The City of Worcester

Request for Bids
Mulcahy Field
Phase I
Improvements

June 2020

PROJECT SPECIAL CONDITIONS AND SPECIFICATIONS

DEPARTMENT OF PUBLIC WORKS AND PARKS

Parks, Recreation and Cemetery Division

Paul J. Moosey, P.E., Commissioner
Robert C. Antonelli, Jr., Assistant Commissioner

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PROJECT SPECIAL CONDITIONS

ARTICLE 1 - PROJECT SITE

a. All work of this contract is located within the confines of Mulcahy Field, 158 Dorchester St., owned and maintained by the City of Worcester DPW and Parks.

ARTICLE 2 - SUMMARY OF WORK

a. The work to be completed under this contract involves the furnishing of all labor, materials and equipment for the following items of work and all incidentals thereto. All work shall be performed in full accordance with the specifications, other contract documents, obviously implied and necessary or under the direction of the Owner.

b. The plans and specifications are intended to be cooperative, and any item called for in one and not the other shall be as binding as if called for in both. During the bidding period discrepancies should be immediately brought to the attention of the Owner for clarification. If a discrepancy is discovered within the plans and the specifications after the Bid period, **the Owner will determine which shall apply.**

c. When Applicable, The City of Worcester DPW and Parks, Parks, Recreation and Cemetery Division is in the process of standardizing appurtenances such as park benches, trash receptacles, irrigation controllers, Area/Street lights, Sports field lighting in the facilities within their jurisdiction and maybe currently installed at this facilities. By standardizing on one manufacturer it provides the Division with a consistent product which through familiarity reduces operator training and maintenance time. Standardization also provides opportunities for maintenance cost saving through interchangeable parts such as but not inclusive to luminaries, ballast, poles, compatibility with current Division maintenance equipment etc.

d. Quality Control: In order to ensure the highest level of quality with respect to the playing surface of this greatly utilized public athletic facility, the General Contractor / Awardee shall have a minimum of five (5) years of successful experience;

   a. as the Prime Contractor constructing (provide verifiable references upon request)
   b. ability to demonstrate constructing (provide verifiable references upon request)
   c. coordinating and supervising (provide verifiable references upon request)

Park and playground Improvements of similar size and quality of this project as per the standards of the project specifications and construction drawings.

ARTICLE 3 - WORK WITHIN A PUBLIC PROPERTY

a. As a point of information, all of the work to be undertaken is located within the confines of an unsecured public property, and as such is subject to acts of vandalism. The City of Worcester will not pay for any damage to the Contractor's equipment or material. The Contractor shall take all means and measures necessary to protect the public, work in progress, work completed, and all furnishings, materials and equipment stored at the site through the completion of the project. The repair or replacement of work in place or in progress shall be the sole responsibility of the Contractor and shall be accomplished at no cost to the Owner.

ARTICLE 4 - SITE INSPECTION

a. It shall be contingent upon the Contractor to inspect the site as an aid to determining the extent of the work under the various contract items before submission of the bid.

ARTICLE 5 - PRE-CONSTRUCTION MEETINGS

a. .A mandatory pre-construction meeting will be arranged by the Owner's representative after the award of the contract. Sub-consultants may be asked to attend the pre-construction meeting if determined by the Owner's Representative to be warranted.

ARTICLE 6 - SITE ACCESS

b. Prospective bidders are advised that access to the project sites shall be in accordance with the governing traffic patterns with specific locations into the site to be designated in the field after award of the contract.

c. Regardless of the eventual location of the construction access and limits of work, the Contractor shall make every provision to ensure the access and safety of the public using the adjacent building and existing site amenities on the property.

ARTICLE 7 - OWNER'S TAX EXEMPTION

a. The Awarding Authority, as a department of a corporate municipality in the Commonwealth is exempt from the taxes listed below. Contractor shall notify all suppliers of the following current certificates.

1. Federal Excise Taxes as applied to articles taxable under Chapter 32 of the Internal Revenue Code of 1954, as amended, City Excise Tax Exemption Certificate is not required.

2. From Sales and Use Tax imposed by the Commonwealth of Massachusetts under Chapter 14, Acts of 1966, the City has been assigned and exemption certificate with respect to leases, rentals, or purchases of "Tangible Personal Property". The Owner at the Contractor's request will furnish the tax-exempt certification number.

ARTICLE 8 - TIME FOR COMPLETION AND SEQUENCE OF WORK

a. Except as the work may be interrupted by weather conditions as hereinafter specified, the Contractor shall prosecute the Work with the diligence necessary to ensure its completion within the required time. The Contractor shall provide sufficient labor, materials, and equipment, and shall promptly take such appropriate action to keep the Work on schedule or as directed by the Owner. No additional time shall be provided for Change Orders.

b. The Parks, Recreation and Cemetery Division shall be solely responsible for determining when the work shall be interrupted due to unsatisfactory weather conditions. Determination of the period to be included in the Time for Completion shall cease when the City directs that the work stop due to weather and shall commence again on the first working day thereafter that the City may designate for the work to be resumed.

c. The Contractor must completely understand that once the Contractor mobilizes and begins work, the Contractor must be on-site, every day during the normal work week, and must work continuously until substantial completion of the project. The Parks, Recreation, and Cemetery

Division will not allow any time gaps of any length of time during the construction due to the Contractor's scheduling of other work not related to this specific Contract.

d. It should be further understood that this project will not be a "fill-in" for the Contractor and that the Contractor does not have the ability to start and stop construction at the Contractor's option. Any unauthorized time gaps will be subject to a flat fee of $500.00 per day. The Owner reserves the right to deduct said fee from the Contractor's periodic application for payment and the Contract Sum.

e. The Contractor shall carry on the Work and adhere to the schedule during all disputes and disagreements with The Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements. The Contractor shall exercise reasonable precautions, efforts and measures to avoid or mitigate situations that would cause delays.

f. Punch list shall be completed within 21 day from date of issue.

g. The Contractor is advised that the **required calendar days** regarding Time for Completion and Punchlist, shall be consecutive.

ARTICLE 9 - LIQUIDATED DAMAGES

a. Prospective Bidders are advised that liquidated damages shall be in effect for this project. The Contractor shall be liable for and compensate the Owner;

1. the sum of Five Hundred and Dollars ($500.00) as fixed and agreed, as liquidated damages for each calendar day of delay from the date stipulated for completion, or as modified in accordance with the provisions of the Contract
2. If Applicable, State and Federal Grant Funding losses.
3. and/or actual costs incurred by the Owner for additional Construction Administration/Management (City Staff , Consultants, etc.) salaries/compensation from the date stipulated for completion, or as modified in accordance with the provisions of the Contract.

and notification to The Sureties.

ARTICLE 10 - CONSTRUCTION SCHEDULES AND PAYMENT ESTIMATES

a. The Contractor must submit a construction schedule to the Owner indicating the general sequence of all work under this Contract. This schedule must be submitted within 7 days of the date of the Notice-to-Proceed and shall be revised if required to the satisfaction of the Owner.

b. The Contractor shall submit a breakdown and monthly cost estimate (schedule of values) for all items of work, and separate categories for Phase 1 and 2, approved by the Owner.

c. The established breakdown of items, categories and values shall be utilized to prepare the monthly pay requisition forms. It is recommended that the Contractor submit a draft Payment Applications to the Owner for approval, no later than the second week of every month. The Owner shall review and edit this copy to indicate the amount of payment to be approved and return this to the Contractor after field review. Revised/updated payment estimates and construction schedule must be submitted with monthly Payment Applications. The Contractor shall then formally submit three (3) originals of the Payment Applications, conforming to the Owner's approval, for payment.

ARTICLE 11 – CONSTRUCTION REPORTS & WEEKLY PROGRESS MEETINGS

a. The Contractor and Sub-Contractors shall attend a regular weekly meeting with the Owner at the Parks, Recreation and Cemetery Division Headquarters, 50 Skyline Drive, Worcester, MA in the Capital Projects Division Conference Room at a pre-determined time set by the Owner. The Contractor must be present for these meetings during the course of the Contract and reserves no right to cancel the meeting. If the Contractor fails to attend the mandatory weekly meeting, a flat fee of $500.00 will be charged to the Contractor. The Owner reserves the right to deduct said fee from the Contractor's periodic application for payment and the Contract Sum.

b. The Contractor will be required to take minutes for the weekly scheduled meetings. The Contractor will have three (3) business days from the date of the meeting to submit to the Owner the minutes of the meeting on the Parks, Recreation and Cemetery Division form. The form will be supplied to the respective Contractor when the Notice to Proceed has been issued. Failure to supply the minutes of the meeting in the required timeframe will result in a flat fee of $250.00 to be charged to the Contractor. The Owner reserves the right to deduct said fee from the Contractor's periodic application for payment and the Contract Sum.

c. The Contactor will be required to maintain daily construction reports (DCRs) (format and information required to be provided and/or approved by Owner). PDF of the DCRs shall be submitted weekly for review and shall be up to date prior to approval of monthly Payment Applications.

d. The Owner may desire other meetings from time to time, and the Contractor shall attend these and such Sub-Contractors as are directed to attend. All of the above mentioned conditions should apply.

ARTICLE 12 - HOURS OF OPERATION

a. Unless otherwise approved by the Owner, hours of operation shall be 7:00 a.m. to 3:30 p.m., Monday through Friday.

ARTICLE 13 - CONTRACT DOCUMENTS

a. The Owner will furnish the Contractor, without charge, four (4) complete copies of the Contract Documents. Additional copies requested by the Contractor will be furnished at cost.

ARTICLE 14 – STORAGE, USE OF MATERIALS AND EQUIPMENT/MACHINERY

a. Bidders are advised that the storage of equipment within the confines of the project limit shall be at the Contractors own risk. No material or equipment shall be stored outside the limits of work as defined in the contract documents, designated and agreed to by the Owner.

b. The Contractor shall not use as any part of his operation any skid steered, track driven, or heavy machinery/equipment on adjacent roadways

ARTICLE 15 – PROCEDURE OF DELIVERY, ONSITE INSPECTION & ACCEPTANCE OF NEW AMENITIES

a. General Contractor shall provide product manufacturer and Owner, 72 hours advance notice of any onsite scheduled deliveries of amenities for Inspection and Acceptance.

b. Any damages noted by any of the parties present at time of inspection shall be corrected in one of the three options below, as determined by the Owner, with no delays or extensions to the Project Schedule.

   1. Repair to the **FIT & FINISH** of the manufacturer's/factory Specification prior to installation.

2. Replace with new product from manufacturer/factory.
3. Install damaged product and field repair to the Owner's satisfaction and provide new identical replacement part as spare.
4. This Article shall also apply to amenities stored offsite and damages discovered while under the Responsibilities of the General Contractor, until the Acceptance of Work.

ARTICLE 16 – CARE AND RESPONSIBILITIES OF CONTRACTOR

a. Except as otherwise specifically stated in the Contract Documents and Technical Specifications, the Contractor shall provide and pay for all materials, tools, labor, equipment, water, light, heat, power, transportation, superintendence, protection, temporary construction of every nature, charges, levies, fees or other expenses, permits and back charges and all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in this Contract completed in every respect within the specified time.

b. Unless otherwise specified herein all materials, workmanship, methods, and practices shall conform to the current Standards and Ordinances of the appropriate Departments and/or Commissions of the City. The following documents are available online at http://www.ci.worcester.ma.us/dpw/ , a hard copy or CD will be furnished to the Contractor upon request.

   i. The City of Worcester DPW and Parks, Engineering Division, Construction Management Section, Standard Specifications and Details - March 2007 or current edition.

   ii. Permit Manual – Revised 2004 or current edition.

c. The Contractor shall be responsible for detailed layout. All stakeout and grade control shall be performed by a third party MA registered Land Surveyor, approved by the Owner, for this purpose. The Owner has the option to verify and approve the layout and locations of improvements prior to excavation or installation.

d. Grade control shall be verified by the contractor for compliance with federal, state and or local accessibility requirements. During the construction sequence (such as: installation of subbase, bituminous binder and/or top, concrete flatwork etc.), the Contractor shall be required to verify grades, by approved methods, with the Owner present and prior to placement of finished grade for sidewalks, pathways, plazas, ramps, parking spaces, associated appurtenances, etc., that are required to meet accessibility and the Project Documents.

e. The Contractor shall verify dimensions and utility locations shown on the plans and if any inconsistencies or discrepancies should be noted on the Drawings, or between the Drawings and actual field conditions, or between the Drawings and the specifications he/she shall immediately notify the Owner. The Contractor will be held responsible for any errors resulting from his/her failure to exercise the aforementioned precaution. Such information shall be marked on copies of the "As-Built" drawings and the original "As-Built" drawings are to be reviewed at weekly job meetings.

f. The Contractor shall provide final As-Built Survey Drawings to the Owner. See "Record Drawings – As Built" of this Section. Punch list items shall be completed within twenty-eight (28) consecutive calendar days from date of issue, unless agreed upon otherwise by both parties. Owner has the right to complete punch list items not completed in within this timeline and deduct from the Contract.

g. The Contractor shall maintain a full time supervisor or foreman on the construction site, whether the construction forces are employed by his construction company or employed by a Sub-Contractor.

h. As soon as the Contract is executed, the Contractor shall order materials, submit construction schedules as herein after specified and otherwise anticipate the Notice to Proceed. When the Owner gives the Notice to Proceed, the work of construction shall begin at the time stipulated therein and shall be completed within the Time for Completion specified.

i. It is the Contractor's responsibility to make his own investigation and related assumptions, to satisfy her/him as to subsurface conditions and to insure that these are reflected in the bid.

j. In order to verify locations of utilities and varying field conditions, exploratory excavations may be necessary, the cost of which is to be included in the contract bid price.

k. The Contractor's attention is called to the necessity of obtaining permits and coordination with, especially those required by various departments of the City and all external utility companies. These permit fees will **not be waived** by the City and must be paid in full by the Contractor.

l. The Contractor shall furnish and maintain all temporary fences, barriers, enclosures, lights and warning devices necessary to protect his/her work area and to protect the public and his work forces throughout the life of this contract.

ARTICLE 17 - EMERGENCY CONTACT INFORMATION

a. The Contractor will be required to submit within seven (7) business days after the Notice to Proceed a list of all people that will be involved with the completion of this project including all principal(s), president(s), superintendent(s), and project manager(s) of the company. The list shall contain the following information, including but not limited to: name, title, address, voice mail number, cell phone number, pager number, fax number and email address.

ARTICLE 18 - ON SITE SUPERINTENDENT/PROJECT MANAGER

a. The Contractor must, at all times, maintain an on-site superintendent during the construction and administration of this Contract. The superintendent must be completely familiar with all aspects of the project and capable of following the construction through from start to finish. The Contractor does not have the right to switch, replace, change or otherwise remove the superintendent assigned to this project unless specifically authorized in writing by the Owner. The on-site superintendent must be present a minimum of seven (7) hours per day during construction. If the on-site superintendent fails to meet the above-mentioned requirements, the Contractor will be subject to a flat fee of $500.00 per day. The Owner reserves the right to deduct said fee from the Contractor's periodic application for payment and the Contract Sum.

The Contractor must assign a Project Manager to this Contract that is completely familiar with all aspects of the project and capable of completing the project. The Contractor does not have the right to switch, replace, change or otherwise remove the superintendent assigned to this project unless specifically authorized in writing by the Owner. It should be further understood that the Owner would discuss all matters in regards to the administration of this Contract with only one (1) Project Manager, regardless of how many the Contractor assigns to the project.

All correspondence, emails, voice mail, faxes, etc. will be handled through the designated Project Manager only. The Parks, Recreation and Cemetery Division reserves the right, in conjunction with the Contractor, to remove the Contractor's assigned Project Manager if the City feels it is the best interest to do. Upon written notification, the Contractor must assign a new Project Manager within three (3) business days.

ARTICLE 19 - PROVISIONS FOR TRAFFIC/POLICE DETAIL (As Applicable)

a. The Contractor shall not close or obstruct any portion of a public road without obtaining the

necessary permission from the proper municipal authorities. If any street or private way shall be rendered unsafe by the Contractor's opinion, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Owner including the provision of police details required to complete the work.

b. The Contractor at his/her expense shall maintain public roads and sidewalks passable, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made. He shall conduct his construction operations such that interference with the activities of park users will be held to a minimum.

c. The Contractor shall cooperate in every way possible with the municipal authorities in accommodating park activities and events.

ARTICLE 20 - COMMUNICATIONS

a. All notices, demands, requests, instructions, approvals, proposals and claims must be in writing and must be presented in person or by mail to the Owner, or alternate methods (s) agreed upon by both parties.

b. Any notice to or demand upon the Contractor shall be considered sufficiently given if delivered at the office or field office of the Contractor stated on the signature page of the Agreement (or at such other office as the Contractor may from time to time designate in writing to the Owner), or if deposited in the United States mail in a sealed, postage prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to such office.

c. All papers required to be delivered to the **Owner** shall, unless otherwise specified in writing to the Contractor, be delivered to:

Robert C. Antonelli, Jr., Assistant Commissioner
Department of Public Works and Parks
50 Skyline Drive, Worcester, MA 01605

and any notice to or demand upon the Owner shall be sufficiently given is so delivered, or if deposited in the United States mail in a sealed, postage prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission to said Owner at such address, or to such other representatives of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purpose.

d. Any such notice shall be deemed to have been given as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post, or in the case of telegrams, at the time of actual receipt, as the case may be.

ARTICLE 21 - PARTIAL USE OF SITE IMPROVEMENTS

a. The Owner, at its election, may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the Technical Specifications and if, in its opinion, each such section is reasonably safe, fit and convenient for the use and accommodation for which it was intended, provided:

1. The use of such sections of the improvements shall in no way impede the completion of the remainder of the work by the Contractor.

2. The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.

5. The use of such sections shall in no way relieve the Contractor of his liability due to having used defective materials or due to poor workmanship.

4. The period of guarantee stipulated in the specifications shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

ARTICLE 22 - SAMPLING AND TESTING OF MATERIALS AND COMPACTION

a. Sampling and testing ordered or required by the Owner to ensure that materials are as specified and that compaction of all materials conforms to the necessary requirements shall be taken and completed by representatives of a Massachusetts certified testing laboratory satisfactory to the Owner, and shall be paid for by the City as described in the technical specifications.

ARTICLE 23 - TEMPORARY FACILITIES

a. Furnish all labor, materials, and services to fulfill the requirements for temporary facilities, at no additional cost to the Owner, and comply with all requirements set forth herein, except where said requirements are in conflict with Federal, State, or Local laws, rules, and regulations, in which case(s) the applicable Federal, State, or Local requirements shall govern.

ARTICLE 24 - SANITARY FACILITIES

a. Provide, place, and maintain in good order from the commencement to final completion of the work, suitable temporary toilet facilities for use by all persons employed under this contract. Toilets shall be rented from and serviced by an approved company, and shall be kept clean and sanitary and secured at all times. The type of toilets proposed for use shall have the approval of the appropriate City agency, and the number of units shall be as recommended by the Department of Labor. Toilets shall be locked during nonworking hours and placed in a secured (fenced) location, where possible.

ARTICLE 25 - TEMPORARY LIGHT AND POWER

a. Make all necessary arrangements with the local utility company and pay all costs including labor, in operating and maintaining all temporary services for electricity used during the construction, unless specifically noted otherwise.

b. Ensure that temporary wiring, outlets, and lighting are provided in accordance with the requirements of Bulletin No. 12, Division of Industrial Safety, Department of Public Safety, Commonwealth of Massachusetts.

ARTICLE 26 - TEMPORARY WATER

a. Contractor shall be responsible to furnish, install and coordinate temporary water needs and temporary connections.

ARTICLE 27 - UTILITIES

a. The Contractor shall obtain and pay for all licenses and/or permits, which are required by the City or any other agencies that may be involved; he/she shall comply with all codes, regulations and standards of the City.

b. Contractor shall be responsible for all on-site coordination with utility companies and public agencies and for obtaining all required permits and paying all required fees. In accordance with M.G.L., Chapter 82, Section 40, including amendments; Contractor shall notify all utility companies and government agencies in writing prior to such excavation, Contractor shall also call “Dig Safe” at 1-(888) 344-7233 no less than 72 hours (exclusive of Saturdays, Sundays and Holidays.) prior to

such excavation. Documentation of requests and numbers provided to Contractor shall be provided to Owner prior to excavation work.

ARTICLE 28 – PHOTOGRAPHS and TIME-LAPSE CAMERA(S)

a. The Contractor shall be required to furnish one (1) view of before, during and after photographs of each site conditions. The Contractor is encouraged to submit "during" photographs along with each pay requisition to facilitate approvals. Photographs in electronic format via compact disc (jpeg or tiff) are acceptable.

b. The Contactor shall be required to furnish, install and continuously maintain two (2) industrial-grade, wire-free, battery operated, weather-proof, construction time-lapse cameras. Cameras shall be securely mounted up to 25'-0" above sidewalk grade on existing light poles adjacent to the Project, location and field of view to be reviewed and approved by Owner. Minimum specification for the performance of the cameras shall be Brinno Model BCC200 or approved equal. The cameras' AVI file (1 frame per 1 minute, 5 frames per second and 28-day maximum duration) shall be submitted with monthly Payment Applications. Cameras shall be operational within 10 calendar days of notice to proceed (NTP) and maintained until substantial completion of the Project. Cameras and appurtenances shall become property of the Owner at the conclusion of the Project in proper working condition or replaced with new.

ARTICLE 29 - CONTRACTOR'S SHOP AND WORKING DRAWINGS

a. Contractor to coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

b. All Contractors are directed to the timeliness and critical importance of expediting the submittal process. Any lead times that may impact sequencing should be prioritized to meet the project schedule. The Owner must be notified if any delays arise that impact lead times.

c. The Contractor shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that requires sequential activity.

d. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

e. To avoid the need to delay installation as a result of the time required to process submittals and to allow sufficient time for submittal review, all initial product submittals, shop drawings shall be submitted for processing and within **forty-two calendar days** (42) days from the date of Notice to Proceed.

f. The Contractor must allow the Owner **10 calendar days** (10) for initial review to achieve efficient construction sequencing. Allow additional time if the Owner must delay processing to permit coordination with subsequent submittals. If an intermediate submittal is necessary, process the same as the initial submittal. Allow ample time for reprocessing each submittal to achieve efficient construction sequencing.

g. No extension of Contract Time will be authorized because of the Contractor's failure to transmit submittals to the Owner for processing sufficiently in advance of the scheduled Work.

h. Shop drawings, product data and samples submitted for each item will be reviewed no more than two (2) times at the Owner's expense. Submittals failing to comply with the Contract requirements

will be reviewed at times convenient to the Owner and the Owner's consultants and at the Contractor's expense, based upon a flat rate of $100.00 per hour not for each subsequent re-submittal. The Owner reserves the right to deduct said reimbursement from the Contractor's periodic application for payment and the Contract Sum.

i. The Owner's review and approval of submittals shall be held to limitations stated in the conditions of the Contract. In no case shall approval or acceptance by the Owner be interpreted as release of Contractor of responsibility to fulfill requirements of Contract Documents. No acceptance or approval of submittals, nor any indication or note marked by the Owner on submittals, shall constitute authorization for increase in Contract Sum. The Owner will stamp each submittal with an action stamp.

j. As the timely submittal of samples, shop drawings, catalogue cuts and other related submittals is of paramount importance to the completion of the project within the stipulated time period, a contract value of 1% will be assigned to this effort. Upon receipt of the complete submittal package the General Contractor will be permitted to submit payment of this item with a value equal to 1% of the base bid contract amount.

k. Show in large-scale any unique fabrication and setting requirements or any other specified areas seen as necessary or as directed by the Owner's Representative.

l. Prior to review by Owner's representative, shop drawings shall indicate specification section or drawing reference and proof of review and approval by Contractor for project compliance, otherwise the submittal will be rejected immediately and count as one(1) official review as per item "h" above.

m. Contractor shall submit to the Owner's Representative a notarized certificate of compliance from the galvanizer with all galvanizing requirements including ASTM number and weight of coatings in ounces per square foot. Certificate of compliance shall also contain the following:

1. Sole Source Responsibility: include statement that galvanizer accepts sole responsibility for coatings under this Article. Galvanizer who does not accept this responsibility is not acceptable and will be rejected.

2. Quality Assurance: include evidence that Galvanizer meets requirements of ANSI Q90.

3. Certificate of Compliance with Current Environmental Regulations: Galvanizer shall certify that coatings proposed for use comply with applicable environmental regulations. Contractor and Galvanizer shall be responsible for penalties assessed by governmental or environmental authorities for coatings that do not comply with current environmental regulations. All coatings shall be

4. Lead-free.

ARTICLE 30 - HISTORICAL, ARCHAEOLOGICAL OR ANTIQUE ITEMS

a. The Contractor during his excavation, site clearance and other operations may come upon, uncover or otherwise discover items of historical, archaeological or antique nature. The Contractor shall immediately stop operations at the particular site of the discovery and notify the Owner so that a proper evaluation may be made of its importance. The Owner shall arrange for the evaluation in a manner that shall not unduly interfere with the Contractor's operation.

c. All such items, if designated by competent authority to be of historical, archaeological or antique nature shall not become the property of the Contractor but shall be placed in the custody of the Owner for disposition.

c. The Contractor shall be required to remove with care or to assist in the removal of any such item or items and to transport the same to a place of safe keeping within the City. The costs for so assisting shall be reimbursed to the Contractor if approved by the Owner.

ARTICLE 31 - PROVISIONS FOR PUBLIC SAFETY AND CONVENIENCE

a. Particular care shall be taken to establish and maintain such methods and procedures as will not create hazards. Access to all park facilities and shall be maintained in a reasonable and safe manner for the duration of the construction period.

b. Every reasonable effort shall be made to reduce to a minimum any interference with or inconveniences to park operations and park patrons due to the construction work. Excavated material shall be trucked away and returned if the Owner deems it necessary and practical as a means for avoiding serious interference with and inconvenience to business concerns and abutters.

d. The Contractor's attention is directed to the fact that the work on this project is to be performed within a recreation area and adjacent to park drives and walkways which are utilized by pedestrians, bikers, joggers and vehicles. The Contractor shall be responsible for the installation of adequate precautions and other safety measures and controls deemed necessary by the Owner in order to protect all park users.

e. Any automotive equipment not protected by traffic cones that is operating on a public way under this project shall have one amber flashing warning light mounted on the cab roof or on the highest practical point of the machinery. This light shall be in operation while the equipment is so working.

e. Trenches shall not be opened in park areas until all material and equipment required for the work are on the site and available for immediate use. The work at each trench shall be practically continuous, with the placing of utilities, backfill and patching (where applicable) of the surface closely following each preceding operation. When work is not in progress, trenches in areas subject to use by park patrons shall be covered with steel plates capable of safely sustaining all anticipated loads.

f. The Contractor shall provide traffic signs, warning markers and other construction safety measures as necessary to maintain public safety and optimum traffic flow. Parking of personal vehicles will be prohibited in construction areas as directed.

g. With suspension of construction activities during holidays, weekends and nights, the Contractor shall remove temporary traffic and/or safety control devices, as requested, and return them to their positions when work begins again. Payment for the installation and maintenance of appropriate safety provisions shall be included under the base bid price and no separate payment shall be considered.

h. The Contractor shall without additional compensation be required to maintain access to the project area for fire apparatus and other emergency vehicles at all times.

ARTICLE 32 - PROTECTION OF EXISTING FACILITIES

a. All existing walks, pipes, conduits, poles, fences, stairways, curbing, walls, buildings, trees and other structures which are to remain in place shall be carefully supported and protected from injury by the Contractor without additional compensation and in case of injury they shall be restored by him without compensation therefore to as good condition as that in which they were found. The value of any trees damaged shall be determined in accordance with established practices of the American Association of Nurserymen or a Registered or Certified Arborist selected by the Project Manager. Limits of liability shall not be limited to the replacement with new and immature trees.

b. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings, where required, for accommodation of travel and to provide access to the building/property during construction, and shall remove said structures thereafter.

c. The location of all/ prior existing utility systems is not known and therefore may not be shown on the drawings prepared for this project. The existence of utilities shall not be considered as an unusual obstacle, and the Contractor shall not be entitled to extra compensation for maintaining, protecting, or repairing these utilities. The Contractor shall use the exploratory excavation included in his contract price, whenever he/she or the Owner's representatives deem it necessary to verify, or prevent interruption of, existing services.

