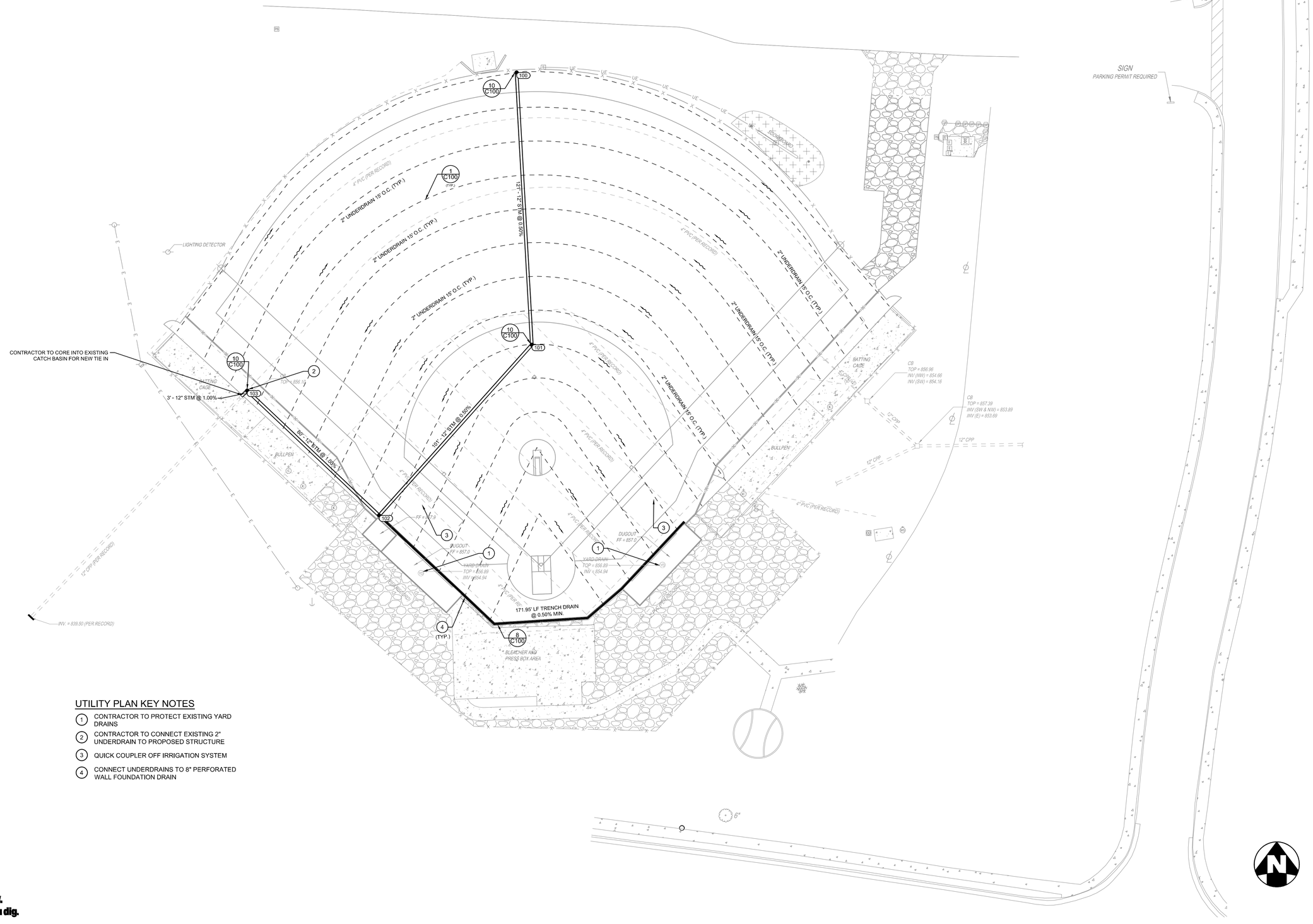
NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: 0 10 20 40

SHEET NAME:
LOCATION PLAN

SHEET NO.
C130

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



UTILITY PLAN KEY NOTES

1. CONTRACTOR TO PROTECT EXISTING YARD DRAINS
2. CONTRACTOR TO CONNECT EXISTING 2" UNDERDRAIN TO PROPOSED STRUCTURE
3. QUICK COUPLER OFF IRRIGATION SYSTEM
4. CONNECT UNDERDRAINS TO 8" PERFORATED WALL FOUNDATION DRAIN

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NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
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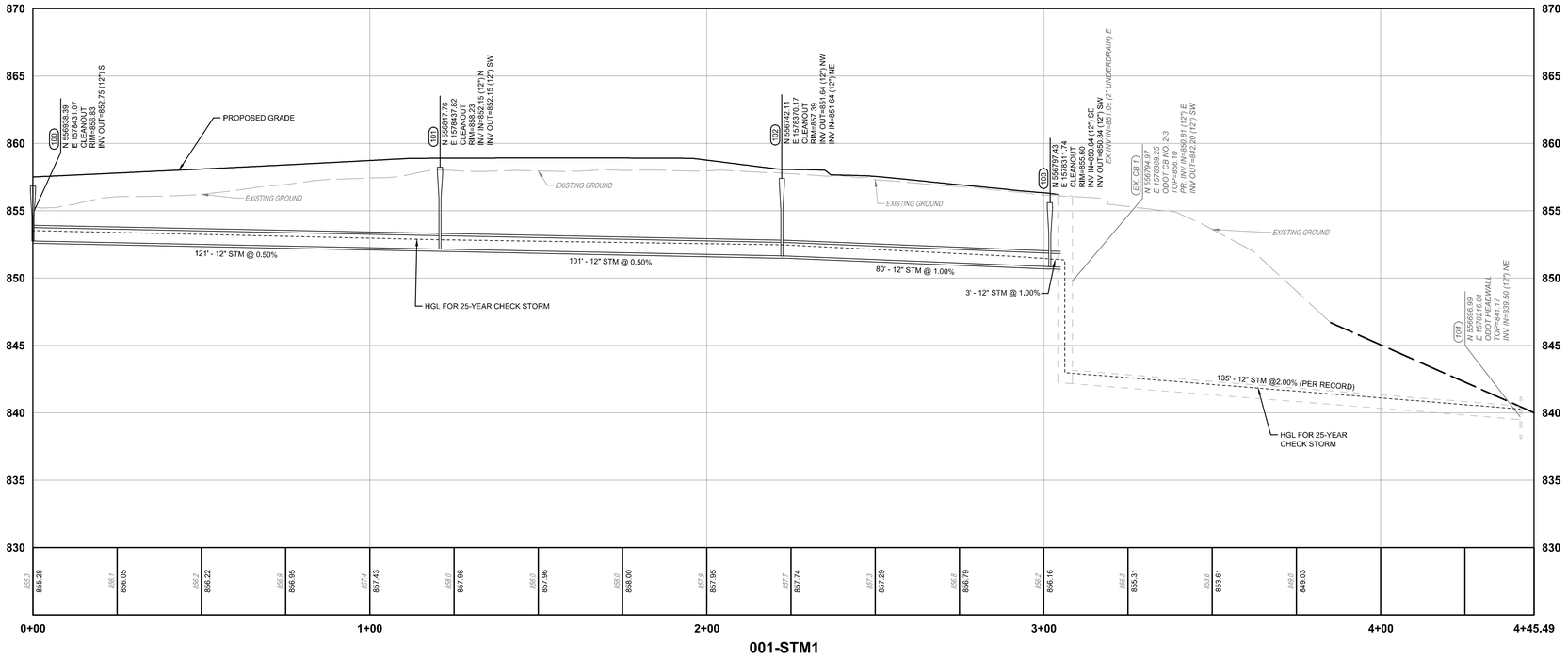
NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: 0 10 20 40

SHEET NAME:
UTILITY PLAN

SHEET NO.
C140

INSPIRED PEOPLE ▸ CREATIVE DESIGN ▸ TRANSFORMING COMMUNITIES



811
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NORTHERN KENTUCKY UNIVERSITY FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:

CRAIG A. HONKOMP 30485

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NKU SOFTBALL FIELD RENOVATIONS

CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: **080115.036**

DATE: **FEBRUARY 2020**

SCALE:
V 0 2.5 5 10
H 0 10 20 40

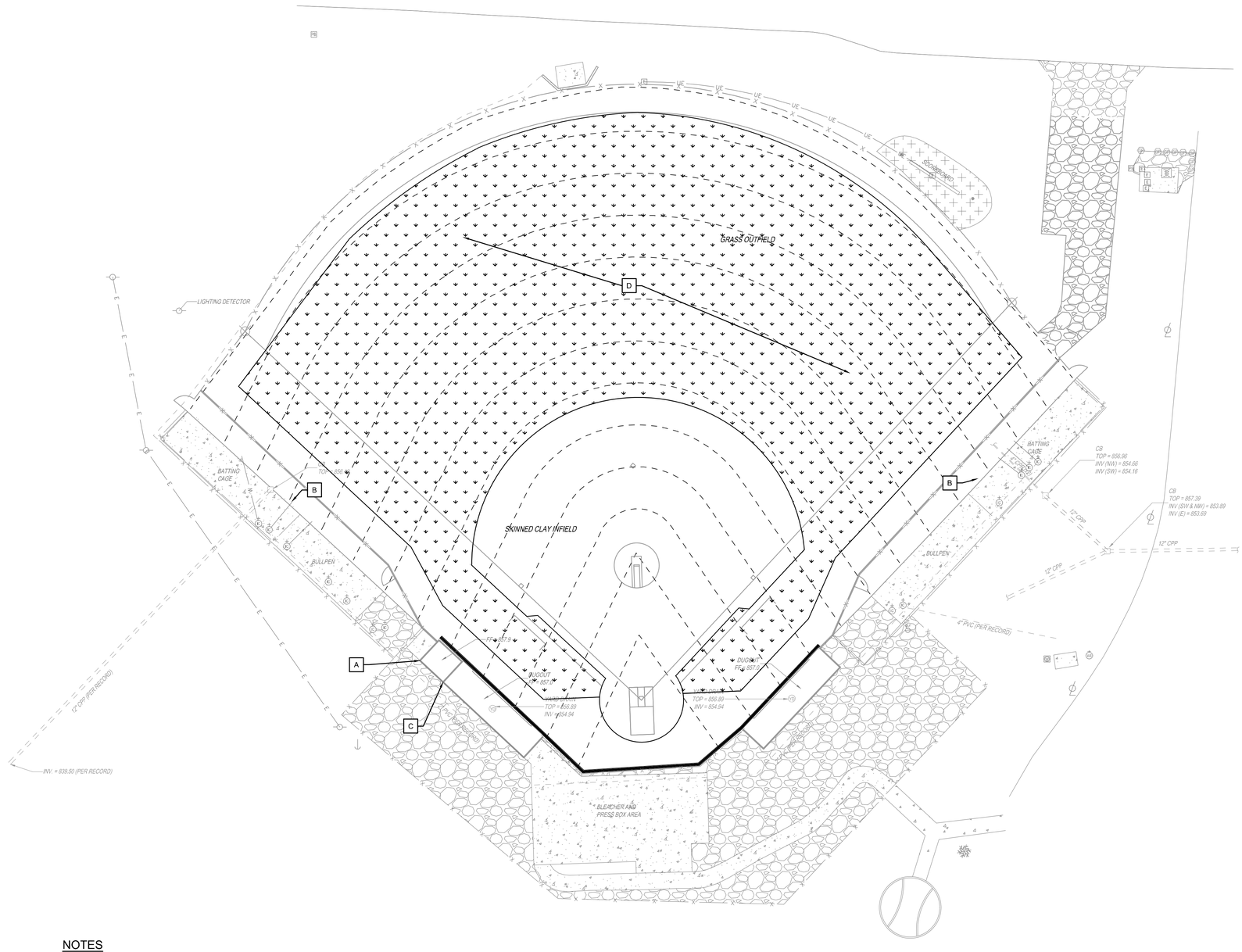
SHEET NAME:

STORM PROFILES

SHEET NO.

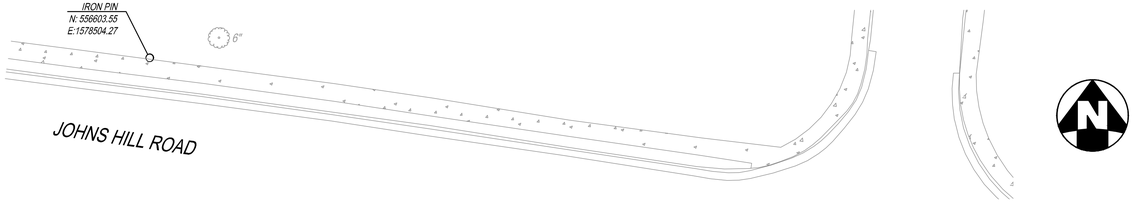
C141

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



NOTES

AREA TO BE IRRIGATED



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IRRIGATION KEY NOTES:

A. INSTALL IRRIGATION CONTROL IN EXISTING 3RD BASE DUGOUT STORAGE ROOM.

B. POINT OF CONNECTION.

C. INSTALL RAIN SENSOR NEAR ROOF OF DUGOUT.

D. AREA TO BE IRRIGATED.

GENERAL IRRIGATION NOTES

1. CONTRACTOR IS TO TEST IRRIGATION SYSTEM FOR LEAKS AFTER EXISTING FIELD IRRIGATION HAS BEEN REMOVED AND PRIOR TO NEW IRRIGATION SYSTEM BEING INSTALLED.
2. THIS IRRIGATION ZONE PLAN IS DIAGRAMMATIC AND ONLY SHOWS AREAS TO BE IRRIGATED. CONTRACTOR TO DESIGN SYSTEM TO ENSURE FULL AND EQUAL IRRIGATION COVERAGE ON AREAS SHOWN TO BE IRRIGATED.
3. IRRIGATION CONTRACTOR TO COORDINATE THE SIZE OF THE TAP AND THE LOCATION OF THE POINT OF CONNECTION PRIOR TO CONSTRUCTION.
4. THE IRRIGATION SYSTEM SHALL BE INSTALLED USING ACCEPTED AND QUALITY INSTALLATION STANDARDS AS USED IN THE INDUSTRY.
5. IT IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR TO BE FAMILIAR WITH ALL GRADE DIFFERENCES, LOCATIONS OF WALLS, STRUCTURES, AND UTILITIES AND MAKE THE NECESSARY ADJUSTMENTS TO ACCOMMODATE THE IRRIGATION SYSTEM. ANY OBSTRUCTIONS SHOULD BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE. IN THE EVENT THAT THIS NOTIFICATION IS NOT PERFORMED, THE IRRIGATION CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY NECESSARY COSTS.
6. MAINLINE PIPING SHALL BE BURIED A MINIMUM OF 12" OF COVER AND A MAXIMUM OF 18" OF COVER. LATERAL LINE PIPING A MINIMUM OF 12" COVER. ALL BACKFILL SURROUNDING THE PIPE SHALL BE SCREENED AND CLEANED OF MATERIAL LARGER THAN 1" IN SIZE.
7. IRRIGATION CONTRACTOR SHALL PROVIDE FIRST WINTERIZATION AND SPRING TURN ON IN BID.
8. THE GENERAL CONTRACTOR IS RESPONSIBLE TO PROVIDE POWER TO THE IRRIGATION, CONTROLLER, SET METER, ALL SLEEVES, TAP, BACKFLOW PREVENTION DEVICE AND TO GAIN ANY AND ALL PERMITTING. IRRIGATION CONTRACTOR TO COORDINATE ALL WORK WITH THE GENERAL CONTRACTOR.
9. WATER FROM IRRIGATION SHALL NOT ENCROACH ON PAVEMENTS.

