CITY MANAGER'S OFFICE
CITY OF NEWARK

220 South Main Street · Newark, Delaware 19711
302.366.7000 · Fax 302.366.7035 · www.newarkde.gov

BIDDER

BID SECURITY

INVITATION TO BID (ITB) NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

NOTICE
Do not disassemble. Return intact with
properly completed forms or bid may be rejected.

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11
EDNA C. DICKEY PARK SITE IMPROVEMENTS

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CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

NOTICE OF LETTING

Sealed bids in response to Invitation to Bid No. 24-11 (Edna C. Dickey Park Site Improvements) will be received by the Purchasing Division (220 South Main Street; Newark, Delaware 19711) until 2:00 p.m., prevailing time on Tuesday September 3, 2024, and will be publicly opened and read aloud in the Council Chamber shortly thereafter.

Alternatively, bids may also be emailed in PDF form to the City Purchasing Division at contracts@newark.de.us by the deadline noted above and will be opened after the closing date and time and will be publicly recorded in the Council Chamber shortly thereafter. Please note that only emails up to 25 MB in size can be accepted.

There will be a non-mandatory pre-bid meeting on Thursday August 8, 2024, at 11:00 a.m. at the project site, located at 60 Madison Drive, Newark DE 19711.

All questions/requests for information regarding this Invitation to Bid must be submitted via email to contracts@newark.de.us by 5:00 p.m. on Friday August 23, 2024 to allow staff sufficient time to develop answers to questions deemed appropriate. Please submit all questions/requests for information in bulk (e.g., in a Word document attachment to an email) to limit the total number of emails received.

The Invitation to Bid documents may be obtained from the City website at www.newarkde.gov/bids.

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

GENERAL PROVISIONS

1. BIDS

Each bid shall be submitted on the proposal form included herein. The proposal and all other required documents must be submitted in a sealed envelope clearly identified with the bidder's name and marked, "City of Newark – Edna C. Dickey Park Site Improvements". **Bid Documents must be received in the Purchasing Office prior to 2:00 p.m. prevailing time, Tuesday, September 3, 2024.** Each bid so submitted shall constitute an irrevocable offer for a period of thirty (30) calendar days following the bid opening date.

There will be a non-mandatory pre-bid meeting on Thursday August 8, 2024 at 11:00 a.m. at the project site, located at 60 Madison Drive, Newark DE 19711.

Alternatively, bids may also be emailed in PDF form to the City Purchasing Division at contracts@newark.de.us by the deadline noted above and will be opened after the closing date and time and will be publicly recorded in the Council Chamber shortly thereafter. Please note that only emails up to 25 MB in size can be accepted—if file sizes are larger than 25 MB, attachments should be broken into multiple emails.

2. DEFINITIONS

a. *Agreement:* The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
b. *Contract Documents:* Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
c. *Contractor:* The individual or entity with whom the Owner has entered into the Agreement.
d. *Engineer:* The Owner's consultant engineer. The Engineer for this project is JMT, Inc.
e. *Owner:* The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The Owner for this project is the City of Newark.
f. *Shop Drawings:* All drawings, diagrams, illustrations, schedules, and other data or

information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

g. *Site:* Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
h. *Subcontractor:* An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
i. *Work:* The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, as required by the Contract Documents.

3. BID SECURITY

Each bid must be accompanied by a certified check, cashier's check, or bid bond in the amount of ten percent (10%) of the proposed bid price, payable to the City of Newark. Failure to provide the required bid security may be grounds for rejection of the bid. If a bid bond is submitted, the attached "Bond to Accompany Proposal" form must be completed and issued by a surety licensed to operate in the State of Delaware.

If the successful bidder fails or refuses to execute and deliver the contract within twenty (20) calendar days after receiving notice of the award of the contract, the successful bidder shall forfeit to the City for such failure or refusal the security deposited with the bid. Any certified check or cashier's check submitted as security shall be returned to all unsuccessful bidders thirty (30) calendar days after the bid opening date.

4. CONTRACT SURETY BOND

The successful bidder shall provide the City with a Performance Bond and Payment Bond in the full amount of the contract guaranteeing faithful performance of the contract. Such bonds shall be provided to the City with the executed contract within twenty (20) calendar days after receiving notice of award of the contract. Upon receipt of the contract surety bond, the City will return any certified check or cashier’s check submitted as bid security by the successful bidder.