ARTICLE 33 - RECORD DRAWINGS / AS-BUILT SURVEY

a. The Contractor shall cooperate with the Project Manager and shall prepare and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as built" locations and dimensions of all his work, indicating thereon all variations from the Contract Drawings. This record of "as built" conditions shall include the **ALL** the work of the contractor and subcontractors and proof of compliance prior to final acceptance of all work. As-built shall be reviewed and updated at weekly meetings.

b. Prior to final acceptance of the work, all "as built" data shall be transferred as a separate overlay or external reference with the digital Auto CAD 2005 format files provided to the Contractor by the Owner This work shall be performed by the Contractor's Registered Land Surveyor with the cooperation of the Contractor as required. After review and approval by the Owner the record drawings will be completed and delivered to the Owner.

1. All geographic data must be submitted in a standard real-world coordinate system. The following coordinate system is required:

Projection:	Massachusetts State-plane Mainland
Datum:	NAD83
Fipszone:	2001
Units:	Feet
Spheroid:	GRS1980

2. All digital data must be delivered in the following format:

   Autodesk AutoCAD dwg. format, and one of the following file formats:

   ESRI Geodatabase
   ESRI Shapefile format
   ESRI Arc/Info Interchange File format (e00)
   Autodesk AutoCAD dxf format

3. All data must be clean of undershooting and overshooting arcs (dangles). Polygons must be snapped closed at nodes and lines must snap to one another at nodes.

4. All data must be thematically organized. There must be separate layers for road edges, road centerlines, buildings, streams, water and sewer mains, hydrants, easements, parcels, water bodies, etc. For example, if a stream is coincident with a parcel boundary that coincident line must appear in both the parcel layer and the stream layer. All data shown on the plan shall be submitted digitally.

5. Features, which contain a third, dimension or elevation data (z value) must have the elevation value within the attribute data. If elevation data is submitted in a CAD format then the value must be part of the feature (polyline).

6. Documentation:
   A. A list of all files being submitted is required.
   B. CAD data shall include metadata for each layer included within the file. This documentation will provide information on the source of the data, feature type (point, line, polygon, etc), source date, and a general description of what is shown on the layer(s).
   C. GIS data submissions (e.g., mdb, shp file, e00 export) must include all items from B above as well as metadata for each of the feature's geographic data attributes. This will include a complete description of each attribute's definition as well as a description of what each of the attribute values mean for each field.
7. Documentation on the method/s used for data collection shall be submitted for all data deliverables.
8. Documentation on the horizontal and vertical accuracy shall be submitted for all data deliverables.
9. Text & Annotation:
   A. For CAD submissions, text must be placed in separate layers. Features must not be erased in order to accommodate the placement of text. Text layers must be thematically separate, meaning that text associated with hydrography should be placed on a single layer, while text pertaining to a parcel's ID number should be placed on yet another separate layer. For example, should there be text on a map defining a parcel's ID number and another piece of text defining a stream name, the deliverable to the town must include two (2) separate text layers, one for the parcel ID numbers and one for the stream names.
   B. Text associated with a GIS formatted data deliverable must be in one of four forms.
      1. A label attribute. This would be related to the feature's attribute fields as previously described above in Section 6.
      2. Annotation subclass. This would be separate annotation included within a feature data set as a series of text attribute tables (TAT).
      3. Annotation coverage (e00 export). This would be an entirely separate feature class containing text or annotation only.
      4. Feature linked annotation as prescribed in ArcGIS.
10. Pertaining to CAD formatted deliverables, features, which cross map sheets, must precisely match each other at the join line between the sheets; edge matching must be seamless.
11. All deliverables, data, text and/or documentation, must be submitted on either CD-ROM or DVD.
12. The Owner shall supply the Contractor with electronic files (AutoCAD) for the sole purpose of creating As- Built Drawings.
13. **As-built tasks shall be assigned a monetary value equal to 2 percent (2%) of Initial Contractor or $15,000 (whichever is greater) and be included as an item in the approved Schedule of values.**
14. **Contractor <u>shall</u> submit the final approved as-built within twenty-eight (28) consecutive calendar days of Issue of Punch list and:**
    a. Prior to Notice of substantial completion.
    b. Prior to Approval of final payment application.

ARTICLE 34 - RUBBISH REMOVAL

a. The Contractor and each Subcontractor shall remove all rubbish, waste, tools, equipment, and appurtenances caused by and used in the execution of his work; but this shall in no way be construed to relieve the Contractor of his primary responsibility for maintaining the site clean and free of debris, leaving all work in a clean condition. The Contractor shall keep the site free of rubbish and construction debris at all times.

b. The Contractor shall provide sufficient metal barrels or dumpsters into which all refuse and garbage shall be deposited. All containers shall have tight fitting covers. These shall be secured overnight or removed daily.

c. At the end of each workweek, the Contractor shall thoroughly clean premises of rubbish and debris of any nature, and remove such from the premises.

ARTICLE 35 - PROJECT CONSTRUCTION SIGN

a. Contractor will provide and temporarily install two monolithic 48" high X 96" wide, 1-sided vinyl banners to identify the Project at a location to be determined in the field by the Owner.

b. The Project sign shall conform exactly to the City of Worcester's DPW and Parks, Parks, Recreation and Cemetery Division's prototype projects sign including but not limited to: size, 15 oz exterior scrim vinyl, hem all edges, #2 metal grommets every 24", font style, size and relief, capitalization, color, weather proofing, fasteners and fastener locations.

c. **Final Graphic and language will be provided by the Owner** (Background color is forest green, text is white). **Sample below is for reference only. Proof required prior to final approval.**

d. The Contractor shall include the cost of furnishing, post installation and removal of sign and posts in the total project costs.

PROJECT SPECIAL SPECIFICATIONS

General

1. The following special standard specifications are to be used on contract work awarded by the City of Worcester DPW and Parks; Parks Recreation and Cemetery Division. They are intended to supplement, support and suit this specific contract.

ARTICLE 36 – DEMOLITION, SITE EXCAVATION AND PREPARATION

a. The work shall consist of excavating, removing and legal disposal of surplus if any, earth, boulders, masonry, existing pavements, building materials, footings, appurtenances and other materials encountered of whatever nature that is unsuitable for the construction and improvements of finished conditions. Excavated to the depth necessary to install according to the specifications, plans and details plans provided in the construction bidding documents.

b. Location of existing utilities shall be verified before excavation commences. The Drawings are based on available utility record drawings and site observation.

c. The excavation shall be carried out to such depths that sufficient materials will be left above the designated grade to allow for compaction to this grade. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace such excavation at his own expense. The Owner shall have complete control over excavation, moving, placing, and disposition of all material. All material determine to be unsuitable shall be disposed offsite at no additional cost to the Owner.

d. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment shall be made for any excavated material, which is used for purposes other than those designated or implied.

e. If it is necessary in the process of the work to interrupt existing surface drainage, sewers, or to pass under drainage, conduits, utilities, or similar underground structures, or parts thereof, the Contractor shall protect it or provide temporary services. The Contractor shall, at his own expense, satisfactorily repair all damage to such facilities or structures that may result from any of his operations or from negligence during the period of the Contract..

f. No excavation shall be started until the Owner has approved the proposed area of construction.

g. Excavation shall be performed at such places as are indicated on the Drawings, to the lines, grades and elevations shown or as directed by the Project Manager, and shall be made in such manner that requirements for the formation of the sub-grade can be followed. Unless directed otherwise any disturbed existing rimmed structures shall be adjusted flush to final adjacent grade.

h. Existing pavements and base courses shall be carefully saw cut or core drilled and removed to the lines indicated and in a manner to obtain sound, vertical edges, and so as not to disturb or damage existing buildings, utilities, pavements, and base coats which are to remain.

i. Unit pavers, such as granite brick and concrete, shall be carefully removed and stockpiled for reuse, if required.

j. All excavations shall be opened using minimum, straight, parallel cuts through pavement and base materials, and other excavations opened using square or rectangular cuts or as directed to minimize removal while permitting regular, straight-line repair and patching.

k. No excavation shall commence in any until the pavement covering the proposed excavation has been marked for cutting.

l. Excavated areas shall be made safe for the residents at the end of each workday.

m. Transport excavated materials, waste materials, trash, and debris and legally dispose of it off city property.

n. Prevent, minimize and control groundwater and/or surface water to accumulate in excavations. Remove water to prevent the undercutting of footings and soil changes detrimental to the stability of sub-grades, foundations and granite, brick or concrete paving.

o. Payment for site excavation and preparation work shall be considered incidental to the individual items installed. No separate payment shall be made for site excavation and preparation work. No separate payment shall be made for all labor, equipment, tools and incidentals necessary to complete the work to the satisfaction of the city, including transportation and disposal of excavated materials.

p. It is the responsibility of the Contractor to verify the accuracy of all survey information provided by the Owner prior to commencing excavations or filling operations. Commencement of these operations constitutes acceptance of the survey information as appropriate to meet the intent of the Contract.

q. Soil testing, if required, for all materials to be reused on-site or removed and disposed of offsite, shall be the responsibility of the contractor. The city reserves the right to obtain its own test results from the same sample as the contractor without penalties to the owner. The contractor is required to obtain a large enough sample to divide with the owner for this proposes.

r. Transport excavated materials, waste materials, trash, and debris and legally dispose of it off city property.

s. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

t. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

u. If required: In response to the State/ Federal imposed quarantine regarding the Asian long-horned beetle infestation, the protocol for handling and disposal of wood based materials within the project area by the contractor shall be to:

   i. at a minimum, process all onsite vegetative, wood and cellulose based materials (trees, shrubs, root, stumps, branches, leaves, etc. **twelve inches and under in diameter** and designated for disposal) to a size of less than one inch as measured in two directions by approved mechanical means (wood chipper) prior to disposal/removal offsite. All other existing vegetative, wood and cellulose based products; tree trunks, stumps, branches etc., **greater than twelve inches, in diameter** and designated for removal/disposal shall be delivered to the current transfer station located within the City property limits.

   ii. Contractor shall be responsible to comply with changes to the current quarantine protocols at the time the work is performed.

ARTICLE 37 – RESERVED

ARTICLE 38 - CAST IN PLACE CEMENT CONCRETE

a. The scope of work under this article shall consist of furnishing all labor, materials, equipments, transportation, reinforcing, forming, finishing and curing of cast in place concrete for the construction of concrete pads, footings and walls for the structures and site improvements as specified herein and according to the plans and details shown in the construction drawings and the balance of any concrete construction necessary to completion of the project.

b. Unless otherwise specified, all materials shall conform to the relevant provisions of Section 901, **Cement Concrete Masonry,** and Section M4, **Cement And Concrete Materials** of latest edition of The Massachusetts Department of Public Works Standard Specifications for Highways, Bridges and Waterways.

c. At a minimum, concrete to be used shall be Class 4,000 PSI - minimum 28 day compressive strength, and cement content of 610 lbs per cubic yard for ¾" course aggregate. Concrete shall be discharged at site within 90-minutes after batching.

d. All horizontal (pad) concrete construction shall be air entrained which shall be 4.5% to 7%, as determined by ASTM C231.

e. Formwork shall be sufficient enough to resist pressure of the concrete without springing and tight enough to prevent leakage of mortar. Forms shall be staked, braced, or tied together to maintain their position and shape when concrete is compacted in place. Forms shall be clean and shall produce an even finish for exposed surfaces. Forms shall not be removed for at least twenty-four (24) hours after concrete has been placed, or longer if directed by Owner.

f. Preformed expansion joint filler shall be non-extruding and resilient non-bituminous type conforming to AASHTO-M135.

g. Reinforcing as required or pads shall be welded wire fabric, 6" X 6", W1.4 X W1.4 gauge cold-drawn steel wires formed into a mesh and welded together at points of intersection in conformance with ASTM A-185-70. Welded wire fabric shall be furnished in mats and not in rolls.

h. All references to 'processed gravel', 'gravel borrow', or 'gravel' shall conform to Article 38 Gravel Borrow.

i. Curing and protection shall be accomplished by applicable optimum method specified in Section 901, **Cement Concrete Masonry,** and Section M4, **Cement And Concrete Materials** of latest edition of The Massachusetts Department of Public Works Standard Specifications for Highways, Bridges and Waterways.

j. The Contractor is responsible for the quality and strength of the concrete. Inferior concrete, including that damaged by frost action shall be removed and replaced at no additional cost to the Owner.

k. The Contractor shall be responsible to repair or replace any concrete exhibiting deficient materials or workmanship with in one (1) year of final acceptance.

l. Payment for concrete and concrete work shall be considered incidental to the individual item in which the concrete is used. No separate payment shall be made for concrete work.

ARTICLE 39 - GRAVEL BORROW

a. The scope of work under this article shall consist of furnishing all labor, materials, equipment and transportation required for placement and compaction of approved processed gravel according to

the plans and details plans and details shown in the construction drawings and the balance of any sub base construction necessary to the completion of the project.

b. All references to 'processed gravel', 'gravel borrow', or 'gravel base' shall conform to Article 39 Gravel Borrow.

c. Gravel borrow shall consist of inert material that is hard durable stone and coarse sand, free from loam and clay, surface coatings and deleterious material. Gravel borrow containing recycled bituminous and concrete material shall not be used in areas of pervious finish grade (i.e. ball fields, skinned, and lawns areas).

d. Gradation requirements for gravel borrow shall be determined by AASHO-T11 and T27 and shall conform to the following:

Sieve	Percent Passing
2"	100
½"	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

e. Maximum size of stone in gravel shall be two (2) inches, largest dimension.

f. Gravel shall be spread and compacted in layers not exceeding six (6) inches in depth compacted measurement and all layers shall be compacted to not less than ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHO Test Designation T99 compaction test Method C at optimum moisture content.

ARTICLE 40 – RESERVED

ARTICLE 41 – RESERVED

ARTICLE 42 - WPRC DIVISION CHAIN LINK FENCE FRAMEWORK AND FABRIC

General

1. This work includes the installation of galvanized, aluminized and polymer coated fence framework and fabric of various heights in accordance with these specifications and in conformity with the details, lines and grades shown on the plans or established.

Construction Requirements

1. 1. Locate and install all posts in concrete (4000 psi at 28 days), with minimum depth of 48 inches below finish grade and minimum diameter of twelve inches or four times the diameter of post, whichever is greater. Typical spacing of post shall be 120 inches max on center. Typical spacing of post on the precast concrete wall shall be the middle of top "anchor" block (Designed spacing of 92 inches O.C.). Refer to plans for post concrete footing depth and size for batting cage, bullpen, backstop and netting framework. Install plumb and true to line and grade and to the height as indicated within the drawings. All posts shall have continuous horizontal rails at the top, middle (for fence height greater than 72 inches), and bottom. In addition, all end and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail couplings shall be placed a maximum of twelve (12) inches from posts. Owner shall be contacted 48 hours prior to install of all fence and gate post/footings for inspection and approval of excavation/footing size. Failure to notify entitles the Owner to pick at random 20 percent of installed post

and concrete footing(s) for removal and inspection to verify they meet Specifications. Replacement and/or reinstall of new materials shall be at no additional cost to the Owner.

2. Chain link fence shall have continuous top and bottom rails. Refer to plans for rail layout for batting cage, bullpen and backstop and netting framework. Top and bottom edge of fence fabric shall have knuckled edges. Fabric shall be stretched uniformly taut and as tight as possible, true to line and grade and complete in all details. Install tension bars at corners.

3. All chain link fence fabric shall be fastened on the outside of the posts unless directed otherwise by the Owner. The fabric shall be properly stretched and securely fastened to the posts and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as specified, herein. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

4. Fabric shall be aligned so that top and bottom shall extend one half the height of the "diamond" beyond outer edge of top and bottom of the horizontal rail. The fabric shall also be one (1) inch maximum above finish grade. The fabric shall be tied (as per item 5 below) to all line posts, top, middle and bottom rails every six (6) "diamonds" as measured horizontally or vertically. Overlapping fence fabric sections shall overlap one full height of the "diamond" and be centered on the horizontal rail.

5. All fabric, shall be fastened to all line posts and horizontal rails with 0.020" thickness, 200/300 series stainless steel ½" wide bands, with a minimum breaking strength of 850 lbs., 1/2" band capacity ear-lokt design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel. Fabric for bleachers shall be attached at each vertical post only, three bands per post. All bands shall be pulled tight and raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles.

Materials

Fabric, posts, gate frames, gate hinges, gate stops, braces, rails, stretcher bars, truss rods, post caps, stretcher bar bands, tension wire shall and other parts shall be of steel, pressed steel or approved equal except that post tops and rail ends may be of aluminum. **No malleable iron, ductile iron materials will be accepted**. The Contractor shall supply a notarized mill certification from manufacturer that all materials used have been tested and fully comply with the specifications specified herein.

1. Fabric: The fabric shall consist of No. 9 gauge (0.148 inch core) wire, 2-inch diamond mesh typical and 1.75-inch diamond mesh for fabric adjacent to tennis courts. All fabric shall be knuckled at both selvages. Public side of fabric shall be installed in accordance with the Owner's direction. The height of the fabric as shown on details shall be typically one piece unless directed otherwise by Owner. Fabric for bleachers will be as per manufacturer's standard.

   (a) *Galvanized /Aluminized Coated Fabric:* All materials used shall conform to the requirements of ASTM A392 Class-2, or ASTM A491. Except aluminum alloy items, shall conform to ASTM-B211, B221 and B429.

   (b) *Polyvinyl Chloride (PVC) Coated Fabric:* Fence fabric shall be zinc coated in accordance ASTM A392 Class-1 or aluminum-coated in accordance with ASTM A 491(TABLE 3). PVC coating shall be applied in accordance with ASTM F668 Class-2a. The color of the fabric shall be black and in accordance with ASTM F934.

2. Framework: Type II, Group IC round steel pipe (electric resistance welded), cold-formed as per ASTM F1043-00 Standard, with minimum yield strength of 50,000 psi. The external zinc coating shall be Type B, zinc with polymer film, 0.90 oz / sq. ft, minimum zinc coating with a chromate conversion and a verifiable polymer film. The internal coating shall be Type B, zinc 0.90 oz./sq.ft. Minimum or type D, zinc pigmented, 81% nominal coating with 0.30 mils minimum thickness. Gate framework joints shall be

welded and coated in accordance with Practice A780, employing zinc-rich paint. Refer to plans for framework sizes for batting cage, bullpen, backstop and netting framework.

(a) End, Corner and Pull Post. Galvanized steel, physical pipe dimension and weights as follows:

(1) Up to 12-foot fabric height: 2.875-inch OD pipe, 4.64-lbs. /lin. ft.
(2) **For basketball and tennis courts: 4.000-inch OD pipe, 6.56-lbs. /lin. ft.**
(3) For combo batting cage/bullpen and backstop: 4.000-inch OD pipe, 6.56-lbs. /lin. ft.
(4) Maximum Spacing between all posts is 10'- 0" On Center.

(b) Line Posts. Galvanized steel, physical pipe dimension and weights as follows:

(1) Up to 12-foot fabric height: 2.375-inch OD steel pipe, 3.12-lbs. /lin. ft.
(2**) For basketball and tennis courts: 2.875-inch OD pipe, 4.64-lbs. /lin. ft.**
(3) For combo batting cage/bullpen and backstop: 4.000-inch OD pipe, 6.56-lbs. /lin. ft.
(4) Maximum Spacing between all posts is 10'- 0" On Center.

(c) Gate Posts. Galvanized steel, single gate widths, physical pipe dimension and weights as follows:

(1) Up to 6-feet: 2.875-inch OD pipe, 4.64-lbs./linear ft.
(2) Over 6-feet to 13 feet: 4.0 inch OD pipe, 6.56-lbs./ linear ft.
(3) Gate frames as per ASTM F 900-94.

(d) Rails (Top, middle and bottom rails): Galvanized steel, manufacturer's longest lengths joined by six-inch (6") long sleeves, rail shall run continuously along top of fence. Bottom rail shall be joined at line posts with boulevard clamps. Minimum pipe sizes and weights as follows:

(1) 1.660-inch OD pipe, 1.82-lbs. /lin. ft. minimum.
(2) Top, Bottom, Middle and Intermediate rails are required for fencing adjacent to the sports court footprint.

(e) Couplings: Expansion types, approximately 6-inch long, install one sleeve for each 500 foot run. Standard couplings are installed at each rail end to form one continuous top rail.

(f) Attaching Devices: Provide fittings for attaching top rail securely to each gate corner pull and end post.

(g) Sleeves: Galvanized steel pipe not less than 6 inches long and with inside diameter not less than 1/2-inch greater than outside diameter of the post pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than 1-inch greater than outside diameter of sleeve.

(h) Post Brace Assembly: Manufacturer's standard adjustable braces at end of gateposts and at both sides of corner and pull posts. Provide horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 3/8-inch diameter galvanized steel truss rods and adjustable tightener.

(i) Post Tops: Galvanized steel, weather-tight closure cap for each tubular post. Furnish caps with openings to permit passage of top rail.

(j) Tension Bars: Galvanized steel, one piece lengths equal to full height of fabric, with minimum cross-section of 3/16 inch x 3/4 inch. Provide tension bar for each gate and end post, and two for each corner and pull post. Stretcher Bar Bands will be manufacturer's standard.

(k) Gate Cross-Bracing: 3/8-inch diameter galvanized steel truss rods and adjustable tightener.

(l) Non-Shrink, Non-Metallic Grout: Premixed, factory-packaged, non-corrosive, non-staining, non-gaseous, exterior grout approved by the Engineer.

(m) Single and Double Swinging Gate and Hardware: Swing gates and hardware shall be manufactured to meet the requirements of ASTM F900. Unless indicate otherwise, and to meet ADA requirements, the minimum clear opening for all single gates (as measure with gate perpendicular to framework) shall be 36 inches.

(1) Hinges. Industrial butt hinges, size and material as required for the gate size. Non-lift-off type, offset to permit 180 degree gate opening. Provide one pair of hinges for each leaf, gates eight feet and taller in nominal height shall have three hinges per leaf. Spot-weld to post and paint (non polymer coated), to prevent rotational movement.

(2) Latch (for both single and double gates). Pressed steel, industrial series gate latch, straight fork type, provide latch catch for double gates, designed to permit operation from either side of gate, with padlock eye as integral part of latch catch. Provide two latch and catch for double gates. All gates shall be equipped with one gate stop.

(n) Sleeves if required for fence shall be galvanized steel pipe conforming to ASTM F1043 sizing as required to accommodate posts.

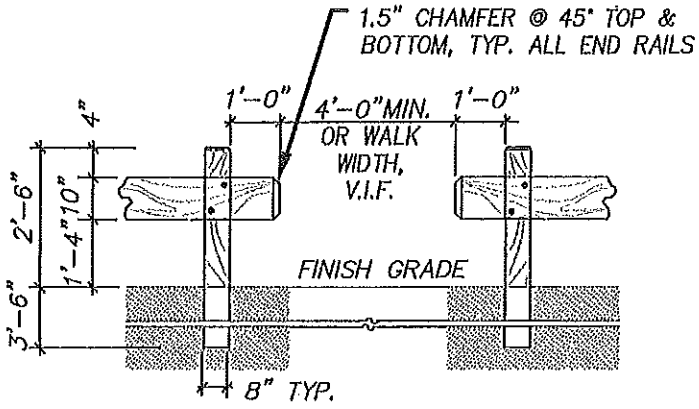
Polymer Coated Framework

Shall meet the above-mentioned specification for materials. The framework shall be subjected to a complete thermal stratification coating process (multi-stage, high-temperature, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The material used for the base coat shall be a zinc-rich (gray color) thermosetting epoxy; the minimum thickness of the base coat shall be two (2) mils. The material used for the finish coat shall be a thermosetting "no-mar" TGIC polyester powder; the minimum thickness of the finish coat shall be two (2) mils. The stratification-coated pipe shall demonstrate the ability to endure a salt-spray resistance test in accordance with ASTM B117 without loss of adhesion for a minimum exposure time of 3,500 hours. Additionally, the coated pipe shall demonstrate the ability to withstand exposure in a weather-ometer apparatus for 1,000 hours without failure in accordance with ASTM D1499 and to show satisfactory adhesion when subjected to the crosshatch test, Method B, in ASTM D3359. The polyester finish coat shall not crack, blister or split under normal use. Painted framework and accessories are not acceptable, welded joints shall be top-coated to match frame color. Color of the polymer coated framework and accessories shall be black and in accordance with ASTM F934.

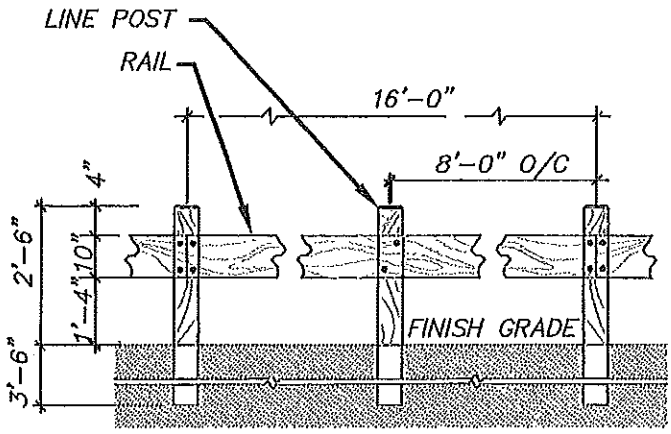
ARTICLE 43 – ATTACHMENTS

D-1, Wood Guardrail and Pipe Bollard Detail (1 page)
D-2, Chain Link Fence Framework and Fabric (1 page)
D-3, Single or Double Pipe Gate Detail (1 page)
Conservation Commission – Order of Conditions
Soil Boring Logs
Subsurface Investigation Report

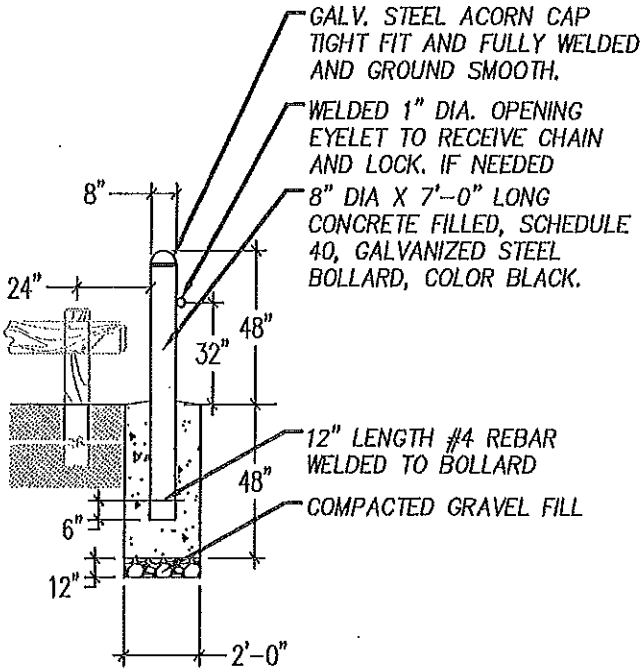
End of DPW and Parks Special Conditions and Specifications.