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NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:

STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

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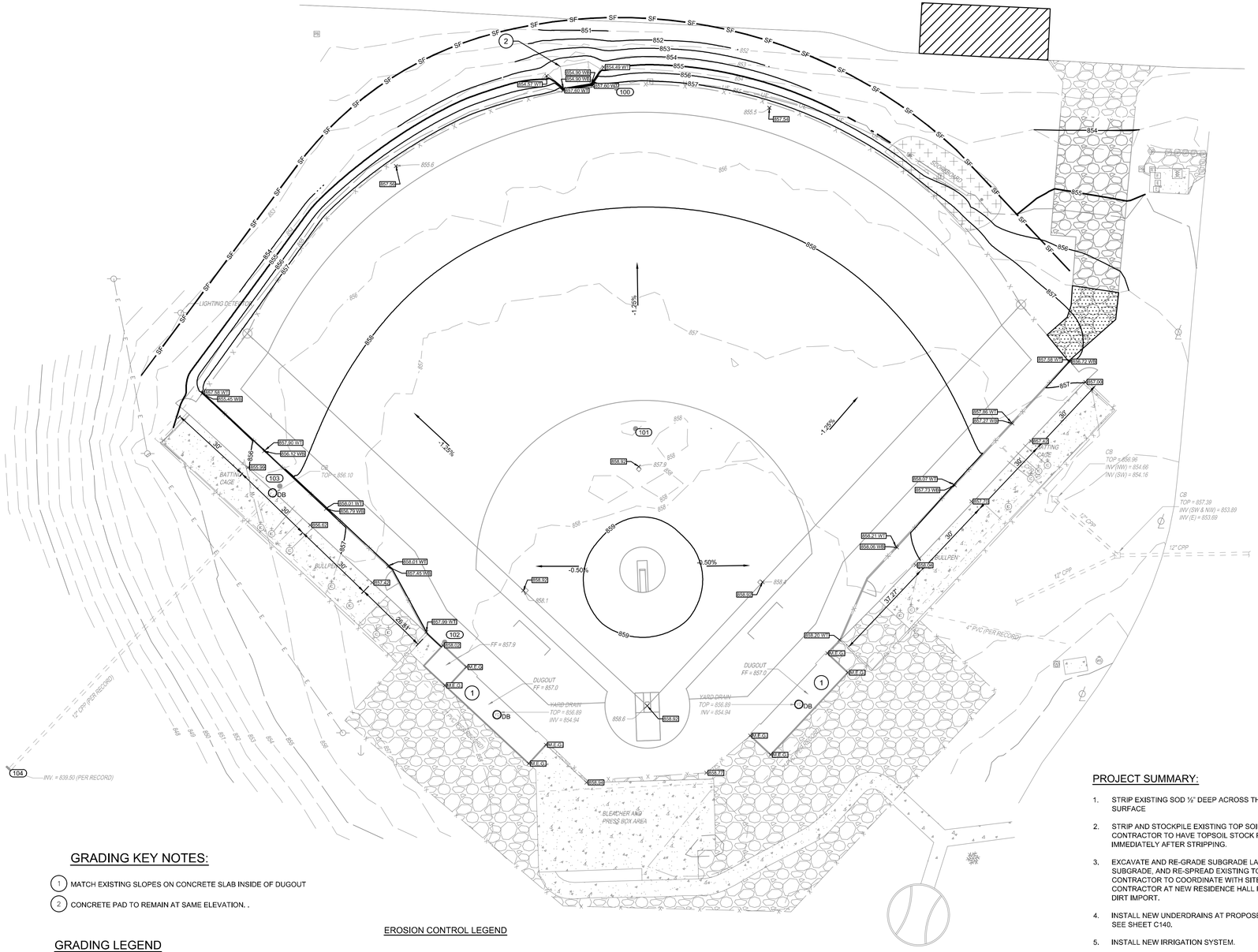
NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: 0 10 20 40

SHEET NAME:
IRRIGATION PLAN

SHEET NO.
C142

INSPIRED PEOPLE ▶ CREATIVE DESIGN ▶ TRANSFORMING COMMUNITIES



GRADING KEY NOTES:

① MATCH EXISTING SLOPES ON CONCRETE SLAB INSIDE OF DUGOUT

② CONCRETE PAD TO REMAIN AT SAME ELEVATION. .

GRADING LEGEND

855	EXISTING MAJOR CONTOUR
856	EXISTING MINOR CONTOUR
855	PROPOSED MAJOR CONTOUR
856	PROPOSED MINOR CONTOUR
× 855.00	PROPOSED SPOT ELEVATION
× 855.00 WT	PROPOSED SPOT ELEVATION TOP OF WALL
× 855.00 WB	PROPOSED SPOT ELEVATION BOTTOM OF WALL

EROSION CONTROL LEGEND

SF	SILT FENCE PER DETAIL 1/C161
	STABILIZED CONSTRUCTION ENTRANCE PER DETAIL 2/C161
DB ○	INLET PROTECTION PER DETAIL 3/C161
▨	CONCRETE WASHOUT PER DETAIL 4/C161

PROJECT SUMMARY:

1. STRIP EXISTING SOD ½" DEEP ACROSS THE PLAYING SURFACE
2. STRIP AND STOCKPILE EXISTING TOP SOIL. CONTRACTOR TO HAVE TOPSOIL STOCK PILE AS-BUILT IMMEDIATELY AFTER STRIPPING.
3. EXCAVATE AND RE-GRADE SUBGRADE LASER GRADE SUBGRADE, AND RE-SPREAD EXISTING TOP SOIL. CONTRACTOR TO COORDINATE WITH SITE CONTRACTOR AT NEW RESIDENCE HALL PROJECT FOR DIRT IMPORT.
4. INSTALL NEW UNDERDRAINS AT PROPOSED LOCATIONS. SEE SHEET C140.
5. INSTALL NEW IRRIGATION SYSTEM.
6. IMPORT AND INSTALL 2" OF SAND PER SPECIFICATION AND LASER GRADE ACROSS THE PLAYING AREA.
7. BASE BID: INSTALL $\frac{1}{2}$" OF SAND BASED, LOW CUT SOD PER SPECIFICATIONS

   BID ALTERNATE: INSTALL $\frac{1}{2}$" OF TUCKAHOE, SAND BASED, LOW CUT SOD PER SPECIFICATIONS.
8. INSTALL WARNING TRACK PER DETAIL 7/C100
9. INSTALL NEW INFIELD CLAY PER SPECIFICATION

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FIELD DESIGN
a division of THE KLEINGERS GROUP

NORTHERN KENTUCKY UNIVERSITY FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

SEAL:

CRAIG A. HONKOMP
30485

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO:	080115.036
DATE:	FEBRUARY 2020

SCALE:
0 10 20 40

SHEET NAME:
GRADING PLAN

SHEET NO.
C150

INSPIRED PEOPLE ▸ CREATIVE DESIGN ▸ TRANSFORMING COMMUNITIES

PROJECT DESCRIPTION

IMPROVING THE CONDITION OF THE EXISTING SOFTBALL FIELD BY REPLACING THE FIELD WITH HIGH PERFORMANCE NATURAL GRASS AND SKINNED INFIELD AS WELL AS IMPROVING THE DRAINAGE AND IRRIGATION WITH THE DESIGN OF ASSOCIATED UTILITIES.

PROJECT DATA

TOTAL SITE AREA:	1.13 ACRES
TOTAL DISTURBED AREA:	1.30 ACRES
EXISTING IMPERVIOUS AREA:	0.02 ACRES
PROPOSED IMPERVIOUS AREA:	0.02 ACRES
PERCENTAGE OF CREATED IMPERVIOUS AREA:	0.00%
RUNOFF COEFFICIENT FOR PRE-CONSTRUCTION:	C=0.35
RUNOFF COEFFICIENT FOR POST-CONSTRUCTION*:	C=0.65
PRIOR LAND USE:	SOFTBALL FIELD
RECEIVING WATER:	UNNAMED TRIBUTARY TO LICKING RIVER
ESTIMATED CONSTRUCTIONS DATES:	APRIL 2020 - SEPTEMBER 2020
SOIL TYPES, DESCRIPTIONS:	NICHOLSON SILT LOAM 2-6% SLOPES, NICHOLSON SILT LOAM 6-12% SLOPES

GENERAL NOTES

THE CONTRACTOR IS HEREBY ADVISED THAT STRICTER POLLUTION CONTROL STANDARDS AND ENFORCEMENT HAVE BEEN IMPOSED BY THE KENTUCKY DEP. ALSO, MANY PRIVATE CITIZEN ENVIRONMENTAL GROUPS, WHO HAVE BEEN KNOWN TO FILE CIVIL LEGAL ACTIONS, ARE PRESENT IN THE AREA AND OBSERVE ALL CONSTRUCTION OPERATIONS.

THE CONTRACTOR SHALL INFORM ALL SUBCONTRACTORS OF THE REQUIREMENTS AND RESPONSIBILITIES OF THE SWPPP AND SHALL DOCUMENT ALL SUCH NOTIFICATIONS AND/OR DISCUSSIONS. ALL SUBCONTRACTORS SHALL SIGN THE NOI.

THE CONTRACTOR WILL BE REQUIRED TO PARTICIPATE IN SEDIMENT AND EROSION CONTROL INSPECTIONS ON A WEEKLY BASIS AND SIGN AN APPROVED INSPECTION SHEET THAT SHALL BE KEPT ON FILE AT THE JOB SITE.

UNLESS OTHERWISE NOTED, STANDARDS AND SPECIFICATIONS ESTABLISHED IN THE LATEST EDITION OF THE KY "BEST MANAGEMENT PRACTICES FOR CONTROLLING EROSION, SEDIMENT, AND POLLUTANT RUNOFF FROM CONSTRUCTION SITES" SHALL GOVERN THE EROSION AND SEDIMENT CONTROL INSTALLATIONS SPECIFIED ON THIS PLAN.

THIS PROJECT WILL INVOLVE SEVERAL CONSTRUCTION PHASES AND SEQUENCING THROUGHOUT ITS LIFETIME. IT IS VERY IMPORTANT THAT ALL TEMPORARY SEDIMENT AND EROSION CONTROL (S&EC) FIELD METHODS ALONG WITH THIS PLAN, ARE UPDATED TO REFLECT THE ACTUAL FIELD CONDITIONS, CURRENT WEATHER CONDITIONS AND SITE GRADE CHANGES. THE CONTRACTOR, OWNER, ENGINEER OR THE KENTUCKY DEP CAN AND WILL MODIFY THIS PLAN AS NECESSARY.

THE CONTRACTOR WILL VOLUNTARILY SELF REPORT ANY POTENTIAL VIOLATIONS OF THE KENTUCKY KPDES PERMIT TO THE OWNER, ENGINEER AND THE KENTUCKY DEP.

THE CONTRACTOR SHALL REMOVE EXISTING GROUND COVER ONLY AS NECESSARY FOR THE PROJECT PHASE CURRENTLY UNDER CONSTRICTION.

CONSTRUCTION AND DEMOLITION DEBRIS SHALL BE PROPERLY DISPOSED OF ACCORDING TO KENTUCKY DEP REQUIREMENTS.

THE CONTRACTOR WILL BE REQUIRED TO BUILD SEDIMENT BASINS OR SEDIMENT TRAPS OR USE EQUAL METHODS TO DETAIN AND CLEAN WATER TO ACCEPTABLE EPA STANDARDS BEFORE RELEASING THE WATER BACK INTO THE STREAM.

THERE SHALL BE NO TURBID DISCHARGES TO SURFACE WATERS, RESULTING FROM DEWATERING ACTIVITIES. SEDIMENT-LADEN WATER MUST PASS THROUGH A SETTLING POND, FILTER BAG, OR OTHER COMPARABLE PRACTICE, PRIOR TO DISCHARGE.

NO SOLID OR LIQUID WASTE SHALL BE DISCHARGED INTO STORM WATER RUNOFF.

ALL PROCESS WASTEWATER (EQUIPMENT WASHING, LEACHATE FROM ON-SITE WASTE DISPOSAL, ETC.) SHALL BE COLLECTED AND DISPOSED OF AT A PUBLICLY OWNED TREATMENT WORKS.

ALL CONSTRUCTION ACTIVITIES MUST COMPLY WITH ALL LOCAL EROSION/SEDIMENT CONTROL, WASTE DISPOSAL, SANITARY AND HEALTH REGULATIONS.

OTHER EROSION CONTROL ITEMS MAY BE NECESSARY DUE TO ENVIRONMENTAL CONDITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND IMPLEMENTATION OF ADDITIONAL EROSION CONTROL ITEMS, AT THE ENGINEER'S DISCRETION.

NO SOIL, ROCK, DEBRIS OR OTHER MATERIAL SHALL BE DUMPED OR PLACED IN ANY AREAS NOT ADEQUATELY PROTECTED BY EROSION CONTROL INSTALLATIONS.

IT IS PREFERRED TO USE PERMANENT EROSION CONTROL ITEMS AS SHOWN IN THE PLANS TO CONTROL CONSTRUCTION POLLUTION WHEN POSSIBLE. OTHERWISE, THE TEMPORARY POLLUTION PREVENTION ITEMS ARE TO BE USED.

MOST TEMPORARY S&EC METHODS, INCLUDING BUT NOT LIMITED TO, SILT FENCE AND DITCH CHECKS MAY ALL HAVE TO BE PERIODICALLY REMOVED AND REPLACED, OR MOVED FROM THE EXISTING ROAD DITCH OR STRIPPED AREAS AS WORK PROGRESSES. ANY CHANGES SHALL BE NOTED IN THE PLAN BY RED LINE AND DATED ON A CORRECTIVE ACTION LOG.

ALL TEMPORARY SEDIMENT CONTROLS AND STORM WATER QUALITY METHODS WILL BE BUILT/INSTALLED AS THE PROJECT PROGRESSES TO ELIMINATE UNNECESSARY DISTURBANCE AND REDUNDANCY. ALL TEMPORARY CONTROLS SHALL BE IN PLACE AND FUNCTIONING PROPERLY WHEN THREATENING WEATHER IS IMMINENT.

"TEMPORARY STABILIZATION" MEANS THE ESTABLISHMENT OF TEMPORARY VEGETATION, MULCHING, GEOTEXTILES, SOD, PRESERVATION OF EXISTING VEGETATION AND OTHER TECHNIQUES CAPABLE OF QUICKLY ESTABLISHING COVER OVER DISTURBED AREAS TO PROVIDE EROSION CONTROL BETWEEN CONSTRUCTION OPERATIONS.

"PERMANENT STABILIZATION" MEANS THE ESTABLISHMENT OF PERMANENT VEGETATION, DECORATIVE LANDSCAPE MULCHING, MATTING, SOD, RIP RAP AND LANDSCAPING TECHNIQUES TO PROVIDE PERMANENT EROSION CONTROL ON AREAS WHERE CONSTRUCTION OPERATIONS ARE COMPLETE OR WHERE NO FURTHER DISTURBANCE IS EXPECTED FOR AT LEAST A YEAR.

OFF-SITE TRACKING OF SEDIMENTS SHALL BE MINIMIZED. A STABILIZED CONSTRUCTION ENTRANCE WILL BE PROVIDED TO HELP REDUCE VEHICLE TRACKING OF SEDIMENTS. ALL PAVED STREETS ADJACENT TO THE SITE WILL BE SWEPT DAILY TO REMOVE ANY EXCESS MUD, DIRT OR ROCK TRACKED FROM THE SITE. DUMP TRUCKS HAULING MATERIAL FROM THE CONSTRUCTION SITE WILL BE COVERED WITH A TARP.

OPERATION SEQUENCE FOR TEMPORARY AND PERMANENT BMP INSTALLATION

TO COMPLETE THE EXCAVATION AND CONSTRUCTION OF THE PROPOSED JOB IMPROVEMENTS, COORDINATION OF THE CONTRACTOR'S WORK CREWS WILL BE REQUIRED. THE EXISTING DITCHES WILL PERFORM TEMPORARY SEDIMENT CONTROL AND STORAGE DURING THE PROPOSED CONSTRUCTION. WORK WILL GENERALLY PROCEED FROM DOWNSTREAM TO UPSTREAM IN THESE WORK AREAS. THE GENERAL CONSTRUCTION SEQUENCE IS AS FOLLOWS:

A) INSTALL EROSION CONTROL ITEMS.
B) STRIP TOPSOIL AND ANY UNSUITABLE MATERIAL THROUGH THE INCREMENTAL WORK AREA.
C) INSTALL TEMPORARY DITCH CHECKS IN DOWNSTREAM END OF EXISTING DITCH WITHIN 24 HOURS FOLLOWING THE STRIPPING OPERATION. \
D) ANY DISTURBED OR EXPOSED AREAS SHALL BE STABILIZED PER KENTUCKY EPA TEMPORARY AND PERMANENT STABILIZATION REGULATIONS INCLUDING:
   1. SEEDING
   2. DITCH MATTING
   3. INLET PROTECTION
   4. MULCHING
   5. WATERING

STABILIZATION PRACTICES

PERMANENT SEEDING AND MULCHING STABILIZATION SHALL BE PROVIDED PER KENTUCKY EPA GUIDELINES.