If a warranty is included as part of this Invitation to Bid’s scope of work, once the project is substantially complete the surety bond shall be converted into a warranty bond for the term of the warranty. Once substantial completion of the project is reached and approved, City staff shall release any remaining retainage and issue a close out letter to the vendor stating the start date of the warranty period. A copy of the above noted warranty bond shall be

provided to the City Purchasing Division no later than thirty (30) days from the receipt of the City's close out letter.

5. TAXES

The price(s) quoted shall not include federal or state taxes. If applicable, the successful bidder shall provide the City with three (3) copies of the required tax exemption forms to accompany the bidder's invoice.

6. AWARDS

The City Manager or designee will review each of the bids submitted and make a recommendation to the City Council on the disposition of the bids. The City Council reserves the right to accept or reject any or all bids or parts of bids as they may determine and to waive any irregularities or defects where the best interest of the City would be served.

7. BID PRICE

For material purchases, the prices shall include all transportation, delivery preparation, and installation charges for the equipment specified. The bid prices shall be F.O.C. Destination and shall not include federal or state taxes. If applicable, the successful bidder/vendor must furnish the City with the necessary tax exception forms in triplicate upon submission of his invoice.

Any prices quoted are those for which the material will be furnished F.O.B. Destination and include all charges that may be imposed during the period of the contract. Unless otherwise specified and agreed upon by both parties in writing, all material shall be designated F.O.B. Destination and have freight included in quotations.

8. UNIT PRICES

In the event of a conflict or error in extension from unit price to total amount, the unit prices shall prevail and shall be considered the correct bid figures. Bidders are cautioned to thoroughly review their bid figures for errors prior to submitting their proposal. The unit price shall include all transportation, delivery, installation and all charges for the goods and services specified in this Invitation to Bid or otherwise by City staff.

9. EQUALS

Where a specific product is specified by catalog or model number, the acceptability of any other "or equal" product shall be subject to the sole judgment of the City of Newark.

10. INQUIRIES/REQUESTS FOR INFORMATION & ADDENDA

All inquiries/requests for information regarding this Invitation to Bid must be submitted via email to contracts@newark.de.us by 5:00p.m. on Tuesday, June 18, 2024. These inquiries will be passed along to relevant staff for their review. Please submit all questions/requests for information in bulk (e.g., in a Word document attachment to an email) to limit the total number of emails received. Any answers deemed necessary will be provided via addendum prior to the bid opening date.

Any changes to the Invitation to Bid documents shall be made by written addendum no later than four (4) calendar days prior to the bid opening date, which may be issued with extensions to the bid submittal date (if necessary) to allow adequate time for review and response. Bidders shall bear the entire responsibility for being sure they have received all such addenda. **The bidder is responsible for submitting a signed letter listing the addenda received for this Invitation to Bid.** All addenda will be posted on the City website at www.newarkde.gov/bids. After the bids have been received, no claim that the bidder did not have complete information will be considered. No verbal agreement or conversation with any officer, agent or employee of the City, either before or after the execution of this contract, shall affect or modify any of the terms or conditions outlined herein.

11. TIME OF COMPLETION AND LIQUIDATED DAMAGES

Contractor shall commence work on a date to be specified by the City in a written "Notice to Proceed" and to fully complete all work under this contract on or before the noted completion date. Liquidated damages of $200.00 per day may be assessed to the Contractor by the City for each day the contract is extended beyond the completion date. Such damages shall be payable to the City immediately upon notice of a breach of contract completion timelines. Liquidated damages shall not be considered a penalty, but rather a reasonable estimate of the damages that would be suffered by the City in the event of a breach. The City and the contractor shall acknowledge that the actual damages resulting from a breach may be difficult to ascertain and that this provision represents a reasonable estimation of such damages. This provision shall not limit the City's right to pursue any other remedies available under law or equity.