TYPICAL RAILING OPENING / END POST

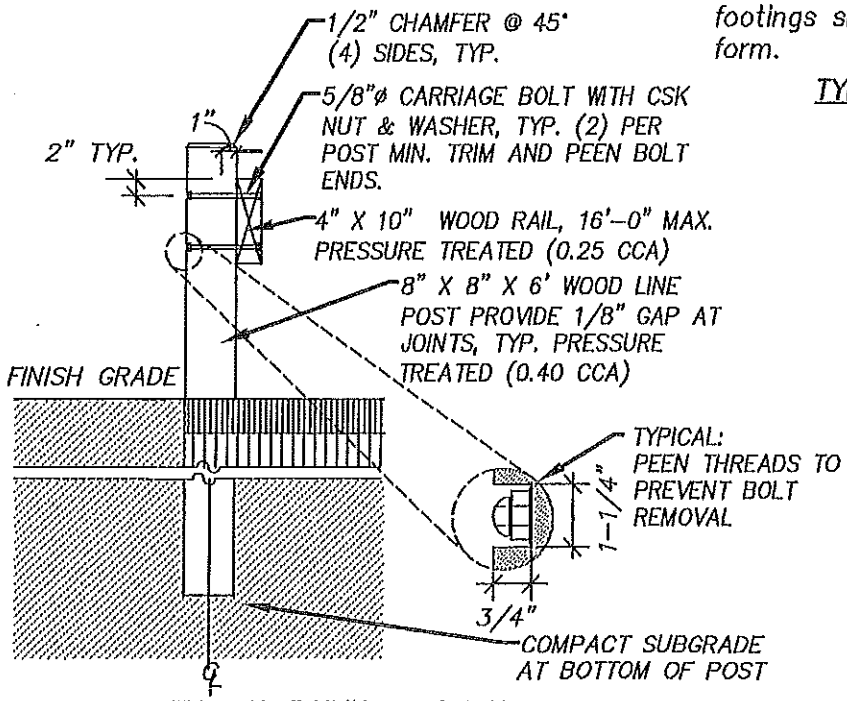


TYPICAL RAILING ELEVATION



1. Steel pipe for bollards shall be seamless steel pipe in accordance with ASTM 53 Type F.
2. All Hardware shall conform to ASTM A307 requirements and shall be galvanized Per ASTM A153.
3. Welding shall be in conformance with AWS codes. All connections shall be formed with fish-mouthed joints full seam welds, grounded smooth and sanded.
4. All bollards shall be set plumb and level. Concrete footings shall be installed using a sonatube for the form.

TYPICAL PIPE BOLLARD ELEVATION



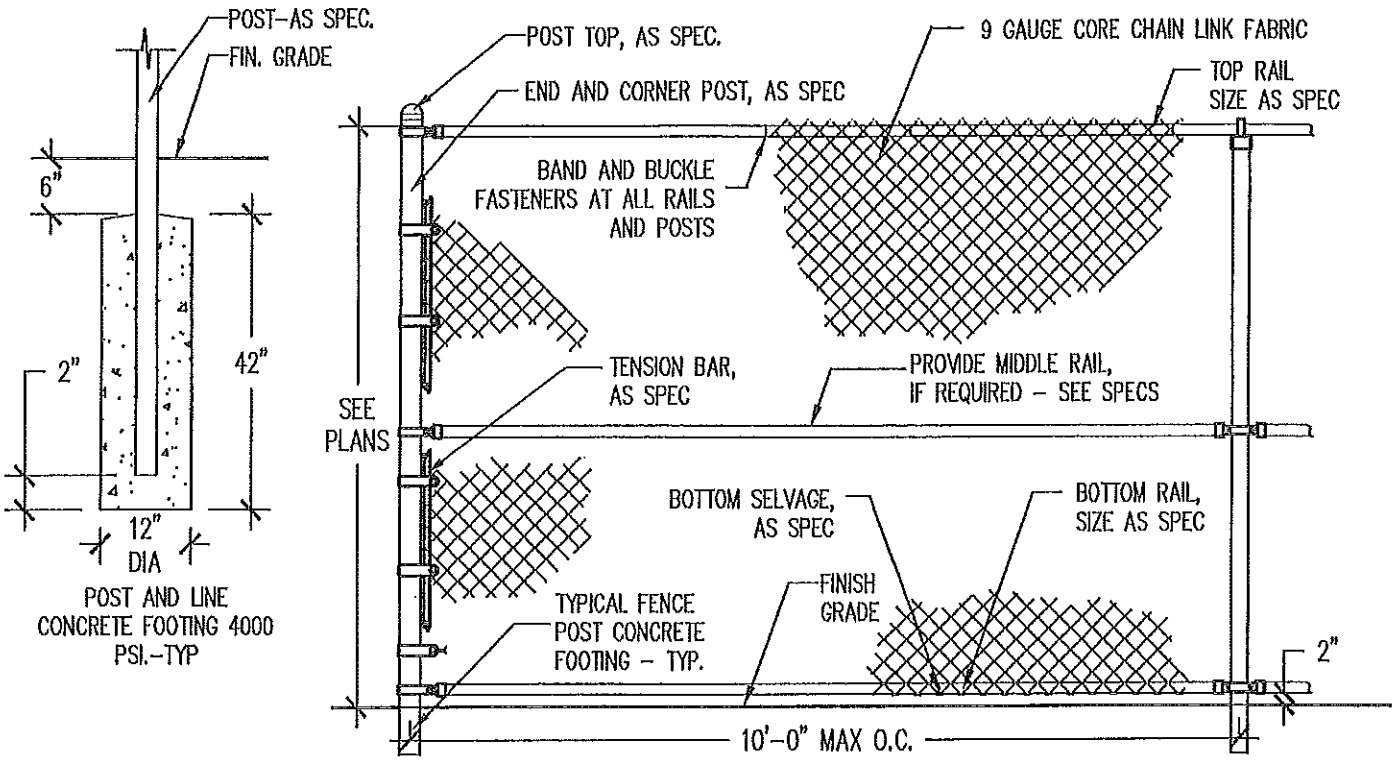
TYPICAL RAILING SECTION

Dept. Of Public Works & Parks
Capital Projects Division
ROBERT C. ANTONELLI, JR.
Assistant Commissioner

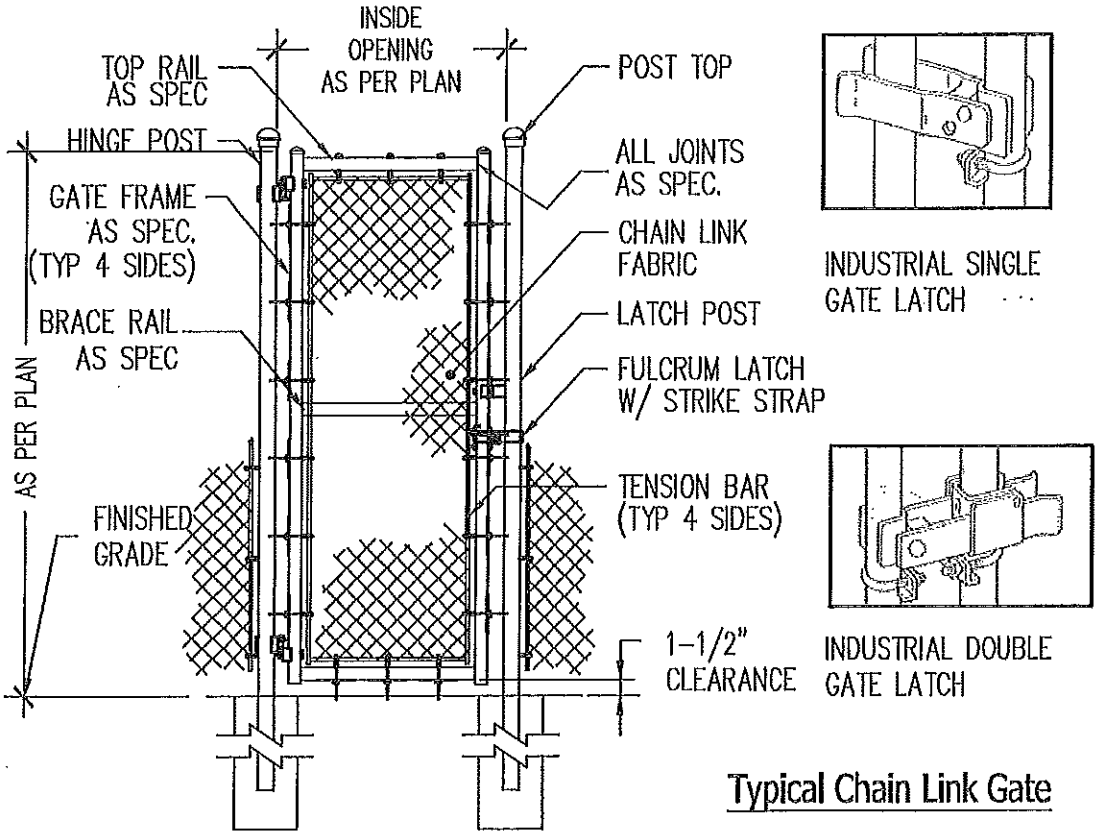
Parks, Recreation & Cemetery Division Standard
Wood Guardrail and Pipe Bollard Detail

Not To Scale

D-1



Typical Chain Link Fence And Footing



INDUSTRIAL SINGLE
GATE LATCH

INDUSTRIAL DOUBLE
GATE LATCH

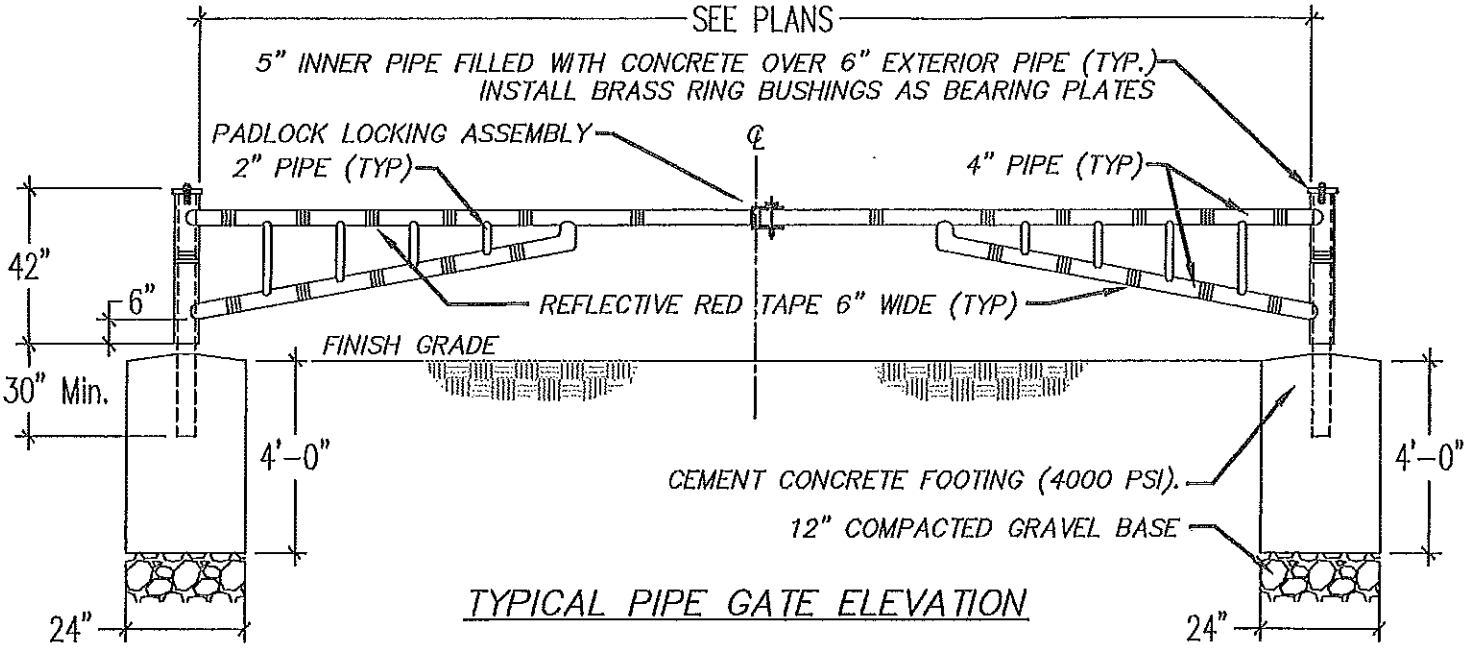
Typical Chain Link Gate

Dept. Of Public Works & Parks
Capital Projects Division
ROBERT C. ANTONELLI, JR.
Assistant Commissioner

Parks, Recreation & Cemetery Division Standard
Chain Link Fence Framework and Fabric

Not To Scale

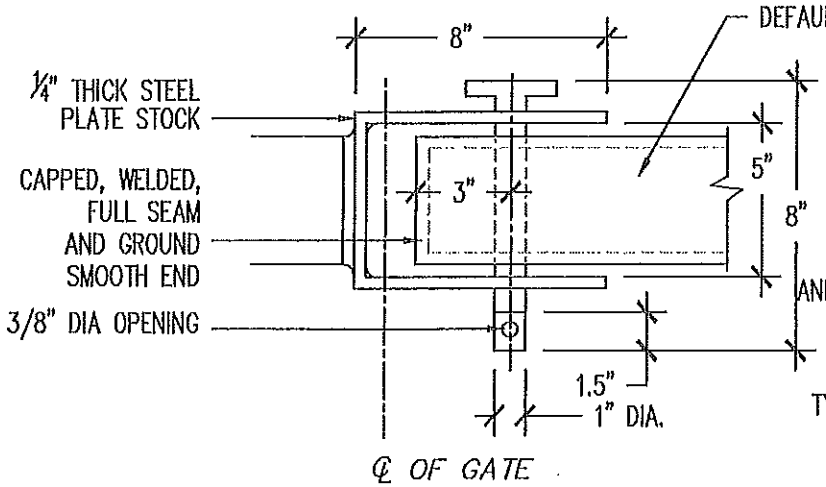
D-2



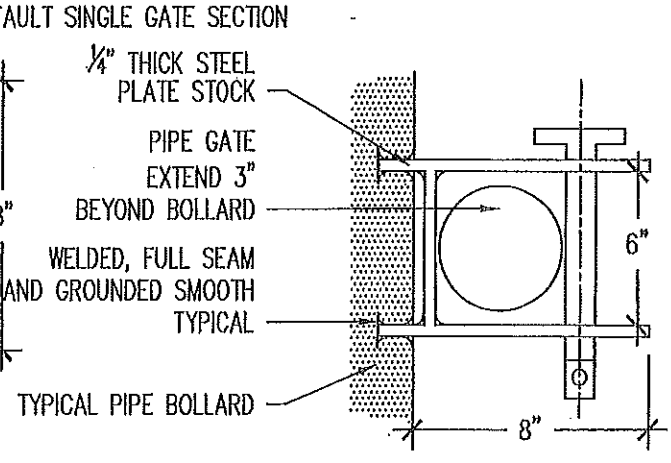
TYPICAL PIPE GATE ELEVATION

GENERAL NOTES:

1. Steel pipe for gates shall be seamless steel pipe in accordance with ASTM 53 type F.
2. All hardware shall conform to ASTM A307 requirements and shall be galvanized per ASTM A153.
3. Welding shall be in conformance with AWS codes. All connections shall be formed with fish-mouthed joints full seam welds, grounded smooth and sanded.
4. All gates shall be set plumb and level. Concrete footings shall be installed using approved formwork and rebar spacing (if required). Submit shop drawing for approval/review.
5. Gate must be free to open a min. of 95° from closed position.
6. Gate to be primed, enameled and painted. Paint type to be approved by owner. Color is Black.



DOUBLE GATE LOCKING ASSEMBLY DETAIL



STANCHION / SINGLE GATE LOCKING ASSEMBLY DETAIL

Dept. Of Public Works & Parks
Capital Projects Division
ROBERT C. ANTONELLI, JR.
Assistant Commissioner

Parks Division Standard
Single or Double Pipe Gate Detail
Not To Scale

D-3

ORDER OF CONDITIONS

City of Worcester, Massachusetts
Conservation Commission
Order of Conditions

Conservation Commission File Number:

CC-2020-013

City of Worcester Wetlands Protection Ordinance & Wetlands Protection Regulations - September, 1990; as amended (City's General Revised Ordinance Part I, Chapter 6)

A. General Information

1. From:

City of Worcester
Conservation Commission

2. This issuance is for (check one): ☒ Order of Conditions ☐ Amended Order of Conditions

3. To: Applicant:

a. First Name | b. Last Name

City of Worcester Department of Public Works and Parks
c. Organization

50 Skyline Drive
d. Mailing Address

Worcester | MA | 01605
e. City/Town | f. State | g. Zip Code

4. Property Owner (if different from applicant):

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

5. Project Location:

158 Dorchester Street
a. Street Address

Worcester
b. City/Town

18-001
c. Assessors Map/Plat Number

-00016
d. Parcel/Lot Number

Latitude and Longitude, if known: d. Latitude | e. Longitude

6. Project Description: To reconfigure and add playing fields including basketball courts, perform grading, construction of approximately six parking spaces, construction of walkways, stormwater management, and associated site work

7. Conservation Commission Review Trigger: The activities shall occur within the Stormwater Protection Zone.

8. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Worcester
a. County

b. Certificate Number (if registered land)

c. Book

d. Page

9. Dates: 2/18/20 a. Date Notice of Intent Filed; 3/2/20 b. Date Public Hearing Closed; 3/13/20 c. Date of Issuance

10. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Mulcahy Field Improvements
a. Plan Title

Quinn Engineering, Inc (Civil Engineer); Earth Design (Landscape Architect)
b. Prepared By

Kevin Quinn, PE; Alice Webb, RLA
c. Signed and Stamped by

1/13/20
d. Final Revision Date

Varies; 1:30 for Civil Drawings
e. Scale

Stormwater Report, Stamped by Kevin Quinn, PE
f. Additional Plan or Document Title

2/12/20
g. Date

B. Findings

11. Findings pursuant to the City of Worcester Wetlands Protection Ordinance:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Ordinance. Check all that apply:

☒ Public Water Supply	☒ Erosion and Sedimentation Control	☒ Prevention of Pollution
☒ Private Water Supply	☒ Fisheries	☒ Protection of Wildlife Habitat
☒ Groundwater Supply	☒ Storm Damage Prevention	☒ Flood Control

12. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

B. Findings (cont.)

Denied because:

☐ The proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Ordinance, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

☐ The information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Ordinance's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order.**

C. General Conditions Under Wetlands Protection Ordinance

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.

2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.

3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.

4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. the work is a maintenance dredging project as provided for in the Act; or
   b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.

5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.

7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words, "City of Worcester Conservation Commission File Number **CC-2020-013**."

11. Within thirty (30) days of completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance to the Conservation Commission.

12. The work shall conform to the plans and special conditions referenced in this order.

13. Any change to the plans identified in Condition #12 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

14. The Agent or members of the Conservation Commission shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

15. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

16. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

17. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

18. The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document): **See Attachment A.**

ATTACHMENT A

Worcester Conservation Commission

Special Order of Conditions

City of Worcester Wetlands Protection Ordinance & City of Worcester Wetlands Protection Regulations

(City of Worcester Revised Ordinance Part I, Chapter 6)

158 Dorchester Street AKA Mulcahy Field (CC-2020-013)

Project Description: To reconfigure and add playing fields including basketball courts, perform grading, construction of approximately six parking spaces, construction of walkways, stormwater management, and associated site work to occur within the Stormwater Protection Zone.

Waivers Granted: N/A

Table of Contents:

Notes:

- **Office of the Commission** is located at the Division of Planning and Regulatory Services (455 Main Street 4th floor, Worcester, MA), which can be contacted by e-mailing planning@worcesterma.gov or calling 508-799-1400 ext. 31440.
- **Asterisked (*) conditions** are standard conditions of approval for all projects.

I. Conditions to Meet Prior to and During Construction

21. Person Responsible for Compliance with the Order of Conditions* – A person shall be designated to be responsible to monitor compliance with the Order of Conditions. Their name and contact information (24/7) shall be provided to the Office of the Commission prior to start of any activity. This person shall conduct:

    a) periodic inspections to assure the adequacy and continued effectiveness of erosion and sediment controls;

    b) inspections of said controls following 0.5-inch or greater rain events, or after a heavy snow melt.

22. Contract* - This Order of Conditions and all approved plans shall be included as part of any contract and subcontract and shall be posted in a prominently displayed location in the supervisory office on site during all phases of construction.

23. Notification* - The applicant shall notify the Office of the Commission a minimum of 48 hours prior to the start of any activity.

II. Conditions to Meet Before the Start of Any Activity

24. Stormwater Pollution Prevention Plan (SWPPP)* – That one (1) copy of the SWPPP submitted to the EPA in compliance with the NPDES permit requirements, if applicable, shall be provided to the Office of the Commission prior to commencement of work.

25. Tree Cutting* – Tree cutting is allowed following installation of erosion and sediment controls; otherwise, it may be allowed, prior to such installation, with the explicit permission of the Commission or its Agents.

26. Trees To Remain* – All trees to remain post construction shall be marked on site as shown on the approved plan so that the Commission or its representative can verify them before any clearing takes place.

27. Pre-Construction Conference* -

    a) The Conservation Commission or its Agents shall conduct a pre-construction conference prior to commencement of activities in each phase of the project. Phasing, if any, shall conform to the approved plans.

    b) The property owner / applicant and any person performing work that is subject to this Order are responsible for understanding and complying with the requirements of this Order, the Wetlands Protection Act, 310 CMR 10.00 and City of Worcester Wetlands Protection Ordinance and Regulations. Said persons shall acknowledge such in writing prior to commencement of activities.

28. Inspections Prior to Site Preparation and Site Work* - Erosion and sediment controls shall be installed and verified, in compliance with final approved plans, by the Commission or its Agents prior to the commencement of any excavation, grubbing and/or stumping of vegetation, grading, construction, or other site preparation.

29. Construction Schedule - Submit a Construction Schedule consistent with Work Sequencing plans provided to the Office of the Commission prior to the start of any activities.

III. Stormwater Management System

30. Catch Basins* –

    a) The paved roadways and parking lots shall be bermed and shall be installed with standard City of Worcester catch basins.

b) Prior to start of activity on site that causes soil erosion and sedimentation, catch basin filter traps shall be installed in the existing and new catch basins.

c) Catch basins shall be cleaned as warranted during construction to keep them clear of sediment, and minimum twice a year thereafter.

31. Construction Timing – The stormwater management system and all associated drainage piping, inverts, and outlets as proposed in the project plans shall be constructed and be operating as designed prior to any other construction related activity on the site, with the exception of the final bioretention area.

32. Stormwater Management System Maintenance* – The stormwater management system shall be maintained in accordance with the approved design plans and Operation and Maintenance Plan on file with the Office of the Commission. The system shall be maintained in good hydraulic condition (e.g. any accumulated silt/sediment shall be removed; the system shall be kept free of any litter, refuse, or other extraneous matter, etc.). This condition shall extend in perpetuity beyond the issuance of the Certificate of Compliance.

33. Retention Basin Vegetation -

a) The stormwater retention basin shall be vegetated as shown in the approved plans to ensure optimal removal of pollutants associated with stormwater runoff.

b) The system shall be maintained in good hydraulic condition (e.g. any accumulated silt/sediment shall be removed; the system shall be kept free of any litter, refuse, or other extraneous matter, etc.). If system maintenance disturbs any wetland plant species, the basin shall be revegetated as soon as possible with the same species.

c) The system shall be monitored for the presence of invasive species during regular inspections, and shall be removed, if found.

IV. Conditions to Meet During Construction

34. Limit of Work* – No removal, filling, dredging or altering of jurisdictional areas shall take place outside the approved work under this Order of Condition.

35. Work Sequencing* – Activities shall take place in accordance with all phasing and sequencing shown on the plan and/or provided in the application materials on file with the Office of the Commission and shall follow any lot opening restrictions otherwise provided herein.

36. Infiltration Unit Inspection - Prior to back-filling, the applicant shall request and have conducted an inspection by the Commission or its Agents in order to verify the installation of the underground infiltration unit was conducted in a manner consistent with that provided on the approved plans as well as an inspection of the bioretention system before it is put online.

37. Erosion Stabilization -

a) *Erosion and Sediment Controls** - All erosion and sediment controls shall be monitored, maintained, and adjusted for the duration of the project to prevent adverse impacts to jurisdictional areas. Additional erosion and sediment controls may be utilized on site as needed.

b) *Off Site Impacts** - There shall be no off-site erosion, flooding, ponding, or flood-related damage from runoff caused by the project activities.

c) *Unanticipated Drainage or Erosion** - The applicant shall control any unanticipated drainage and/or erosion conditions that may cause damage to jurisdictional areas and/or abutting or downstream properties. Said control measures shall be implemented immediately upon need. The Office of the Conservation Commission shall be notified if such conditions arise and of the measures utilized.

d) *Soil Stabilization due to Delay in Work** - If there is an interruption of more than 10, but less than 60 days between completion of grading and revegetation, the applicant shall sow all disturbed areas with annual rye grass to prevent erosion. If soils are to be exposed for longer than 60 days, a temporary cover of rye or other grass should be established following US Soil Conservation Services procedures, as recently amended, to prevent erosion and sedimentation. Once final grading is complete, loaming and seeding of final cover should be completed promptly.

e) *Grading of Slopes**-

i. >40% Slope – Slopes shall not exceed those specified in the plans approved by the Conservation Commission. Any slope equal to or greater than 40% (1 vertical to 2 1/2 horizontal) shall be stabilized with erosion control matting.

ii. <40% Slope – Final grades of vegetated areas shall not exceed a slope of 1 vertical to 2 1/2 horizontal (40%) and shall be stabilized to prevent erosion, particularly during the construction period.

f) *Stockpile Maintenance** - Any stockpiling of loose materials shall be properly stabilized to prevent erosion into and sedimentation of jurisdictional areas. Preventative controls such as haybales or erosion control matting shall be implemented to prevent such an occurrence.

g) *Stockpile Location* – In no case shall any soil or excavated material be stockpiled within 30 feet of any wetland, floodplain, or storm drain inlet.

h) *Site Stabilization Prior to Winter** - Prior to winter, exposed soils shall be stabilized (e.g. with demonstrated vegetative growth, impermeable barriers, erosion control blankets, etc.).

38. Invasive Insects* -

a) *Plantings* – No trees to be planted shall be species susceptible to the Asian Longhorned Beetle or Emerald Ash Borer.

b) *Wood Removal* – All tree, brush & wood removal shall adhere to the most recently amended requirements set forth by the Massachusetts Department of Conservation & Recreation for any project located in the Asian Longhorned Beetle Quarantine Zone.

39. Dust Control* - Provisions for dust control shall be provided during all construction and demolition activities. Such provisions shall be conducted in compliance with all City of Worcester Water Use Restrictions, if in effect, during such activities.

40. Dewatering* – If dewatering is required,

a) Notice of such activities shall be given to the Office of the Commission within 24 hours of commencement;

b) There shall be no discharge of untreated dewatered stormwater or groundwater to jurisdictional areas either by direct or indirect discharge to existing drainage systems;

c) Any discharge to surface waters or drainage structures must be visibly free of sediment;

d) To the maximum extent practicable, proposed dewatering activities should be located outside of the 100' buffer. If such activities must be located within the 100' buffer, they shall be monitored at all times when the pumps are running;

e) Dewatering activities shall be confined within an area of secondary containment at all times.

41. Spill Prevention* -

a) No fuel, oil, or other pollutants shall be stored in any resource area or the buffer zone thereto, unless specified in this Order;

b) No refueling shall take place within resource areas or 100-ft to a resource area;

c) The applicant shall take all necessary precautions to prevent discharge or spillage of fuel, oil or other pollutants onto any part of the site;

d) A spill kit shall be present on site at all times.

V. Conditions to Meet at Completion of Project

42. Site Stabilization* - All disturbed areas shall be properly stabilized with well-established perennial vegetation or other approved methods before the project is considered complete.

43. Erosion and Sediment Controls* - Erosion and sediment controls shall not be removed from the site until all disturbed areas have been stabilized with final vegetative cover and approval has been received from the Commission or its Agents to do so. The controls must then be removed within two weeks of receipt of that certification.

44. Certificate of Compliance* - Upon completion of the project, the applicant shall request in writing a Certificate of Compliance from the Commission. If the project has been completed in accordance with plans stamped by a registered professional engineer, architect, landscape architect, or land surveyor, certification must include a written statement by such professional certifying the same.

    a) If the project required compliance with the Massachusetts Stormwater Standards and/or work was conducted within Riverfront Area or Bordering Land Subject to Flooding, a certified as-built plan-of-land shall be provided showing final grades, resource areas, and all constructed improvements;

    b) If permanent markers were required, the certified as-built plan-of-land shall depict their location.

45. Deed Condition – Conditions numbered 32 shall extend beyond the Certificate of Compliance, in perpetuity, and shall be referred to in all future deeds to this property.

VI. General Conditions

46. Change in Ownership* - If a change in ownership takes place while this Order is still in effect, it is the responsibility of the new owner to notify the Commission of the change and to provide the name of the person responsible for compliance with the Order.