TABLE 1: PERMANENT STABILIZATION

AREA REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY AREAS THAT WILL LIE DORMANT FOR ONE YEAR OR MORE	WITHIN SEVEN DAYS OF THE MOST RECENT DISTURBANCE
ANY AREAS WITHIN 50 FEET OF A SURFACE WATER OF THE STATE AND AT FINAL GRADE	WITHIN TWO DAYS OF REACHING FINAL GRADE
ANY OTHER AREAS AT FINAL GRADE	WITHIN SEVEN DAYS OF REACHING FINAL GRADE WITHIN THAT AREA

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TABLE 2: TEMPORARY STABILIZATION

AREA REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY DISTURBED AREAS WITH 50 FEET OF A SURFACE WATER OF THE STATE AND NOT AT FINAL GRADE	WITHIN TWO DAYS OF THE MOST RECENT DISTURBANCE IF THE AREA WILL REMAIN IDLE FOR MORE THAN 14 DAYS
FOR ALL CONSTRUCTION ACTIVITIES, ANY DISTURBED AREAS THAT WILL BE DORMANT FOR MORE THAN 14 DAYS BUT LESS THAN ONE YEAR, AND NOT WITHIN 50 FEET OF A SURFACE WATER OF THE STATE	WITHIN SEVEN DAYS OF THE MOST RECENT DISTURBANCE WITHIN THE AREA FOR RESIDENTIAL SUBDIVISIONS, DISTURBED AREAS MUST BE STABILIZED AT LEAST SEVEN DAYS PRIOR TO TRANSFER OF PERMIT COVERAGE FOR THE INDIVIDUAL LOT(S).
DISTURBED AREAS THAT WILL BE IDLE OVER WINTER	PRIOR TO THE ONSET OF WINTER WEATHER

ALL TEMPORARY EROSION AND SEDIMENT CONTROL INSTALLATIONS SHALL BE REMOVED WHEN 70% VEGETATION HAS BEEN REACHED.

SEEDING & MULCHING

MULCH AND/OR OTHER APPROPRIATE VEGETATIVE PRACTICES SHALL BE APPLIED TO DISTURBED AREAS WITHIN 7 DAYS OF GRADING IF THE AREA IS TO REMAIN DORMANT (UNDISTURBED) FOR MORE THAN 14 DAYS OR ON AREAS AND PORTIONS OF THE SITE WHICH CAN BE BROUGHT TO FINAL GRADE.

MULCH SHALL CONSIST OF UNROTTED SMALL GRAIN STRAW APPLIED AT THE RATE OF 3 TONS/AC. OR 138 LB./1000 SQ. FT. (TWO TO THREE BALES). THE STRAW MULCH SHALL BE SPREAD UNIFORMLY BY HAND OR MECHANICALLY SO THE SOIL SURFACE IS COVERED. FOR UNIFORM DISTRIBUTION OF HAND-SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1000-SQ.-FT. SECTIONS AND PLACE THREE 45-LB. BALES OF STRAW IN EACH SECTION.

MULCH SHALL BE ANCHORED IMMEDIATELY TO MINIMIZE LOSS BY WIND OR RUNOFF. THE FOLLOWING ARE ACCEPTABLE METHODS FOR ANCHORING MULCH:

1) MECHANICAL-USE A DISK, CRIMPER, OR SIMILAR TYPE TOOL SET STRAIGHT TO PUNCH OR ANCHOR THE MULCH MATERIAL INTO THE SOIL. STRAW MECHANICALLY ANCHORED SHALL NOT BE FINELY CHOPPED BUT BE LEFT GENERALLY LONGER THAN 6 IN.
2) MULCH NETTINGS-USE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS, FOLLOWING ALL PLACEMENT AND ANCHORING SUGGESTIONS. USE IN AREAS OF WATER CONCENTRATION AND STEEP SLOPES TO HOLD MULCH IN PLACE.
3) ASPHALT EMULSION-FOR STRAW MULCH, APPLY AT THE RATE OF 160 GAL./AC. (0.1 GAL./SY) INTO THE MULCH AS IT IS BEING APPLIED OR AS RECOMMENDED BY THE MANUFACTURE.
4) SYNTHETIC BINDERS-FOR STRAW MULCH, SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRI-TAC), DCA-70, PETROSET, TERRA TACK OR EQUAL MAY BE USED AT RATES RECOMMENDED BY THE MANUFACTURER.

TEMPORARY SEEDING & MULCHING FOR EROSION CONTROL

SEED TYPE	PER 1000 SQ FT	PER ACRE
PERENNIAL RYEGRASS TALL FESCUE ANNUAL RYEGRASS	1 POUND 1 POUND 1 POUND	40 POUNDS 40 POUNDS 40 POUNDS
SMALL GRAIN STRAW	90 POUNDS	2 TONS
FERTILIZER	6 POUNDS OF 10-10-10 OR 12-12-12	250 POUNDS OF 10-10-10 OR 12-12-12

NOTE: OTHER APPROVED SPECIES MAY BE SUBSTITUTED

WINTER SEEDING & MULCHING

WINTER SEED AND MULCH IS REQUIRED FOR EARTH DISTURBANCE ACTIVITY OPERATIONS OCCURRING BETWEEN OCTOBER 15 AND MARCH 15 AND CAN ONLY BE INSTALLED DURING THAT TIME. ALL STRAW MULCH INCLUDED IN THIS WORK MUST BE EITHER CRIMPED IN PLACE OR INSTALLED WITH A BIODEGRADABLE BONDED FIBER MATRIX. CRIMPED MULCH IS REQUIRED TO BE ANCHORED INTO THE SOIL SURFACE WITH A MECHANICAL CRIMPING IMPLEMENT OR OTHER SUITABLE IMPLEMENT APPROVED BY THE ENGINEER. THE MULCH INCLUDED IN THIS WORK MUST BE CAPABLE OF PROVIDING SUFFICIENT DURABLE PROTECTIVE COVER THAT PROVIDES KENTUCKY DEP KPDES PERMIT COMPLIANT EROSION CONTROL FOR A MINIMUM OF 6 MONTHS. THE USE OF OTHER SEED AND/OR MULCH MATERIALS IN THIS TIME PERIOD REQUIRES SPECIFIC APPROVAL BY THE ENGINEER. THE USE OF WINTER SEEDING AND MULCHING IS NOT AN ACCEPTABLE PRACTICE FOR PROTECTING THE SUBGRADE SURFACE.

STOCKPILE

SILT FENCING SHALL BE INSTALLED AROUND TEMPORARY SPOIL STOCKPILES. THESE STOCKPILES SHALL BE STRAW MULCHED AND/OR TEMPORARILY SEEDED WITHIN 7 WORKING DAYS IF LEFT DORMANT FOR 14 DAYS OR LONGER.

TIMING OF CONTROLS/MEASURES

AS INDICATED IN THE SEQUENCE OF MAJOR ACTIVITIES, CONSTRUCTION ENTRANCE(S) AND SILT FENCE WILL BE CONSTRUCTED PRIOR TO CLEARING OR GRADING OF ANY OTHER PORTIONS OF THE SITE. SEDIMENT CONTROL DEVICES SHALL BE IMPLEMENTED FOR ALL AREAS REMAINING DISTURBED LONGER THAN 14 DAYS AND/OR WITHIN 7 DAYS OF ANY GRUBBING ACTIVITIES. AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR MORE THAN 14 DAYS WILL BE STABILIZED WITH A TEMPORARY SEED AND MULCH WITHIN 2 DAYS OF THE LAST DISTURBANCE IF THE AREA IS WITHIN 50 FEET OF A STREAM, AND WITHIN 7 DAYS OF THE LAST DISTURBANCE IF THE AREA IS MORE THAN 50 FEET AWAY FROM A STREAM. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN AREA, THAT AREA WILL BE STABILIZED WITH PERMANENT SEED AND MULCH. AFTER THE ENTIRE SITE IS STABILIZED, THE ACCUMULATED SEDIMENT WILL BE REMOVED FROM THE BASIN.

STABILIZATION TYPE	J	F	M	A	M	J	J	A	S	O	N	D
PERMANENT SEEDING			●	●	●	*	*	*	●	●		
DORMANT SEEDING	●	●	●							●	●	●
TEMPORARY SEEDING			●	●	●	*	*	*	●	●		
SODDING			**	**	**	**	**	**	**			
MULCHING	●	●	●	●	●	●	●	●	●	●	●	●

* - IRRIGATION NEEDED

** - IRRIGATION NEEDED FOR 2-3 WEEKS AFTER SOD IS APPLIED

INSPECTIONS

ALL BMPS ON THIS SITE SHALL BE INSPECTED BY THE CONTRACTOR OR DESIGNATED REPRESENTATIVE AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES PER 24 HOUR PERIOD. A RECORD OF THESE INSPECTIONS SHALL BE MAINTAINED IN THE CONSTRUCTION OFFICE WITH THE SWPPP FOR PUBLIC VIEWING. ANY VIOLATIONS WILL BE REPORTED THROUGH THE PROJECT PERSONNEL. A RAIN GAUGE WILL BE LOCATED WITHIN THE PROJECT LIMITS.

FOLLOWING EACH INSPECTION, A CHECKLIST MUST BE COMPLETED AND SIGNED BY THE QUALIFIED INSPECTION PERSONNEL REPRESENTATIVE. AT A MINIMUM, THE INSPECTION REPORT SHALL INCLUDE:

1. THE INSPECTION DATE;
2. NAMES, TITLES, AND QUALIFICATIONS OF PERSONNEL MAKING THE INSPECTION;
3. WEATHER INFORMATION FOR THE PERIOD SINCE THE LAST INSPECTION (OR SINCE COMMENCEMENT OF ONSTRUCTION ACTIVITY IF THE FIRST INSPECTION) INCLUDING A BEST ESTIMATE OF THE BEGINNING OF EACH STORM EVENT, DURATION OF EACH STORM EVENT, APPROXIMATE AMOUNT OF RAINFALL FOR EACH STORM EVENT (IN INCHES), AND WHETHER ANY DISCHARGES OCCURRED;
4. WEATHER INFORMATION AND A DESCRIPTION OF ANY DISCHARGES OCCURRING AT THE TIME OF THE INSPECTION;
5. LOCATION(S) OF DISCHARGES OF SEDIMENT OR OTHER POLLUTANTS FROM THE SITE;
6. LOCATION(S) OF BMPS THAT NEED TO BE MAINTAINED;
7. LOCATION(S) OF BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION;
8. LOCATION(S) WHERE ADDITIONAL BMPS ARE NEEDED THAT DID NOT EXIST AT THE TIME OF INSPECTION; AND
9. CORRECTIVE ACTION REQUIRED INCLUDING ANY CHANGES TO THE SWP3 NECESSARY AND IMPLEMENTATION DATES.

THE PERMITTEE SHALL MAINTAIN A RECORD OF ALL INSPECTIONS FOR A PERIOD OF 3 YEARS FOLLOWING THE SUBMITTAL OF THE NOTICE OF TERMINATION.

MAINTENANCE

THE CONTRACTOR SHALL MAINTAIN, REPAIR, OR REPLACE ALL EROSION CONTROL INSTALLATIONS AS NEEDED TO ENSURE THE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL REPAIRS TO BMPS SHALL BE MADE WITHIN 3 DAYS (OR SOONER IF POSSIBLE) OF NOTIFICATION OF DEFICIENCIES. IF THE CORRECTIONS ARE NOT MADE WITHIN THE 3 DAY PERIOD, LIQUIDATED DAMAGES MAY BE ASSESSED.

ONGOING INSPECTION OF INSTALLATIONS WILL BE PERFORMED BY THE CONTRACTOR OR DESIGNATED REPRESENTATIVE.

ANY TRAPPED SEDIMENT OR DEBRIS REMOVED DURING CLEANING OF OR REMOVAL OF BMP INSTALLATIONS SHALL BE PLACED IN AREAS NOT SUBJECT TO EROSION AND PERMANENTLY STABILIZED.

SPILL PREVENTION

MATERIAL MANAGEMENT PRACTICES:

THE FOLLOWING ARE THE MATERIAL MANAGEMENT PRACTICES THAT WILL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORM WATER RUNOFF.

GOOD HOUSEKEEPING:

THE FOLLOWING GOOD HOUSEKEEPING PRACTICES WILL BE FOLLOWED ONSITE DURING THE CONSTRUCTION PROJECT.

1. AN EFFORT WILL BE MADE TO STORE ONLY ENOUGH PRODUCT REQUIRED TO DO THE JOB.
2. ALL MATERIALS STORED ONSITE WILL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE.
3. PRODUCTS WILL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE ORIGINAL MANUFACTURER'S LABEL.
4. SUBSTANCES WILL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.
5. WHENEVER POSSIBLE, ALL OF A PRODUCT WILL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
6. MANUFACTURERS' RECOMMENDATIONS FOR PROPER USE AND DISPOSAL WILL BE FOLLOWED.
7. THE SITE SUPERINTENDENT WILL INSPECT DAILY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS ONSITE.

HAZARDOUS PRODUCTS:

THESE PRACTICES ARE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS.

1. PRODUCTS WILL BE KEPT IN ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.
2. ORIGINAL LABELS AND MATERIAL SAFETY DATA WILL BE RETAINED; THEY CONTAIN IMPORTANT PRODUCT INFORMATION.
3. IF SURPLUS PRODUCT MUST BE DISPOSED OF, MANUFACTURERS' OR LOCAL AND STATE RECOMMENDED METHODS FOR PROPER DISPOSAL WILL BE FOLLOWED.

SPILL CONTROL PRACTICES

IN ADDITION TO THE GOOD HOUSEKEEPING AND MATERIAL MANAGEMENT PRACTICES DISCUSSED IN THE PREVIOUS SECTIONS OF THIS PLAN, THE FOLLOWING PRACTICES WILL BE FOLLOWED FOR SPILL PREVENTION AND CLEANUP:

1. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY. MANUFACTURERS' RECOMMENDED METHODS FOR SPILL CLEANUP POSTED AND SITE PERSONNEL WILL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES.
2. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP WILL BE KEPT IN THE MATERIAL STORAGE AREA ONSITE. EQUIPMENT AND MATERIALS WILL INCLUDE BUT NOT BE LIMITED TO BROOMS, DUST PANS, MOPS, RAGS, GLOVES, GOGGLES, KITTY LITTER, SAND, SAWDUST, AND PLASTIC AND METAL TRASH CONTAINERS SPECIFICALLY FOR THIS PURPOSE.
3. THE SPILL AREA WILL BE KEPT WELL VENTILATED AND PERSONNEL WILL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE.
4. SPILLS OF TOXIC OR HAZARDOUS MATERIAL WILL BE REPORTED TO THE APPROPRIATE STATE OR LOCAL GOVERNMENT AGENCY, REGARDLESS OF THE SIZE. SPILLS OF 25 OR MORE GALLONS OF PETROLEUM WASTE MUST BE REPORTED TO KENTUCKY EPA, THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE WITHIN 30 MINUTES OF THE SPILL.
5. SOILS CONTAMINATED BY PETROLEUM OR OTHER CHEMICAL SPILLS MUST BE TREATED/DISPOSED AT A KENTUCKY EPA APPROVED SOLID WASTE MANAGEMENT FACILITY OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITY (TSDF).
6. THE SPILL PREVENTION PLAN WILL BE ADJUSTED TO INCLUDE MEASURES TO PREVENT THIS TYPE OF SPILL FROM REOCCURRING AND HOW TO CLEAN UP THE SPILL IF THERE IS ANOTHER ONE. A DESCRIPTION OF THE SPILL, WHAT CAUSED IT, AND THE CLEANUP MEASURES WILL ALSO BE INCLUDED.
7. THE SITE SUPERINTENDENT RESPONSIBLE FOR THE DAY-TO-DAY SITE OPERATIONS, WILL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR. HE WILL DESIGNATE SITE PERSONNEL WHO WILL RECEIVE SPILL PREVENTION AND CLEANUP TRAINING. THESE INDIVIDUALS WILL EACH BECOME RESPONSIBLE FOR A PARTICULAR PHASE OF PREVENTION AND CLEANUP. THE NAMES OF RESPONSIBLE SPILL PERSONNEL WILL BE POSTED IN THE MATERIAL STORAGE AREA AND IN THE OFFICE TRAILER ONSITE.

PRODUCT SPECIFIC PRACTICES

THE FOLLOWING PRODUCT SPECIFIC PRACTICES WILL BE FOLLOWED ONSITE:

PETROLEUM PRODUCTS - ALL ONSITE VEHICLES WILL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE. PETROLEUM PRODUCTS WILL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT SUBSTANCES USED ONSITE WILL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

FUEL STORAGE TANKS SHALL BE LOCATED AWAY FROM SURFACE WATERS AND STORM SEWER SYSTEM INLETS. FUEL TANKS SHALL BE STORED IN A DIKED AREA CAPABLE OF HOLDING 150% OF THE TANK CAPACITY.

FERTILIZERS - FERTILIZERS USED WILL BE APPLIED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, FERTILIZER WILL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORM WATER. STORAGE WILL BE IN A COVERED SHED. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER WILL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.