12. LIABILITY INSURANCE

a. The Contractor shall at all times maintain and keep in force such insurance as will protect him from claims under Worker's Compensation Acts, and also such insurance as will protect him and the owner from any such claims for damages for personal injuries, including death, which may arise from operations under this contract, whether such operations be by the Contractor or by any Subcontractor or anyone directly or indirectly employed by any of them.

b. The Contractor shall be required to provide Workers' Compensation (WC)/Employer's Liability (EL) coverage with limits of insurance not less than:

$1,000,000 Per Accident
$1,000,000 Per Illness, Employee
$1,000,000 Per Illness, Aggregate

The Contractor shall be required to provide Contractors Professional Liability coverage with limits of insurance not less than (requests for waivers of Contractors Professional Liability coverage will be considered by the City on a case-by-case basis):

$1,000,000 Per Claim
$1,000,000 Per Aggregate

The Contractor shall be required to provide Umbrella/Excess Liability coverage with limits of insurance not less than:

$3,000,000 Each Occurrence
$3,000,000 Aggregate

The Contractor shall be required to provide Commercial General Liability (CGL) coverage with limits of insurance not less than:

$1,000,000 Each Occurrence Limit
$1,000,000 Personal & Advertising Injury Limit
$2,000,000 Annual Aggregate Limit
$2,000,000 Products-Completed Operations Limit
$1,000,000 Business Auto Liability Limit (Owned, Hired, & Non-Owned Autos)

The Contractor, The City of Newark (Owner) and all other parties required of the Contractor shall be included as insured on the CGL, using Additional Insured Endorsements providing coverage as broad as the coverage provided for the named insured Subcontractor.

Subcontractors approved in association with the hiring of a Contractor shall be required to provide Commercial General Liability (CGL) coverage with limits of insurance in equal amount to those required of the Contractor.

c. A copy of the Certificate of Insurance must accompany each bid. The Contractor shall ensure that all insurances required remain valid for the entire term of the contract, inclusive of any term extension(s) and retroactive if claim is made afterward. The Prime Contractor's attention should be directed to other sections of the contract documents in the event additional insurance is required based on the scope of work.

13. APPROVAL

The contractor shall receive approval in writing from the City before ordering any material for work to be done under this contract.

14. STANDARDS AND WARRANTY OF TITLE

No material, supplies, or equipment to be installed as part of the work shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which any interest therein or in any part thereof is retained by the seller or supplier. The contractor shall warrant good title to all material, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together by him to the City free from any claims, liens or charges. Neither the contractor nor any person, firm or corporation furnishing any material or labor covered by this contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the contractor for their protection or any right under any law permitting such persons to look to funds due the contractor in the hands of the City.

The provisions of this paragraph shall be inserted in all the subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

All equipment shall be unused in all component parts and will be the latest current production including all accessories. The specifications will be construed as the minimum required. When the manufacturer's standards exceed these, the standard units will be furnished. All material will be free of defects. Manufacturer's standard warranties shall apply.

15. GUARANTEE

The contractor hereby guarantees all work for a period of two years after the date of completion and final acceptance thereof by the City as follows:

a. Against all faulty or imperfect materials and against all imperfect, careless, and/or unskilled workmanship.

b. The contractor agrees to replace with proper workmanship and materials, and to re-execute, correct or repair without cost to the City, any work which may be found to be improper or imperfect and/or which fails to perform as specified.

c. The guarantee obligations assumed by the contractor under these contract documents shall not be held or taken to be in any way impaired because of the specifications, indication or approval by or on behalf of the City of any articles, materials, means, combination of things used or to be used in the construction, performance and completion of the work or any part thereof.

d. No use or acceptance by the City of the work or any part thereof, nor any failure to use the same nor any repairs, adjustments, replacements, or corrections made by the City due to the contractor's failure to comply with any of his obligations under the contract documents, shall impair in any way the guarantee obligations assumed by the contractor under these contract documents.

16. EEO AND LICENSING

The contractor shall be licensed to do business in the State of Delaware and shall be registered as a contractor in the City of Newark and possess all other required licenses. The contractor shall also be a fair and equal opportunity employer.