47. Conservation Agent's Power to Act* - With respect to all conditions, except _____, the Conservation Commission designates the Conservation Agent, as its Agent with full powers to act on its behalf in administering and enforcing this Order, unless the Agent determines approval from the Commission is appropriate.

48. Right to Inspect* - A member of the Conservation Commission or its Agent may enter and inspect the property and the activity that are the subjects of this Order at all reasonable times, with or without probable cause or prior notice, and until a Certificate of Compliance is issued, for the purpose of evaluating compliance with this Order (and other applicable laws and regulations).

49. Changes to the Plan or Errors & Omissions* -

    (a) If any plan, calculation, or other data presented to the Office of the Commission is in error or have omissions, and are deemed significant by the Commissioners or their Agents, all work will stop at the discretion of the Commission, until the discrepancies have been rectified to the Commission's satisfaction.

    (b) The applicant must notify the Commission in writing of any changes in the plans or implementation of the proposed activity where mandated by any local, state, or federal agencies having jurisdiction over the proposed activity. If, in the opinion of the Commission, any changes in the plans or implementation of the proposed activity so require, then the Commission may modify, amend or rescind this Order in a way consistent with:

- M.G.L. Chapter 131, Section 40,
- 310 CMR 10.00, *Wetlands Protection*,
- the City of Worcester's *Wetlands Protection Ordinance*, and
- the Commission's *Wetlands Protection Regulations*

If any provisions of any conditions, or application thereof is held to be invalid, such invalidity shall not affect any other provisions of this Order. If the Commission deems that a proposed change is major or substantial, a new hearing may be required.

50. Liability* - The applicant shall indemnify and save harmless the Commonwealth, the City of Worcester, the Conservation Commission, and its Agents against all sites, claims or liabilities of every name and nature arising at any time out of or in consequence of the acts of the Commission or its Agents in the performance of the work covered by this Order and/or failure to comply with the terms and conditions or this Order whether by itself or its employees or subcontractors.

CC-2020-013
158 Dorchester St
Mulcahy field

C. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

3/13/20
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

6
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the property owner, if different from applicant.

Signatures:

by hand delivery on
3/13/20
Date

by certified mail, return receipt requested, on
Date

D. Appeals

Appeal from a decision of the Conservation Commission shall be taken in accordance with law to the Superior Court or other body of competent jurisdiction. Any such appeal shall be taken within ten (10) days from the date from the receipt of such decision and shall not relieve the individual of the responsibility of taking an appeal to Department of Environmental Protection if such is required under said regulations.

No work may proceed until the appeal on the Commission's decision on a Notice of Intent has been decided and all appeal periods have elapsed.

SOIL BORING LOGS

Logs are on the following pages. These logs are for the purpose of providing information about physical soil characteristics. They are not to be confused with separate borings and samples described in the report by Beta Group regarding soil contaminants.

These soil boring locations are indicated on the Existing Conditions sheet of the Drawings.

TEST BORING LOG

SHEET 1

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Earth Design

Site: Mulcahy Field

Worcester, MA

BORING B-1

PROJECT NO. 14-0835

DATE: August 22, 2014

Ground Elevation:
Date Started: August 21, 2014
Date Finished: August 21, 2014
Driller: PG
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
						4"	Topsoil.
1		1	21"	0-2'0"	4-7-15-14		Dry, brown, medium dense, fine and medium sand, some gravel, trace coal.
		2	12"	2'0"-4'0"	10-9-6-7		Dry, brown, loose fine and medium sand, some gravel, trace silt.
		3	18"	4'0"-6'0"	6-4-3-4	4'0"	Dry, dark brown, loose fine and medium sand, some gravel, trace silt, trace organics, trace coal.
5		4	15"	6'0"-7'6"	4-4-3		Dry, dark brown, very loose fine and medium sand, little gravel,
		4A		7'6"-8'0"	3	7'6"	trace silt, trace organics, trace coal, fill.
		5	18"	8'0"-9'6"	2-2-4		Moist, tan, very loose fine sand, little silt.
		5A		9'6"-10'0"	10	9'6"	Moist, grey, medium dense, fine and medium sand, some gravel,
10		6	18"	10'0"-12'0"	10-11-19-16		trace silt.
15		7	12"	15'0"-17'0"	13-6-7-10		Wet, grey, loose, fine and medium sand, some gravel, trace silt.
20		8	21"	20'0"-22'0"	13-16-18-22		Wet, grey, medium dense, fine and medium sand, some gravel, trace silt.
25		9	21"	25'0"-27'0"	15-19-29-36		Wet, grey, medium dense, fine and medium sand, some gravel, trace silt.
						27'0"	
30							End of boring at 27'0". Groundwater at 14'0".
35							
39							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 2

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Earth Design
Site: Mulcahy Field
Worcester, MA

BORING B-2

PROJECT NO. 14-0835
DATE: August 26, 2014

Ground Elevation:
Date Started: August 25, 2014
Date Finished: August 25, 2014
Driller: DL
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS			
DATE	DEPTH	CASING	STABILIZATION

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
1		1	8"	0-2'0"	5-4-2-2		Dry, very loose to medium dense, fine to medium sand, trace inorganic silt and fine gravel.
		2	10"	2'0"-4'0"	12-10-10-5		
5		3	3"	5'0"-7'0"	2-1-1-2		
		4	19"	7'0"-9'0"	5-5-10-14	7'0"	
10		5	12"	10'0"-12'0"	2-5-6-5		Moist to wet, medium dense, fine to medium sand, some organic silt.
		6	11"	12'0"-14'0"	9-10-15-12	12'0"	
15		7	21"	15'0"-17'0"	22-16-16-10		
20		8	5"	20'0"-22'0"	6-9-12-9		Wet, medium dense to very dense, fine to medium sand and inorganic silt, trace fine gravel.
25		9	12"	25'0"-26'1"	30-30-100/1"	26'1"	
30							End of boring at 26'1". Groundwater at 10'0".
35							
39							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 3

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Earth Design
Site: Mulcahy Field
Worcester, MA

BORING B-3

PROJECT NO. 14-0835
DATE: August 22, 2014

Ground Elevation:
Date Started: August 21, 2014
Date Finished: August 21, 2014
Driller: PG
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
						3"	Topsoil.
1		1	12"	0-2'0"	3-3-6-6		Dry, brown, loose fine and medium sand, some gravel, trace silt.
		2	15"	2'0"-4'0"	4-3-3-4		Dry, brown, very loose fine and medium sand, some gravel, trace silt.
5		3	15"	4'0"-6'0"	3-2-2-3		Dry, brown, very loose fine and medium sand, some gravel, trace silt.
		4	15"	6'0"-8'0"	6-6-4-2		Dry, brown, loose fine and medium sand, some gravel, trace silt.
		5	12"	8'0"-10'0"	2-3-3-3	8'0"	Moist, dark brown, very loose, fine and medium sand, trace gravel, trace silt, trace glass, trace coal.
10		6	12"	10'0"-12'0"	2-3-3-3		Moist, dark brown, very loose, fine and medium sand, trace gravel, trace silt, trace glass, trace coal, fill.
		7	9"	12'0"-14'0"	4-3-2-2	12'0"	Wet, black, very loose organic peat, trace fine sand, trace gravel, trace silt.
15		8	12"	15'0"-17'0"	13-19-18-14	15'0"	Wet, grey, medium dense, fine and medium sand, some gravel, trace silt.
20		9	15"	20'0"-22'0"	9-13-14-7	20'0"	Wet, brown, medium dense, fine and medium sand, some gravel, trace silt.
25		10	18"	25'0"-27'0"	20-37-26-40		Wet, brown, dense, fine and medium sand, some gravel, trace silt.
						27'0"	
30							End of boring at 27'0". Groundwater at 13'0".
35							
39							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 4

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Earth Design
Site: Mulcahy Field
Worcester, MA

BORING B-4

PROJECT NO. 14-0835
DATE: August 22, 2014

Ground Elevation:
Date Started: August 21, 2014
Date Finished: August 21, 2014
Driller: PG
Soil Engineer/Geologist:

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
						4"	Topsoil.
1		1	18"	0-2'0"	4-3-5-7		Dry, brown, loose fine and medium sand, little gravel, trace silt, trace organics.
		2	15"	2'0"-4'0"	5-5-7-7	2'0"	Dry, brown, loose fine and medium sand, some gravel, trace silt.
5		3	12"	4'0"-6'0"	7-7-6-4	4'0"	Dry, dark brown, loose fine and medium sand, some gravel, trace silt, trace brick, trace coal.
		4	12"	6'0"-8'0"	5-4-4-5		Dry, dark brown, loose fine and medium sand, some gravel, trace silt, trace brick, trace coal.
		5	15"	8'0"-10'0"	3-3-7-4	8'0"	Dry, brown, loose fine and medium sand, some gravel, some brick, trace silt, fill.
10		6	12"	10'0"-12'0"	4-3-3-4	10'0"	Moist, dark brown, very loose organic peat.
		7	18"	12'0"-14'0"	15-10-11-13	12'0"	Moist, brown, medium dense, fine and medium sand, some gravel, trace silt.
15		8	18"	15'0"-17'0"	4-5-7-10	15'0"	Wet, brown, loose fine sand, little silt.
						19'0"	
20		9	21"	20'0"-22'0"	12-13-15-16		Wet, brown, medium dense, fine and medium sand, some gravel, trace silt.
25		10	18"	25'0"-27'0"	10-10-13-25	25'0"	Wet, grey, medium dense, fine and medium sand, some gravel, trace silt.
						27'0"	
30							End of boring at 27'0". Groundwater at 15'0".
35							
39							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V Dense.
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M Stiff 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

SUBSURFACE INVESTIGATION REPORT

March 25, 2020

Ms. Alice W. Webb, PLA, ASLA
Principal
EarthDesign Landscape Architecture LLC
280 Beverly Road
Worcester, Massachusetts 01605

Re: Subsurface Investigation
Mulcahy Field
158 Dorchester Street
Worcester, Massachusetts

Dear Ms. Webb:

BETA Group, Inc. (BETA) has conducted a preliminary site investigation at the referenced location on behalf of EarthDesign Architecture LLC. The sampling and analytical program was conducted to support soil management activities during upcoming renovation of Mulcahy Field. Mulcahy Field is a public multi-use park with athletic fields. Renovations to the park are planned to commence later this year. A summary of the subsurface soil investigations and analytical results is presented below.

Site Description

The subject property (hereafter referred to as "the Site") is a public athletic field owned by the City of Worcester. The Site is in a mixed residential and light commercial area. Residences bound the Site to the east and west. A restaurant and an auto repair facility are present to the southeast. Worcester East Middle School is present across Dorchester Street to the north. An asphalt-surfaced parking lot is present on the southern portion of the Site. A basketball court and playground are present on the west side of the Site. A small building containing restrooms is present in the northwest portion of the Site. Two baseball fields are present on the Site. Most of the Site contains grass-landscaped areas or baseball diamonds. Bleachers and dugouts are present on the southern baseball diamond.

Historical Research

BETA obtained historical aerial photographs, Sanborn fire insurance maps and a radius map from Environmental Data Resources (EDR) of Shelton, CT. The aerial photographs depict the Site developed as an athletic field from 1966 through 2016. The Sanborn maps indicate the Site developed with a hen house in 1910. The Site was indicated as undeveloped in subsequent maps until 1949 when a locker building is depicted in the location where it currently exists in the northwest corner of the Site. The 1978 map shows the Site as it exists today with a ballfield present. The 1937, 1949 and 1978 Sanborn maps show gasoline tanks at an auto repair facility to the southeast. The EDR Radius map does not depict any evidence of a release to the subsurface on the target property. The nearby release sites, including the auto-repair facility mentioned above are not considered to represent a material threat to the Site based on regulatory status and presumed groundwater flow direction. EDR aerial photographs, Sanborn fire insurance maps and radius maps are included in **Appendix A**.

MCP Reportable Concentrations

In accordance with Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), target analyte concentrations detected during laboratory soil analyses are compared to applicable MCP Reportable Concentrations to determine whether a release condition is present that requires notification to the Massachusetts Department of Environmental Protection (MassDEP), pursuant to 310 CMR 40.0315. Two reporting categories exist for concentrations of oil or hazardous materials (OHM) in soil:

- Reporting Category RCS-1 (310 CMR 40.0361) is applicable to all soil samples obtained at or within 500-feet of a residential dwelling, a residentially zoned property, school, playground, recreational area, or park, or within the geographical boundaries of a groundwater resource area.
- Reporting Category RCS-2 (310 CMR 40.0362) is applicable to all soil samples that are not obtained from category RCS-1 areas.

The Site contains a playground/park and is within 500 feet of residential dwellings and a school; therefore, the RCS-1 category applies.

Soil Assessment Activities

Martin Geo-Environmental (Martin) advanced twelve (12) soil borings at the site on March 4, 2020 using a truck-mounted direct push drill rig under BETA observation. The borings were advanced in various locations at the Site to evaluate soil that will be disturbed and/or exported. The borings were advanced to a depth of up to 10 feet below grade. Soil samples were collected continuously using a macro-core sampler. A BETA Environmental Scientist observed soil samples collected from each boring and screened them for visual and olfactory evidence of contamination. Photoionization detector (PID) headspace screening was also conducted at each sample interval. Soil samples (grab) were collected from the interval exhibiting the greatest visual evidence of anthropogenic materials at boring locations B-3, B-4, B-5, B-7, B-8, B-9, B-10, B-11 and B-12 and submitted for laboratory analyses of extractable petroleum hydrocarbons (EPH) and Resource Conservation and Recovery Act (RCRA 8) metals. The soil sample from B-4 was also submitted for analysis of toxicity characteristic leaching procedure (TCLP).

Two (2) surface soil samples from borings B-1 and B-9 in grass landscaped areas were also collected from the 0 to 6-inch depth for analysis of organochlorine pesticides and herbicides. Additional samples were analyzed from B-8 and B-9 for total lead only in shallow soil.

Discussion of Soil Screening/Sampling Results

The borings generally indicate the presence of urban fill from about 18 inches below grade throughout the depth of exploration. Materials encountered included ash, glass, bricks and other anthropogenic material.

Analytical results for soil samples B-1-surface and B-9-surface, collected from a depth of 0 to 6 inches, indicate that organochlorine pesticides and herbicides were not detected above laboratory reporting limits.

An elevated PID headspace screening result of 53.2 parts per million was observed in the sample interval from 5 to 7.5 feet in Boring B-3. A sample of this interval was submitted to a laboratory for analysis of volatile petroleum hydrocarbons. The laboratory analytical results indicated all VPH hydrocarbon fractions and targets are below RCS-1 thresholds. Most of the remaining samples indicated relatively low PID headspace screening as indicated in the boring logs.

Analytical results for soil samples from Borings B-3, B-4, B-8, B-9, B-10 and B-12 indicate the presence of lead above its RCS-1 concentration. Soil from Boring B-4 containing lead at a concentration of 1,700 mg/kg was submitted for toxicity characteristic leaching procedure (TCLP) analysis. The results of that testing indicate that the soil is potentially hazardous due to its leachability characteristic. However, the results may be

attributable to elemental lead, a lead paint chip or other anomaly. See the recommendations section of this letter with respect to this area.

Analytical results for soil samples collected from Borings B-3, and B-10 indicate the presence of arsenic above its reportable concentration. Samples from borings B-8, B-9, B-10 and B-12 indicate the presence of polynuclear aromatic hydrocarbons (PAHs), also above their respective reportable concentrations. However, because the detected compounds are typical urban fill containing anthropogenic materials, it appears that they are exempt from MCP notification.

Subsurface soil samples collected from Borings B-5, B-7, B-11 (EPH and RCRA 8 Metals) and surface soil samples collected from B-8 and B-9 (pesticides/herbicides) did not contain target analytes above RCS-1 concentrations.

The geologic descriptions are included in the attached boring logs included in **Appendix B**. The soil sample and boring locations are depicted in **Figure 1**. The laboratory analytical data are summarized in **Table 1**, **Table 2** and **Table 3** included in **Appendix C**. The complete laboratory analytical reports are attached in **Appendix D**.

Conclusions

- Lead, arsenic and PAHs are all present at the Site above MCP reportable concentrations due to the presence of urban fill containing coal ash or wood ash. As such, they are exempt from MCP notification.
- Elevated levels of arsenic are most likely due to naturally occurring deposits.
- A potential 120-day reportable condition exists under the MCP at Boring B-4 with respect to lead. See recommendations below. The remaining contaminants are believed to be exempt from reporting in accordance with 310 CMR 40.0317.
- A minor area of petroleum contamination was observed at Boring B-3, but at concentrations below MCP reportable concentrations.
- Soil in the vicinity of Boring B-4 exhibits TCLP results above 5 mg/l indicating it would potentially have to be either stabilized or disposed as hazardous waste if the soil is excavated for installation of utilities.

Recommendations:

BETA present the following recommendations for your consideration:

- You should disclose all of this environmental information in the Bid Documents to avoid additional claims for additional time or costs related to worker protection and/or soil management.
- Appropriate measures for the protection of workers and on and off-site management of urban fill (contaminated soil) management options should be included in the Bid Documents.
    - Excess excavated soil containing contaminants below RCS-1 levels must be managed in accordance with the anti-degradation provisions of the MCP at 310 CMR 40.0032(3).
    - Excess soil containing contaminants above RCS-1 levels must be disposed of at appropriately licensed, off-site soil management facilities.
- The Owner or Contractor should retain an LSP to conduct additional investigations to assess the extent of soil containing lead above TCLP thresholds near B-4. This is necessary to confirm whether the lead concentration and its corresponding TCLP result are anomalies or an MCP reportable condition that warrants further response actions.

- An LSP or qualified environmental professional retained by the Owner or the Contractor should pre-characterize urban fill that is to be excavated and managed either on or off-site. Alternatively, LSP or qualified environmental professional, could characterize stockpiled soil and make decisions regarding on or off-site management, consistent with provisions in the Contract Documents. Owner should review all environmental data and soil management decisions by Contractor, prior to on and off-site management of excavated soil.

If you have any questions, please do not hesitate to contact either of the undersigned at 413-331-5326.

Very Truly Yours,
BETA GROUP, INC.

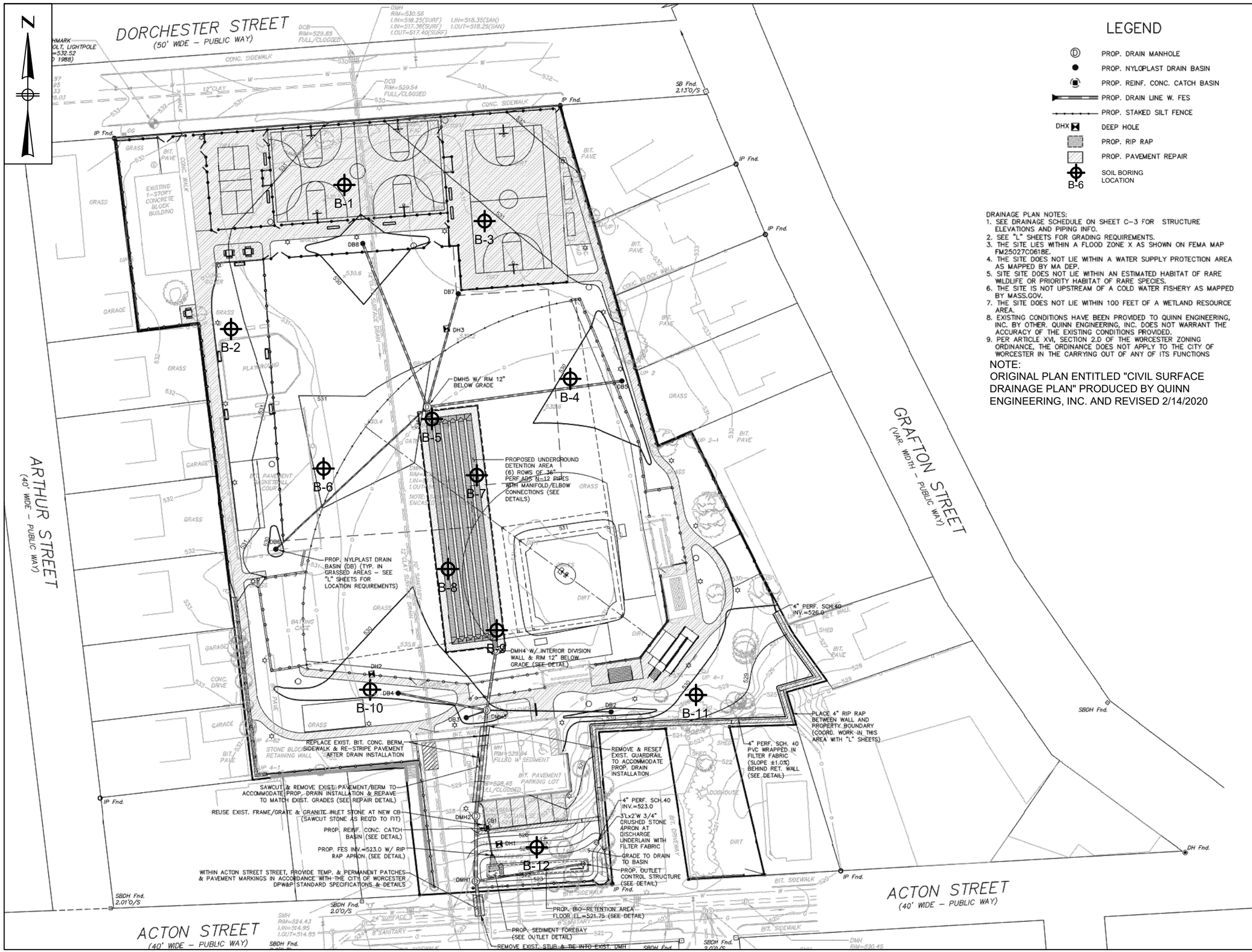
Robert E. Smith, LSP
Senior Project Manager

Alan D. Hanscom, LSP
Vice President

Appendices

Figure 1 - Site Plan
Table 1 – Summary of EPH and RCRA 8 Metal Results
Table 2 – Summary of Organochlorine Pesticide and Herbicide Results
Table 3 – Summary of VPH Results
Borings Logs
Laboratory Analytical Results

FIGURES



LEGEND

- PROP. DRAIN MANHOLE
- PROP. NYLOPLAST DRAIN BASIN
- PROP. REINF. CONC. CATCH BASIN
- PROP. DRAIN LINE W. FES
- PROP. STAKED SILT FENCE
- DHX — DEEP HOLE
- PROP. RIP RAP
- PROP. PAVEMENT REPAIR
- B-6 — SOIL BORING LOCATION

DRAINAGE PLAN NOTES:

1. SEE DRAINAGE SCHEDULE ON SHEET C-3 FOR STRUCTURE ELEVATIONS AND PIPING INFO.
2. SEE "L" SHEETS FOR GRADING REQUIREMENTS.
3. THE SITE LIES WITHIN A FLOOD ZONE X AS SHOWN ON FEMA MAP FM25027C0618E.
4. THE SITE DOES NOT LIE WITHIN A WATER SUPPLY PROTECTION AREA AS MAPPED BY MA DEP.
5. SITE SITE DOES NOT LIE WITHIN AN ESTIMATED HABITAT OF RARE WILDLIFE OR PRIORITY HABITAT OF RARE SPECIES.
6. THE SITE IS NOT UPSTREAM OF A COLD WATER FISHERY AS MAPPED BY MASS.GOV.
7. THE SITE DOES NOT LIE WITHIN 100 FEET OF A WETLAND RESOURCE AREA.
8. EXISTING CONDITIONS HAVE BEEN PROVIDED TO QUINN ENGINEERING, INC. BY OTHER. QUINN ENGINEERING, INC. DOES NOT WARRANT THE ACCURACY OF THE EXISTING CONDITIONS PROVIDED.
9. PER ARTICLE XVI, SECTION 2.D OF THE WORCESTER ZONING ORDINANCE, THE ORDINANCE DOES NOT APPLY TO THE CITY OF WORCESTER IN THE CARRYING OUT OF ANY OF ITS FUNCTIONS

NOTE:
ORIGINAL PLAN ENTITLED "CIVIL SURFACE DRAINAGE PLAN" PRODUCED BY QUINN ENGINEERING, INC. AND REVISED 2/14/2020

Prepared by:

BETA
www.BETA-Inc.com

Print Date: 3/23/2020 2:01 PM

Mulcahy Field

Worcester, MA

0 30 60 120

1 inch = 60 ft.

Figure No. 1

Site Plan

O:\70001\7041 - EARTHDESIGN - MULCAHY FIELD\DRAWING FILES\XREFS\MULCAHYFIELDPDPPLAN.DWG

APPENDIX A

APPENDIX B

TEST BORING LOG

BORING ID: B-1

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-19") Brown SAND, trace c-f gravel	
				0.4			
0-5	S1	31	NA	0.5		(19-31") Black, URBAN FILL (brick, coal ash, glass)	
						(0-10") Brown, URBAN FILL (brick, coal ash, glass), few c-f gravel	
5-10	S2	20	NA	1.5 1.2		(10-20") Black, URBAN FILL (brick, coal ash, glass)	
						END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-2

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
				1.2			
0-5	S1	43	NA	0.4		(2-41") Brown SAND and SILT, trace c-f gravel (0-17") Black URBAN FILL (brick, coal ash)	
				1.5			
5-10	S2	35	NA	1.6		(17-23") Black SILT and URBAN FILL (brick, coal ash) END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-3

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-14") Brown SAND	
				0.5			
0-5	S1	29	NA	2.1		(14-15") Dark brown SAND	
						(0-12") Red, white, brown URBAN FILL (brick, coal ash, glass) few c-f gravel	
				53.2			
5-10	S2	24	NA	1.2		(12-24") moist, Grey SAND and SILT, few c-f gravel	
						END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-4

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample ID #	REC/PEN Inches	Blows / 6" `--/--/--/--	PID (ppmv)			
						(0-2") Brown SAND and GRASS	
				0.8		(2-30") Brown SAND, some c-f gravel	
0-5	S1	41	NA	0.5		(30-41") Red and brown URBAN FILL (brick, coal ash)	
						(0-24") Black URBAN FILL (brick, coal ash)	
				5.8		(24-27") Red URBAN FILL (brick)	
5-10	S2	33	NA	3.0		(27-33") Black URBAN FILL (brick, coal ash), some silt	
						END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-5

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, I

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
				0.8		(2-16") Brown SAND and SILT, few c-f gravel	
0-5	S1	41	NA	0.5		(16-41") Black and Grey URBAN FILL (brick, coal ash, glass)	
						(0-28") Black and Grey URBAN FILL (brick, coal ash, glass)	
5-10	S2	28	NA	5.8 3.0		END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-6

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-7") Golden brown SAND	
				0.4		(7-14") Dark brown SAND, few c-f gravel	
0-5	S1	44	NA	0.5		(14-44") Black URBAN FILL (brick, coal ash)	
						(0-42") Black URBAN FILL (brick, coal ash)	
5-10	S2	42	NA	2.6 0.8		END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-7

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
				0.3		(2-22") Brown SAND some silt, few c-f gravel	
0-5	S1	45	NA	0.3		(22-45") Dark brown and black URBAN FILL (brick, coal ash)	
						(0-30") Dark brown URBAN FILL (brick, coal ash)	
5-10	S2	30	NA	3.3 1.9		END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-8

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
						(2-18") Brown SAND few c-f gravel	
				0.2		(18-24") Brown URBAN FILL (brick, coal ash) some silt	
0-5	S1	32	NA	0.3		(24-27") White CRUSHED ROCK	
						(27-32") Dark brown and black URBAN FILL (brick, coal ash)	
						(0-20") Black URBAN FILL (brick, coal ash, glass)	
				0.2			
5-10	S2	30	NA	0.5		(20-30") Grey URBAN FILL (brick, coal ash, glass)	
						END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-9

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
						(2-11") Brown SAND little silt	
				0.2		(11-22") Brown SAND some c-f gravel	
0-5	S1	41	NA	0.2		(22-25") Grey CRUSHED ROCK	
						(25-41") Dark brown and black URBAN FILL (brick, coal ash)	
				0.3		(0-26") Black URBAN FILL (brick, coal ash), some crushed rock	
5-10	S2	28	NA	0.3		(26-28") Dark black and Grey SILT	
						END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-10

IMPROVING COMMUNITIES TOGETHER

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
						(2-11") Brown SAND	
				0.3		(11-16') Brown SILT, few c-f gravel	
						(16-26") Dark Brown URBAN FILL (brick, coal ash) some sand	
0-5	S1	38	NA	0.7		(26-38") Dark Brown URBAN FILL (brick, coal ash) some silt	
						(0-16") Dark Brown URBAN FILL (brick, coal ash)	
				0.7			
5-10	S2	38	NA	0.7		(16-38") Dark Brown and Black URBAN FILL (brick, coal ash)	
						END OF BORING AT 10'	

DRILLING RIG TYPE:	GeoProbe 6620DT	MONITORING WELL INSTALLED:	
SURFACE ELEVATION:		RISER FROM:	SCREEN FROM: TO:
START DATE:	3/4/2020	Filter Sand:	Sand Pack Intervals
END DATE:	3/4/2020	Slot Size:	Bentonite Seal Interval
			Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-11

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample **ID #**	**REC/PEN** Inches	**Blows / 6"** `--/--/--/--	**PID** (ppmv)			
						(0-2") Brown SAND and GRASS	
						(2-12") Brown SAND	
				0.6		(12-15') Brown SAND and SILT, few c-f gravel	
0-5	S1	39	NA	0.3		(15-39") Dark Brown URBAN FILL (brick, coal ash), some c-f gravel	
						(0-12") Dark Brown URBAN FILL (brick, coal ash), some c-f gravel	
				0.4		(12-20") White CRUSHED ROCK	
5-10	S2	22	NA	0.4		(20-22") Dark Brown CLAY	
						END OF BORING AT 10'	

DRILLING RIG TYPE:	GeoProbe 6620DT	MONITORING WELL INSTALLED:	
SURFACE ELEVATION:		RISER FROM:	SCREEN FROM: TO:
START DATE:	3/4/2020	Filter Sand:	Sand Pack Intervals
END DATE:	3/4/2020	Slot Size:	Bentonite Seal Interval
			Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

TEST BORING LOG

BORING ID: B-12

PROJECT:	EarthDesign - Mulcahy Field	**BETA JOB NUMBER:**	20.07041.00
		FIELD REP:	A.Makela
LOCATION:	Mulcahy Field Worcester, MA	**CLIENT:**	EarthDesign Landscape Architecture, LLC.
CONTRACTOR:	BETA Group, Inc.	**DRILLER:**	Martin Geo Environmental, LLC.