PAINTS - ALL CONTAINERS WILL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE. EXCESS PAINT WILL NOT BE DISCHARGED TO THE STORM SEWER SYSTEM BUT WILL BE PROPERLY DISPOSED OF ACCORDING TO MANUFACTURERS' INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.

DUST CONTROL

DUST CONTROL INVOLVES PREVENTING OR REDUCING DUST FROM EXPOSED SOILS OR OTHER SOURCES DURING LAND DISTURBING, DEMOLITION AND CONSTRUCTION ACTIVITIES TO REDUCE THE PRESENCE OF AIRBORNE SUBSTANCES WHICH MAY PRESENT HEALTH HAZARDS, TRAFFIC SAFETY PROBLEMS OR HARM ANIMAL OR PLANT LIFE.

THE FOLLOWING SPECIFICATIONS FOR DUST CONTROL SHALL BE FOLLOWED ONSITE:

1. VEGETATIVE COVER AND/MULCH - APPLY TEMPORARY OR PERMANENT SEEDING AND MULCH TO AREAS THAT WILL REMAIN IDLE FOR OVER 14 DAYS. SAVING EXISTING TREES AND LARGE SHRUBS WILL ALSO REDUCE SOIL AND AIR MOVEMENT ACROSS DISTURBED AREAS. SEE TEMPORARY SEEDING; PERMANENT SEEDING; MULCHING PRACTICES; AND TREE AND NATURAL AREA PROTECTION PRACTICES.
2. WATERING - SPRAY SITE WITH WATER UNTIL THE SURFACE IS WET BEFORE AND DURING GRADING AND REPEAT AS NEEDED, ESPECIALLY ON HAUL ROADS AND OTHER HEAVY TRAFFIC ROUTES. WATERING SHALL BE DONE AT A RATE THAT PREVENTS DUST BUT DOES NOT CAUSE SOIL EROSION. WETTING AGENTS SHALL BE UTILIZED ACCORDING TO MANUFACTURERS INSTRUCTIONS.
3. SPRAY-ON ADHESIVES - APPLY ADHESIVE ACCORDING TO THE FOLLOWING TABLE OR MANUFACTURERS' INSTRUCTIONS.

NKU SPORT WORKS FIELD DESIGN
a division of THE KLEINGERS GROUP

NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL
FIELD RENOVATIONS

SEAL: STATE OF KENTUCKY ★ CRAIG A. HONKOMP 30485 ★ LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE:

SHEET NAME: **EROSION CONTROL NOTES**

SHEET NO. **C160**

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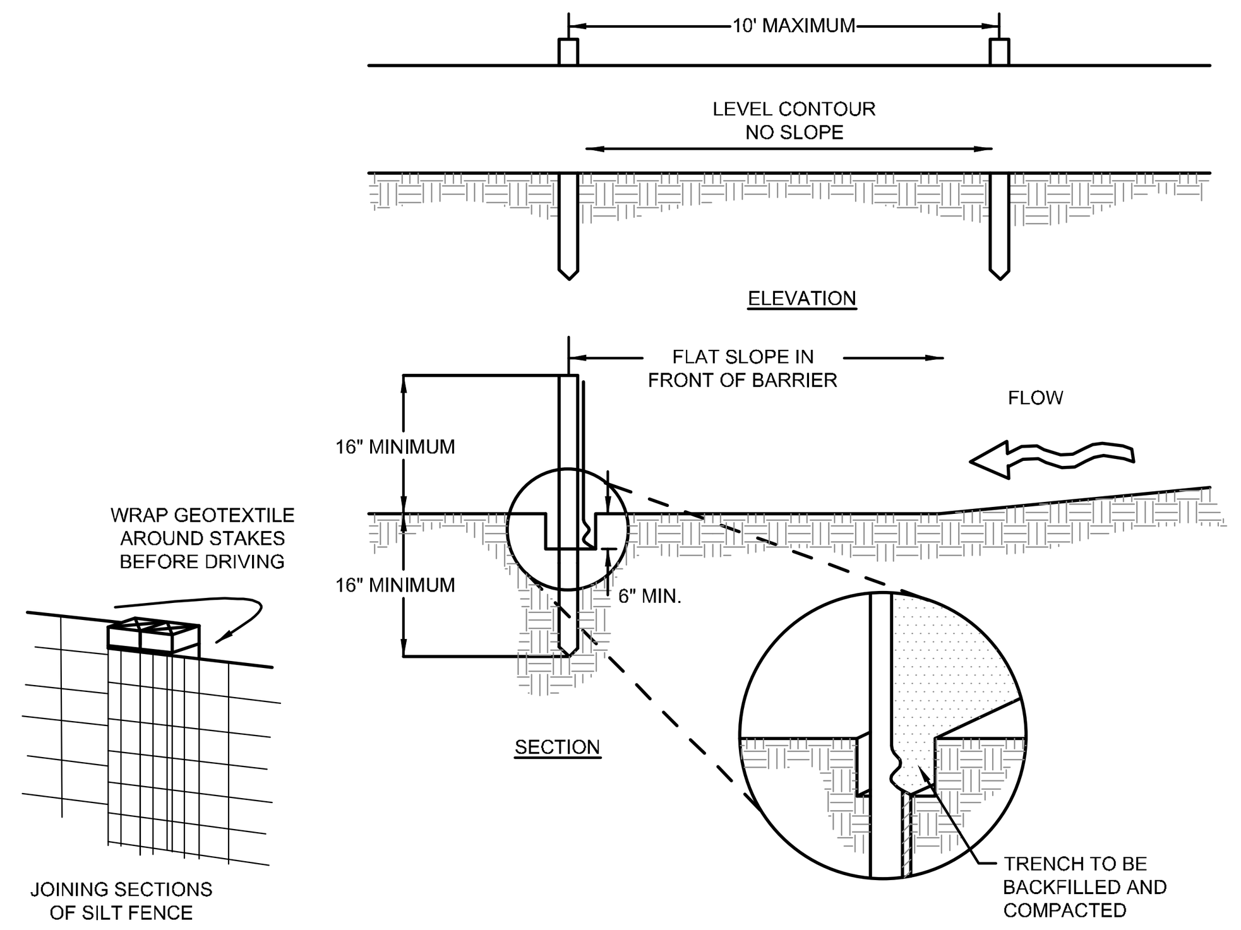


NOTES:

1. SILT FENCE SHALL BE CONSTRUCTED BEFORE UPSLOPE LAND DISTURBANCE BEGINS.
2. ALL SILT FENCE SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE SO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS THAT MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.
3. ENDS OF THE SILT FENCES SHALL BE BROUGHT UPSLOPE SLIGHTLY SO THAT WATER PONDED BY THE SILT FENCE WILL BE PREVENTED FROM FLOWING AROUND THE ENDS.
4. SILT FENCE SHALL BE PLACED ON THE FLATTEST AREA AVAILABLE.
5. WHERE POSSIBLE, VEGETATION SHALL BE PRESERVED FOR 5 FEET (OR AS MUCH AS POSSIBLE) UPSLOPE FROM THE SILT FENCE. IF VEGETATION IS REMOVED, IT SHALL BE REESTABLISHED WITHIN 7 DAYS FROM THE INSTALLATION OF THE SILT FENCE.
6. THE HEIGHT OF THE SILT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
7. THE SILT FENCE SHALL BE PLACED IN AN EXCAVATED OR SLICED TRENCH CUT A MINIMUM OF 6 INCHES DEEP. THE TRENCH SHALL BE MADE WITH A TRENCHER, CABLE LAYING MACHINE, SLICING MACHINE, OR OTHER SUITABLE DEVICE THAT WILL ENSURE AN ADEQUATELY UNIFORM TRENCH DEPTH.
8. THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWNSLOPE SIDE OF THE GEOTEXTILE. A MINIMUM OF 8 INCHES OF GEOTEXTILE MUST BE BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6-INCH DEEP TRENCH. THE TRENCH SHALL BE BACKFILLED AND COMPACTED ON BOTH SIDES OF THE FABRIC.
9. SEAMS BETWEEN SECTIONS OF SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST WITH A MINIMUM 6-IN. OVERLAP PRIOR TO DRIVING INTO THE GROUND.
10. MAINTENANCE—SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVERTOPS THE SILT FENCE, FLOWS UNDER THE FABRIC OR AROUND THE FENCE ENDS, OR IN ANY OTHER WAY ALLOWS A CONCENTRATED FLOW DISCHARGE, ONE OF THE FOLLOWING SHALL BE PERFORMED, AS APPROPRIATE: 1) THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED, 2) ACCUMULATED SEDIMENT SHALL BE REMOVED, OR 3) OTHER PRACTICES SHALL BE INSTALLED.

SEDIMENT DEPOSITS SHALL BE ROUTINELY REMOVED WHEN THE DEPOSIT REACHES APPROXIMATELY ONE-HALF OF THE HEIGHT OF THE SILT FENCE.

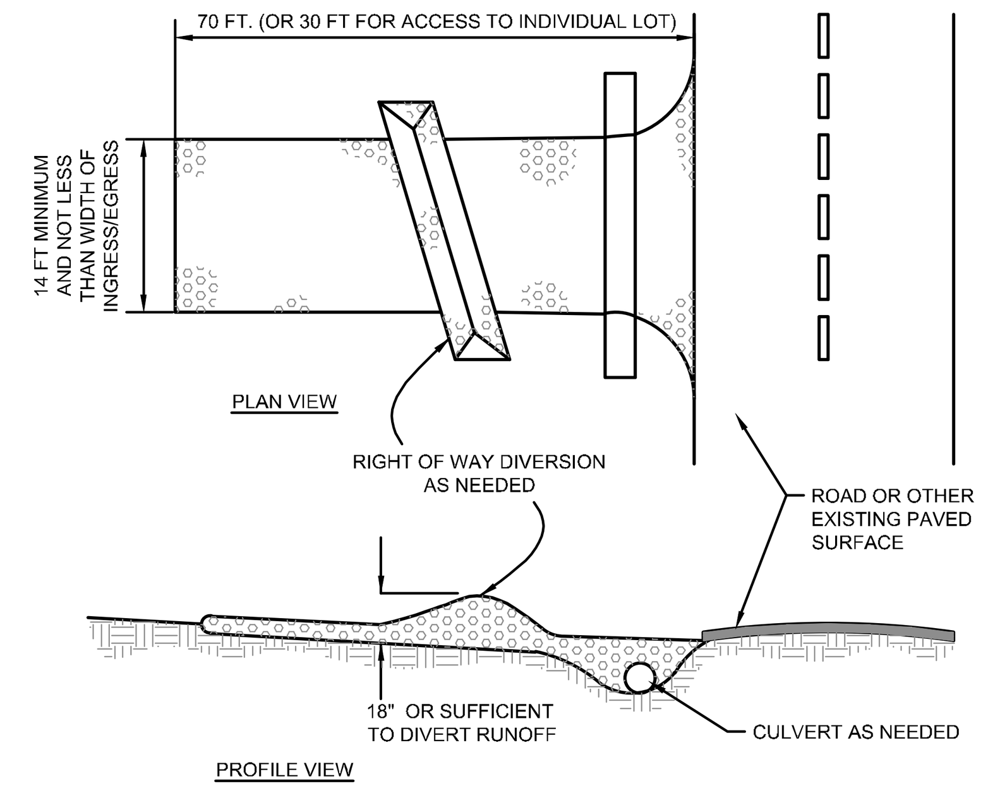
SILT FENCES SHALL BE INSPECTED AFTER EACH RAINFALL AND AT LEAST DAILY DURING A PROLONGED RAINFALL. THE LOCATION OF EXISTING SILT FENCE SHALL BE REVIEWED DAILY TO ENSURE ITS PROPER LOCATION AND EFFECTIVENESS. IF DAMAGED, THE SILT FENCE SHALL BE REPAIRED IMMEDIATELY.

CRITERIA FOR SILT FENCE MATERIALS

1. FENCE POST – THE LENGTH SHALL BE A MINIMUM OF 32 INCHES. WOOD POSTS WILL BE 2-BY-2-IN. NOMINAL DIMENSIONED HARDWOOD OF SOUND QUALITY. THEY SHALL BE FREE OF KNOTS, SPLITS AND OTHER VISIBLE IMPERFECTIONS, THAT WILL WEAKEN THE POSTS. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10 FT. POSTS SHALL BE DRIVEN A MINIMUM 16 INCHES INTO THE GROUND, WHERE POSSIBLE. IF NOT POSSIBLE, THE POSTS SHALL BE ADEQUATELY SECURED TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT/WATER LOADING.
2. SILT FENCE FABRIC – SEE CHART BELOW.

FABRIC PROPERTIES	VALUES	TEST METHOD
MINIMUM TENSILE STRENGTH	120 LBS. (535 N)	ASTM D 4632
MAXIMUM ELONGATION AT 60 LBS	50%	ASTM D 4632
MINIMUM PUNCTURE STRENGTH	50 LBS. (220 N)	ASTM D 4833
MINIMUM TEAR STRENGTH	40 LBS. (180 N)	ASTM D 4533
APPARENT OPENING SIZE	<0.84 MM	ASTM D 4751
MINIMUM PERMITTIVITY	1X10-2 SEC-1	ASTM D 4491
UV EXPOSURE STRENGTH RETENTION	70%	ASTM G 4355

1 / C161 SILT FENCE DETAIL
N.T.S.



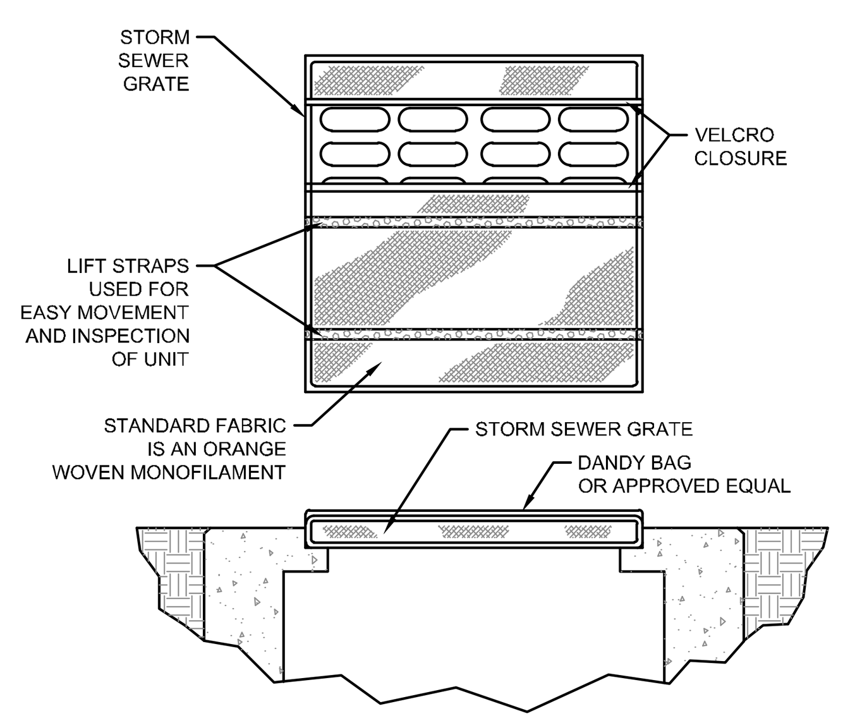
NOTES

1. STONE SIZE - ODOT #2 (1.5-2.5 INCH) STONE SHALL BE USED, OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 70 FT. (EXCEPTION: APPLY 30 FT. MINIMUM TO SINGLE RESIDENCE LOTS).
3. THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6 INCHES THICK FOR LIGHT DUTY ENTRANCES OR AT LEAST 10 INCHES FOR HEAVY DUTY USE.
4. WIDTH - THE ENTRANCE SHALL BE AT LEAST 14 FEET WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. GEOTEXTILE - A GEOTEXTILE SHALL BE LAID OVER THE ENTIRE ARE PRIOR TO PLACING STONE. IT SHALL BE COMPOSED OF STRONG ROT-PROOF POLYMERIC FIBERS AND MEET THE FOLLOWING SPECIFICATIONS:

MINIMUM TENSILE STRENGTH	200 LBS
MINIMUM PUNCTURE STRENGTH	80 LBS
MINIMUM TEAR STRENGTH	50 LBS
MINIMUM BURST STRENGTH	320 PSI
MINIMUM ELONGATION	20%
EQUIVALENT OPENING SIZE	EOS< 0.6MM
PERMITTIVITY	$1X10^{-3}$ CM/SEC

6. TIMING - THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED AS SOON AS IS PRACTICABLE BEFORE MAJOR GRADING ACTIVITIES.
7. CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEED ED TO PREVENT SURFACE WATER FROM FLOWING ACROSS THE ENTRANCE OR TO PREVENT RUNOFF FROM BEING DIRECTED OUT ONTO PAVED SURFACES.
8. WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.
9. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE WASHING AND REWORKING OF EXISTING STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY. THE USE OF WATER TRUCKS TO REMOVE MATERIALS DROPPED, WASHED, OR TRACKED ONTO ROADWAYS WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES. TOP DRESSING OF ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADS, OR ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVE IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING OR SWEEPING.
10. CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF-SITE TRACKING. VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION-SITE SHALL BE RESTRICTED FROM MUDDY AREAS.
11. REMOVAL - THE ENTRANCE SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREA IS STABILIZED OR REPLACED WITH A PERMANENT ROADWAY OR ENTRANCE.