17. PREFERENCE FOR DELAWARE LABOR

According to State law, any person, company or corporation who violates the requirements of Title 29, Section 6962, of the Delaware Code regarding preference for Delaware Labor shall pay a penalty to the State Secretary of Finance equal to the amount of compensation paid to any person in violation of this Section. This regulation is waived if it is in conflict with Federal requirements.

18. VENDOR REQUIREMENTS FOR FEDERALLY FUNDED PROJECTS

This ITB is funded through a federal grant. As such, the awarded vendor and subcontractors must be registered at www.sam.gov before contract agreements are signed. The awarded vendor and subcontractors must also show proof of SAM registration and good standing through the SAM portal before contract agreements are signed. SAM (System for Award Management) is the primary supplier database for the U.S. Federal Government.

The City of Newark shall not conduct business with vendors that are debarred or otherwise flagged/blacklisted if the project is funded using federal money. If a vendor or subcontractors are determined to be debarred at any point during the term of a contract, this will be seen as grounds for termination of the contract, and potentially grounds for termination from other contracts held with the City, if any.

19. NONCOLLUSION

The bidder shall not, either directly or indirectly, enter into any agreement, participate in any collusion, or otherwise take any action in restraint of free competitive bidding in connection with this contract.

20. EXCEPTIONS & OMISSIONS

Any and all exceptions which are taken to the specifications and terms and conditions outlined herein shall be noted in the space provided on the proposal form. The listing of any exception may be grounds for rejection of a bid.

Further, the bidder recognizes that the City of Newark is not in the business of preparing specifications, and any omissions in this ITB/RFP must be strictly addressed by the firm with the submittal of its proposal.

21. INCREASE AND/OR REDUCTION OF ESTIMATED QUANTITIES

a. The contractor's attention is directed to the fact that the quantities indicated in this contract are approximate and may be increased or decreased by the engineer. An increase or a reduction in these quantities will in no way alter the unit prices bid by or paid to the contractor.

b. The City shall also have the right to delete any portion of this contract or to update specific quantities as needed. Regardless of any changes, deletions, or additions authorized by the City, all work done or purchases made under this contract shall be based on the unit prices stipulated by the contractor in his proposal.

22. PAYMENT

No invoice will be processed for payment until the goods and/or services have been delivered and verification is made that the specifications under this contract have been met. Progress payments, when requested, will be evaluated and approved for payment based on work completed to date. If applicable, upon written request from the Contractor, payment for material stored on site may be made at 50% of the material's invoice price; full payment will be made after the material is installed. Payment for all services complete or goods received will be made within thirty (30) days of final acceptance by the City.

The City of Newark will not disperse payment to any vendor via paper check. As such, all bidders acknowledge that electronic fund transfer (EFT) payments are acceptable. The successful bidder will be required to submit EFT payment information to the City at the time of contract execution.

23. BASIS OF PAYMENT

Payment for these items shall be included in the unit prices for each item as described in the Proposal. All other items, methods, and materials necessary to complete the work as described above shall be incidental to the bid item the work is being completed under.

24. RETAINAGE

The City will retain 5% of the progress payments until such time as the project is complete and accepted by the City.

25. RELEASE OF LIENS

The Contractor is required to provide documentation stating that all liens filed against the Contractor have been paid before the final 5% retainage is released to the Contractor.

26. ADVERTISEMENT

It is further agreed that any bidder/contractor submitting bids will not use the name of the City in any advertisement without first obtaining the written consent of the City Manager or their designee. All such requests should be submitted in writing to contracts@newark.de.us.

27. CONTRACTOR'S UNDERSTANDING

It is understood and agreed that the contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground; the character, quality and quantity of the material which will be required; the character of equipment needed preliminary to and during the prosecution of the work; the general and local conditions; all permit restrictions and conditions; and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent, or employee of the City of Newark, either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

28. INTENT OF SPECIFICATIONS

It shall be the Contractor's responsibility to furnish the goods and services specifically indicated in the scope of work and specifications and such other as may be required to meet the intent of the specifications, drawings, or as may be necessary to provide the operation intended by the City.