	SAMPLER	CASING	CORE BARREL	DEPTH TO GROUNDWATER		
TYPE	GeoProbe	NA	NA	DATE	NA	
SIZE (ID)	\	NA	NA	TIME	NA	
HAMMER WEIGHT	NA	NA	---	DEPTH	NA	
HAMMER FALL	NA	NA	---	SURFACE ELEVATION	---	

SAMPLING INTERVALS					Strata Change	DESCRIPTION OF MATERIALS (Burmister Soil Classification System)	Monitoring Well Construction Details / Materials
DEPTH (feet)	Sample ID #	REC/PEN Inches	Blows / 6" `--/--/--/--	PID (ppmv)			
						(0-16") Dark Brown SAND, few c-f gravel	
				0.4		(16-20') Brown SAND, few c-f gravel	
0-5	S1	37	NA	6.7		(15-37") Dark Brown URBAN FILL (brick, coal ash)	
						(0-22") Brown-grey CLAY some c-f gravel	
5-10	S2	52	NA	0.3 0.2		(22-52") Moist grey CLAY, few c-f gravel END OF BORING AT 10'	

DRILLING RIG TYPE: GeoProbe 6620DT

SURFACE ELEVATION:
START DATE: 3/4/2020
END DATE: 3/4/2020

MONITORING WELL INSTALLED:
RISER FROM: SCREEN FROM: TO:
Filter Sand: Sand Pack Intervals
Slot Size: Bentonite Seal Interval
Native Backfill

PROPORTIONS USED		RELATIVE DENSITY		CONSISTENCY		SOIL CLASSIFICATION (inches)				SUMMARY	
trace	0-10%	0-4	Very Loose	0-2	Very Soft	Boulders	>11.8	Fine Sand	.02-.003	Overburden (feet):	10
little	10-20%	4-10	Loose	2-4	Soft	Cobbles	11.8-2.9	Fine Silt	<.003	Rock Cored (feet):	NA
some	20-35%	10-30	Medium Dense	4-8	Medium Stiff	Coarse Gravel	2.9-.75	Clay	<.003	# of samples:	2
and	35-50%	30-50	Dense	8-15	Stiff	Fine Gravel	.75-.19			Well set (feet):	
		50+	Very Dense	15-30	Very Stiff	Course Sand	.19-.08				
				30+	Hard	Medium Sand	.08-.02				

APPENDIX C

Table 1
Summary of EPH and RCRA 8 Metals Results
Mulcahy Field
158 Dorchester Street
Worcester, MA

Sample Designation		**B-3 5-7.5'**		**B-4 5-7.5'**		**B-5 2.5-5'**		**B-7 5-7.5'**		**B-8 7.5-10'**		**B-8 0-2.5'**		**B-8 2.5-5'**			
Lab Sample Number:		**0C05045-01**		**0C05045-02**		**0C05045-03**		**0C05045-04**		**0C05045-05**		**0C13025-02**		**0C13025-03**			
Date Sampled:		3/4/2020 11:00		3/4/2020 10:45		3/4/2020 10:30		3/4/2020 10:15		3/4/2020 10:00		3/4/2020 14:15		3/4/2020 14:30			
Date Received:		3/5/2020 13:41		3/5/2020 13:41		3/5/2020 13:41		3/5/2020 13:41		3/5/2020 13:41		3/13/2020 12:09		3/13/2020 12:09			
Parameter	CAS Number	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	MassDEP Reportable Concentration S-1	MassDEP Reportable Concentration S-2
Extractable Petroleum Hydrocarbons (EPH)																	
Naphthalene	91-20-3	ND	0.44	ND	0.39	ND	0.38	ND	0.37	**0.48**	0.47	NA	NA	NA	NA	4	20
2-Methylnaphthalene	91-57-6	ND	0.44	ND	0.39	ND	0.38	ND	0.37	**0.53**	0.47	NA	NA	NA	NA	0.7	80
Phenanthrene	85-01-8	**1.71**	0.44	**2.25**	0.39	**0.55**	0.38	**1.72**	0.37	**18.6**	0.47	NA	NA	NA	NA	10	1000
Acenaphthene	83-32-9	ND	0.44	ND	0.39	ND	0.38	ND	0.37	**1.96**	0.47	NA	NA	NA	NA	4	3000
Acenaphthylene	208-96-8	ND	0.44	**0.42**	0.39	ND	0.38	ND	0.37	ND	0.47	NA	NA	NA	NA	1	10
Fluorene	86-73-7	ND	0.44	ND	0.39	ND	0.38	ND	0.37	**2.86**	0.47	NA	NA	NA	NA	1000	3000
Anthracene	120-12-7	**0.45**	0.44	**0.98**	0.39	ND	0.38	**0.48**	0.37	**4.24**	0.47	NA	NA	NA	NA	1000	3000
Fluoranthene	206-44-0	**2.98**	0.44	**2.84**	0.39	**1.24**	0.38	ND	0.37	**18.2**	0.47	NA	NA	NA	NA	1000	3000
Pyrene	129-00-0	**2.49**	0.44	**2.26**	0.39	**1.04**	0.38	ND	0.37	**13**	0.47	NA	NA	NA	NA	1000	3000
Benzo(a)anthracene	56-55-3	**1.65**	0.44	**1.73**	0.39	**0.87**	0.38	ND	0.37	**8.63**	0.47	NA	NA	NA	NA	7	40
Chrysene	218-01-9	**1.79**	0.44	**1.88**	0.39	**1.37**	0.38	ND	0.37	**11**	0.47	NA	NA	NA	NA	70	400
Benzo(b)fluoranthene	205-99-2	**1.58**	0.44	**1.6**	0.39	**1.5**	0.38	ND	0.37	**8.08**	0.47	NA	NA	NA	NA	7	40
Benzo(k)fluoranthene	207-08-9	**1.03**	0.44	**1.14**	0.39	**0.73**	0.38	ND	0.37	**4.46**	0.47	NA	NA	NA	NA	70	400
Benzo(a)pyrene	50-32-8	**1.61**	0.44	**1.39**	0.39	**0.79**	0.38	ND	0.37	**6.44**	0.47	NA	NA	NA	NA	2	7
Indeno(1,2,3-cd)pyrene	193-39-5	**1.2**	0.44	**1.15**	0.39	**0.64**	0.38	ND	0.37	**3.57**	0.47	NA	NA	NA	NA	7	40
Dibenz(a,h)anthracene	53-70-3	ND	0.44	**0.41**	0.39	ND	0.38	ND	0.37	**1.34**	0.47	NA	NA	NA	NA	0.7	4
Benzo(g,h,i)perylene	191-24-2	**1.21**	0.44	**1.42**	0.39	**0.69**	0.38	ND	0.37	**3.21**	0.47	NA	NA	NA	NA	1000	3000
C9-C18 Aliphatic Hydrocarbons		ND	17.8	ND	15.6	ND	15.3	**22.1**	14.9	ND	18.8	NA	NA	NA	NA	1000	3000
C19-C36 Aliphatic Hydrocarbons		**50.3**	17.8	**58.8**	15.6	**18.3**	15.3	**668**	14.9	**131**	18.8	NA	NA	NA	NA	3000	5000
C11-C22 Aromatic Hydrocarbons		**60.3**	8.94	**115**	39.2	**30.8**	7.68	**691**	7.5	**396**	47	NA	NA	NA	NA	1000	3000
RCRA 8 Metals																	
Arsenic	7440-38-2	**29.4**	0.25	**9.94**	0.34	**11.7**	0.19	**16.5**	0.19	**12.3**	0.43	NA	NA	NA	NA	20	20
Barium	7440-39-3	**501**	0.12	**715**	0.17	**98.8**	0.09	**73.3**	0.1	**397**	0.21	NA	NA	NA	NA	1000	3000
Cadmium	7440-43-9	**2.22**	0.12	**18.5**	0.17	**2.93**	0.09	**9.98**	0.1	**1.79**	0.21	NA	NA	NA	NA	70	100
Chromium	7440-47-3	**13.7**	0.12	**21.4**	0.17	**15.4**	0.09	**17.1**	0.1	**21.2**	0.21	NA	NA	NA	NA	100	200
Lead	7439-92-1	**663**	0.12	**1700**	0.17	**141**	0.09	**154**	0.1	**857**	0.21	**41.5**	0.36	**188**	0.38	200	600
Selenium	7782-49-2	ND	0.25	ND	0.34	ND	0.19	ND	0.19	ND	0.43	NA	NA	NA	NA	400	700
Silver	7440-22-4	ND	0.12	ND	0.17	ND	0.09	ND	0.1	ND	0.21	NA	NA	NA	NA	100	200
Mercury	7439-97-6	**0.279**	0.088	**0.698**	0.079	**0.201**	0.074	**0.101**	0.077	**0.134**	0.087	NA	NA	NA	NA	20	30
TCLP Lead		NA	NA	**23.4**	0.025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5*	

Notes:

45.1	analyte detected above laboratory reporting limits
18.6	exceeds reportable concentrations

NE - no standard established
NA - not analyzed for this analyte
ND - not detected above laboratory reporting limits
TCLP - toxicity characteristic leaching procedure
* - TCLP threshold for determination of hazardous waste threshold

Table 1
Summary of EPH and RCRA 8 Metals Results
Mulcahy Field
158 Dorchester Street
Worcester, MA

B-8 5-7.5'		B-9 5-7.5'		B-9 0-2.5'		B-9 2.5-5'		B-10 7.5-10'		B-11 0-2.5'		B-12 2.5-5'				
0C13025-04		0C05045-06		0C13025-05		0C13025-06		0C05045-07		0C13025-01		0C05045-08				
3/4/2020 15:00		3/4/2020 12:00		3/4/2020 15:15		3/4/2020 15:30		3/4/2020 9:45		3/4/2020 14:00		3/4/2020 9:30				
3/13/2020 12:09		3/5/2020 13:41		3/13/2020 12:09		3/13/2020 12:09		3/5/2020 13:41		3/13/2020 12:09		3/5/2020 13:41				
Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Units	MassDEP Reportable Concentration S-1	MassDEP Reportable Concentration S-2
NA	NA	**0.4**	0.4	NA	NA	NA	NA	**0.95**	0.38	ND	0.37	ND	0.36	mg/kg	4	20
NA	NA	ND	0.4	NA	NA	NA	NA	**0.46**	0.38	ND	0.37	ND	0.36	mg/kg	0.7	80
NA	NA	**12.4**	0.4	NA	NA	NA	NA	**5.28**	0.38	**1.42**	0.37	**1.33**	0.36	mg/kg	10	1000
NA	NA	**0.58**	0.4	NA	NA	NA	NA	**0.63**	0.38	ND	0.37	ND	0.36	mg/kg	4	3000
NA	NA	ND	0.4	NA	NA	NA	NA	**0.53**	0.38	ND	0.37	ND	0.36	mg/kg	1	10
NA	NA	**0.7**	0.4	NA	NA	NA	NA	**0.88**	0.38	ND	0.37	ND	0.36	mg/kg	1000	3000
NA	NA	**4.13**	0.4	NA	NA	NA	NA	**1.82**	0.38	ND	0.37	ND	0.36	mg/kg	1000	3000
NA	NA	**15.4**	0.4	NA	NA	NA	NA	**6.09**	0.38	**1.69**	0.37	**2.49**	0.36	mg/kg	1000	3000
NA	NA	**12**	0.4	NA	NA	NA	NA	**5**	0.38	**1.38**	0.37	**2.22**	0.36	mg/kg	1000	3000
NA	NA	**7.39**	0.4	NA	NA	NA	NA	**3.42**	0.38	**0.78**	0.37	**1.88**	0.36	mg/kg	7	40
NA	NA	**7.23**	0.4	NA	NA	NA	NA	**4.17**	0.38	**0.84**	0.37	**2.67**	0.36	mg/kg	70	400
NA	NA	**5.25**	0.4	NA	NA	NA	NA	**2.63**	0.38	**0.62**	0.37	**4.33**	0.36	mg/kg	7	40
NA	NA	**3.99**	0.4	NA	NA	NA	NA	**2.51**	0.38	**0.61**	0.37	**1.37**	0.36	mg/kg	70	400
NA	NA	**4.97**	0.4	NA	NA	NA	NA	**3.2**	0.38	**0.68**	0.37	**2.81**	0.36	mg/kg	2	7
NA	NA	**3.05**	0.4	NA	NA	NA	NA	**2.81**	0.38	**0.46**	0.37	**2.99**	0.36	mg/kg	7	40
NA	NA	**0.98**	0.4	NA	NA	NA	NA	**0.78**	0.38	ND	0.37	**0.78**	0.36	mg/kg	0.7	4
NA	NA	**2.77**	0.4	NA	NA	NA	NA	**2.8**	0.38	**0.52**	0.37	**2.87**	0.36	mg/kg	1000	3000
NA	NA	ND	16.3	NA	NA	NA	NA	ND	15.3	ND	14.9	ND	14.4	mg/kg	1000	3000
NA	NA	**367**	16.3	NA	NA	NA	NA	**249**	15.3	ND	14.9	**63.4**	14.4	mg/kg	3000	5000
NA	NA	**346**	40.8	NA	NA	NA	NA	**407**	38.5	**17.5**	7.47	**95.1**	7.24	mg/kg	1000	3000
NA	NA	**9.26**	0.23	NA	NA	NA	NA	**21.7**	0.3	**13**	0.65	**9.47**	0.29	mg/kg	20	20
NA	NA	**190**	0.11	NA	NA	NA	NA	**76.6**	0.15	**34.2**	0.33	**51.8**	0.15	mg/kg	1000	3000
NA	NA	**1.6**	0.11	NA	NA	NA	NA	**1.89**	0.15	**1.9**	0.33	**9.8**	0.15	mg/kg	70	100
NA	NA	**20.8**	0.11	NA	NA	NA	NA	**19.7**	0.15	**21.2**	0.33	**9.55**	0.15	mg/kg	100	200
179	0.33	**513**	0.11	**57**	0.36	**83.4**	0.31	**303**	0.15	**35**	0.33	**37.4**	0.15	mg/kg	200	600
NA	NA	ND	0.23	NA	NA	NA	NA	ND	0.3	ND	0.65	ND	0.29	mg/kg	400	700
NA	NA	ND	0.11	NA	NA	NA	NA	ND	0.15	**0.71**	0.33	ND	0.15	mg/kg	100	200
NA	NA	**0.308**	0.086	NA	NA	NA	NA	**0.539**	0.159	ND	0.08	**0.091**	0.072	mg/kg	20	30
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	mg/l	5*	

Table 2

Summary of Organochlorine Pesticide and Herbicide Results

Mulcahy Field

158 Dorchester Street

Worcester, MA

Sample Designation		**B-1 Surface**		**B-9 Surface**				
Lab Sample Number:		**0C05045-09**		**0C05045-10**				
Date Sampled:		3/4/2020 11:30		3/4/2020 11:15				
Analyte	CAS Number	Sample Result	Reporting Limit	Sample Result	Reporting Limit	Units	MassDEP Reportable Concentration S-1	MassDEP Reportable Concentration S-2
Herbicides								
Dalapon	75-99-0	ND	128	ND	149	ug/kg	NE	NE
Dicamba	1918-00-9	ND	64	ND	75	ug/kg	NE	NE
Dichloroprop	120-36-5	ND	64	ND	75	ug/kg	NE	NE
2,4-D	94-75-7	ND	64	ND	75	ug/kg	NE	NE
2,4,5-TP (Silvex)	93-72-1	ND	64	ND	75	ug/kg	NE	NE
2,4,5-T	93-76-5	ND	64	ND	75	ug/kg	NE	NE
2,4-DB	94-82-6	ND	64	ND	75	ug/kg	NE	NE
Dinoseb	88-85-7	ND	128	ND	149	ug/kg	NE	NE
Pesticides								
alpha-BHC	319-84-6	ND	2.05	ND	2.4	ug/kg	NE	NE
gamma-BHC (Lindane)	58-89-9	ND	2.05	ND	2.4	ug/kg	3	500
beta-BHC	319-85-7	ND	2.05	ND	2.4	ug/kg	NE	NE
delta-BHC	319-86-8	ND	2.05	ND	2.4	ug/kg	NE	NE
Heptachlor	76-44-8	ND	2.05	ND	2.4	ug/kg	300	2000
Aldrin	309-00-2	ND	2.05	ND	2.4	ug/kg	80	500
Heptachlor epoxide	1024-57-3	ND	2.05	ND	2.4	ug/kg	100	900
gamma-Chlordane	5566-34-7	ND	2.05	ND	2.4	ug/kg	see Chlordane	see Chlordane
alpha-Chlordane	5103-71-9	ND	2.05	ND	2.4	ug/kg	see Chlordane	see Chlordane
Chlordane	57-74-9	ND	20.5	ND	24	ug/kg	5000	30000
4,4'-DDE	72-55-9	ND	4.09	ND	4.79	ug/kg	6000	30000
Endosulfan I	959-98-8	ND	2.05	ND	2.4	ug/kg	NE	NE
Dieldrin	60-57-1	ND	2.05	ND	2.4	ug/kg	80	500
Endrin	72-20-8	ND	2.05	ND	2.4	ug/kg	10000	20000
4,4'-DDD	72-54-8	ND	4.09	ND	4.79	ug/kg	8000	40000
Endosulfan II	33213-65-9	ND	2.05	ND	2.4	ug/kg	NE	NE
Endrin aldehyde	7421-93-4	ND	2.05	ND	2.4	ug/kg	NE	NE
4,4'-DDT	50-29-3	ND	4.09	ND	4.79	ug/kg	6000	30000
Methoxychlor	72-43-5	ND	4.09	ND	4.79	ug/kg	200000	400000
Endosulfan sulfate	1031-07-8	ND	2.05	ND	2.4	ug/kg	NE	NE
Endrin Ketone	53494-70-5	ND	2.05	ND	2.4	ug/kg	NE	NE
Toxaphene	8001-35-2	ND	20.5	ND	24	ug/kg	NE	NE

Notes:

ND - not detected above laboratory reporting limits

µg/kg - micrograms per kilogram

45.1 analyte detected

18.6 exceeds reportable concentrations

NE - no standard established

Table 3

Summary of VPH Results

Mulcahy Field

158 Dorchester Street

Worcester, MA

Sample Designation		**B-3 5-7.5'**				
Lab Sample Number:		**0C05045-01**				
Date Sampled:		3/4/2020 11:00				
Date Received:		3/5/2020 13:41				
Parameter	**CAS Number**	**Sample Result**	**Reporting Limit**	**Units**	**MassDEP Reportable Concentration S-1**	**MassDEP Reportable Concentration S-2**
Volatile Petroleum Hydrocarbons (MADEP-VPH)						
Benzene	71-43-2	ND	0.6	mg/kg	2	200
Ethylbenzene	100-41-4	ND	0.6	mg/kg	40	1000
Methyl t-butyl ether (MTBE)	1634-04-4	ND	0.1	mg/kg	0.1	100
Naphthalene	91-20-3	ND	1.2	mg/kg	4	20
Toluene	108-88-3	ND	0.6	mg/kg	30	1000
m&p-Xylene	1330-20-7	ND	1.2	mg/kg	see Total xylenes	see Total xylenes
o-Xylene	95-47-6	ND	1.2	mg/kg	see Total xylenes	see Total xylenes
Total xylenes	1330-20-7	ND	1.2	mg/kg	100	100
C5-C8 Aliphatic Hydrocarbons		ND	11.9	mg/kg	100	500
C9-C12 Aliphatic Hydrocarbons		**45.1**	11.9	mg/kg	1000	3000
C9-C10 Aromatic Hydrocarbons		**77.8**	11.9	mg/kg	100	500

Notes:

ND - not detected above laboratory reporting limits

mg/kg - milligrams per kilogram

45.1	analyte detected
18.6	exceeds reportable concentrations

NE - no standard established

APPENDIX D

New England Testing Laboratory, Inc.
(401) 353-3420

REPORT OF ANALYTICAL RESULTS

NETLAB Work Order Number: 0C05045
Client Project: 20.07041.00 - Earth Design, Mulcahy Field

Report Date: 17-March-2020

Prepared for:

Rob Smith
BETA Group
315 Norwood Park South
Norwood, MA 02062

Richard Warila, Laboratory Director
New England Testing Laboratory, Inc.
59 Greenhill Street
West Warwick, RI 02893
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Samples Submitted :

The samples listed below were submitted to New England Testing Laboratory on 03/05/20. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 0C05045. Custody records are included in this report.

Lab ID	Sample	Matrix	Date Sampled	Date Received
0C05045-01	B-3 5-7.5'	Soil	03/04/2020	03/05/2020
0C05045-02	B-4 5-7.5'	Soil	03/04/2020	03/05/2020
0C05045-03	B-5 2.5-5'	Soil	03/04/2020	03/05/2020
0C05045-04	B-7 5-7.5'	Soil	03/04/2020	03/05/2020
0C05045-05	B-8 7.5-10'	Soil	03/04/2020	03/05/2020
0C05045-06	B-9 5-7.5'	Soil	03/04/2020	03/05/2020
0C05045-07	B-10 7.5-10'	Soil	03/04/2020	03/05/2020
0C05045-08	B-12 2.5-5'	Soil	03/04/2020	03/05/2020
0C05045-09	B-1 Surface	Soil	03/04/2020	03/05/2020
0C05045-10	B-9 Surface	Soil	03/04/2020	03/05/2020

Request for Analysis

At the client's request, the analyses presented in the following table were performed on the samples submitted.

B-1 Surface (Lab Number: 0C05045-09)

Analysis	Method
Herbicides	EPA 8151A
Pesticides	EPA 8081B

B-10 7.5-10' (Lab Number: 0C05045-07)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-12 2.5-5' (Lab Number: 0C05045-08)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-3 5-7.5' (Lab Number: 0C05045-01)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
MADEP VPH	MADEP VPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-4 5-7.5' (Lab Number: 0C05045-02)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C

Request for Analysis (continued)

B-4 5-7.5' (Lab Number: 0C05045-02) (continued)

Analysis	Method
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C
TCLP Lead	EPA 6010C

B-5 2.5-5' (Lab Number: 0C05045-03)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-7 5-7.5' (Lab Number: 0C05045-04)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-8 7.5-10' (Lab Number: 0C05045-05)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

Request for Analysis (continued)

B-9 5-7.5' (Lab Number: 0C05045-06)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-9 Surface (Lab Number: 0C05045-10)

Analysis	Method
Herbicides	EPA 8151A
Pesticides	EPA 8081B

Method References

Method for the Determination of Extractable Petroleum Hydrocarbons, Rev. 2.1, Massachusetts Department of Environmental Protection, 2004

Method for the Determination of Volatile Petroleum Hydrocarbons, Rev. 2.1, Massachusetts Department of Environmental Protection, 2018

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, USEPA

Case Narrative

Sample Receipt:

The samples associated with this work order were received in appropriately cooled and preserved containers. The chain of custody was adequately completed and corresponded to the samples submitted.

Exceptions: None

Analysis:

All samples were prepared and analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) were within method specified quality control requirements and allowances. Results for all soil samples, unless otherwise indicated, are reported on a dry weight basis.