3 / C161 CONSTRUCTION ENTRANCE DETAIL
N.T.S.



SPECIFICATIONS

MECHANICAL PROPERTIES	TEST METHOD	UNITS	MARV
GRAB TENSILE STRENGTH	ASTM D 4632	KN (LBS)	1.62 (365) X 0.89 (200)
GRAB TENSILE ELONGATION	ASTM D 4632	%	24 X 10
PUNCTURE STRENGTH	ASTM D 4833	KN (LBS)	0.40 (90)
MULLEN BURST STRENGTH	ASTM D 3786	KPA (PSI)	3097 (450)
TRAPEZOID TEAR STRENGTH	ASTM D 4533	KN (LBS)	0.51 (115) X 0.33 (75)
UV RESISTENCE	ASTM D 4355	%	90
APPARENT OPENING SIZE	ASTM D 4751	MM (US STD SIEVE)	0.425 (40)
FLOW RATE	ASTM D 4491	$1/MIN/M^2(GAL/MIN/FT^2)$	5907 (145)
PERMITTIVITY	ASTM D 4491	SEC^{-1}	2.1

INSTALLATION: THE EMPTY DANDY BAG SHOULD BE PLACED OVER THE GRATE AS THE GRATE STANDS ON END. IF USING OPTIONAL OIL ABSORBENTS: PLACE ABSORBENT PILLOW IN POUCH, ON THE BOTTOM (BELOW-GRADE SIDE) OF THE UNIT. ATTACH ABSORBENT PILLOW TO TETHER LOOP. TUCK THE ENCLOSURE FLAP INSIDE TO COMPLETELY ENCLOSE THE GRATE. HOLDING THE LIFTING DEVICES (DO NOT RELY ON LIFTING DEVICES TO SUPPORT THE ENTIRE WEIGHT OF THE GRATE), PLACE THE GRATE INTO ITS FRAME.

MAINTENANCE: REMOVE ALL ACCUMULATED SEDIMENT AND DEBRIS FROM SURFACE AND VICINITY OF UNIT AFTER EACH STORM EVENT. REMOVE SEDIMENT THAT HAS ACCUMULATED WITHIN THE CONTAINMENT AREA OF THE DANDY BAG AS NEEDED. IF USING OPTIONAL OIL ABSORBENTS; REMOVE AND REPLACE ABSORBENT PILLOW WHEN NEAR SATURATION.

2 / C161 DANDY BAG DETAIL
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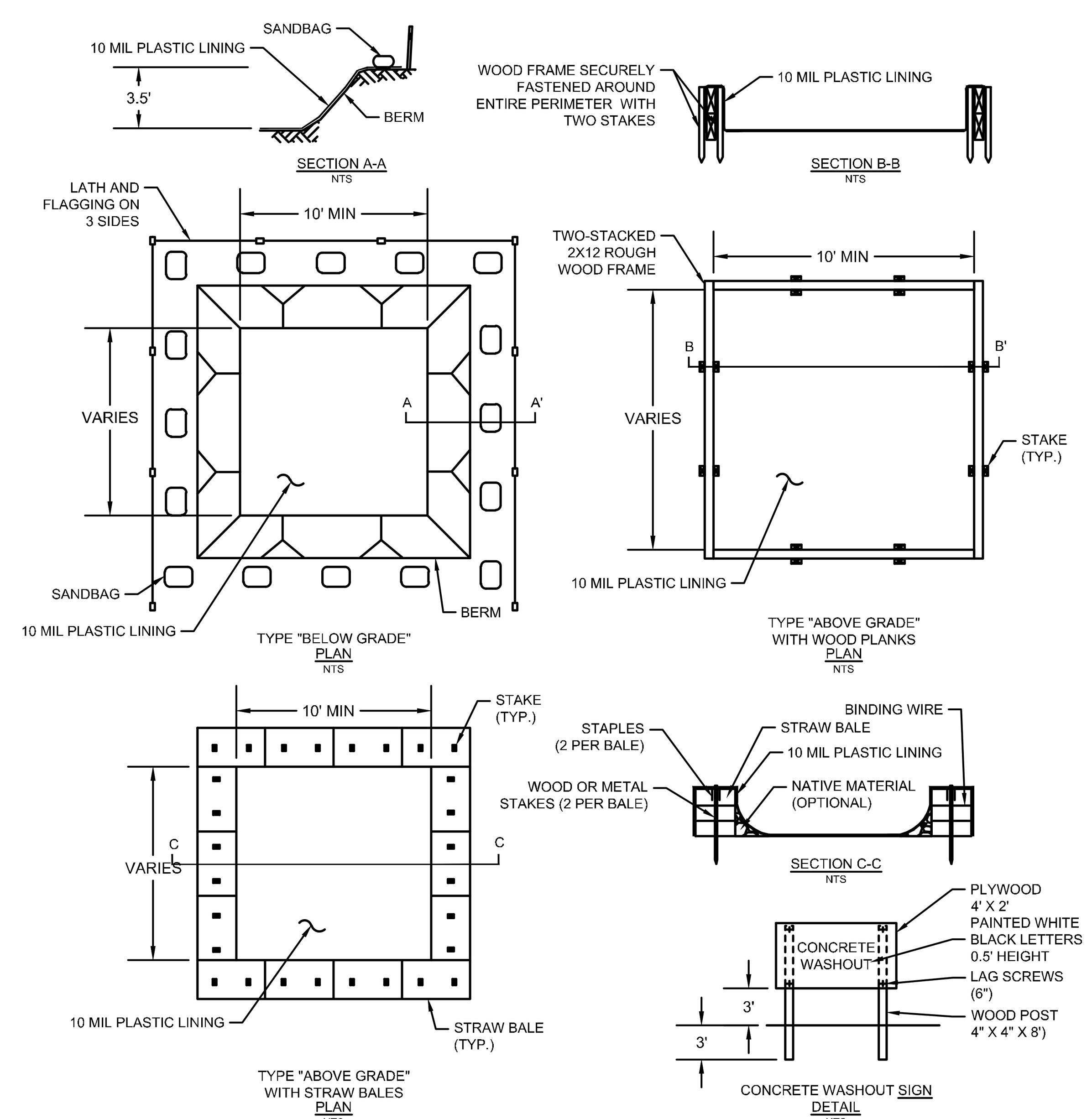


NOTES:
1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30' OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

4 / C161 CONCRETE WASHOUT DETAIL
N.T.S.

Know what's **below.**
Call before you dig.

NKU SPORT WORKS FIELD DESIGN
a division of THE KLEINGERS GROUP

NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL
FIELD RENOVATIONS

SEAL:
STATE OF KENTUCKY
CRAIG A. HONKOMP
30485
LICENSED PROFESSIONAL ENGINEER

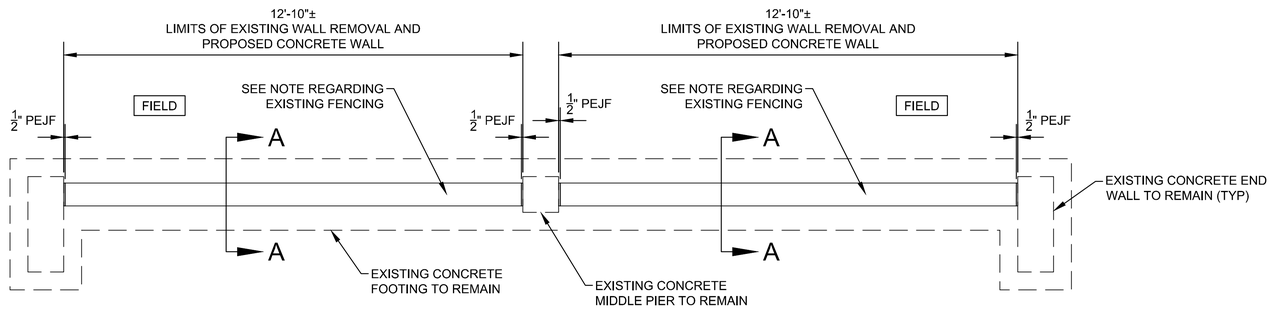
NO.	DATE	DESCRIPTION
1	02/11/2020	BID SET

NKU SOFTBALL FIELD RENOVATIONS
CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE:

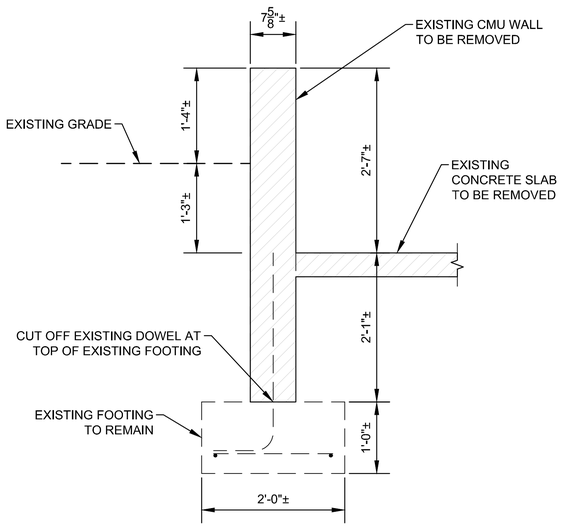
SHEET NAME:
EROSION CONTROL DETAILS

SHEET NO.
C161



PLAN - TYPICAL DUGOUT

0 1' 2' 4'



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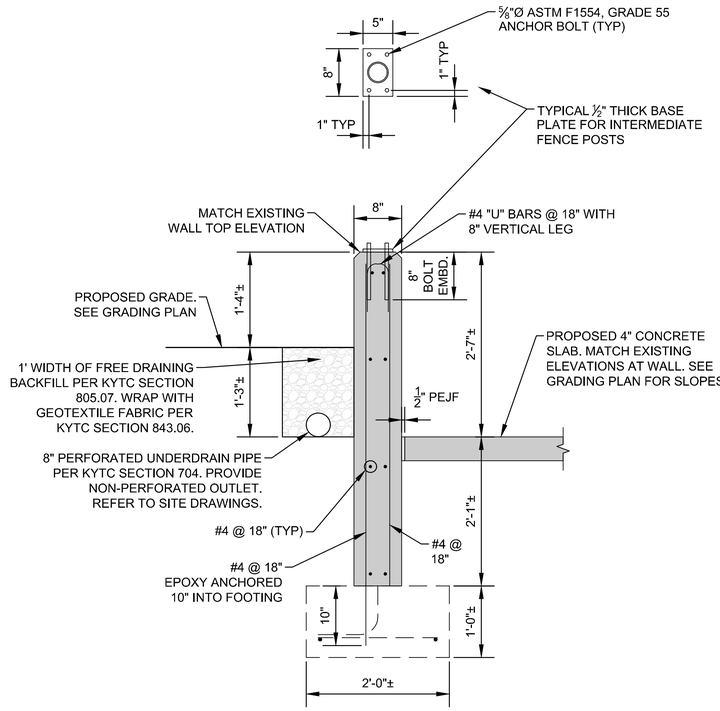

PROPOSED

SECTION A-A - TYPICAL WALL

0 6" 1' 2'

STRUCTURAL NOTES:

REFERENCES TO KYTC SECTION NUMBERS:
- KYTC SECTION NUMBERS REFER TO THE 2019 EDITION OF THE KYTC STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. COMPLY WITH ALL REQUIREMENTS OF THE SECTION NUMBER CITED, AS WELL AS ALL OTHER KYTC SECTION NUMBERS CITED THEREIN.
- THE KYTC STANDARD SPECIFICATIONS ARE AVAILABLE FOR FREE DOWNLOAD FROM THE KYTC WEBPAGE.

DESIGN LOADS, MATERIAL PROPERTIES AND FOUNDATION CAPACITY:
- NO BORINGS OR GEOTECHNICAL REPORT INFORMATION WERE AVAILABLE FOR THE WALL DESIGN. ALL DESIGN LOADS, FOUNDATION AND RETAINED MATERIAL PROPERTIES, AND FOUNDATION CAPACITIES ARE BASED ON PROFESSIONAL EXPERIENCE AND ASSUMPTIONS.
- ACTIVE LATERAL EARTH PRESSURE = 60 pcf EQUIVALENT FLUID.
- NO LATERAL PRESSURE FROM SURCHARGES ON THE SURFACE OF THE FINISHED GRADE ON THE HIGH SIDE OF THE WALL WERE INCLUDED
- ALLOWABLE FOUNDATION BEARING PRESSURE = 2,000 psf
- COEFFICIENT OF FRICTION FOR RESISTING SLIDING = 0.25
- ALLOWABLE PASSIVE PRESSURE = 150 pcf.

EXCAVATION FOR WALL:
- THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ALL OSHA REQUIREMENTS PERTAINING TO SAFE EXCAVATION PRACTICES.
- THE CONTRACTOR SHALL DESIGN ALL REQUIRED CONSTRUCTION SHORING.

EXISTING FOUNDATION:
- THE EXISTENCE OF THE 2'-0"± WIDE FOOTING BELOW THE EXISTING CMU WALLS IS BASED ON RECORD DRAWING L7 FROM THE 1998 CONSTRUCTION DRAWINGS.
- NOTIFY THE ENGINEER IMMEDIATELY IF THIS FOOTING IS SMALLER THAN INDICATED OR IF IT DOES NOT EXIST.

EXISTING FENCING:
- THE POSTS ON TOP OF THE EXISTING CONCRETE END WALLS AND THE MIDDLE CONCRETE PIER ARE TO REMAIN IN PLACE.
- DOCUMENT THE LOCATION OF THE TWO INTERMEDIATE FENCE POSTS FOR ANCHOR BOLT PLACEMENT FOR LATER POST RE-INSTALLATION.
- REMOVE AND STORE THE EXISTING FENCE FABRIC, THE BOTTOM HORIZONTAL FENCE MEMBERS, AND THE TWO INTERMEDIATE FENCE POSTS.
- MODIFY THE TWO EXISTING INTERMEDIATE POSTS BY TRIMMING AS NECESSARY AND WELDING THE BASE PLATE SHOWN TO THE BOTTOM OF EACH POST.
- RE-INSTALL THE MODIFIED INTERMEDIATE POSTS TO THE TOP OF THE COMPLETED PROPOSED CONCRETE WALL WITH THE ANCHOR BOLTS THAT WERE CAST INTO THE WALL.
- RE-ATTACH THE EXISTING BOTTOM HORIZONTAL FENCE MEMBERS AND FENCE FABRIC.

CONCRETE:
- ALL CONCRETE CONSTRUCTION SHALL CONFORM TO THE BUILDING CODE REQUIREMENTS OF THE AMERICAN CONCRETE INSTITUTE.
- REINFORCING STEEL SHALL COMPLY WITH KYTC SECTION 602 AND MEET ASTM A 615, GRADE 60.
- CONCRETE SHALL COMPLY WITH KYTC SECTION 601, CLASS AA, 4,000 psi COMPRESSIVE STRENGTH.
- THE MINIMUM REINFORCING STEEL LAPS ARE:
  #4 = 30"
- PROVIDE 2" CLEAR COVER OVER ALL REINFORCING IN THE WALL.
- ALL EXPOSED WALL CORNERS SHALL HAVE ¾" CHAMPFERS.

TYPICAL DETAILS:
- DETAILS LABELED "TYPICAL" ON THE DRAWINGS SHALL APPLY TO ALL SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SUCH DETAILS SHALL APPLY WHETHER OR NOT THEY ARE KEYED AT EACH LOCATION.

CONSTRUCTION:
- CONTRACTOR SHALL BRACE THE ENTIRE STRUCTURE AS REQUIRED TO MAINTAIN STABILITY UNTIL COMPLETE AND FUNCTIONING AS THE DESIGNED UNIT.

EXISTING CONDITIONS:
- FIELD VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS BEFORE FABRICATING ANY MATERIALS. NOTIFY ENGINEER IMMEDIATELY OF ANY EXISTING CONDITIONS THAT DIFFER FROM THE CONSTRUCTION DOCUMENTS BEFORE PROCEEDING.