29. LIST OF SUBCONTRACTORS' CERTIFICATION

a. Each bidder shall execute and submit with his bid, on the form provided herein, a list of subcontractors, including complete names and addresses, whose services the bidder intends to use in performing all work under the contract. Bids submitted without such a list, or with a list not completely or properly executed, are subject to rejection.

b. Each bidder is required to notify all subcontractors that they are obligated to comply with the provisions of Federal and State law as they pertain to this project, and that they

must submit evidence of such compliance upon notice or request. The bidder shall certify his compliance with this requirement on the list of subcontractors.

c. After the contract has been awarded, the successful bidder shall not substitute another subcontractor for any subcontractor whose name was set forth on the list of subcontractors which accompanied his bid, without the written consent of the City.

30. INDEMNIFICATION

The contractor shall solely be responsible and liable for the accuracy and completeness of all work performed and shall agree to indemnify, defend and hold harmless the City of Newark, its officers, agents and employees, from and against any and all claims, actions, suits and proceedings arising out of, based upon or caused by negligent acts, omissions or errors of or the infringement of any copyright of patent, by the contractor, its officers, agents, employees or subcontractors, in the performance of the contracted agreement.

31. TERMINATION OF AGREEMENT

This agreement may be terminated by the City upon thirty (30) days written notice if the contractor fails to perform satisfactorily in accordance with the terms and conditions of the contract. In the event this agreement is terminated, the contractor shall be paid for services satisfactorily rendered up to the termination date.

32. FAMILIARITY WITH PROPOSED WORK

A complete understanding of the conditions as they exist is required by careful personal examination of the work at the site. Each contractor bidding must completely satisfy himself as to the exact nature and existing conditions of the work area. The contractor also shall carefully examine the plans, specifications, and the contract forms for the work contemplated. Failure to do so will not relieve the successful contractor of his obligation to carry out the provisions of the contract.

The contractor shall not, at any time after the execution of the contract, set up any claims whatsoever based upon insufficient data or incorrectly assumed conditions, nor shall claim any misunderstanding in regard to the nature, conditions or character of the work to be done under this contract, and shall assume all risks resulting from any change in the conditions which may occur during the progress of the work.

The Contractor is solely responsible to identify, obtain, and pay for all required permits, licenses, and approvals required by any and all State, local, or Federal authorities or governmental agencies to complete the Work.

33. FINAL INSPECTION

All delivered goods and services will be subject to inspection by the City of Newark, Delaware. If in any way an item fails to meet the terms of the contract, it may be rejected or liquidated damage charges made. The decision of the City will be final, and any rejected items or materials will have to be replaced at the expense of the vendor.

34. OWNERSHIP OF MATERIAL

All documents prepared and submitted pursuant to this RFP or ITB shall be property of the City upon submittal and will be subject to staff and public review and discussion in association with our public bidding and formal proposal process. Any information or documents deemed proprietary shall be so marked at time of submittal and limited to detail where the disclosure of contents could be prejudicial to competing offerors during the process of negotiation, and any commercial or financial information of a privileged or confidential nature.

35. REGULATIONS AND EXCEPTIONS

The application of lead paint as defined in Title 16, Chapter 30M of State Code and Chapter 7 of City Code as part of this contract is prohibited. The contractor will be subject to fines as outlined in State and City Code if it is determined that lead paint was applied in violation of State and City code.

Safety Data Sheet information for all paints applied to internal or external structures shall be provided to the City for review and approval prior to application. The contractor will be required to remove and remediate any lead paint to the satisfaction of the City, at no cost to the City. Prior to commencing removal and remediation efforts, the contractor shall provide a written remedial action plan which includes health safety protection requirements for both employees and the public for review and approval by the City and/or DNREC/DHSS. Any and all sample results that are generated as a result of improper application of lead paint shall be provided to the City within 5 working days of being received by the contractor. The contractor will also be required to replace all paint removed with non-lead paint to the satisfaction of the City, and at no cost to the City.

Failure to adequately remove, remediate, and replace lead paint applied in violation of State and City Code as outlined herein will be considered a breach of contract.

36. FORCE MAJEURE OCCURRENCE

Upon the occurrence of a force majeure event, the City of Newark shall immediately

notify the awarded vendor. In this instance, the City shall be excused from any further financial or contractual obligations for as long as such circumstances prevail. As used in this document, a "force majeure occurrence" means acts of God; acts of the public enemy; acts of the State and any other governmental entity in its sovereign or contractual capacity; fires; floods; epidemics or pandemics; quarantine restrictions; strikes or other labor disputes; freight embargoes; unusually severe weather; or other unusual event outside of the reasonable control of a party hereto that prevents a party to this Agreement from performing its contractual obligations.