Exceptions: None

Results: Total Metals

Sample: B-3 5-7.5'

Lab Number: 0C05045-01 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**29.4**		0.25	mg/kg	03/06/20	03/11/20
Barium	**501**		0.12	mg/kg	03/06/20	03/11/20
Cadmium	**2.22**		0.12	mg/kg	03/06/20	03/11/20
Chromium	**13.7**		0.12	mg/kg	03/06/20	03/11/20
Lead	**663**		0.12	mg/kg	03/06/20	03/11/20
Mercury	**0.279**		0.088	mg/kg	03/06/20	03/06/20
Selenium	ND		0.25	mg/kg	03/06/20	03/11/20
Silver	ND		0.12	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-4 5-7.5'

Lab Number: 0C05045-02 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**9.94**		0.34	mg/kg	03/06/20	03/11/20
Barium	**715**		0.17	mg/kg	03/06/20	03/11/20
Cadmium	**18.5**		0.17	mg/kg	03/06/20	03/11/20
Chromium	**21.4**		0.17	mg/kg	03/06/20	03/11/20
Lead	**1700**		0.17	mg/kg	03/06/20	03/11/20
Mercury	**0.698**		0.079	mg/kg	03/06/20	03/06/20
Selenium	ND		0.34	mg/kg	03/06/20	03/11/20
Silver	ND		0.17	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-5 2.5-5'

Lab Number: 0C05045-03 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**11.7**		0.19	mg/kg	03/06/20	03/11/20
Barium	**98.8**		0.09	mg/kg	03/06/20	03/11/20
Cadmium	**2.93**		0.09	mg/kg	03/06/20	03/11/20
Chromium	**15.4**		0.09	mg/kg	03/06/20	03/11/20
Lead	**141**		0.09	mg/kg	03/06/20	03/11/20
Mercury	**0.201**		0.074	mg/kg	03/06/20	03/06/20
Selenium	ND		0.19	mg/kg	03/06/20	03/11/20
Silver	ND		0.09	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-7 5-7.5'

Lab Number: 0C05045-04 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**16.5**		0.19	mg/kg	03/06/20	03/11/20
Barium	**73.3**		0.10	mg/kg	03/06/20	03/11/20
Cadmium	**9.98**		0.10	mg/kg	03/06/20	03/11/20
Chromium	**17.1**		0.10	mg/kg	03/06/20	03/11/20
Lead	**154**		0.10	mg/kg	03/06/20	03/11/20
Mercury	**0.101**		0.077	mg/kg	03/06/20	03/06/20
Selenium	ND		0.19	mg/kg	03/06/20	03/11/20
Silver	ND		0.10	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-8 7.5-10'

Lab Number: 0C05045-05 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**12.3**		0.43	mg/kg	03/06/20	03/11/20
Barium	**397**		0.21	mg/kg	03/06/20	03/11/20
Cadmium	**1.79**		0.21	mg/kg	03/06/20	03/11/20
Chromium	**21.2**		0.21	mg/kg	03/06/20	03/11/20
Lead	**857**		0.21	mg/kg	03/06/20	03/11/20
Mercury	**0.134**		0.087	mg/kg	03/06/20	03/06/20
Selenium	ND		0.43	mg/kg	03/06/20	03/11/20
Silver	ND		0.21	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-9 5-7.5'

Lab Number: 0C05045-06 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**9.26**		0.23	mg/kg	03/06/20	03/11/20
Barium	**190**		0.11	mg/kg	03/06/20	03/11/20
Cadmium	**1.60**		0.11	mg/kg	03/06/20	03/11/20
Chromium	**20.8**		0.11	mg/kg	03/06/20	03/11/20
Lead	**513**		0.11	mg/kg	03/06/20	03/11/20
Mercury	**0.308**		0.086	mg/kg	03/06/20	03/06/20
Selenium	ND		0.23	mg/kg	03/06/20	03/11/20
Silver	ND		0.11	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-10 7.5-10'

Lab Number: 0C05045-07 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**21.7**		0.30	mg/kg	03/06/20	03/11/20
Barium	**76.6**		0.15	mg/kg	03/06/20	03/11/20
Cadmium	**1.89**		0.15	mg/kg	03/06/20	03/11/20
Chromium	**19.7**		0.15	mg/kg	03/06/20	03/11/20
Lead	**303**		0.15	mg/kg	03/06/20	03/11/20
Mercury	**0.539**		0.159	mg/kg	03/06/20	03/06/20
Selenium	ND		0.30	mg/kg	03/06/20	03/11/20
Silver	ND		0.15	mg/kg	03/06/20	03/11/20

Results: Total Metals

Sample: B-12 2.5-5'

Lab Number: 0C05045-08 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**9.47**		0.29	mg/kg	03/06/20	03/11/20
Barium	**51.8**		0.15	mg/kg	03/06/20	03/11/20
Cadmium	**9.80**		0.15	mg/kg	03/06/20	03/11/20
Chromium	**9.55**		0.15	mg/kg	03/06/20	03/11/20
Lead	**37.4**		0.15	mg/kg	03/06/20	03/11/20
Mercury	**0.091**		0.072	mg/kg	03/06/20	03/06/20
Selenium	ND		0.29	mg/kg	03/06/20	03/11/20
Silver	ND		0.15	mg/kg	03/06/20	03/11/20

Volatile Petroleum Hydrocarbons
Sample: B-3 5-7.5' (0C05045-01)

SAMPLE INFORMATION

Matrix	Soil		
Containers	Satisfactory		
Sample Preservation	Aqueous	NA	
	Soil or Sediment	Preserved with methanol and/or in an air-tight container	ml methanol per gram soil: 1:.68
		Methanol preserved (covering sample)	
		Received in air-tight container	
Temperature	Received on Ice Received at: 4+/-2 C°		

VPH ANALYTICAL RESULTS

Method for Ranges: MADEP VPH-18-2.1				Client ID	B-3 5-7.5'	
Method for Target Analytes: MADEP VPH-18-2.1				Lab ID	0C05045-01	
VPH Surrogate Standards:				Date Collected	03/04/20	
PID: 2,5-Dibromotoluene				Date Received	03/05/20	
FID: 2,5-Dibromotoluene				% Moisture	27.10	
RANGE/TARGET ANALYTE	**Elution Range**	**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C5-C8 Aliphatic Hydrocarbons [1]	NA	50X	11.9	mg/kg	<11.9	03/10/20 22:15
Unadjusted C9-C12 Aliphatic Hydrocarbons [1]	NA	50X	11.9	mg/kg	**123**	03/10/20 22:15
Benzene	C5-C8	50X	0.6	mg/kg	<0.6	03/10/20 22:15
Ethylbenzene	C9-C12	50X	0.6	mg/kg	<0.6	03/10/20 22:15
Methyl t-butyl ether (MTBE)	C5-C8	50X	0.1	mg/kg	<0.1	03/10/20 22:15
Naphthalene	NA	50X	1.2	mg/kg	<1.2	03/10/20 22:15
Toluene	C5-C8	50X	0.6	mg/kg	<0.6	03/10/20 22:15
m&p-Xylene	C9-C12	50X	1.2	mg/kg	<1.2	03/10/20 22:15
o-Xylene	C9-C12	50X	1.2	mg/kg	<1.2	03/10/20 22:15
Total xylenes		50X	1.2	mg/kg	<1.2	03/10/20 22:15
C5-C8 Aliphatic Hydrocarbons [1,2]	NA	50X	11.9	mg/kg	<11.9	03/10/20 22:15
C9-C12 Aliphatic Hydrocarbons [1,3]	NA	50X	11.9	mg/kg	**45.1**	03/10/20 22:15
C9-C10 Aromatic Hydrocarbons [1]	NA	50X	11.9	mg/kg	**77.8**	03/10/20 22:15
2,5-Dibromotoluene-PID				%	119	03/10/20 22:15
2,5-Dibromotoluene-FID				%	122	03/10/20 22:15
Surrogate Acceptance Range				%	70-130	

[1] Hydrocarbon Range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range
[2] C5-C8 Aliphatic Hydrocarbons exclude the concentration of Target Analytes eluting in that range
[3] C9-C12 Aliphatic Hydrocarbons exclude conc of Target Analytes eluting in that range AND concentration of C9-C10 Aromatic Hydrocarbons

Results: Pesticides

Sample: B-1 Surface

Lab Number: 0C05045-09 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
alpha-BHC	ND		2.05	ug/kg	03/09/20	03/10/20
gamma-BHC (Lindane)	ND		2.05	ug/kg	03/09/20	03/10/20
beta-BHC	ND		2.05	ug/kg	03/09/20	03/10/20
delta-BHC	ND		2.05	ug/kg	03/09/20	03/10/20
Heptachlor	ND		2.05	ug/kg	03/09/20	03/10/20
Aldrin	ND		2.05	ug/kg	03/09/20	03/10/20
Heptachlor epoxide	ND		2.05	ug/kg	03/09/20	03/10/20
gamma-Chlordane	ND		2.05	ug/kg	03/09/20	03/10/20
alpha-Chlordane	ND		2.05	ug/kg	03/09/20	03/10/20
Chlordane	ND		20.5	ug/kg	03/09/20	03/10/20
4,4'-DDE	ND		4.09	ug/kg	03/09/20	03/10/20
Endosulfan I	ND		2.05	ug/kg	03/09/20	03/10/20
Dieldrin	ND		2.05	ug/kg	03/09/20	03/10/20
Endrin	ND		2.05	ug/kg	03/09/20	03/10/20
4,4'-DDD	ND		4.09	ug/kg	03/09/20	03/10/20
Endosulfan II	ND		2.05	ug/kg	03/09/20	03/10/20
Endrin aldehyde	ND		2.05	ug/kg	03/09/20	03/10/20
4,4'-DDT	ND		4.09	ug/kg	03/09/20	03/10/20
Methoxychlor	ND		4.09	ug/kg	03/09/20	03/10/20
Endosulfan sulfate	ND		2.05	ug/kg	03/09/20	03/10/20
Endrin Ketone	ND		2.05	ug/kg	03/09/20	03/10/20
Toxaphene	ND		20.5	ug/kg	03/09/20	03/10/20

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*46.3%*	*30-106*	03/09/20	03/10/20
Decachlorobiphenyl (DCBP)	*47.9%*	*32-110*	03/09/20	03/10/20

Results: Pesticides

Sample: B-9 Surface

Lab Number: 0C05045-10 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
alpha-BHC	ND		2.40	ug/kg	03/09/20	03/10/20
gamma-BHC (Lindane)	ND		2.40	ug/kg	03/09/20	03/10/20
beta-BHC	ND		2.40	ug/kg	03/09/20	03/10/20
delta-BHC	ND		2.40	ug/kg	03/09/20	03/10/20
Heptachlor	ND		2.40	ug/kg	03/09/20	03/10/20
Aldrin	ND		2.40	ug/kg	03/09/20	03/10/20
Heptachlor epoxide	ND		2.40	ug/kg	03/09/20	03/10/20
gamma-Chlordane	ND		2.40	ug/kg	03/09/20	03/10/20
alpha-Chlordane	ND		2.40	ug/kg	03/09/20	03/10/20
Chlordane	ND		24.0	ug/kg	03/09/20	03/10/20
4,4'-DDE	ND		4.79	ug/kg	03/09/20	03/10/20
Endosulfan I	ND		2.40	ug/kg	03/09/20	03/10/20
Dieldrin	ND		2.40	ug/kg	03/09/20	03/10/20
Endrin	ND		2.40	ug/kg	03/09/20	03/10/20
4,4'-DDD	ND		4.79	ug/kg	03/09/20	03/10/20
Endosulfan II	ND		2.40	ug/kg	03/09/20	03/10/20
Endrin aldehyde	ND		2.40	ug/kg	03/09/20	03/10/20
4,4'-DDT	ND		4.79	ug/kg	03/09/20	03/10/20
Methoxychlor	ND		4.79	ug/kg	03/09/20	03/10/20
Endosulfan sulfate	ND		2.40	ug/kg	03/09/20	03/10/20
Endrin Ketone	ND		2.40	ug/kg	03/09/20	03/10/20
Toxaphene	ND		24.0	ug/kg	03/09/20	03/10/20

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*47.4%*	*30-106*	03/09/20	03/10/20
Decachlorobiphenyl (DCBP)	*48.9%*	*32-110*	03/09/20	03/10/20

Results: Herbicides

Sample: B-1 Surface

Lab Number: 0C05045-09 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Dalapon	ND		128	ug/kg	03/10/20	03/11/20
Dicamba	ND		64	ug/kg	03/10/20	03/11/20
Dichloroprop	ND		64	ug/kg	03/10/20	03/11/20
2,4-D	ND		64	ug/kg	03/10/20	03/11/20
2,4,5-TP (Silvex)	ND		64	ug/kg	03/10/20	03/11/20
2,4,5-T	ND		64	ug/kg	03/10/20	03/11/20
2,4-DB	ND		64	ug/kg	03/10/20	03/11/20
Dinoseb	ND		128	ug/kg	03/10/20	03/11/20

Surrogate(s)	Recovery%	Limits		
2,4-Dichlorophenyl acetic acid	*99.5%*	*41-145*	03/10/20	03/11/20

Results: Herbicides

Sample: B-9 Surface

Lab Number: 0C05045-10 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Dalapon	ND		149	ug/kg	03/10/20	03/11/20
Dicamba	ND		75	ug/kg	03/10/20	03/11/20
Dichloroprop	ND		75	ug/kg	03/10/20	03/11/20
2,4-D	ND		75	ug/kg	03/10/20	03/11/20
2,4,5-TP (Silvex)	ND		75	ug/kg	03/10/20	03/11/20
2,4,5-T	ND		75	ug/kg	03/10/20	03/11/20
2,4-DB	ND		75	ug/kg	03/10/20	03/11/20
Dinoseb	ND		149	ug/kg	03/10/20	03/11/20

Surrogate(s)	Recovery%	Limits		
2,4-Dichlorophenyl acetic acid	*94.0%*	*41-145*	03/10/20	03/11/20

Extractable Petroleum Hydrocarbons
Sample: B-3 5-7.5' (0C05045-01)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-3 5-7.5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-01	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/05/20	
				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	27.10	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		1X	8.94	mg/kg	**78.0**	03/09/20 21:26
Diesel PAH Analytes	Naphthalene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
	2-Methylnaphthalene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
	Phenanthrene	1X	0.44	mg/kg	**1.71**	03/09/20 21:26
	Acenaphthene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
Other Target PAH Analytes	Acenaphthylene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
	Fluorene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
	Anthracene	1X	0.44	mg/kg	**0.45**	03/09/20 21:26
	Fluoranthene	1X	0.44	mg/kg	**2.98**	03/09/20 21:26
	Pyrene	1X	0.44	mg/kg	**2.49**	03/09/20 21:26
	Benzo(a)anthracene	1X	0.44	mg/kg	**1.65**	03/09/20 21:26
	Chrysene	1X	0.44	mg/kg	**1.79**	03/09/20 21:26
	Benzo(b)fluoranthene	1X	0.44	mg/kg	**1.58**	03/09/20 21:26
	Benzo(k)fluoranthene	1X	0.44	mg/kg	**1.03**	03/09/20 21:26
	Benzo(a)pyrene	1X	0.44	mg/kg	**1.61**	03/09/20 21:26
	Indeno(1,2,3-cd)pyrene	1X	0.44	mg/kg	**1.20**	03/09/20 21:26
	Dibenz(a,h)anthracene	1X	0.44	mg/kg	<0.44	03/09/20 21:26
	Benzo(g,h,i)perylene	1X	0.44	mg/kg	**1.21**	03/09/20 21:26
C9-C18 Aliphatic Hydrocarbons [1]		1X	17.8	mg/kg	<17.8	03/10/20 21:49
C19-C36 Aliphatic Hydrocarbons [1]		1X	17.8	mg/kg	**50.3**	03/10/20 21:49
C11-C22 Aromatic Hydrocarbons [1,2]		1X	8.94	mg/kg	**60.3**	03/09/20 21:26
Chlorooctadecane (Sample Surrogate)				%	56.5	03/10/20 21:49
o-Terphenyl (Sample Surrogate)				%	73.3	03/09/20 21:26
2-Fluorobiphenyl (Fractionation Surrogate)				%	96.5	03/09/20 21:26
2-Bromonaphthalene (Fractionation Surrogate)				%	94.7	03/09/20 21:26
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-4 5-7.5' (0C05045-02)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-4 5-7.5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-02	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/05/20	
				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	18.70	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		5X	39.2	mg/kg	**135**	03/09/20 21:51
Diesel PAH Analytes	Naphthalene	5X	0.39	mg/kg	<0.39	03/09/20 21:51
	2-Methylnaphthalene	5X	0.39	mg/kg	<0.39	03/09/20 21:51
	Phenanthrene	5X	0.39	mg/kg	**2.25**	03/09/20 21:51
	Acenaphthene	5X	0.39	mg/kg	<0.39	03/09/20 21:51
Other Target PAH Analytes	Acenaphthylene	5X	0.39	mg/kg	**0.42**	03/09/20 21:51
	Fluorene	5X	0.39	mg/kg	<0.39	03/09/20 21:51
	Anthracene	5X	0.39	mg/kg	**0.98**	03/09/20 21:51
	Fluoranthene	5X	0.39	mg/kg	**2.84**	03/09/20 21:51
	Pyrene	5X	0.39	mg/kg	**2.26**	03/09/20 21:51
	Benzo(a)anthracene	5X	0.39	mg/kg	**1.73**	03/09/20 21:51
	Chrysene	5X	0.39	mg/kg	**1.88**	03/09/20 21:51
	Benzo(b)fluoranthene	5X	0.39	mg/kg	**1.60**	03/09/20 21:51
	Benzo(k)fluoranthene	5X	0.39	mg/kg	**1.14**	03/09/20 21:51
	Benzo(a)pyrene	5X	0.39	mg/kg	**1.39**	03/09/20 21:51
	Indeno(1,2,3-cd)pyrene	5X	0.39	mg/kg	**1.15**	03/09/20 21:51
	Dibenz(a,h)anthracene	5X	0.39	mg/kg	**0.41**	03/09/20 21:51
	Benzo(g,h,i)perylene	5X	0.39	mg/kg	**1.42**	03/09/20 21:51
C9-C18 Aliphatic Hydrocarbons [1]		1X	15.6	mg/kg	<15.6	03/10/20 22:14
C19-C36 Aliphatic Hydrocarbons [1]		1X	15.6	mg/kg	**58.8**	03/10/20 22:14
C11-C22 Aromatic Hydrocarbons [1,2]		5X	39.2	mg/kg	**115**	03/09/20 21:51
Chlorooctadecane (Sample Surrogate)				%	40.9	03/10/20 22:14
o-Terphenyl (Sample Surrogate)				%	63.8	03/09/20 21:51
2-Fluorobiphenyl (Fractionation Surrogate)				%	94.4	03/09/20 21:51
2-Bromonaphthalene (Fractionation Surrogate)				%	87.1	03/09/20 21:51
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-5 2.5-5' (0C05045-03)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-5 2.5-5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-03	
EPH Surrogate Standards:				Date Collected	03/04/20	
Aliphatic: Chlorooctadecane				Date Received	03/05/20	
Aromatic: o-Terphenyl				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates:				Percent Moisture	15.80	
(1) 2-Fluorobiphenyl						
(2) 2-Bromonaphthalene						
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		1X	7.68	mg/kg	**40.3**	03/09/20 21:00
Diesel PAH Analytes	Naphthalene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	2-Methylnaphthalene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	Phenanthrene	1X	0.38	mg/kg	**0.55**	03/09/20 21:00
	Acenaphthene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
Other Target PAH Analytes	Acenaphthylene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	Fluorene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	Anthracene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	Fluoranthene	1X	0.38	mg/kg	**1.24**	03/09/20 21:00
	Pyrene	1X	0.38	mg/kg	**1.04**	03/09/20 21:00
	Benzo(a)anthracene	1X	0.38	mg/kg	**0.87**	03/09/20 21:00
	Chrysene	1X	0.38	mg/kg	**1.37**	03/09/20 21:00
	Benzo(b)fluoranthene	1X	0.38	mg/kg	**1.50**	03/09/20 21:00
	Benzo(k)fluoranthene	1X	0.38	mg/kg	**0.73**	03/09/20 21:00
	Benzo(a)pyrene	1X	0.38	mg/kg	**0.79**	03/09/20 21:00
	Indeno(1,2,3-cd)pyrene	1X	0.38	mg/kg	**0.64**	03/09/20 21:00
	Dibenz(a,h)anthracene	1X	0.38	mg/kg	<0.38	03/09/20 21:00
	Benzo(g,h,i)perylene	1X	0.38	mg/kg	**0.69**	03/09/20 21:00
C9-C18 Aliphatic Hydrocarbons [1]		1X	15.3	mg/kg	<15.3	03/10/20 22:40
C19-C36 Aliphatic Hydrocarbons [1]		1X	15.3	mg/kg	**18.3**	03/10/20 22:40
C11-C22 Aromatic Hydrocarbons [1,2]		1X	7.68	mg/kg	**30.8**	03/09/20 21:00
Chlorooctadecane (Sample Surrogate)				%	59.8	03/10/20 22:40
o-Terphenyl (Sample Surrogate)				%	73.4	03/09/20 21:00
2-Fluorobiphenyl (Fractionation Surrogate)				%	92.2	03/09/20 21:00
2-Bromonaphthalene (Fractionation Surrogate)				%	90.0	03/09/20 21:00
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-7 5-7.5' (0C05045-04)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-7 5-7.5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-04	
EPH Surrogate Standards:				Date Collected	03/04/20	
Aliphatic: Chlorooctadecane				Date Received	03/05/20	
Aromatic: o-Terphenyl				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates:				Percent Moisture	13.50	
(1) 2-Fluorobiphenyl						
(2) 2-Bromonaphthalene						
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		1X	7.50	mg/kg	**694**	03/10/20 09:55
Diesel PAH Analytes	Naphthalene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	2-Methylnaphthalene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Phenanthrene	1X	0.37	mg/kg	**1.72**	03/10/20 09:55
	Acenaphthene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
Other Target PAH Analytes	Acenaphthylene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Fluorene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Anthracene	1X	0.37	mg/kg	**0.48**	03/10/20 09:55
	Fluoranthene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Pyrene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Benzo(a)anthracene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Chrysene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Benzo(b)fluoranthene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Benzo(k)fluoranthene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Benzo(a)pyrene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Indeno(1,2,3-cd)pyrene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Dibenz(a,h)anthracene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
	Benzo(g,h,i)perylene	1X	0.37	mg/kg	<0.37	03/10/20 09:55
C9-C18 Aliphatic Hydrocarbons [1]		1X	14.9	mg/kg	**22.1**	03/11/20 00:22
C19-C36 Aliphatic Hydrocarbons [1]		1X	14.9	mg/kg	**668**	03/11/20 00:22
C11-C22 Aromatic Hydrocarbons [1,2]		1X	7.50	mg/kg	**691**	03/10/20 09:55
Chlorooctadecane (Sample Surrogate)				%	57.6	03/11/20 00:22
o-Terphenyl (Sample Surrogate)				%	78.2	03/10/20 09:55
2-Fluorobiphenyl (Fractionation Surrogate)				%	95.7	03/10/20 09:55
2-Bromonaphthalene (Fractionation Surrogate)				%	92.3	03/10/20 09:55
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-8 7.5-10' (0C05045-05)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-8 7.5-10'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-05	
EPH Surrogate Standards:				Date Collected	03/04/20	
Aliphatic: Chlorooctadecane				Date Received	03/05/20	
Aromatic: o-Terphenyl				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates:				Percent Moisture	29.40	
(1) 2-Fluorobiphenyl						
(2) 2-Bromonaphthalene						
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		5X	47.0	mg/kg	**503**	03/09/20 22:17
Diesel PAH Analytes	Naphthalene	5X	0.47	mg/kg	**0.48**	03/09/20 22:17
	2-Methylnaphthalene	5X	0.47	mg/kg	**0.53**	03/09/20 22:17
	Phenanthrene	5X	0.47	mg/kg	**18.6**	03/09/20 22:17
	Acenaphthene	5X	0.47	mg/kg	**1.96**	03/09/20 22:17
Other Target PAH Analytes	Acenaphthylene	5X	0.47	mg/kg	<0.47	03/09/20 22:17
	Fluorene	5X	0.47	mg/kg	**2.86**	03/09/20 22:17
	Anthracene	5X	0.47	mg/kg	**4.24**	03/09/20 22:17
	Fluoranthene	5X	0.47	mg/kg	**18.2**	03/09/20 22:17
	Pyrene	5X	0.47	mg/kg	**13.0**	03/09/20 22:17
	Benzo(a)anthracene	5X	0.47	mg/kg	**8.63**	03/09/20 22:17
	Chrysene	5X	0.47	mg/kg	**11.0**	03/09/20 22:17
	Benzo(b)fluoranthene	5X	0.47	mg/kg	**8.08**	03/09/20 22:17
	Benzo(k)fluoranthene	5X	0.47	mg/kg	**4.46**	03/09/20 22:17
	Benzo(a)pyrene	5X	0.47	mg/kg	**6.44**	03/09/20 22:17
	Indeno(1,2,3-cd)pyrene	5X	0.47	mg/kg	**3.57**	03/09/20 22:17
	Dibenz(a,h)anthracene	5X	0.47	mg/kg	**1.34**	03/09/20 22:17
	Benzo(g,h,i)perylene	5X	0.47	mg/kg	**3.21**	03/09/20 22:17
C9-C18 Aliphatic Hydrocarbons [1]		1X	18.8	mg/kg	<18.8	03/10/20 23:05
C19-C36 Aliphatic Hydrocarbons [1]		1X	18.8	mg/kg	**131**	03/10/20 23:05
C11-C22 Aromatic Hydrocarbons [1,2]		5X	47.0	mg/kg	**396**	03/09/20 22:17
Chlorooctadecane (Sample Surrogate)				%	60.8	03/10/20 23:05
o-Terphenyl (Sample Surrogate)				%	83.2	03/09/20 22:17
2-Fluorobiphenyl (Fractionation Surrogate)				%	97.1	03/09/20 22:17
2-Bromonaphthalene (Fractionation Surrogate)				%	94.3	03/09/20 22:17
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-9 5-7.5' (0C05045-06)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-9 5-7.5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-06	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/05/20	
				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	22.60	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		5X	40.8	mg/kg	**428**	03/09/20 23:33
Diesel PAH Analytes	Naphthalene	5X	0.40	mg/kg	**0.40**	03/09/20 23:33
	2-Methylnaphthalene	5X	0.40	mg/kg	<0.40	03/09/20 23:33
	Phenanthrene	5X	0.40	mg/kg	**12.4**	03/09/20 23:33
	Acenaphthene	5X	0.40	mg/kg	**0.58**	03/09/20 23:33
Other Target PAH Analytes	Acenaphthylene	5X	0.40	mg/kg	<0.40	03/09/20 23:33
	Fluorene	5X	0.40	mg/kg	**0.70**	03/09/20 23:33
	Anthracene	5X	0.40	mg/kg	**4.13**	03/09/20 23:33
	Fluoranthene	5X	0.40	mg/kg	**15.4**	03/09/20 23:33
	Pyrene	5X	0.40	mg/kg	**12.0**	03/09/20 23:33
	Benzo(a)anthracene	5X	0.40	mg/kg	**7.39**	03/09/20 23:33
	Chrysene	5X	0.40	mg/kg	**7.23**	03/09/20 23:33
	Benzo(b)fluoranthene	5X	0.40	mg/kg	**5.25**	03/09/20 23:33
	Benzo(k)fluoranthene	5X	0.40	mg/kg	**3.99**	03/09/20 23:33
	Benzo(a)pyrene	5X	0.40	mg/kg	**4.97**	03/09/20 23:33
	Indeno(1,2,3-cd)pyrene	5X	0.40	mg/kg	**3.05**	03/09/20 23:33
	Dibenz(a,h)anthracene	5X	0.40	mg/kg	**0.98**	03/09/20 23:33
	Benzo(g,h,i)perylene	5X	0.40	mg/kg	**2.77**	03/09/20 23:33
C9-C18 Aliphatic Hydrocarbons [1]		1X	16.3	mg/kg	<16.3	03/11/20 00:47
C19-C36 Aliphatic Hydrocarbons [1]		1X	16.3	mg/kg	**367**	03/11/20 00:47
C11-C22 Aromatic Hydrocarbons [1,2]		5X	40.8	mg/kg	**346**	03/09/20 23:33
Chlorooctadecane (Sample Surrogate)				%	54.3	03/11/20 00:47
o-Terphenyl (Sample Surrogate)				%	85.8	03/09/20 23:33
2-Fluorobiphenyl (Fractionation Surrogate)				%	90.0	03/09/20 23:33
2-Bromonaphthalene (Fractionation Surrogate)				%	87.3	03/09/20 23:33
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-10 7.5-10' (0C05045-07)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-10 7.5-10'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-07	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/05/20	
				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	15.80	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		5X	38.5	mg/kg	**451**	03/09/20 23:59
Diesel PAH Analytes	Naphthalene	5X	0.38	mg/kg	**0.95**	03/09/20 23:59
	2-Methylnaphthalene	5X	0.38	mg/kg	**0.46**	03/09/20 23:59
	Phenanthrene	5X	0.38	mg/kg	**5.28**	03/09/20 23:59
	Acenaphthene	5X	0.38	mg/kg	**0.63**	03/09/20 23:59
Other Target PAH Analytes	Acenaphthylene	5X	0.38	mg/kg	**0.53**	03/09/20 23:59
	Fluorene	5X	0.38	mg/kg	**0.88**	03/09/20 23:59
	Anthracene	5X	0.38	mg/kg	**1.82**	03/09/20 23:59
	Fluoranthene	5X	0.38	mg/kg	**6.09**	03/09/20 23:59
	Pyrene	5X	0.38	mg/kg	**5.00**	03/09/20 23:59
	Benzo(a)anthracene	5X	0.38	mg/kg	**3.42**	03/09/20 23:59
	Chrysene	5X	0.38	mg/kg	**4.17**	03/09/20 23:59
	Benzo(b)fluoranthene	5X	0.38	mg/kg	**2.63**	03/09/20 23:59
	Benzo(k)fluoranthene	5X	0.38	mg/kg	**2.51**	03/09/20 23:59
	Benzo(a)pyrene	5X	0.38	mg/kg	**3.20**	03/09/20 23:59
	Indeno(1,2,3-cd)pyrene	5X	0.38	mg/kg	**2.81**	03/09/20 23:59
	Dibenz(a,h)anthracene	5X	0.38	mg/kg	**0.78**	03/09/20 23:59
	Benzo(g,h,i)perylene	5X	0.38	mg/kg	**2.80**	03/09/20 23:59
C9-C18 Aliphatic Hydrocarbons [1]		1X	15.3	mg/kg	<15.3	03/10/20 23:31
C19-C36 Aliphatic Hydrocarbons [1]		1X	15.3	mg/kg	**249**	03/10/20 23:31
C11-C22 Aromatic Hydrocarbons [1,2]		5X	38.5	mg/kg	**407**	03/09/20 23:59
Chlorooctadecane (Sample Surrogate)				%	41.8	03/10/20 23:31
o-Terphenyl (Sample Surrogate)				%	58.6	03/09/20 23:59
2-Fluorobiphenyl (Fractionation Surrogate)				%	90.2	03/09/20 23:59
2-Bromonaphthalene (Fractionation Surrogate)				%	86.3	03/09/20 23:59
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Extractable Petroleum Hydrocarbons
Sample: B-12 2.5-5' (0C05045-08)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-12 2.5-5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C05045-08	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/05/20	
				Date Thawed	NA	
				Date Extracted	03/06/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	9.70	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		1X	7.24	mg/kg	**121**	03/10/20 10:42
Diesel PAH Analytes	Naphthalene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
	2-Methylnaphthalene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
	Phenanthrene	1X	0.36	mg/kg	**1.33**	03/10/20 10:42
	Acenaphthene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
Other Target PAH Analytes	Acenaphthylene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
	Fluorene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
	Anthracene	1X	0.36	mg/kg	<0.36	03/10/20 10:42
	Fluoranthene	1X	0.36	mg/kg	**2.49**	03/10/20 10:42
	Pyrene	1X	0.36	mg/kg	**2.22**	03/10/20 10:42
	Benzo(a)anthracene	1X	0.36	mg/kg	**1.88**	03/10/20 10:42
	Chrysene	1X	0.36	mg/kg	**2.67**	03/10/20 10:42
	Benzo(b)fluoranthene	1X	0.36	mg/kg	**4.33**	03/10/20 10:42
	Benzo(k)fluoranthene	1X	0.36	mg/kg	**1.37**	03/10/20 10:42
	Benzo(a)pyrene	1X	0.36	mg/kg	**2.81**	03/10/20 10:42
	Indeno(1,2,3-cd)pyrene	1X	0.36	mg/kg	**2.99**	03/10/20 10:42
	Dibenz(a,h)anthracene	1X	0.36	mg/kg	**0.78**	03/10/20 10:42
	Benzo(g,h,i)perylene	1X	0.36	mg/kg	**2.87**	03/10/20 10:42
C9-C18 Aliphatic Hydrocarbons [1]		1X	14.4	mg/kg	<14.4	03/10/20 23:56
C19-C36 Aliphatic Hydrocarbons [1]		1X	14.4	mg/kg	**63.4**	03/10/20 23:56
C11-C22 Aromatic Hydrocarbons [1,2]		1X	7.24	mg/kg	**95.1**	03/10/20 10:42
Chlorooctadecane (Sample Surrogate)				%	56.7	03/10/20 23:56
o-Terphenyl (Sample Surrogate)				%	68.0	03/10/20 10:42
2-Fluorobiphenyl (Fractionation Surrogate)				%	95.3	03/10/20 10:42
2-Bromonaphthalene (Fractionation Surrogate)				%	92.2	03/10/20 10:42
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Results: TCLP Metals