SAFETY:
- IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY.
- PERFORMANCE OF THE THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS.
- IF ENGINEER PROVIDES CONSTRUCTION REVIEW SERVICES, SUCH SERVICES SHALL NOT INCLUDE REVIEW OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.

NKU SPORT WORKS FIELD DESIGN
a division of THE KLEINGERS GROUP

NORTHERN KENTUCKY UNIVERSITY
FRANK IGNATIUS GREIN SOFTBALL FIELD RENOVATIONS

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CITY OF HIGHLAND HEIGHTS
CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

PROJECT NO: 080115.036
DATE: FEBRUARY 2020
SCALE: VARIES
SHEET NAME: STRUCTURAL DETAILS
SHEET NO. S100

Appendix 3 2020-02-11 NKU Softball Bid Project Manual Specification

Project Manual

For

Frank Ignatius Grein
Softball Field Renovations

For

Northern Kentucky University

Highland Heights, KY 41099

Project # - 080115.036
Project Record Drawings

By

Sportworks Field Design
A Division of Kleingers
6219 Centre Park Drive
West Chester, OH 45069
513-779-7851

SECTION 116500 – ATHLETIC & RECREATIONAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following outdoor field equipment:

1. Foul Pole
2. Skinned Infield (bags)
3. Skinned Infield (bulk)
4. Mound Clay Blocks
5. Outfield Fence Cover
6. Warning Track
7. Softball Bases and Pitching Rubber

B. Related Sections include the following:

1. Division 03 Section “Cast In Place Concrete” for criteria for structural concrete bases for sport equipment.
2. Division 32 Section “Chain Link Fences and Gates” and “Decorative Metal Fences and Gates” for fences at sport fields.
3. Division 32 Section “Concrete Paving” for concrete pads and walks associated with sport fields.

1.3 DEFINITIONS

A. NCAA: National Collegiate Athletic Association

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. If applicable, include assembly, disassembly, and storage instructions for removable equipment.

B. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation including loads, footing and foundation design for football goal posts.

C. Coordination Drawings: Layout plans, drawn to scale, and coordinating locations of all field equipment and space requirements.

D. Samples for Initial Selection: For each type of equipment offering a color selection.

E. Samples for Verification:

1. Actual material sample of material in color(s) selected. Provide sample that is approximately 8-inches square or (for extrusions and linear items) 12-inches long.

F. Product Certificates: For each type of equipment, signed by product manufacturer.

G. Qualification Data: For installer.

H. Operation and Maintenance Data: For equipment to include in operation and maintenance manuals.

I. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of equipment through one source from a single manufacturer.

B. Conform to the latest rules and regulations of the NCAA.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify position and elevation of equipment. Coordinate fully with finish grading elevations and finish paving elevations.

B. Install only when other site work is completed to a point that ensures no displacement of installed athletic field equipment.

C. Install equipment only when weather conditions and soil conditions are in a range acceptable to the equipment manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of field sport equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Profiles, and Tubes: ASTM B 221.
2. Cast Aluminum: ASTM B 179.
3. Flat Sheet: ASTM B 209.

B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36.
2. Steel Tubing: ASTM A 500 or ASTM A 513, cold formed.
3. Steel Sheet: ASTM A 1011.
4. Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 666.
5. Stainless Steel Bars and Shapes: ASTM A 276

C. Anchors, Fasteners, Fittings and Hardware: Manufacturer's standard corrosion-resistant or noncorrodible units; concealed.

D. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 with minimum strength recommended in writing by equipment manufacturer.

2.2 SPORTS EQUIPMENT

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated as the basis of design or the most comparable product by one of the other named manufacturers. If product number given for the "other named" manufacturers is not the closest possible to the basis of design, advise Engineer and submit the product that IS most close to the basis of design.

B. Softball Foul Pole:
1. 20' above ground.
2. 6" diameter aluminum tube.
3. Color: white
4. 1-1/2" aluminum lockcrimp mesh.
5. Powder-coated finish.
6. Products:
   a. Basis of Design: Sportsfield Specialties (FPW420)
   b. Aluminum Athletic Equipment Co.
   c. UCS

C. Skinned Infield (Pre-packaged): Provide one of the following:
1. Basis of Design: Dura-Edge Collegiate
2. Diamond Pro
3. Kurtz Brothers

D. Skinned Infield (Field Mixed): Mix design recommendations as follows:
1. 65% sand of which, 50% is composed of a round, uniform (masonry-type) sand and 50% is composed of sharp, angular, manufactured sand that is often used by city street departments for roads or by highway departments for crack and seal sand.
   a. The round sand shall be uniform, medium/coarse sand screened and washed meeting the following criteria:

Fraction Size Name	Sieve Diameter (mm)	Allowable Range (% Retained on Sieve)
Gravel	>2.00	<3%
Very Coarse	1 mm – 2 mm	<7%
Coarse	0.5 mm – 1 mm	At least 60% particles
Medium	0.25 mm – 0.5 mm	In this range

   b. The manufactured, angular sand shall be screened and washed meeting the following criteria:

Fraction Size Name	Sieve Diameter (mm)	Allowable Range (% Retained on Sieve)
Gravel	>2.00	<25%
Very Coarse	1 mm – 2 mm	At least 50% particles

Coarse	0.5 mm – 1 mm	In this range
Medium	0.25 mm – 0.5 mm	<15%
Fines	<0.25 mm	<3%

2. 15% silt
3. 20% clay

E. Coarse calcined clay or infield conditioner
1. The calcined clay/ infield conditioner shall be of the coarser material meeting the following criteria:

Fraction Size Name	Sieve Diameter (mm)	Allowable Range (% Retained on Sieve)
Gravel	>2.00	>40%
Very Coarse	1 mm – 2 mm	>40%
Coarse	0.5 mm – 1 mm	>10%
Medium	0.25 mm – 0.5 mm	<0.5%
Fines	<0.25 mm	<0.1%

2. Products: Subject to compliance with requirements, provide products by one of the following:
   a. Basis of Design: Dura-Edge Fair Ball
   b. Turface; Profile Products, LLC
   c. Infield Conditioner/Infield Top Dressing; Diamond Pro

F. Pitching Mound/Batter's Box Clay Blocks
1. Provide 2.5"x4"x8" pitching mound clay blocks.
2. 100% pure virgin clay
3. Red in color.
4. 1 mounds total, 2 batter's box total, 1 catcher's box
5. Products:
   a. Basis of Design: Dura-Edge Pro Loc
   b. Turface Athletics MoundMaster Blocks
   c. Diamond Pro Mound/Home Plate Clay Bricks

G. Premium Outfield Fence Cover: Chain link top rail fence cover to be installed on all fence rails adjacent to warning track.
1. Include a 3" W x 4-1/2" H x 8' L UV resistant polyethylene cover with a minimum .09" thick wall.
2. 8" L fasteners to be installed in drilled holes every 24" o.c.
3. Color: Yellow
4. 4" diameter corrugated covers are prohibited.

H. Warning Track
1. The subgrade shall be prepared at a uniform depth of 4 inched below finished grade.
2. Install 8 mil black polyethylene with herbidicide.
3. Provide 4" of red crushed brick.
4. See drawings for limits.

I. Softball Bases and Pitching Rubber
1. Provide 3 bases complete with anchors and plugs.
2. 15" x 15" x 3" bases.
3. 8" ground anchor – 1 ¾" square.
4. Mushroom Plug
5. Provide bury-all home plate.
6. Provide pitcher's rubber complete with anchors and plugs.
7. Step-down style pitching rubber.
8. Products:

a. Basis of Design: Schutt – Jack Corbett Hollywood Bases #129010XX, Ground Anchors #12916550, Mushroom Plug #12916580, Hollywood Bury-All Home Plate #12908170, 24" Step Down Pitching Rubber #1909190
b. Bolco
c. AFP

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for position, elevation and alignment of mounting substrates, installation tolerances, operational clearances and other conditions affecting performance.

1. Verify critical dimensions.
2. Examine supporting structure and subgrades, and footings.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions and competition rules applicable to each type of equipment. Complete equipment field assembly, where required.

B. Unless otherwise indicated, install equipment after interfacing final grades and paving have been completed.

C. Permanently Placed Equipment and Components: Rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated on Shop Drawings; in proper relation to adjacent construction; and aligned with filed sport layout.

D. Insert Setting: Position sleeve in oversized, recessed voids in concrete and footings. Clean voids of debris. Fill void around sleeves with grout, mixed and placed to comply with grout manufacturer's written instructions.

E. Anchoring to In-Place Construction: Use anchors and fasteners where necessary for securing built-in and permanently placed equipment to structural support and for properly transferring load to in-place construction.

3.3 INSTALLATION

A. Skinned Infield: See Drawings for elevations. Grade to ¼ inch variation in 10 feet for flat, sloped, or curved profiles.
1. The subgrade shall be prepared at a uniform depth of 6 inches below the finished grade.
2. The subgrade shall then be rolled with a 3 to 5 ton roller, or other suitable roller, and the surface lightly scarified to insure bonding with the sand clay mixture.
3. If placing a pre-packaged infield mix, spread evenly to a loose depth so that the compacted depth will be 6 inches.
4. If preparing a field-mixed infield mix:
a. Evenly spread a layer of clay on the prepared subgrade and thereon a layer of sand to such a loose depth that, when compacted, the material mixed together shall be the required 6 inch depth. The order of spreading the sand and clay may be reversed if required by the Engineer.

b. These 2 layers shall then be thoroughly mixed and pulverized in place and spread by a minimum of 6 passes by a roto tiller or other approved mechanical means, shaped, and compacted to a uniform depth and approved by the Artchitect. If the moisture content is such as not to permit satisfactory compaction, water shall be added under his direction.

5. Apply "soil conditioner" at the rate of eight 50 lb bags per 100 sq ft., equal to 12-1/2 sq ft per bag, each bag at the center of a square measuring 42-1/2 inches on each side. After emptying the bags, level the piles of "soil conditioner" with rakes or tractor grading blade to a uniform thickness. By use of a rototiller, disc cultivator, tiller rake, or tine harrow, thoroughly mix "soil conditioner" in an evenly blended layer in the top 3 inches. The preferred implement is a tractor mounted rototiller. A half ton or one ton power roller will compact the loose mixture to the required firmness.

B. Install protective pads in strict accordance with manufacturer’s recommendations and as located on the plans.

3.4 ADJUSTING

A. Adjust components to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.5 CLEANING

A. After completing equipment installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.

B. Replace equipment and finishes that cannot be cleaned and repaired, in a manner approved by Engineer, before time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment.

END OF SECTION 116500

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, groundcovers, plants, and grass, to remain.
2. Removing existing trees, shrubs, groundcovers, plants, and grass as indicated on drawings.
3. Clearing and grubbing.
4. Removing above- and below-grade site improvements.
5. Disconnecting, capping or sealing, and removing site utilities.
6. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:
1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

A. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in ITB Sections.

1.5 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and in accordance with sediment and erosion control Drawings.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.

3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.

3.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Construction Manager not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Construction Manager's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.
5. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.

B. Related Sections include the following:
1. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 32 Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.
3. Division 32 Section "Plants" for planting bed establishment and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Geotextile.
   2. Controlled low-strength material, including design mixture.

B. Qualification Data: For field builder including list of relevant projects as described in section 1.5.D.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

B. Geotechnical Testing Agency Qualifications: Owner will employ and pay a qualified, independent geotechnical testing laboratory to perform soil testing and inspection services during earthwork operations. Contractor shall be responsible for scheduling and coordination of these services.

C. Preexcavation Conference: Before commencing earthwork, meet with representatives of governing authorities, Owner, Engineer, Structural Engineer, consultants, Geotechnical Testing Agency and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three working days prior to convening conference. Record discussions and agreements and furnish a copy to each attendee.

D. Sports laser Builder(Installer)’s Experience:

   1. The athletic field builder shall have the experience of at least Ten (5) acceptable varsity NCAA natural grass installations within the past five (5) years.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Construction Manager and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Construction Manager not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Construction Manager's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide off-site borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

B. Satisfactory Soils: On site soils satisfactory to testing agency, containing less than 25% pulverized shale fragments, free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, organics, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Silt, highly organic soils, wood, roots, trash, debris, and other soils and materials not acceptable to the testing agency.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; as noted on drawings.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; as noted on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect and maintain erosion and sedimentation controls during earthwork operations.

C. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated utility trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. For sanitary sewer, storm sewer, and water lines, please see the corresponding spec sections. For other site utilities follow below.

B. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

C. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 SUBGRADE INSPECTION

A. Notify testing agency when excavations have reached required subgrade.

B. If testing agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Construction Manager, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Geotechnical Engineer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Construction Manager.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. For sanitary sewer, storm sewer, and water lines, please see the corresponding spec sections. For other site utility backfill, follow below.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.

E. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

F. Place and compact initial backfill material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit in non-paved areas.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit in paved areas.

H. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

I. Place and compact final backfill of satisfactory soil to final subgrade elevation in non-paved areas.

J. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation in paved areas.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations in accordance with sections 3.13 and 3.14 and as follows:

1. Under grass and planted areas, use satisfactory soil material or engineered fill.
2. Under walks and pavements, use satisfactory soil material (excluding topsoil) or engineered fill.
3. Under steps and ramps, use satisfactory soil material (excluding topsoil) or engineered fill.
4. Under building slabs, use satisfactory soil material (excluding topsoil) or engineered fill.
5. Under footings and foundations, use satisfactory (excluding topsoil) soil material or engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, including 10 feet beyond all such areas, compact each layer of backfill or fill soil material at 100 percent maximum dry density.

2. Under walkways, compact each layer of backfill or fill soil material at 100 percent maximum dry density.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent maximum dry density.
4. For utility trenches, compact each layer of initial and final backfill soil material at 100 percent maximum dry density.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Non-Athletic Field Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Athletic Field Area: Plus or minus 1/2 inch. **Must be laser graded.**
3. Walks: Plus or minus 1 inch.
4. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.

3.17 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Where specified install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Shape subbase and base course to required crown elevations and cross-slope grades.
3. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry density.

C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 100 percent of maximum dry density.

3.18 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Construction Manager; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Transport surplus soil material offsite to a legal disposal site off Owner’s property.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Excavated pavements shall be considered waste material and shall not be incorporated into fills.

END OF SECTION 312000

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.

4. Applied finish materials.

D. Jointing Plan

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications:
1. Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
2. Comply with ACI 330, "Guide for Design and Construction of Concrete Parking Lot" unless modified by requirements in the Contract Documents.
3. Comply with ACI 325, " Design of Jointed Concrete Pavements for Streets and Local Roads" unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in ITB Sections.

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete producer.
d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.

C. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 deformed bars.

D. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.

E. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.

F. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.

G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

J. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

K. Zinc Repair Material: ASTM A 780.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I., gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material when steel reinforcement is called out in exterior installations.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. Dry, delivered pre-wetted and soaked.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM 1752 Vinyl full depth, with joint sealant.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi, unless otherwise indicated on the drawings.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 3 inches, or up to 5 inches with the use of a water-reducing chemical admixture.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements and as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades
1. Proof rolling to be performed in presence of Engineer or Construction Manager.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, Construction Manager, or Geotechnical Engineer, and replace with compacted backfill or fill as directed.

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain 2” minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, or through locations of intended contraction or isolation joints, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated, or when construction joint will experience heavy truck traffic . Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint. Dowels to be epoxy coated and sized per ACI 330.

C. Isolation (expansion) Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of not more than 30 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
6. Apply joint sealant / caulk.
7. Doweled Joints: Install dowel bars and support assemblies at joints where indicated, or when construction joint will experience heavy truck traffic . Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint. Dowels to be epoxy coated and sized per ACI 330.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. For thickness 5 inches or less construct contraction joints for a depth equal to at least one-third of the concrete thickness, for thickness greater than 5 inches construct contraction joints for a depth equal to at least one-quarter of the concrete thickness, as follows or match jointing of existing adjacent concrete pavement:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated, or when construction joint will experience heavy truck traffic . Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint. Dowels to be epoxy coated and sized per ACI 330.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed if plastic shrinkage cracking is of concern.

D. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

E. Comply with ACI 301 and ASTM C94, requirements for measuring, mixing, transporting, and placing concrete.

F. A one time add of water to concrete during delivery or at Project site is permitted but the water to cementitious material ratio must not be violated.

G. Do not add water to fresh concrete after testing.

H. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

I. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms.

Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

O. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven

floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated prior to placement and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.

7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Chain-Link Fences
2. Gates

B. Related Sections include the following:
1. Division 31 Section "Earth Moving" for site excavation, fill, and backfill where chain-link fences and gates are located.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence and gate posts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Gates and hardware.
4. Gate operators, including operating instructions.
5. Accessories: Privacy slats.
6. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: Show locations of fences, gates, posts, rails, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. UL Standard: Provide gate operators that comply with UL 325.

C. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators serving as a required means of access.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in ITB Sections.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

A. General: Insert height, limited to 12 feet (3.6 m). Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:

1. Steel Wire Fabric: Polymer-coated wire with a diameter of 0.148 inch (3.76 mm).

   a. Mesh Size: 2 inches (50 mm).
   b. Polymer Coating: ASTM F 668, Class 2b over metallic-coated steel wire.

      1) Color: Black, complying with ASTM F 934.

   c. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

2. Selvage: Knuckled at both selvages.

2.2 INDUSTRIAL FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:

1. Group: IA, round steel pipe, Schedule 40 IC, round steel pipe, yield strength 50,000 psi (345 MPa).
2. Fence Height: As indicated on drawings.
3. Strength Requirement: Heavy industrial according to ASTM F 1043.
4. Post Diameter and Thickness: According to ASTM F 1083.
5. Post Size and Thickness: According to ASTM F 1083.

   a. Top Rail: 1.66 inches.
   b. Steel Line Post:
      1) Height up to and including 6 feet – 1.900 inches
      2) Height over 6 feet – 2.875 inches
   c. Steel End, Corner and Pull Post:
      1) Height up to and including 6 feet – 2.375 inches
      2) Height over 6 feet – 3.500 inches
   d. Swing Gate Post for fabric height up to and including 6 feet:: According to ASTM F 900 and as follows:
      1) Gate leaf width up to and including 4 feet: 2.375 inches OD pipe, 3.11-lb/ft weight
      2) Gate leaf width over 4 feet to 10 feet: 2.875 inches OD pipe, 4.64-lb/ft weight.
   e. Swing Gate Post for fabric height over 6 feet:: According to ASTM F 900 and as follows:
      1) Gate leaf width up to and including 6 feet: 2.875 inches OD pipe, 4.64-lb/ft weight

2) Gate leaf width over 4 feet to 10 feet: 4.000 inches OD pipe, 8.65-lb/ft weight.

6. Coating for Steel Framing:

a. Metallic Coating:

1) Type I Steel Pipe: Type A, consisting of not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating per ASTM A 653/A 653M.
2) Type II Steel Pipe: Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, of 30 plus or minimum 15 micrograms, and a clear, verifiable polymer film of 0.5 plus 0.2 mils. Type B inside with a minimum of 0.9 oz of zinc per sq.ft.

b. Polymer coating over metallic coating.

2.3 INDUSTRIAL SWING GATES

A. General: Comply with ASTM F 900 for single and double swing gate types.

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1043 and ASTM F 1083 for materials and protective coatings.

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:

1. Gate Fabric Height: 2 inches (50 mm) less than adjacent fence height.
2. Leaf Width: As indicated on drawings.
3. Frame Members:

a. Tubular Steel: 1.66 inches (42 mm) round for gate heights up to and including 6 feet; 1.90 inches (48 mm) round for gate heights over 6 feet.

C. Frame Corner Construction:

1. Welded and 5/16-inch- (7.9-mm-) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.

D. Hardware: Provide galvanized and coated hardware matching the fence specs as necessary and as follows:

1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 1-1/2 pair of hinges foe each leaf over 6-foot nominal height.
2. Latch: Forked type or plunger-bar type to permit operation form either side of gate with padlock eye as integral part of latch.
3. Keeper: Provide a keeper for vehicle gates that automatically engages gate leaf and holds it in the open position until manually released.
4. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage a center drop rod or plunger bar. Include a locking device and padlock eyes as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

2.4 FITTINGS

A. General: Comply with ASTM F 626.

B. Post and Line Caps: Provide for each post.

1. Line post caps with loop to receive top rail.

C. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches (152 mm) long.
2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
   a. Aluminum: ASTM B 211 (ASTM B 211M); Alloy 1350-H19; 0.148-inch- (3.76-mm-) diameter, mill-finished wire.

H. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.

2. Match Fence materials.

2.5 PRIVACY SLATS

A. Material: Polyethylene tubular slats, not less than 0.023 inch (0.58 mm) thick, manufactured for chain-link fences from virgin polyethylene containing UV inhibitor, sized to fit mesh specified for direction indicated; with vandal-resistant fasteners and lock strips, and fins for increased privacy factor.

B. Color: Black.

2.6 CAST-IN-PLACE CONCRETE

A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water.

1. Concrete Mixes: Normal-weight concrete with not less than 3000-psi (20.7- MPa) compressive strength (28 days), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum size aggregate.

2.7 POLYMER FINISHES

A. Supplemental Color Coating: In addition to specified metallic coatings for steel, provide fence components with polymer coating.

B. Metallic-Coated Steel Framing and Fittings: Comply with ASTM F 626 and ASTM F 1043 for polymer coating applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces.

1. Polymer Coating: Not less than 10-mil- (0.254-mm-) thick PVC finish.

C. Color: Match chain-link fabric, complying with ASTM F 934.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.

1. Do not begin installation before final grading is completed, unless otherwise permitted by Engineer.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed soil.
1. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than four times the largest cross section of post.
2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than the post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

B. Post Setting: Center and align posts in holes 3 inches above bottom of excavation. Space a maximum of 10 feet o.c., unless otherwise indicated.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Space line posts uniformly at 10 feet (3 m) o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 6 feet (1.83 m) or higher, on fences with top rail and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

G. Bottom Rails: Install, spanning between posts.

H. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches (50 mm) between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, and rails. Anchor to framework so fabric remains under tension after pulling force is released.

I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches (380 mm) o.c.

J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.

K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

L. Privacy Slats: Install slats in vertical direction, securely locked in place.

3.5 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

END OF SECTION 323113

SECTION 328400 – UNDERGROUND IRRIGATION SYSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and ITB sections, apply to work of this section.
   1. Division 32 Section 329300 “Exterior Plants”.
   2. Division 32 Section 329200 “Turf and Grasses”.

1.02 DESCRIPTION OF WORK

General:

A. The system shall provide 100% coverage and uniformly irrigate all zones and perform as required:
   1. The contractor shall provide an underground irrigation system drawing and adhere to these specifications.
      a) Automatic irrigation system including piping, fittings, sprinkler heads, control wire, quick coupler valves, controllers, and accessories.
      b) Excavating and backfilling irrigation system work.
      c) Testing and adjusting of system.
      d) “As – Built” drawings
      e) Winterization – shutdown – spring start-up
   2. All work required by the contractor’s plans and these specifications shall be accomplished by the Irrigation Contractor even though minor items required may not be specifically mentioned in the above listing.

B. Drawings: The irrigation layout is diagrammatic. Exact locations of piping, sprinkler heads, valves, and other components shall be by the Contractor. Modifications in the field at time of installation to allow for actual on site conditions are acceptable. Proper spacing of sprinkler heads will be required to obtain satisfactory coverage. Minor adjustments in the system layout will be permitted to clear fixed obstructions. Any major revisions to the irrigation system shall be submitted in writing to the owner for approval. The final system layout must be acceptable to the owner.

C. Verification of Plans and Specifications: It shall be the responsibility of the Irrigation Contractor to carefully examine the irrigation zones and specifications relating to this work for completeness, accuracy, and clarity. Any conflict errors or clarifications request shall be immediately brought to the attention of the owner's representative for written interpretation or instructions. No claim for increased compensation for additions, changes, or alterations will be considered unless written authorization is granted by Owner’s representative. Otherwise any additional materials and/or labor due to existing conditions shall be furnished under this contract.

D. Irrigation Contractor is responsible for obtaining all permits required for installation of this work.

E. Irrigation contractor to ensure that the general contractor provides required power to irrigation system.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide underground irrigation system as a complete unit produced by a single acceptable manufacturer, including heads, valves, controls, and accessories.

B. Work and materials shall be in accordance with the latest rules, and other applicable state or local laws. Nothing in the Contract Documents is to be construed to permit work not conforming to these codes.

C. Contractors Qualifications: Bidding contractors shall have a minimum of three years experience in the construction of a job of similar size and complexity.
   1. Provide the General Contractor a list of five equivalent, irrigation system installations, performed in the last five years, incorporating the following information:
      a) Name and address of product.
      b) Name and address of Owner.
         1) Contact person
      c) Name and address with whom contact was with.
         1) Contact person

D. Requirements of regulatory agencies and utilities:
   1. System shall comply with the latest requirements of all state and local codes and ordinances.
   2. System shall comply with the latest rules and requirements by all utility companies involved.
   3. Nothing in the contract documents is to be constructed to permit work not conforming to these rules, codes and ordinances.

E. Electrical devices shall carry Underwriter's Laboratory labels.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for underground irrigation system.

B. Record Drawings: After completion of the work and before final acceptance, a set of scaled, reproducible record drawings, and two sets of prints showing the location of the complete work shall be submitted to the Owner. Final payment and any retainage will not be released until these drawings are submitted and accepted by the Owner.

C. Submit a weekly irrigation schedule based on an annual evapotranspiration rate, average rainfall amounts etc.

1.05 WARRANTY

A. The contractor shall furnish a manufacturer's written warranty to the effect that all heads, valves, and controllers will be warranted for a period of no less than one year to be free from defects and faulty workmanship, and that any defective heads, valves, or controllers shall be promptly repaired or replaced without additional cost to the Owner in accordance with that warranty.

B. All materials other than those referred to in Paragraph A above shall be warranted for a period of one full year from the date of final acceptance by the Owner.

C. All installation labor used on this project will be warranted for one full year from date of final acceptance by the Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
   1. Basis of Design: Rain Bird Sprinkler Mfg. Corp.
   2. Hunter Industries
   3. The TORO Co., Irrigation Div.

2.02 MATERIALS

A. Pressure Pipe: Comply with following:
   1. Unplasticized PVC pipe, Class 200 SDR21, ASTMD 2241.
      a) 3” and larger, may be installed with slip joint ring tite seals.
      b) 2-1/2” and smaller shall be installed using solvent weld joints.
   2. Dripper Tubing with Pressure Compensating Emitters

B. Circuit Pipe (downstream from circuit valves): Comply with following:
   1. Unplasticized PVC pipe, Class 200 SDR-21, ASTMD 2241.
   2. Virgin Polyethylene tubing, 80 pound minimum N.S.F. approved, ASTM D2239.

C. Pipe Fittings: Comply with following:
   1. For PVC plastic pipe, Approved socket fittings to be used with ASTM D2241 pipe and ASTM D2564 solvent cement.
   2. For polyethylene (PE) plastic pipe, plastic insert fittings, ASTM D2609.

D. Valves: Manufacturer’s standard, of type and size indicated, and as follows:
   1. Provide PVC or cast bronze bodies, as called for on plans.
   2. Proved pressure regulating valves, if called for on plans.
   3. Manual Circuit Valves: Globe valves.
   4. Key Operated Valves: Manual valves, fitted for key operation.
      a) Furnish 2 valve keys, 3 feet long with tee handles and key end to fit valves.
   5. Automatic Circuit valves Globe valves operated by low-power solenoid, normally closed, manual flow adjustment.
   6. Automatic Drain Valves: Designed to open for drainage when line pressure drops below 3 psi.

E. Backflow Preventer: As required by governing code.

F. Sprinkler Heads: Manufacturer’s standard unit designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure, as follows:
   1. Bubbler: Fixed pattern, pressure compensating type.
   2. Shrubbery: Fixed pattern, pressure compensating type
   3. Pop-Up Spray: Fixed pattern, with screw-type flow adjustment or pressure regulating nozzle and stainless steel retraction spring.
   4. Pop-Up Rotary Spray: Gear drive, full circle and adjustable part circle type.
   5. Pop-Up Rotary Impact: Impact drive, full circle and part circle as indicated.
   6. Above_Ground Rotary Impact: Impact drive, full circle and part circle as indicated.

G. Valve Box: Industrial Grade Plastic.

H. Valve Cover and Frame: Industrial Grade Plastic.

I. Wiring: UF type single strand wire #14 with white common ground and others color coded.
   1. Connections: Suitable moisture proof device; 3M pack or Rain Bird snap type connector.

J. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3” maximum to ¾” minimum.

2.03 AUTOMATIC CONTROL SYSTEM

A. General: Furnish low voltage system manufactured expressly for control of automatic circuit valves of underground irrigation systems. Provide unit of capacity to suit number of circuits as indicated.

B. Exterior Control Enclosure: Manufacturer's standard weatherproof enclosure with locking cover, complying with NFPA 70 (National Electric Code).

C. Interior Control Enclosure: Manufacturer's standard with locking cover, complying with NFPA 70.

D. Transformer: To convert building service voltage to control voltage of 24 bolts.

E. Circuit Control: Each circuit variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each circuit.

F. Timing Device: Adjustable, 24-hour and 7 or 14 day clocks to operate any time of day and skip any day in a 7 or 14 day period.
   1. Allow for manual or semi-automatic operation without disturbing preset automatic operation.

PART 3 – EXECUTION

3.01 SYSTEM DESIGN

A. Design Pressures: As indicated on contractor’s drawings, at connection to building system and at last head in circuit.

B. Location of Heads: As indicated on drawings. Make minor adjustments as necessary to avoid plantings and other obstructions.

C. Minimum Water Coverage:
   1. Turf areas, 100%
   2. Planting areas, 100%.
   3. Layout may be modified, if necessary to obtain coverage, to suit manufacturer’s standard heads. Do not decrease number of heads indicated on contractor’s drawings unless otherwise acceptable to Engineer/Owners Representative.

3.02 TRENCHING AND BACKFILLING

A. General: Excavate straight and true with bottom uniformly sloped to low points.
   1. Protect existing lawns and plantings. Remove and replant as necessary to complete installation. Replace damaged lawn areas plants and mulch with new to match existing.

B. Trench Depth: Excavate trenches to a depth of 3” below invert of pipe, unless otherwise indicated.

C. Minimum Cover: Provide following minimum cover over top of installed piping:
A minimum of 18" cover shall be held over all main lines and lateral lines 1” thru 2” in diameter, and a minimum of 24” of cover for pipe sizes 2-1/2” thru 3” diameter.
Pipe sizes between 4” and 6” in diameter should have a minimum of 30” of cover.

D. Backfill: Backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than 1” diameter. Place acceptable backfill material in 6” lifts, compacting each lift.

E. Existing Lawns: Where trenching is required across existing lawns, uniformly cut strips of sod 6” wider than trench. Remove sod in rolls of suitable size for handling and keep moistened until replanted.

F. Backfill trench to within 6” of finished grade. Continue fill with acceptable topsoil and compact to bring sod even with existing lawn.

G. Replant or replace sod within 7 days after removal, roll and water generously.

H. Reseed and restore to original condition any sod areas not in healthy condition equal to adjoining lawns 30 days after replanting.

I. Pavements: Where existing pavements must be cut to install irrigation system, cut smoothly to straight lines 6” wider than trench.
1. Excavate trench to required depth and width.
2. Remove cut-out pavement and excavated material from site.
3. At walkways, jack piping under paving material, if possible.
4. Backfill with dry sand fill material, placing in 6-inch lifts.
5. Repair or replace pavement cuts with equivalent materials and finishes.

3.03 PULLING PIPE AND WIRE

A. Contractor may elect to install the irrigation pipe and electrical wire by means of vibratory plow. Starting and finishing holes for his method of installation shall not exceed a 1’-0” by 3’-0” opening. These excavations and other necessary excavations for installation of valves, sprinkler heads, connections, etc., shall be backfilled immediately after work is completed with sand or pea rock to preclude future settlement.

3.04 INSTALLATION

A. General: Unless otherwise indicated, comply with requirements of Uniform Plumbing Code.

B. Connection to Main: Connect to existing building piping in location indicated.
1. Install new tee, valve, and union.
2. Connect to existing stub. Install new valve and union.
3. Connect to existing stub with union.

C. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shut-off with Engineer.

D. Backflow Preventer: Provide union on downstream side. Install approved back flow prevention device as directed by manufacturer and in a manner approved by state and local codes.

E. Water Hammer Arrester: Install between connection to building main and circuit valves, inside building or in valve box as indicated.

F. Circuit Valves: Install in valve box, arranged for easy adjustment and removal.
1. Provide union on downstream side.
2. Adjust automatic control valves to provide flow rate or rated operating pressure required for each sprinkler circuit. If an over pressure condition exists, contractor shall install, at his expense, such pressure compenstation devices as are necessary to bring the circuit or heads into proper operating range.

G. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions.
1. For circuit piping, slope to drain valve at least ½" in 10' or run.
2. At wall penetrations, pack the opening around pipe with non-shrink grout. At exterior face, leave a perimeter slot approximately ½" wide by ¾" deep. Fill this slot with backer rod and an acceptable elastomeric sealant. Repair below grade waterproofing disturbed by this wok and make penetration watertight.
3. Install PVC pipe in dry weather when temperature is above 40 F (4 C) in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperature above 40 F (4 C) before testing, unless otherwise recommended by manufacturer.
    a) Allow joints to cure at least 24 hours at temperature above 40 degrees F (4 degrees C) before testing, unless otherwise recommended by manufacturer.

H. Drain Pockets: Excavate to sizes indicated. Backfill with acceptable drain material to 12" below grade. Cover drain material with a sheet of 30-pound Asphalt saturated felt and backfill remainder with excavated material.
1. Restore lawns or plantings disturbed by this work.

I. Sprinkler Heads: Flush circuit lines with full head of water and install heads after hydrostatic test is completed.
1. Install lawn heads at manufacturer's recommended heights.
2. Install shrubbery heads at heights indicated.
3. Locate part-circle heads to maintain a minimum distance of 4" from walls and 2" from other boundaries, unless otherwise indicated.

J. Wiring : Make all wire splices in valve boxes.

K. Dielectric Protection: Use dielectric fittings at connection where pipes of dissimilar metal are joined.

L. Closing of Pipe and Flushing Lines: Cap or plug all openings as soon as lines have been installed to prevent the entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of the installation. Thoroughly flush out all main water lines before installing valves. Thoroughly flush out all lateral lines after installation and before attaching heads.

3.05 TESTING AND TRAINING

A. General: Notify Engineer in writing when testing will be conducted. Conduct tests in presence of Engineer.

B. Hydrostatic Test: Test water piping and valves, before backfilling trenches, to a hydrostatic pressure of not less than 100 psi. Piping may be tested in sections to expedite work. Remove and repair piping, connections, valves which do not pass hydrostatic testing.

C. Operational Testing: Perform operational testing after hydrostatic testing is completed, backfill is in place, and sprinkler heads adjusted to final position.
   1. Demonstrate to Engineer that system meets coverage requirements and that automatic controls function properly.
   2. Coverage requirements are based on operation of one circuit at a time.

D. After completion of grading, seeding or sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with or not more than ½" above finish grade.

E. Personnel training
   1. Contractor shall be responsible for the training of as many personnel as the Owner shall deem necessary.
   2. Contractor shall be responsible for one starting and one winterizing of the system during the appropriate times of the year after final acceptance by the Owner as part of the training of the Owner's personnel.
   3. Contractor shall include general troubleshooting and operation of the system with reference to head, valve, and controller operation.
   4. Contractor shall furnish a complete operation and maintenance manual to the Owner's personnel. This manual shall include repair parts lists, assembly instructions, troubleshooting guides, programming instructions, and recommended precipitation rates.

3.06 ADJUSTMENT

A. After completion of grading, seeding or sodding, if applicable, Contractor shall return to the job site to perform any final adjustments to the system, which might be deemed necessary.

B. The contractor will be responsible for any pressure testing and start up of the system when construction is complete. The contractor will also be responsible for the winterization of the system after the first season of operation.

END SECTION 328400

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sodding.
2. Turf renovation.

B. Related Requirements:

1. Section 329113 "Soil Preparation" for soil material.
2. Section 334100 "Storm Drainage" for below-grade drainage of turf areas.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

A. Qualification Data: For field builder including list of relevant projects as described in section 1.7.A.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Seed Mix: For sod type.

D. Sand-based Soil Mix: For soil that sod is grown on.

E. Product Certificates: For fertilizers, from manufacturer.

F. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during the first calendar year and a typical calendar year moving forward. Recommendations should include but are not limited to watering frequency, mowing heights, fertilization, aeration and top dressing. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Sports field Installer Qualifications: A qualified sports field installer whose work has resulted in successful athletic field establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
2. Maintenance Proximity: Not more than one (1) hours' normal travel time from Installer's place of business to Project site.
3. The athletic field builder shall have the experience of at least Ten (5) acceptable varsity NCAA natural grass installations within the past five (5) years.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in ITB Sections.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Spring Planting: March 15 to May 31
2. Fall Planting: August 15 to October 31

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Quality: State-certified seed of grass species that ranks in top ten species according to NTEP ratings.

C. Sod of grass species as follows, with not less than 95 percent germination, not less than 100 percent pure seed:

1. Base Bid – Sod for Athletic Use
   a. Athletic Field Mix: Proportioned by weight as follows:
      1) 80 percent turf-type tall fescue.
      2) 20 percent Kentucky bluegrass.
   b. Supplier: Green Velvet Sod Farm or approved equal.
   c. Size: Big roll cut: 250 sq. ft. minimum.
   d. Cut Thickness: ½ inch.
   e. Mow Height: Sod to be mown to ½ inch height prior delivery.

2. Bid Alternate – Bluegrass
   a. Basis of Design: Certified Bluegrass grown by Tuckahoe Turf Farms, Inc., P.O. Box 148, 401 Myrtle Avenue, Hammonton, NJ 08037. Phone: 866-711-2326. Or approved equal.
   b. Size: Big roll cut: 250 sq. ft. minimum.
   c. Cut Thickness: ½ inch.
   d. Mow Height: Sod to be mown to ½ inch height prior delivery.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 10 percent nitrogen, 20 percent phosphorous, and 20 percent potassium, by weight.

2.3 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.5 TURF RENOVATION

A. Renovate existing turf where indicated.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

1. Initial Fertilizer: Apply according to manufacturer's recommendations.

J. Apply sod as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.6 GRADING

A. Fine-grade subgrade to elevations required to create final finish elevation flush with proposed curb surface. Field to be on uniform plane and grade.

B. Subgrade: Laser grade the subgrade to a tolerance of + 0.5” of design elevation. Proof-roll the subgrade to assure a consistent and uniform, satisfactory compaction across the entire field. Owner is to be provided with 24 hour notice of proof-roll. Proof-roll to occur in the presence of owner or owner’s representative. The Owner, or owner’s representative will observe the subgrade and inform the contractor of visual acceptance of the subgrade conditions. Acceptance of the subgrade is required before the contactor can commence drainage installation and/or growing medium placement. The Owner reserves the right to inspect and test the subgrade as it deems appropriate, including employing a certified surveyor or geotechnical engineer. Such acceptance, however, does not relieve the Bidder of responsibility for complying with these specifications.

C. Drainage: Install drainage according to the plans and specifications and connect the drainage to storm water structures as indicated on the drawings.

D. Growing Medium: Grade finished surface of gravel base to a tolerance of + 0.5" across the entire field, with variations of less than 0.25" in any 10 lineal feet. Acceptance of the finished grade is required before the contactor can commence sod installation. The Owner reserves the right to independently inspect and test the finished surface, as it deems appropriate, including employing a certified surveyor to assure elevation conformance. Such acceptance, however, does not relieve the Bidder of responsibility for complying with these Specifications.

3.7 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Water via the irrigation system to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow turf to a height of 1-1/4 to 1-1/2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry per sod manufacturer's recommendations.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Engineer:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.11 MAINTENANCE SERVICE

A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer for lawn areas and sports field Installed for athletic fields. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Sodded Turf: 60 days from date of planting completion.

END OF SECTION 329200

SECTION 334100 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and ITB Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
   1. Cleanouts.
   2. Drains, Catch Basins, Inlets, & Headwalls.
   3. Precast concrete & Cast-in-place concrete manholes.

1.3 DEFINITIONS

A. PE: Polyethylene plastic.

B. PVC: Polyvinyl chloride plastic.

C. ODOT: Ohio Department of Transportation

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:

   1. Pipe.
   2. Cleanouts.
   3. Trench Drains.

B. Shop Drawings: For the following:

   1. Manholes: Include plans, sections, details, and frames and covers.
   2. Catch Basins, Headwalls and Stormwater Inlets. Include plans, sections, details, and frames, covers, and grates.
   3. Stormwater Detention Structures: Include plans, sections, details, frames, grates, and covers.

C. Coordination Drawings: Show pipe sizes, and locations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

D. Profile Drawings (as necessary): Show system piping in elevation view. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and locations of other utilities crossing system piping.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle catch basins, headwalls, and stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Construction Manager 's permission.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Public Roadway Culverts: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type A Conduits.

B. Conduit Under Pavement: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type B Conduits.

C. Conduit Not Under Pavement: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type C Conduits.

D. Private Drive Pipes and Bikeways: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type B Conduits.

2.2 ALUMINIZED CORRUGATED METAL PIPE AND FITTINGS

A. Per the latest version of the ODOT Construction and Material Specifications and as noted on the Drawings.

2.3 PE PIPE AND FITTINGS

A. Per the latest version of the ODOT Construction and Material Specifications and as noted on the Drawings.

2.4 PVC PIPE AND FITTINGS

A. Per the latest version of the ODOT Construction and Material Specifications and as noted on the Drawings.

B. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

C. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.5 REINFORCED CONCRETE PIPE AND FITTINGS

A. Per the latest version of the ODOT Construction and Material Specifications and as noted on the Drawings.

2.6 DUCTILE IRON PIPE

A. Per ODOT 748.01 conforming to ANSI/AWWA C151/A21.51, service and extra-heavy classes, for gasketed joints.

B. Gaskets: ANSI/AWWA C111/A21.11, rubber, compression type, thickness to match class of pipe.

2.7 CLEANOUTS

A. PVC with cast iron adaptor: Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Include cast iron adaptor and threaded brass closure plug.

2.8 DRAINS

A. Yard Drains: As noted on the Drawings.

B. Trench Drains: As noted on the Drawings.

2.9 MANHOLES

A. Per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.
   1. Diameter: 48 inches minimum, unless otherwise indicated on the drawings.
   2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

3. Riser Sections: 4-inch minimum thickness, and of length to provide depth indicated.
4. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.Steps: ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; Ductile Iron; or Cast Aluminum. Steps shall be wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Steps shall be equally spaced. Whenever possible steps shall not be placed directly above manhole flow channel. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
5. Manhole Frames and Covers: Include lettering cast into cover, using wording equivalent to "STORM SEWER."
    a. Frames and Covers must be heavy duty

2.10 CONCRETE

A. General: Cast-in-place concrete according to the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings

2.11 CATCH BASINS

A. Per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.
    1. See drawings for schedule of specific types of catch basins
    2. Frames and Grates:
        a. Are to be heavy duty.
        b. Are to be ADA compliant.
        c. Are to be Bicycle safe.

2.12 STORMWATER DETENTION STRUCTURES

A. As indicated on the Drawings and Per the jurisdiction having authority.

2.13 PIPE INLETS AND OUTLETS

A. Headwalls: Per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.

B. Rock Channel Protection (Riprap): Per the latest version of the ODOT Construction and Material Specifications and as indicated on the Drawings.

PART 3 - EXECUTION

3.1 EARTHWORK

A. General:
    1. Conduit Under Pavement: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type B Conduits.
    2. Conduit Not Under Pavement: Refer to The Ohio Department of Transportation Construction and Material Specifications Item 603.02, Type C Conduits.

B. Excavation For Utility Trenches:
   1. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
   2. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit.
   3. Excavate trench walls per ODOT Item 603.05 and geotechnical report as identified on the Drawings.
   4. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

C. Utility Trench Backfill:
   1. Place and compact bedding course as required by ODOT specifications Item 603.06 and geotechnical report. Type 2 bedding consists of structural backfill extending at least 3 inches (75 mm) for all ODOT Item 706 rigid pipe conduits and 6 inches (150 mm) for all other conduits below the bottom of the conduit for the full width of the trench. Extend the bedding up around the pipe for a depth of not less than 30 percent of the rise of the conduit. Shape the bedding to fit the conduit with recesses shaped to receive the bell of bell-and-spigot pipe. Leave the bedding below the middle one-third of the pipe span uncompacted. Compact the remaining bedding according to ODOT Item 603.11.
   2. Use Type 2 bedding for Types A, B, C, and D conduits except for long span structures and for conduits that require Type 3 bedding.
   3. Type 3 bedding consists of a natural foundation with recesses shaped to receive the bell of bell-and-spigot pipe. Scarify and loosen the middle one-third of the pipe span.
   4. Use Type 3 bedding for Type C and Type D conduits of the following materials: ODOT Items 706.01, 706.02, or 706.03.
   5. Structural backfill for ODOT Item 603 bedding and backfill shall consist of limestone, gravel, natural sand, sand manufactured from stone, or foundry sand. Provide Type I or Type II structural backfill per the requirements of ODOT Item 703.11
   6. Non-structural backfill should consist of clean, inorganic soil free of any miscellaneous materials, cobbles, and boulders. The fill should be placed in uniform, thin lifts and carefully compacted to a unit dry weight equal to 100 percent in structure areas and at least 98 percent of the maximum dry weight below pavement areas. The moisture content of the fill should be maintained at –2 to +1 percent of the optimum moisture content as determined in the laboratory by the Standard Test Methods for Moisture-Density Relations of Soils (ASTM D 698). Fill should not be placed in a frozen condition or upon a frozen subgrade.
   7. Place backfill to the limits described and according to the compaction requirements of ODOT Item 603.11. Place the backfill in the trench and embankment outside the trench uniformly on both sides of the conduit for all conduit installations.
      a. Type A and B. Backfill Types A and B conduits except for long span structures as follows
         1) In a cut situation, place and compact structural backfill above the bedding for the full depth of the trench. Within the trench and more than 4 feet (1.2 m) above the top of the conduit, if the trench can accommodate compaction equipment, the Contractor may construct Item 203 Embankment. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.
         2) In a fill situation, place and compact structural backfill above the bedding for the full depth of the trench specified in 603.05.B. Above these limits, uniformly place the lesser of one pipe span or 4 feet (1.2 m) of structural backfill on each side of the conduit and to a depth of 2 feet (0.6 m) above the top of the conduit. Construct the embankment outside the limits of the backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.
      b. Type C and D. Backfill Type C and D conduits as follows:
         1) In a cut situation, for plastic pipe, place and compact structural backfill above the bedding and to 12 inches (300 mm) over the top of the pipe. All

other conduit material types place and compact backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

2) In a fill situation, for plastic pipe, place and compact structural backfill above the bedding for the full depth of the trench specified in 603.05.B. Above these limits, uniformly place the lesser of one pipe span or 4 feet (1.2 m) of structural backfill on each side of the conduit and vertically to the top of the conduit. Then place for a depth of 12 inches (300 mm) structural backfill over the top of the pipe equal to the trench width centered on the pipe center line. Construct the embankment outside the limits of the backfill. All other conduit material types place and compact backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

8. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
9. All fill soils shall be placed in accordance with the article “Compaction of Soil Backfills and Fills” from the Earth Moving Specification Section 312000.
10. Coordinate backfilling with utilities testing.
11. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
12. Place and compact final backfill of satisfactory soil material to final subgrade.

3.2 PIPING INSTALLATION

A. All installation shall be per the latest version of the ODOT Construction and Material Specifications item 603 and the latest version of the ODOT Standard Construction Drawings.

B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, contact engineer.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install piping with 12inches minimum cover, unless otherwise indicated on the drawings. Notify engineer if less than 12 inches of cover will exist.
3. During construction protect installed piping from damage. Maintain manufacturers recommended minimum cover.

3.3 PIPE JOINT CONSTRUCTION

A. All joint construction shall be per the latest version of the ODOT Construction and Material Specifications item 603 and the latest version of the ODOT Standard Construction Drawings.

B. Join dissimilar pipe materials with pressure-type couplings, or concrete collar.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
   1. Use medium-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
   2. Use heavy-duty, top-loading classification cleanouts in paved foot-traffic, vehicle-traffic, roads, and service areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in asphalt or concrete pavement with tops flush with pavement surface.

3.5 DRAIN INSTALLATION

A. Install type of drains in locations indicated.
   1. Use medium-duty, top-loading classification drains in earth or unpaved foot-traffic areas.
   2. Use heavy-duty, top-loading classification drains in paved foot-traffic, vehicle-traffic, roads, and service areas.

B. Install per manufacturer’s written recommendations.

3.6 MANHOLE INSTALLATION

A. General: Installation shall be per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.

B. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3.7 CATCH BASIN INSTALLATION

A. General: Installation shall be per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.

B. Set frames and grates to elevations indicated.

3.8 STORMWATER INLET AND OUTLET INSTALLATION

A. General: Installation of Headwalls and Rock Channel Protection shall be per the latest version of the ODOT Construction and Material Specifications and the latest version of the ODOT Standard Construction Drawings.

3.9 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.10 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping."

3.11 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
   1. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
      c. Crushed, broken, cracked, or otherwise damaged piping.
   2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
   3. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Do not enclose, cover, or put into service before inspection and approval.
   2. Test completed piping systems according to authorities having jurisdiction.
   3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

C. Replace defective piping using new materials, and repeat testing until defect is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 334100