37. SEVERABILITY

If any provision of this contract (general, special, technical, or other) shall be held to be invalid or unenforceable for any reason, the remaining provisions shall continue to be valid and enforceable. If a court finds that any provision of this contract is invalid or unenforceable, but that by limiting such provision it would become valid and enforceable, then such provision shall be deemed to be written, construed, and enforced as so limited.

38. BIDDER'S QUALIFICATIONS

No contract will be awarded to any bidder who in the judgment of the City is not a responsible or fit bidder, or is not prepared with all the necessary experience, capital, organization, and equipment to conduct and complete the work for which the bidder proposes on the proposal form.

39. SAFETY REQUIREMENTS

The Contractor shall comply with the requirements and standards of the Occupational Safety and Health Act (OSHA) and all other state and local laws, ordinances, and codes governing all work associated with the executed contract.

40. RESTORATION OF DISTURBED AREAS AND CLEAN UP

Upon completion of the work, all related work, such as lawns, curbs, sidewalks, fences, shrubbery, and driveways that have been disturbed shall be restored to their original condition and in accordance with City of Newark Standards and Specifications. The area shall be cleared of all tools, equipment and refuse resulting from the project. The contractor shall, at the end of each day, leave the areas in which he has worked, free of debris and safely secure his material and equipment.

41. DEBRIS COLLECTION AND DISPOSAL

The Contractor is responsible for collection, removal, transport, and lawful disposal of construction debris and or materials.

42. INSPECTION OF MATERIAL AND WORK

a. Workmanship shall be of good quality and all work and material shall be at all times subject to the inspection of the City of Newark or their duly authorized representatives. The Contractor shall provide reasonable and necessary facilities for such inspection. If required by the City of Newark, the contractor shall take down or uncover portions of the finished work.

b. The Contractor agrees that in case any of the material or work, or both, shall be rejected as defective or unsuitable by the city, material and the work shall be done again immediately to the satisfaction and approval of the city at the cost and expense of the Contractor.

c. Any omission or failure on the part of the City of Newark or inspectors to disapprove or reject any defective work or materials shall not be construed to be an acceptance of any defective work or material.

d. In case the City should not consider the defect of sufficient importance to require the contractor to replace any imperfect work or materials, the City shall have the power to make an equitable deduction from the stipulated price.

e. Neither the inspection nor supervision of the work, nor the presence or absence of an inspector shall relieve the contractor of any of his obligations under the contract or of making his work conform to the specifications.

43. REFERENCES

Bidders must provide three (3) business references consisting of current or previous (within the last five (5) calendar years) customers where similar services are/were provided.

44. ITEMS TO BE EXECUTED AND SUBMITTED WITH BID

Bidders are notified that the proposal, insurance documentation, and bid security must be executed and completed in full and submitted with the bid at the time of bidding, or bid may be subject to rejection.

The bidder shall submit the following with the bid:

A. Proposal
B. Executed Bid Bond or Cashier's Check
C. Acknowledgement of Addendum(a)
D. www.sam.gov information
E. Exceptions or qualifications to the ITB documents
F. List of subcontractors
G. References
H. Non-collusion statement

45. ITEMS TO BE SUBMITTED WITH SIGNED CONTRACT

A. Construction Schedule
B. Performance/surety bond
C. Insurance documentation showing required coverages and the City of Newark as the certificate holder

CITY OF NEWARK

Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

SCOPE OF WORK

1. SCOPE OF WORK

The Edna C. Dickey Park Site Improvements consists of the installation of a walking path, pavilion, and general site upgrades to the Edna C. Dickey Park located at 60 Madison Drive, in the City of Newark.

2. LOCATION

The project is located at 60 Madison Drive, Newark DE 19711 within the extents of the City of Newark's municipal limits.

3. PERMITS, CERTIFICATIONS, LAWS AND ORDINANCES

The Contractor shall perform the work in accordance with all local, state and federal laws and ordinances.