Sample: B-4 5-7.5'
Lab Number: 0C05045-02 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**23.4**		0.025	mg/L	03/17/20	03/17/20

Quality Control

Total Metals

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0261 - Metals Digestion Soils										
Blank (B0C0261-BLK1)					Prepared: 03/06/20 Analyzed: 03/10/20					
Lead	ND		0.33	mg/kg						
Selenium	ND		0.66	mg/kg						
Chromium	ND		0.33	mg/kg						
Cadmium	ND		0.33	mg/kg						
Arsenic	ND		0.66	mg/kg						
LCS (B0C0261-BS1)					Prepared: 03/06/20 Analyzed: 03/11/20					
Cadmium	87.8		0.33	mg/kg	100		87.8	85-115		
Arsenic	18.8		0.66	mg/kg	20.0		94.2	85-115		
Chromium	85.3		0.33	mg/kg	100		85.3	85-115		
Selenium	17.9		0.66	mg/kg	20.0		89.6	85-115		
Lead	90.9		0.33	mg/kg	100		90.9	85-115		
Batch: B0C0262 - Metals Digestion Soils										
Blank (B0C0262-BLK1)					Prepared: 03/06/20 Analyzed: 03/11/20					
Chromium	ND		0.33	mg/kg						
Selenium	ND		0.66	mg/kg						
Silver	ND		0.33	mg/kg						
Arsenic	ND		0.66	mg/kg						
Barium	ND		0.33	mg/kg						
Cadmium	ND		0.33	mg/kg						
Lead	ND		0.33	mg/kg						
LCS (B0C0262-BS1)					Prepared: 03/06/20 Analyzed: 03/11/20					
Selenium	18.6		0.66	mg/kg	20.0		93.1	85-115		
Barium	87.4		0.33	mg/kg	100		87.4	85-115		
Silver	39.5		0.33	mg/kg	40.0		98.6	85-115		
Cadmium	87.8		0.33	mg/kg	100		87.8	85-115		
Chromium	90.9		0.33	mg/kg	100		90.9	85-115		
Arsenic	17.2		0.66	mg/kg	20.0		85.8	85-115		
Lead	85.0		0.33	mg/kg	100		85.0	85-115		

Quality Control
(Continued)

Total Metals (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0290 - Metals Cold-Vapor Mercury										
Blank (B0C0290-BLK1)					Prepared & Analyzed: 03/06/20					
Mercury	ND		0.071	mg/kg						
LCS (B0C0290-BS1)					Prepared & Analyzed: 03/06/20					
Mercury	1.01			ug/l	1.00		101	93-114		

Quality Control
(Continued)

Volatile Petroleum Hydrocarbons (MADEP-VPH)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0442 - MADEP VPH										
Blank (B0C0442-BLK1)					Prepared & Analyzed: 03/10/20					
Unadjusted C5-C8 Aliphatic Hydrocarbons	ND		5.0	mg/kg						
Unadjusted C9-C12 Aliphatic Hydrocarbons	ND		5.0	mg/kg						
Benzene	ND		0.2	mg/kg						
Ethylbenzene	ND		0.2	mg/kg						
Methyl t-butyl ether (MTBE)	ND		0.05	mg/kg						
Naphthalene	ND		0.5	mg/kg						
Toluene	ND		0.2	mg/kg						
m&p-Xylene	ND		0.5	mg/kg						
o-Xylene	ND		0.5	mg/kg						
Total xylenes	ND		0.5	mg/kg						
C5-C8 Aliphatic Hydrocarbons	ND		5.0	mg/kg						
C9-C12 Aliphatic Hydrocarbons	ND		5.0	mg/kg						
C9-C10 Aromatic Hydrocarbons	ND		5.0	mg/kg						
Surrogate: 2,5- Dibromotoluene-PID			*49.8*	ug/l	*50.0*		*99.6*	*70-130*		
Surrogate: 2,5- Dibromotoluene-FID			*51.3*	ug/l	*50.0*		*103*	*70-130*		
LCS (B0C0442-BS1)					Prepared & Analyzed: 03/10/20					
Benzene	50.0			ug/l	50.0		100	70-130		
Ethylbenzene	53.6			ug/l	50.0		107	70-130		
Methyl t-butyl ether (MTBE)	43.7			ug/l	50.0		87.4	70-130		
Naphthalene	50.6			ug/l	50.0		101	70-130		
Toluene	51.6			ug/l	50.0		103	70-130		
m&p-Xylene	107			ug/l	100		107	70-130		
2-Methylpentane	51.9			ug/l	50.0		104	70-130		
o-Xylene	52.7			ug/l	50.0		105	70-130		
n-Nonane	60.8			ug/l	50.0		122	70-130		
Decane	59.6			ug/l	50.0		119	70-130		
n-Butylcylohexane	60.2			ug/l	50.0		120	70-130		
n-Pentane	40.4			ug/l	50.0		80.9	70-130		
1,2,4-Trimethylbenzene	53.1			ug/l	50.0		106	70-130		
VPH_LCS_Aliphatic_C5-C8	146			ug/l	150		97.3	70-130		
VPH_LCS_Aliphatic_C9-C12	120			ug/l	100		120	70-130		
VPH_LCS_Aromatic_C9-C10	53.1			ug/l	50.0		106	70-130		
Surrogate: 2,5- Dibromotoluene-PID			*50.8*	ug/l	*50.0*		*102*	*70-130*		
Surrogate: 2,5- Dibromotoluene-FID			*52.2*	ug/l	*50.0*		*104*	*70-130*		

Quality Control
(Continued)

Volatile Petroleum Hydrocarbons (MADEP-VPH) (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0442 - MADEP VPH (Continued)										
LCS Dup (B0C0442-BSD1)					Prepared & Analyzed: 03/10/20					
Benzene	50.6			ug/l	50.0		101	70-130	1.07	25
Ethylbenzene	54.8			ug/l	50.0		110	70-130	2.27	25
Methyl t-butyl ether (MTBE)	44.6			ug/l	50.0		89.2	70-130	2.04	25
Naphthalene	49.7			ug/l	50.0		99.5	70-130	1.81	25
Toluene	52.5			ug/l	50.0		105	70-130	1.81	25
m&p-Xylene	109			ug/l	100		109	70-130	2.20	25
2-Methylpentane	54.2			ug/l	50.0		108	70-130	4.31	25
o-Xylene	53.8			ug/l	50.0		108	70-130	2.08	25
n-Nonane	65.0			ug/l	50.0		130	70-130	6.73	25
Decane	61.8			ug/l	50.0		124	70-130	3.59	25
n-Butylcylohexane	64.2			ug/l	50.0		128	70-130	6.46	25
n-Pentane	42.4			ug/l	50.0		84.9	70-130	4.85	25
1,2,4-Trimethylbenzene	53.8			ug/l	50.0		108	70-130	1.25	25
VPH_LCS_Aliphatic_C5-C8	153			ug/l	150		102	70-130	4.93	25
VPH_LCS_Aliphatic_C9-C12	126			ug/l	100		126	70-130	5.03	25
VPH_LCS_Aromatic_C9-C10	53.8			ug/l	50.0		108	70-130	1.27	25
Surrogate: 2,5- Dibromotoluene-PID			*46.4*	ug/l	*50.0*		*92.8*	*70-130*		
Surrogate: 2,5- Dibromotoluene-FID			*47.4*	ug/l	*50.0*		*94.8*	*70-130*		

Pesticides

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0318 - EPA 3546										
Blank (B0C0318-BLK1)					Prepared: 03/09/20 Analyzed: 03/10/20					
alpha-BHC	ND		1.67	ug/kg						
gamma-BHC (Lindane)	ND		1.67	ug/kg						
beta-BHC	ND		1.67	ug/kg						
delta-BHC	ND		1.67	ug/kg						
Heptachlor	ND		1.67	ug/kg						
Aldrin	ND		1.67	ug/kg						
Heptachlor epoxide	ND		1.67	ug/kg						
gamma-Chlordane	ND		1.67	ug/kg						
alpha-Chlordane	ND		1.67	ug/kg						
Chlordane	ND		16.7	ug/kg						
4,4'-DDE	ND		3.33	ug/kg						
Endosulfan I	ND		1.67	ug/kg						
Dieldrin	ND		1.67	ug/kg						
Endrin	ND		1.67	ug/kg						
4,4'-DDD	ND		3.33	ug/kg						
Endosulfan II	ND		1.67	ug/kg						
Endrin aldehyde	ND		1.67	ug/kg						
4,4'-DDT	ND		3.33	ug/kg						
Methoxychlor	ND		3.33	ug/kg						
Endosulfan sulfate	ND		1.67	ug/kg						
Endrin Ketone	ND		1.67	ug/kg						
Toxaphene	ND		16.7	ug/kg						
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*8.53*	ug/kg	*13.3*		*64.0*	*30-106*		
Surrogate: Decachlorobiphenyl (DCBP)			*9.88*	ug/kg	*13.3*		*74.1*	*32-110*		
LCS (B0C0318-BS1)					Prepared: 03/09/20 Analyzed: 03/10/20					
alpha-BHC	11.3		1.67	ug/kg	13.3		84.6	50-132		
gamma-BHC (Lindane)	11.6		1.67	ug/kg	13.3		86.7	54-128		
beta-BHC	12.2		1.67	ug/kg	13.3		91.8	69-126		
delta-BHC	11.3		1.67	ug/kg	13.3		84.7	40-126		
Heptachlor	11.6		1.67	ug/kg	13.3		87.2	55-125		
Aldrin	11.2		1.67	ug/kg	13.3		83.6	45-135		
Heptachlor epoxide	11.7		1.67	ug/kg	13.3		87.8	54-127		
gamma-Chlordane	11.6		1.67	ug/kg	13.3		86.8	55-124		
alpha-Chlordane	11.6		1.67	ug/kg	13.3		86.9	54-126		
4,4'-DDE	12.6		3.33	ug/kg	13.3		94.6	63-130		
Endosulfan I	11.4		1.67	ug/kg	13.3		85.3	53-128		
Dieldrin	11.5		1.67	ug/kg	13.3		86.2	57-124		
Endrin	12.3		1.67	ug/kg	13.3		92.1	40-140		
4,4'-DDD	12.4		3.33	ug/kg	13.3		92.6	74-140		
Endrin aldehyde	11.8		1.67	ug/kg	13.3		88.3	40-140		
Endosulfan II	11.8		1.67	ug/kg	13.3		88.4	45-125		
4,4'-DDT	12.7		3.33	ug/kg	13.3		94.9	60-140		
Methoxychlor	14.4		3.33	ug/kg	13.3		108	71-140		
Endosulfan sulfate	11.5		1.67	ug/kg	13.3		86.3	43-131		
Endrin Ketone	12.8		1.67	ug/kg	13.3		95.8	56-131		
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*9.41*	ug/kg	*13.3*		*70.6*	*38-106*		
Surrogate: Decachlorobiphenyl (DCBP)			*9.79*	ug/kg	*13.3*		*73.4*	*32-110*		

Pesticides (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0318 - EPA 3546 (Continued)										
LCS Dup (B0C0318-BSD1)					Prepared: 03/09/20 Analyzed: 03/10/20					
alpha-BHC	12.5		1.67	ug/kg	13.3		93.4	50-132	9.91	20
gamma-BHC (Lindane)	12.6		1.67	ug/kg	13.3		94.7	54-128	8.85	20
beta-BHC	13.2		1.67	ug/kg	13.3		98.8	69-126	7.29	20
delta-BHC	12.5		1.67	ug/kg	13.3		93.9	40-126	10.3	20
Heptachlor	12.9		1.67	ug/kg	13.3		97.1	55-125	10.7	20
Aldrin	12.3		1.67	ug/kg	13.3		92.4	45-135	10.0	20
Heptachlor epoxide	12.8		1.67	ug/kg	13.3		95.9	54-127	8.77	20
gamma-Chlordane	12.6		1.67	ug/kg	13.3		94.8	55-124	8.76	20
alpha-Chlordane	12.6		1.67	ug/kg	13.3		94.8	54-126	8.72	20
4,4'-DDE	13.4		3.33	ug/kg	13.3		101	63-130	6.45	20
Endosulfan I	12.4		1.67	ug/kg	13.3		92.9	53-128	8.61	20
Dieldrin	12.6		1.67	ug/kg	13.3		94.3	57-124	9.06	20
Endrin	13.5		1.67	ug/kg	13.3		101	40-140	9.09	20
4,4'-DDD	13.6		3.33	ug/kg	13.3		102	74-140	9.56	20
Endosulfan II	12.9		1.67	ug/kg	13.3		96.6	45-125	8.90	20
Endrin aldehyde	12.6		1.67	ug/kg	13.3		94.9	40-140	7.18	20
4,4'-DDT	13.5		3.33	ug/kg	13.3		101	60-140	6.28	20
Methoxychlor	14.2		3.33	ug/kg	13.3		106	71-140	1.82	20
Endosulfan sulfate	12.6		1.67	ug/kg	13.3		94.4	43-131	8.94	20
Endrin Ketone	13.8		1.67	ug/kg	13.3		103	56-131	7.71	20
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*9.41*	ug/kg	*13.3*		*70.6*	*38-106*		
Surrogate: Decachlorobiphenyl (DCBP)			*9.69*	ug/kg	*13.3*		*72.7*	*32-110*		

Quality Control
(Continued)

Herbicides

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0361 - EPA 3550C										
Blank (B0C0361-BLK1)					Prepared: 03/10/20 Analyzed: 03/11/20					
Dalapon	ND		100	ug/kg						
Dicamba	ND		50	ug/kg						
Dichloroprop	ND		50	ug/kg						
2,4-D	ND		50	ug/kg						
2,4,5-TP (Silvex)	ND		50	ug/kg						
2,4,5-T	ND		50	ug/kg						
2,4-DB	ND		50	ug/kg						
Dinoseb	ND		100	ug/kg						
Surrogate: 2,4-Dichlorophenyl acetic acid			*146*	ug/kg	*250*		*58.3*	*41-145*		
LCS (B0C0361-BS1)					Prepared: 03/10/20 Analyzed: 03/11/20					
Dalapon	159		100	ug/kg	250		63.6	40-140		
Dicamba	196		50	ug/kg	250		78.5	40-140		
Dichloroprop	203		50	ug/kg	250		81.4	40-140		
2,4-D	155		50	ug/kg	250		61.8	40-140		
2,4,5-TP (Silvex)	218		50	ug/kg	250		87.4	40-140		
2,4,5-T	172		50	ug/kg	250		68.7	40-140		
2,4-DB	243		50	ug/kg	250		97.3	40-140		
Dinoseb	147		100	ug/kg	250		58.7	40-140		
Surrogate: 2,4-Dichlorophenyl acetic acid			*211*	ug/kg	*250*		*84.5*	*41-145*		
LCS Dup (B0C0361-BSD1)					Prepared: 03/10/20 Analyzed: 03/11/20					
Dalapon	160		100	ug/kg	250		64.0	40-140	0.591	20
Dicamba	194		50	ug/kg	250		77.7	40-140	0.962	20
Dichloroprop	202		50	ug/kg	250		80.7	40-140	0.869	20
2,4-D	153		50	ug/kg	250		61.3	40-140	0.931	20
2,4,5-TP (Silvex)	217		50	ug/kg	250		87.0	40-140	0.462	20
2,4,5-T	171		50	ug/kg	250		68.2	40-140	0.684	20
2,4-DB	241		50	ug/kg	250		96.5	40-140	0.849	20
Dinoseb	143		100	ug/kg	250		57.3	40-140	2.51	20
Surrogate: 2,4-Dichlorophenyl acetic acid			*209*	ug/kg	*250*		*83.4*	*41-145*		

Extractable Petroleum Hydrocarbons (MADEP-EPH)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0247 - EPA 3546										
Blank (B0C0247-BLK1)					Prepared: 03/06/20 Analyzed: 03/09/20					
Unadjusted C11-C22 Aromatic Hydrocarbons	ND		6.67	mg/kg						
Naphthalene	ND		0.33	mg/kg						
2-Methylnaphthalene	ND		0.33	mg/kg						
Phenanthrene	ND		0.33	mg/kg						
Acenaphthene	ND		0.33	mg/kg						
Acenaphthylene	ND		0.33	mg/kg						
Fluorene	ND		0.33	mg/kg						
Anthracene	ND		0.33	mg/kg						
Fluoranthene	ND		0.33	mg/kg						
Pyrene	ND		0.33	mg/kg						
Benzo(a)anthracene	ND		0.33	mg/kg						
Chrysene	ND		0.33	mg/kg						
Benzo(b)fluoranthene	ND		0.33	mg/kg						
Benzo(k)fluoranthene	ND		0.33	mg/kg						
Benzo(a)pyrene	ND		0.33	mg/kg						
Indeno(1,2,3-cd)pyrene	ND		0.33	mg/kg						
Dibenz(a,h)anthracene	ND		0.33	mg/kg						
Benzo(g,h,i)perylene	ND		0.33	mg/kg						
C9-C18 Aliphatic Hydrocarbons	ND		13.3	mg/kg						
C19-C36 Aliphatic Hydrocarbons	ND		13.3	mg/kg						
C11-C22 Aromatic Hydrocarbons	ND		6.67	mg/kg						
Surrogate: Chlorooctadecane			*4.81*	mg/kg	*8.33*		*57.7*	*40-140*		
Surrogate: o-Terphenyl			*6.77*	mg/kg	*8.33*		*81.3*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*3.67*	mg/kg	*3.33*		*110*	*40-140*		
Surrogate: 2-Bromonaphthalene			*3.60*	mg/kg	*3.33*		*108*	*40-140*		
LCS (B0C0247-BS1)					Prepared: 03/06/20 Analyzed: 03/09/20					
Naphthalene	2.00		0.33	mg/kg	2.67		75.0	40-140		
2-Methylnaphthalene	2.07		0.33	mg/kg	2.67		77.7	40-140		
Phenanthrene	2.09		0.33	mg/kg	2.67		78.4	40-140		
Acenaphthene	2.05		0.33	mg/kg	2.67		76.8	40-140		
Acenaphthylene	2.02		0.33	mg/kg	2.67		75.7	40-140		
Fluorene	2.04		0.33	mg/kg	2.67		76.6	40-140		
Anthracene	2.31		0.33	mg/kg	2.67		86.6	40-140		
Fluoranthene	2.21		0.33	mg/kg	2.67		83.0	40-140		
Pyrene	2.26		0.33	mg/kg	2.67		84.6	40-140		
Benzo(a)anthracene	2.25		0.33	mg/kg	2.67		84.6	40-140		
Chrysene	2.31		0.33	mg/kg	2.67		86.4	40-140		
Benzo(b)fluoranthene	2.25		0.33	mg/kg	2.67		84.3	40-140		
Benzo(k)fluoranthene	2.54		0.33	mg/kg	2.67		95.4	40-140		
Benzo(a)pyrene	2.18		0.33	mg/kg	2.67		81.7	40-140		
Indeno(1,2,3-cd)pyrene	2.07		0.33	mg/kg	2.67		77.7	40-140		
Dibenz(a,h)anthracene	2.07		0.33	mg/kg	2.67		77.7	40-140		
Benzo(g,h,i)perylene	2.10		0.33	mg/kg	2.67		78.6	40-140		
EPH_LCS_Aliphatic_C19-C36	15.6		10.0	mg/kg	21.3		73.0	0-200		
EPH_LCS_Aliphatic_C9-C18	8.09		5.00	mg/kg	16.0		50.6	0-200		
EPH_LCS_Aromatic_C11-C22	36.8		10.0	mg/kg	45.3		81.2	0-200		
Nonane	0.87		0.33	mg/kg	2.67		32.5	30-140		
Decane	1.17		0.33	mg/kg	2.67		44.0	40-140		
Dodecane	1.39		0.33	mg/kg	2.67		52.2	40-140		
Tetradecane	1.32		0.33	mg/kg	2.67		49.4	40-140		
Hexadecane	1.47		0.33	mg/kg	2.67		55.0	40-140		
Octadecane	1.88		0.33	mg/kg	2.67		70.5	40-140		

Extractable Petroleum Hydrocarbons (MADEP-EPH) (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0247 - EPA 3546 (Continued)										
LCS (B0C0247-BS1)					Prepared: 03/06/20 Analyzed: 03/09/20					
Nonadecane	1.85		0.33	mg/kg	2.67		69.3	40-140		
Eicosane	1.94		0.33	mg/kg	2.67		72.7	40-140		
Docosane	2.01		0.33	mg/kg	2.67		75.4	40-140		
Tetracosane	2.02		0.33	mg/kg	2.67		75.8	40-140		
Hexacosane	2.03		0.33	mg/kg	2.67		76.0	40-140		
Octacosane	2.01		0.33	mg/kg	2.67		75.3	40-140		
Triacontane	1.96		0.33	mg/kg	2.67		73.6	40-140		
Hexatriacontane	1.74		0.33	mg/kg	2.67		65.4	40-140		
Surrogate: Chlorooctadecane			*5.95*	mg/kg	*8.33*		*71.4*	*40-140*		
Surrogate: o-Terphenyl			*5.96*	mg/kg	*8.33*		*71.5*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*3.63*	mg/kg	*3.33*		*109*	*40-140*		
Surrogate: 2-Bromonaphthalene			*3.61*	mg/kg	*3.33*		*108*	*40-140*		
LCS Dup (B0C0247-BSD1)					Prepared: 03/06/20 Analyzed: 03/09/20					
Naphthalene	2.11		0.33	mg/kg	2.67		79.2	40-140	5.54	25
2-Methylnaphthalene	2.20		0.33	mg/kg	2.67		82.5	40-140	5.93	25
Phenanthrene	2.18		0.33	mg/kg	2.67		81.6	40-140	4.03	25
Acenaphthene	2.18		0.33	mg/kg	2.67		81.9	40-140	6.33	25
Acenaphthylene	2.15		0.33	mg/kg	2.67		80.5	40-140	6.18	25
Fluorene	2.13		0.33	mg/kg	2.67		80.0	40-140	4.44	25
Anthracene	2.35		0.33	mg/kg	2.67		88.1	40-140	1.66	25
Fluoranthene	2.33		0.33	mg/kg	2.67		87.6	40-140	5.34	25
Pyrene	2.40		0.33	mg/kg	2.67		90.0	40-140	6.19	25
Benzo(a)anthracene	2.42		0.33	mg/kg	2.67		90.6	40-140	6.91	25
Chrysene	2.47		0.33	mg/kg	2.67		92.7	40-140	7.03	25
Benzo(b)fluoranthene	2.39		0.33	mg/kg	2.67		89.8	40-140	6.32	25
Benzo(k)fluoranthene	2.71		0.33	mg/kg	2.67		102	40-140	6.46	25
Benzo(a)pyrene	2.33		0.33	mg/kg	2.67		87.2	40-140	6.60	25
Indeno(1,2,3-cd)pyrene	2.31		0.33	mg/kg	2.67		86.6	40-140	10.9	25
Dibenz(a,h)anthracene	2.21		0.33	mg/kg	2.67		82.8	40-140	6.33	25
Benzo(g,h,i)perylene	2.24		0.33	mg/kg	2.67		84.1	40-140	6.82	25
EPH_LCS_Aliphatic_C19-C36	15.1		10.0	mg/kg	21.3		70.9	0-200	2.81	200
EPH_LCS_Aliphatic_C9-C18	8.63		5.00	mg/kg	16.0		54.0	0-200	6.45	200
EPH_LCS_Aromatic_C11-C22	39.1		10.0	mg/kg	45.3		86.3	0-200	6.06	200
Nonane	0.90		0.33	mg/kg	2.67		33.9	30-140	4.14	25
Decane	1.20		0.33	mg/kg	2.67		44.8	40-140	1.91	25
Dodecane	1.47		0.33	mg/kg	2.67		55.3	40-140	5.86	25
Tetradecane	1.55		0.33	mg/kg	2.67		58.2	40-140	16.4	25
Hexadecane	1.60		0.33	mg/kg	2.67		60.2	40-140	9.03	25
Octadecane	1.90		0.33	mg/kg	2.67		71.4	40-140	1.20	25
Nonadecane	1.84		0.33	mg/kg	2.67		69.1	40-140	0.289	25
Eicosane	1.91		0.33	mg/kg	2.67		71.5	40-140	1.77	25
Docosane	1.95		0.33	mg/kg	2.67		73.1	40-140	3.13	25
Tetracosane	1.96		0.33	mg/kg	2.67		73.7	40-140	2.81	25
Hexacosane	1.95		0.33	mg/kg	2.67		73.1	40-140	3.96	25
Octacosane	1.93		0.33	mg/kg	2.67		72.3	40-140	4.10	25
Triacontane	1.89		0.33	mg/kg	2.67		71.0	40-140	3.63	25
Hexatriacontane	1.70		0.33	mg/kg	2.67		63.7	40-140	2.60	25
Surrogate: Chlorooctadecane			*5.91*	mg/kg	*8.33*		*71.0*	*40-140*		
Surrogate: o-Terphenyl			*6.62*	mg/kg	*8.33*		*79.4*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*3.66*	mg/kg	*3.33*		*110*	*40-140*		
Surrogate: 2-Bromonaphthalene			*3.64*	mg/kg	*3.33*		*109*	*40-140*		

Quality Control
(Continued)

TCLP Metals

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0683 - Metals Digestion Waters										
LCS (B0C0683-BS1)					Prepared & Analyzed: 03/17/20					
Lead	0.986		0.005	mg/L	1.00		98.6	85-115		
LCS Dup (B0C0683-BSD1)					Prepared & Analyzed: 03/17/20					
Lead	0.984		0.005	mg/L	1.00		98.4	85-115	0.235	20
Leach Fluid Blank (B0C0683-LBK1)					Prepared & Analyzed: 03/17/20					
Lead	ND		0.025	mg/L						

Notes and Definitions

Item	Definition
Wet	Sample results reported on a wet weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.