The Contractor is required to have or obtain a City Contractor's License and State of Delaware business license prior to starting the work. The Contractor is required to obtain any permits required for completion of the work. The fees for City of Newark permits, if applicable, will be waived.

4. COORDINATION

A. Contractor shall coordinate construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Contractor shall coordinate its operations with operations that depend on each other for proper installation, connection, and operation.
B. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
C. Coordinate removal of different components to ensure maximum performance and

accessibility for required maintenance, service, and repair.

D. Coordinate with the City to detour pedestrian access to the project site.

5. SUBMITTALS

The Contractor shall submit an **electronic copy** of each submittal for review and approval by the Owner. Provide submittals in accordance with specifications. For scheduling purposes, the Contractor shall allow for a ten (10) business day review time by the Owner. Comments and Approvals will be returned in a digital format. The Contractor shall provide, at minimum, all submittals identified in the specifications. Each shop drawing shall contain only one work item and shall be consecutively numbered before submission. Additional submittals may be requested at the discretion of the Owner.

6. RESTORATION

The Contractor is responsible to restore all disturbed areas to original or better condition and remove all debris, residuals, trash, and excess materials from the sites.

7. SECURITY AND SITE ACCESS

The Contractor is responsible for security of his equipment and materials related to the work. The Contractor is responsible to maintain the work site in a safe and orderly manner.

Contractor is required to maintain a secure perimeter around the work area. Pedestrian walkways shall be always open except where indicated on the project plans.

A. Walkways and Entrances: Keep walkways and entrances outside of designated laydown and work area clear and accessible at all times. Do not use these areas for parking or storage of materials.
B. Schedule deliveries to minimize disruption to walkways and entrances not within the limits of disturbance shown on the project plans.
C. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

Prior to mobilization, the Contractor shall take a pre-construction video or photographs of any such areas to be used for access, staging, or work during the project and submit to the Owner. Video or photographs shall be used to document any existing damage or deteriorated conditions.

It shall be the responsibility of the contractor to obtain permission from any neighboring property owner if said contractor finds it necessary to enter upon or use in any manner the property of any neighbor for the expedition of the contractor's work.

8. WORK RESTRICTIONS

A. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
B. On-Site Work Hours: Limit work at the site to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated or approved by City of Newark.
C. Weekend Hours: Weekend hours must be approved by the City. Contractor must submit request to work on weekends at least 5 business days in advance of the projected work date.
D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

    1. Notify Owner not less than five days in advance of proposed utility interruptions.
    2. Obtain Owner's written permission before proceeding with utility interruptions.

E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption with Owner.

    1. Notify Owner not less than two days in advance of proposed disruptive operations.
    2. Obtain Owner's written permission before proceeding with disruptive operations.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project sites is not permitted. See Office of Management and Budget – Drug Testing Requirements for further information regarding controlled substances.

G. Contractor shall have contaminant spill response equipment readily available on-site during construction activity.

9. SITE CONSTRUCTION AND EXISTING UTILITIES

A. The Contractor is responsible to account for and consider existing site conditions and existing utilities. Prior to starting any work, the Contractor shall contact Miss Utility of Delmarva at 1-800-282-8555 for a utility mark out. The Contractor is responsible for locating and protecting existing utilities for the duration of the work.
B. The failure to show on the contract drawings any existing utilities shall not relieve the contractor of his responsibility in determining the locations of utilities.
C. Any damage done to existing utility lines, services, poles and structures shall be repaired or replaced by the Contractor at his own expense. The Contractor shall notify all possible owners of utilities in the areas where work is to be done and the schedule and extent of such work.

10. EXAMINATION OF SITE, DRAWINGS, ETC.

Before submitting proposals, bidders shall inform themselves fully of the nature of the work by a personal examination of the site and the drawings and by such other means as they may prefer or consider necessary, as to matters, conditions and considerations bearing on or in any way affecting the preparation of their proposals and the contract. They shall not, at any time after submission of the proposal, dispute the accuracy of such drawings or the specifications and the general conditions nor assert that there is any misunderstanding in regard to the location, extent or nature of the work to be performed.