NEW ENGLAND TESTING LABORATORY, INC.
59 Greenhill Street
West Warwick, RI 02893
1-888-863-8522

0 C 0 50455

CHAIN OF CUSTODY RECORD

PROJ. NO.: 20.07041.00
PROJECT NAME/LOCATION: EarthDesign - Mulcahy Field
CLIENT: BETA Group, Inc.
REPORT TO: Robert Smith RSmith@BETA-Inc.com
INVOICE TO:

DATE	TIME	COMP	GRAB	SAMPLE I.D.	AQUEOUS	SOIL	OTHER	NO. OF CONTAINERS	PRESERVATIVE	TESTS*: EPH	RCRA-8	VPH	Organochlorine Pesticides and Herbicides	TCLP Pb	REMARKS
3/4/20	1100		X	B-3 5-7.5'		X		2	Methanol Ice	X	X	X			
	1045		X	B-4 5-7.5'		X		1	Ice	X	X			X	
	1030		X	B-5 2.5-5'		X		1		X	X				TCLP Pb 48hr TAT added per Kate 3/13 gf
	1015		X	B-7 5-7.5'		X		1		X	X				
	1000		X	B-8 7.5-10'		X		1		X	X				
	1200		X	B-9 5-7.5'		X		1		X	X				
	0945		X	B-10 7.5-10'		X		1		X	X				
	0930		X	B-12 2.5-5'		X		1		X	X				
	1130		X	B-1 surface		X		1					X		
↓	1115		X	B-9 surface		X		1	↓				X		
						X									

Sampled by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Amelia Medella	3/4/2020 1200		
Relinquished by: (Signature)	**Date/Time**	**Received by: (Signature)**	**Date/Time**
Amelia Medella	3/5/2020 1305	[signature]	3/5/20 1305
Relinquished by: (Signature)	**Date/Time**	**Received for Laboratory by: (Signature)**	**Date/Time**
[signature]	3/5/20 1545	[signature]	3/5/20 1545

Laboratory Remarks
Temp. received: 4
Cooled ☐

Special Instructions.
List Specific Detection Limit Requirements:

AA

Turnaround (Business Days)_____

**Netlab subcontracts the following tests: Radiologicals, Radon, Asbestos, UCMRs, Perchlorate, Bromate, Bromide, Sieve, Salmonella, Carbamates, CT ETPH

NEW ENGLAND TESTING LABORATORY, INC.
59 Greenhill Street
West Warwick, RI 02893
1-888-863-8522

0 C 0 50455

CHAIN OF CUSTODY RECORD

PROJ. NO.: 20.07041.00
PROJECT NAME/LOCATION: EarthDesign - Mulcahy Field
CLIENT: BETA Group, Inc.
REPORT TO: Robert Smith RSmith@BETA-Inc.com
INVOICE TO:

DATE	TIME	COMP	GRAB	SAMPLE I.D.	AQUEOUS	SOIL	OTHER	NO. OF CONTAINERS	PRESERVATIVE	TESTS** EPH	RCRA-8	VPH	Organochlorine Pesticides and Herbicides				REMARKS
3/4/20	1100		X	B-3 5-7.5'		X		2	Methanol Ice	X	X	X					
	1045		X	B-4 5-7.5'		X		1	Ice	X	X						
	1030		X	B-5 2.5-5'		X		1		X	X						
	1015		X	B-7 5-7.5'		X		1		X	X						
	1000		X	B-8 7.5-10'		X		1		X	X						
	1200		X	B-9 5-7.5'		X		1		X	X						
	0945		X	B-10 7.5-10'		X		1		X	X						
	0930		X	B-12 2.5-5'		X		1		X	X						
	1130		X	B-1 surface		X		1					X				
↓	1115		X	B-9 surface		X		1	↓				X				
						X											

Sampled by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Amelia Medeiros	3/4/2020 1200		
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Amelia Medeiros	3/5/2020 1305		3/5/20 1305
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time
	3/5/20 1545		3/5/20 1545

Laboratory Remarks
Temp. received: 4
Cooled ☐

Special Instructions.
List Specific Detection Limit Requirements:

Turnaround (Business Days) AA

**Netlab subcontracts the following tests: Radiologicals, Radon, Asbestos, UCMRs, Perchlorate, Bromate, Bromide, Sieve, Salmonella, Carbamates, CT ETPH

MassDEP Analytical Protocol Certification Form

Laboratory Name: New England Testing Laboratory, Inc. Project #: 20.07041.00

Project Location: Mulcahy Field RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s): 0C05045

Matrices: ☐ Groundwater/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☒	MassDEP VPH (GC/PID/FID) CAM IV A ☒	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☒	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☒	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☒	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: _____ **Position:** Laboratory Director

Printed Name: Richard Warila **Date**: 3/17/2020

New England Testing Laboratory, Inc.
(401) 353-3420

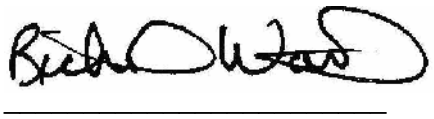
REPORT OF ANALYTICAL RESULTS

NETLAB Work Order Number: 0C13025
Client Project: 20.07041.00 - Earth Design, Mulcahy Field

Report Date: 17-March-2020

Prepared for:

Rob Smith
BETA Group
315 Norwood Park South
Norwood, MA 02062



Richard Warila, Laboratory Director
New England Testing Laboratory, Inc.
59 Greenhill Street
West Warwick, RI 02893
rich.warila@newenglandtesting.com

Samples Submitted :

The samples listed below were submitted to New England Testing Laboratory on 03/13/20. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 0C13025. Custody records are included in this report.

Lab ID	Sample	Matrix	Date Sampled	Date Received
0C13025-01	B-11 0-2.5'	Soil	03/04/2020	03/13/2020
0C13025-02	B-8 0-2.5'	Soil	03/04/2020	03/13/2020
0C13025-03	B-8 2.5-5'	Soil	03/04/2020	03/13/2020
0C13025-04	B-8 5-7.5'	Soil	03/04/2020	03/13/2020
0C13025-05	B-9 0-2.5'	Soil	03/04/2020	03/13/2020
0C13025-06	B-9 2.5-5'	Soil	03/04/2020	03/13/2020

Request for Analysis

At the client's request, the analyses presented in the following table were performed on the samples submitted.

B-11 0-2.5' (Lab Number: 0C13025-01)

Analysis	Method
Arsenic	EPA 6010C
Barium	EPA 6010C
Cadmium	EPA 6010C
Chromium	EPA 6010C
Lead	EPA 6010C
MADEP EPH	MADEP EPH
Mercury	EPA 7471B
Selenium	EPA 6010C
Silver	EPA 6010C

B-8 0-2.5' (Lab Number: 0C13025-02)

Analysis	Method
Lead	EPA 6010C

B-8 2.5-5' (Lab Number: 0C13025-03)

Analysis	Method
Lead	EPA 6010C

B-8 5-7.5' (Lab Number: 0C13025-04)

Analysis	Method
Lead	EPA 6010C

B-9 0-2.5' (Lab Number: 0C13025-05)

Analysis	Method
Lead	EPA 6010C

B-9 2.5-5' (Lab Number: 0C13025-06)

Analysis	Method
Lead	EPA 6010C

Method References

Method for the Determination of Extractable Petroleum Hydrocarbons, Rev. 2.1, Massachusetts Department of Environmental Protection, 2004

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, USEPA

Case Narrative

Sample Receipt:

The samples associated with this work order were received in appropriately cooled and preserved containers. The chain of custody was adequately completed and corresponded to the samples submitted.

Exceptions: None

Analysis:

All samples were prepared and analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) were within method specified quality control requirements and allowances. Results for all soil samples, unless otherwise indicated, are reported on a dry weight basis.

Exceptions: None

Results: Total Metals

Sample: B-11 0-2.5'

Lab Number: 0C13025-01 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Arsenic	**13.0**		0.65	mg/kg	03/16/20	03/16/20
Barium	**34.2**		0.33	mg/kg	03/16/20	03/16/20
Cadmium	**1.90**		0.33	mg/kg	03/16/20	03/16/20
Chromium	**21.2**		0.33	mg/kg	03/16/20	03/16/20
Lead	**35.0**		0.33	mg/kg	03/16/20	03/16/20
Mercury	ND		0.080	mg/kg	03/16/20	03/16/20
Selenium	ND		0.65	mg/kg	03/16/20	03/16/20
Silver	**0.71**		0.33	mg/kg	03/16/20	03/16/20

Results: Total Metals

Sample: B-8 0-2.5'
Lab Number: 0C13025-02 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**41.5**		0.36	mg/kg	03/16/20	03/16/20

Results: Total Metals

Sample: B-8 2.5-5'
Lab Number: 0C13025-03 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**188**		0.38	mg/kg	03/16/20	03/16/20

Results: Total Metals

Sample: B-8 5-7.5'
Lab Number: 0C13025-04 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**179**		0.33	mg/kg	03/16/20	03/16/20

Results: Total Metals

Sample: B-9 0-2.5'
Lab Number: 0C13025-05 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**57.0**		0.36	mg/kg	03/16/20	03/16/20

Results: Total Metals

Sample: B-9 2.5-5'
Lab Number: 0C13025-06 (Soil)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Lead	**83.4**		0.31	mg/kg	03/16/20	03/16/20

Extractable Petroleum Hydrocarbons
Sample: B-11 0-2.5' (0C13025-01)

SAMPLE INFORMATION

Matrix	Soil
Containers	Satisfactory
Aqueous Preservatives	NA
Temperature	Received on Ice Received at: 4+/-2 C°
Extraction Method	EPA Method 3546

EPH ANALYTICAL RESULTS

Method for Ranges: MADEP EPH 4-1.1				Client ID	B-11 0-2.5'	
Method for Target Analytes: MADEP EPH 4-1.1				Lab ID	0C13025-01	
EPH Surrogate Standards: Aliphatic: Chlorooctadecane Aromatic: o-Terphenyl				Date Collected	03/04/20	
				Date Received	03/13/20	
				Date Thawed	NA	
				Date Extracted	03/16/20	
EPH Fractionation Surrogates: (1) 2-Fluorobiphenyl (2) 2-Bromonaphthalene				Percent Moisture	15.90	
RANGE/TARGET ANALYTE		**Dilution**	**RL**	**Units**	**Result**	**Analyzed**
Unadjusted C11-C22 Aromatic Hydrocarbons [1]		1X	7.47	mg/kg	**26.5**	03/17/20 11:01
Diesel PAH Analytes	Naphthalene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	2-Methylnaphthalene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	Phenanthrene	1X	0.37	mg/kg	**1.42**	03/17/20 11:01
	Acenaphthene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
Other Target PAH Analytes	Acenaphthylene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	Fluorene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	Anthracene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	Fluoranthene	1X	0.37	mg/kg	**1.69**	03/17/20 11:01
	Pyrene	1X	0.37	mg/kg	**1.38**	03/17/20 11:01
	Benzo(a)anthracene	1X	0.37	mg/kg	**0.78**	03/17/20 11:01
	Chrysene	1X	0.37	mg/kg	**0.84**	03/17/20 11:01
	Benzo(b)fluoranthene	1X	0.37	mg/kg	**0.62**	03/17/20 11:01
	Benzo(k)fluoranthene	1X	0.37	mg/kg	**0.61**	03/17/20 11:01
	Benzo(a)pyrene	1X	0.37	mg/kg	**0.68**	03/17/20 11:01
	Indeno(1,2,3-cd)pyrene	1X	0.37	mg/kg	**0.46**	03/17/20 11:01
	Dibenz(a,h)anthracene	1X	0.37	mg/kg	<0.37	03/17/20 11:01
	Benzo(g,h,i)perylene	1X	0.37	mg/kg	**0.52**	03/17/20 11:01
C9-C18 Aliphatic Hydrocarbons [1]		1X	14.9	mg/kg	<14.9	03/17/20 10:30
C19-C36 Aliphatic Hydrocarbons [1]		1X	14.9	mg/kg	<14.9	03/17/20 10:30
C11-C22 Aromatic Hydrocarbons [1,2]		1X	7.47	mg/kg	**17.5**	03/17/20 11:01
Chlorooctadecane (Sample Surrogate)				%	73.8	03/17/20 10:30
o-Terphenyl (Sample Surrogate)				%	62.7	03/17/20 11:01
2-Fluorobiphenyl (Fractionation Surrogate)				%	72.4	03/17/20 11:01
2-Bromonaphthalene (Fractionation Surrogate)				%	77.1	03/17/20 11:01
Surrogate Acceptance Range [3]				%	40 - 140	

[1] Hydrocarbon range data excludes area counts of any surrogate(s) and/or internal standards eluting in that range.
[2] C11-C22 Aromatic Hydrocarbons excludes the concentration of Target PAH Analytes.
[3] See the case narrative in cases where a dash (-) is entered in the surrogate recovery block.

Quality Control

Total Metals

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0636 - Metals Digestion Soils										
Blank (B0C0636-BLK1)					Prepared & Analyzed: 03/16/20					
Selenium	ND		0.66	mg/kg						
Silver	ND		0.33	mg/kg						
Arsenic	ND		0.66	mg/kg						
Lead	ND		0.33	mg/kg						
Barium	ND		0.33	mg/kg						
Cadmium	ND		0.33	mg/kg						
Chromium	ND		0.33	mg/kg						
LCS (B0C0636-BS1)					Prepared & Analyzed: 03/16/20					
Lead	87.3		0.33	mg/kg	100		87.3	85-115		
Chromium	91.3		0.33	mg/kg	100		91.3	85-115		
Barium	88.4		0.33	mg/kg	100		88.4	85-115		
Arsenic	18.3		0.66	mg/kg	20.0		91.4	85-115		
Silver	36.1		0.33	mg/kg	40.0		90.3	85-115		
Cadmium	89.0		0.33	mg/kg	100		89.0	85-115		
Selenium	17.3		0.66	mg/kg	20.0		86.4	85-115		
Batch: B0C0655 - Metals Cold-Vapor Mercury										
Blank (B0C0655-BLK1)					Prepared & Analyzed: 03/16/20					
Mercury	ND		0.071	mg/kg						
LCS (B0C0655-BS1)					Prepared & Analyzed: 03/16/20					
Mercury	1.01			ug/l	1.00		101	93-114		

Extractable Petroleum Hydrocarbons (MADEP-EPH)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0650 - EPA 3546										
Blank (B0C0650-BLK1)					Prepared: 03/16/20 Analyzed: 03/17/20					
Unadjusted C11-C22 Aromatic Hydrocarbons	ND		6.67	mg/kg						
Naphthalene	ND		0.33	mg/kg						
2-Methylnaphthalene	ND		0.33	mg/kg						
Phenanthrene	ND		0.33	mg/kg						
Acenaphthene	ND		0.33	mg/kg						
Acenaphthylene	ND		0.33	mg/kg						
Fluorene	ND		0.33	mg/kg						
Anthracene	ND		0.33	mg/kg						
Fluoranthene	ND		0.33	mg/kg						
Pyrene	ND		0.33	mg/kg						
Benzo(a)anthracene	ND		0.33	mg/kg						
Chrysene	ND		0.33	mg/kg						
Benzo(b)fluoranthene	ND		0.33	mg/kg						
Benzo(k)fluoranthene	ND		0.33	mg/kg						
Benzo(a)pyrene	ND		0.33	mg/kg						
Indeno(1,2,3-cd)pyrene	ND		0.33	mg/kg						
Dibenz(a,h)anthracene	ND		0.33	mg/kg						
Benzo(g,h,i)perylene	ND		0.33	mg/kg						
C9-C18 Aliphatic Hydrocarbons	ND		13.3	mg/kg						
C19-C36 Aliphatic Hydrocarbons	ND		13.3	mg/kg						
C11-C22 Aromatic Hydrocarbons	ND		6.67	mg/kg						
Surrogate: Chlorooctadecane			*6.62*	mg/kg	*8.33*		*79.4*	*40-140*		
Surrogate: o-Terphenyl			*4.94*	mg/kg	*8.33*		*59.3*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*2.70*	mg/kg	*3.33*		*81.0*	*40-140*		
Surrogate: 2-Bromonaphthalene			*2.83*	mg/kg	*3.33*		*84.8*	*40-140*		
LCS (B0C0650-BS1)					Prepared: 03/16/20 Analyzed: 03/17/20					
Naphthalene	1.44		0.33	mg/kg	2.67		53.8	40-140		
2-Methylnaphthalene	1.47		0.33	mg/kg	2.67		55.2	40-140		
Phenanthrene	1.63		0.33	mg/kg	2.67		61.2	40-140		
Acenaphthene	1.53		0.33	mg/kg	2.67		57.3	40-140		
Acenaphthylene	1.54		0.33	mg/kg	2.67		57.9	40-140		
Fluorene	1.55		0.33	mg/kg	2.67		58.3	40-140		
Anthracene	1.68		0.33	mg/kg	2.67		63.1	40-140		
Fluoranthene	1.76		0.33	mg/kg	2.67		66.0	40-140		
Pyrene	1.78		0.33	mg/kg	2.67		66.9	40-140		
Benzo(a)anthracene	1.88		0.33	mg/kg	2.67		70.5	40-140		
Chrysene	1.86		0.33	mg/kg	2.67		69.7	40-140		
Benzo(b)fluoranthene	1.88		0.33	mg/kg	2.67		70.3	40-140		
Benzo(k)fluoranthene	1.94		0.33	mg/kg	2.67		72.8	40-140		
Benzo(a)pyrene	1.79		0.33	mg/kg	2.67		67.2	40-140		
Indeno(1,2,3-cd)pyrene	1.75		0.33	mg/kg	2.67		65.6	40-140		
Dibenz(a,h)anthracene	1.74		0.33	mg/kg	2.67		65.2	40-140		
Benzo(g,h,i)perylene	1.75		0.33	mg/kg	2.67		65.5	40-140		
EPH_LCS_Aliphatic_C19-C36	18.4		0.00	mg/kg	21.3		86.2	0-200		
EPH_LCS_Aliphatic_C9-C18	10.3		0.00	mg/kg	16.0		64.7	0-200		
EPH_LCS_Aromatic_C11-C22	29.0		0.00	mg/kg	45.3		63.9	0-200		
Nonane	1.19		0.33	mg/kg	2.67		44.5	30-140		
Decane	1.57		0.33	mg/kg	2.67		59.0	40-140		
Dodecane	1.84		0.33	mg/kg	2.67		69.0	40-140		
Tetradecane	1.88		0.33	mg/kg	2.67		70.5	40-140		
Hexadecane	1.85		0.33	mg/kg	2.67		69.3	40-140		
Octadecane	2.02		0.33	mg/kg	2.67		75.6	40-140		

Extractable Petroleum Hydrocarbons (MADEP-EPH) (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B0C0650 - EPA 3546 (Continued)										
LCS (B0C0650-BS1)					Prepared: 03/16/20 Analyzed: 03/17/20					
Nonadecane	1.89		0.33	mg/kg	2.67		71.0	40-140		
Eicosane	2.19		0.33	mg/kg	2.67		82.0	40-140		
Docosane	2.28		0.33	mg/kg	2.67		85.7	40-140		
Tetracosane	2.37		0.33	mg/kg	2.67		88.9	40-140		
Hexacosane	2.33		0.33	mg/kg	2.67		87.2	40-140		
Octacosane	2.33		0.33	mg/kg	2.67		87.2	40-140		
Triacontane	2.34		0.33	mg/kg	2.67		87.7	40-140		
Hexatriacontane	2.65		0.33	mg/kg	2.67		99.5	40-140		
Surrogate: Chlorooctadecane			*6.43*	mg/kg	*8.33*		*77.2*	*40-140*		
Surrogate: o-Terphenyl			*5.07*	mg/kg	*8.33*		*60.8*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*2.49*	mg/kg	*3.33*		*74.6*	*40-140*		
Surrogate: 2-Bromonaphthalene			*2.65*	mg/kg	*3.33*		*79.4*	*40-140*		
LCS Dup (B0C0650-BSD1)					Prepared: 03/16/20 Analyzed: 03/17/20					
Naphthalene	1.41		0.33	mg/kg	2.67		52.8	40-140	1.92	25
2-Methylnaphthalene	1.44		0.33	mg/kg	2.67		53.8	40-140	2.48	25
Phenanthrene	1.57		0.33	mg/kg	2.67		58.7	40-140	4.17	25
Acenaphthene	1.47		0.33	mg/kg	2.67		55.1	40-140	3.87	25
Acenaphthylene	1.49		0.33	mg/kg	2.67		55.9	40-140	3.56	25
Fluorene	1.49		0.33	mg/kg	2.67		56.0	40-140	4.02	25
Anthracene	1.64		0.33	mg/kg	2.67		61.5	40-140	2.45	25
Fluoranthene	1.69		0.33	mg/kg	2.67		63.2	40-140	4.18	25
Pyrene	1.71		0.33	mg/kg	2.67		64.1	40-140	4.24	25
Benzo(a)anthracene	1.80		0.33	mg/kg	2.67		67.5	40-140	4.24	25
Chrysene	1.78		0.33	mg/kg	2.67		66.8	40-140	4.28	25
Benzo(b)fluoranthene	1.83		0.33	mg/kg	2.67		68.5	40-140	2.70	25
Benzo(k)fluoranthene	1.95		0.33	mg/kg	2.67		73.1	40-140	0.446	25
Benzo(a)pyrene	1.74		0.33	mg/kg	2.67		65.1	40-140	3.14	25
Indeno(1,2,3-cd)pyrene	1.71		0.33	mg/kg	2.67		64.0	40-140	2.47	25
Dibenz(a,h)anthracene	1.69		0.33	mg/kg	2.67		63.5	40-140	2.68	25
Benzo(g,h,i)perylene	1.70		0.33	mg/kg	2.67		63.8	40-140	2.63	25
EPH_LCS_Aliphatic_C19-C36	18.0		0.00	mg/kg	21.3		84.2	0-200	2.30	200
EPH_LCS_Aliphatic_C9-C18	10.1		0.00	mg/kg	16.0		63.4	0-200	2.02	200
EPH_LCS_Aromatic_C11-C22	28.1		0.00	mg/kg	45.3		62.0	0-200	3.07	200
Nonane	1.16		0.33	mg/kg	2.67		43.5	30-140	2.39	25
Decane	1.54		0.33	mg/kg	2.67		57.8	40-140	2.14	25
Dodecane	1.83		0.33	mg/kg	2.67		68.8	40-140	0.290	25
Tetradecane	1.84		0.33	mg/kg	2.67		68.9	40-140	2.40	25
Hexadecane	1.81		0.33	mg/kg	2.67		67.8	40-140	2.30	25
Octadecane	1.96		0.33	mg/kg	2.67		73.6	40-140	2.68	25
Nonadecane	1.85		0.33	mg/kg	2.67		69.3	40-140	2.35	25
Eicosane	2.14		0.33	mg/kg	2.67		80.1	40-140	2.31	25
Docosane	2.23		0.33	mg/kg	2.67		83.7	40-140	2.39	25
Tetracosane	2.32		0.33	mg/kg	2.67		86.9	40-140	2.30	25
Hexacosane	2.27		0.33	mg/kg	2.67		85.2	40-140	2.29	25
Octacosane	2.27		0.33	mg/kg	2.67		85.3	40-140	2.23	25
Triacontane	2.29		0.33	mg/kg	2.67		85.7	40-140	2.28	25
Hexatriacontane	2.59		0.33	mg/kg	2.67		97.3	40-140	2.26	25
Surrogate: Chlorooctadecane			*6.31*	mg/kg	*8.33*		*75.7*	*40-140*		
Surrogate: o-Terphenyl			*4.83*	mg/kg	*8.33*		*58.0*	*40-140*		
Surrogate: 2-Fluorobiphenyl			*2.35*	mg/kg	*3.33*		*70.6*	*40-140*		
Surrogate: 2-Bromonaphthalene			*2.45*	mg/kg	*3.33*		*73.4*	*40-140*		

Notes and Definitions

Item	Definition
Wet	Sample results reported on a wet weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.

NEW ENGLAND TESTING LABORATORY, INC.
59 Greenhill Street
West Warwick, RI 02893
1-888-863-8522

0 C 1 3025 *

CHAIN OF CUSTODY RECORD

PROJ. NO: 20.07041.00
PROJECT NAME/LOCATION: EarthDesign - Mulcahy Field
CLIENT: BETA Group, Inc.
REPORT TO: Robert Smith RSmith@BETAInc.com
INVOICE TO: RSmith@Beta-Inc.com

DATE	TIME	COMP	GRAB	SAMPLE I.D.	AQUEOUS	SOIL	OTHER	NO. OF CONTAINERS	PRESERVATIVE	TESTS** RCRA-8	EPH	Lead	REMARKS
3/4/20	1400		X	B-11 0-2.5'		X		1	Ice	X	X		
	1415		X	B-8 0-2.5'		X		1				X	
	1430		X	B-8 2.5-5'		X		1				X	
	1500		X	B-8 5-7.5'		X		1				X	
	1515		X	B-9 0-2.5'		X		1				X	
↓	1530		X	B-9 2.5-5'		X		1	↓			X	

	Date/Time		Date/Time	
Sampled by: (Signature) Amanda Mellen	03/04/2020 1400	Received by: (Signature)	3/3/20	12:00
Relinquished by: (Signature) Amanda Mellen	3/3/20 1200	Received by: (Signature)		
Relinquished by: (Signature)	3/3/20	13:45	Received for Laboratory by: (Signature)	3/3/20 1345

Laboratory Remarks: Temp. received: 4
Cooled ☐

Special Instructions:
List Specific Detection Limit Requirements:

Turnaround (Business Days) 48 hrs

per Rob via Shan

**Netlab subcontracts the following tests: Radiologicals, Radon, Asbestos, UCMRs, Perchlorate, Bromate, Bromide, Sieve, Salmonella, Carbamates, CT ETPH

NEW ENGLAND TESTING LABORATORY, INC.
59 Greenhill Street
West Warwick, RI 02893
1-888-863-8522

0 C 1 3025 *

CHAIN OF CUSTODY RECORD

PROJ NO.: 20.07041.00
PROJECT NAME/LOCATION: EarthDesign - Mulcahy Field
CLIENT: BETA Group, Inc.
REPORT TO: Robert Smith RSmith@BETAInc.com
INVOICE TO: RSmith@Beta-Inc.com

DATE	TIME	COMP	GRAB	SAMPLE I.D.	AQUEOUS	SOIL	OTHER	NO. OF CONTAINERS	PRESERVATIVE	TESTS** RCRA-8	EPH	Lead	REMARKS
3/4/20	1400		X	B-11 0-2.5'		X		1	Ice	X	X		
	1415		X	B-8 0-2.5'		X		1			X		
	1430		X	B-8 2.5-5'		X		1			X		
	1500		X	B-8 5-7.5'		X		1			X		
	1515		X	B-9 0-2.5'		X		1			X		
	1530		X	B-9 2.5-5'		X		1			X		

	Date/Time		Date/Time
Sampled by: (Signature) Amelia Mellen	03/04/2020 1400	Received by: (Signature)	3/13/20 12:00
Relinquished by: (Signature) Amelia Mellen	3/13/20 1200	Received by: (Signature)	
Relinquished by: (Signature)	3/13/20 13:45	Received for Laboratory by: (Signature)	3/14/20 1345

Laboratory Remarks. Temp. received: 4
Cooled ☐

Special Instructions. List Specific Detection Limit Requirements.

Turnaround (Business Days) A

**Netlab subcontracts the following tests: Radiologicals, Radon, Asbestos, UCMRs, Perchlorate, Bromate, Bromide, Sieve, Salmonella, Carbamates, CT ETPH

MassDEP Analytical Protocol Certification Form

Laboratory Name: New England Testing Laboratory, Inc. Project #: 20.07041.00

Project Location: Mulcahy Field RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s): 0C13025

Matrices: ☐ Groundwater/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☒	MassDEP VPH (GC/PID/FID) CAM IV A ☐	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☒	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: _____ **Position:** Laboratory Director

Printed Name: Richard Warila **Date**: 3/17/2020