Existing drawings and information provided in these contract documents and appendices form a part of the Bid Specification to the extent referenced and provide detailed information about the project. The documentation is provided for informational purposes only and for the sole use of the Contractor. The City makes no claims as to the correctness or accuracy of the data provided therein. The Contractor shall review and determine for themselves the correctness and accuracy of the information before incorporating and relying on the prior work as part of their work product to the City.

11. STARTING DATE, SEQUENCE OF CONSTRUCTION & COMPLETION DEADLINE

The starting date of this contract will be as specified by the City in a written "Notice to Proceed." It is anticipated that the Contractor will receive a Notice To Proceed by October 1, 2024. The contract duration is 180 calendar days from the Notice to Proceed. A preconstruction meeting shall be scheduled to finalize the sequence of construction. The final decision as to sequence of construction shall be that of the Owner.

12. SUPERVISION OF WORK AND COORDINATION

The Contractor shall supervise the work and shall secure full cooperation of all subcontractors, if any, to complete the work with a minimum interference from the operating personnel of the Owner.

13. COORDINATION WITH THE OWNER

The Contractor shall coordinate all activities with the Owner. The Contractor shall provide the City with reasonable time to respond to requests for information and for coordination.

14. INSPECTION OF MATERIAL AND WORK

A. Workmanship shall be of good quality and all work and material shall be at all times subject to the inspection of the City of Newark or their duly authorized representatives. The contractor shall provide reasonable and necessary facilities for such inspection. If required by the City, the contractor shall take down or uncover portions of the finished work.

B. The contractor agrees that in the event that any of the material or work, or both, shall be rejected as defective or unsuitable by the City, the material shall be replaced and the work shall be done again immediately to the satisfaction and approval of the City at the cost and expense of the Contractor.
C. Any omission or failure on the part of the City of Newark or its inspectors to disapprove or reject any defective work or materials shall not be construed to be acceptance of any defective work or material.
D. Contractor and City Inspector must agree on additional work required outside of the contract documents. A daily time and material log for all additional work shall be supplied by the contractor and signed by the City Inspector.

15. PROTECTION TO PUBLIC AND PROPERTY

A. The contractor shall insure protective measures to the general public and to occupants of property along and adjacent to the work area.
B. The contractor is responsible for any and all damage or injury of any kind which directly or indirectly may be done to any property or sustained by any persons during the execution of the work.
C. If any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work, the contractor shall restore at his own expense such property to a condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner.

16. SAFETY PRECAUTIONS

A. The Contractor shall execute work under this contract with the utmost concern for the safety of the general public. All areas worked upon and subject to travel by the public shall be identified with the proper warning indicators and signs during the working period. Upon completion of the contract or when such areas are reopened to public travel, they shall be rendered in a safe condition using either temporary or permanent repair material as the case may be. No private driveway shall be blocked or closed without the property owner being notified and obtaining their agreement.
B. Streets, roads, and driveways used by the contractor for access to and from the work site shall be protected from damage in excess of that caused by the normal traffic of vehicles used for or in connection with construction work. Any such damage done shall be repaired immediately and left in good condition at the end of the construction period and shall be repaired at the contractor's expense.

17. RIGHT-OF-WAY

All operations shall be confined to the assigned work area. The City will provide no right-of-way over other properties. The contractor shall take every precaution to minimize the inconvenience to the owners or tenants of adjacent property. Public roads shall not be obstructed in such a way as to cut off traffic. The contractor shall, at his own expense, repair any damage or injury to either public or private property during the progress of the work.

18. TRAFFIC CONTROL AND ROAD SIGNS

A. The contractor shall be responsible for traffic control for the duration of the project, as needed, and shall coordinate traffic control plans and obtain necessary permits from the Owner for work on city-owned roads. The contractor shall be responsible for removal and re-installation of all signs in the work area. Signs necessary for the safe movement of traffic shall be maintained in operation during construction. Any other signs shall be properly stored by the Contractor, who shall be responsible for them. All signage shall comply with the current Manual on Uniform Traffic Control Devices (MUTCD).
B. The Contractor shall provide notice to the City seven (7) calendar days in advance of any planned road or entrance closure. All closures shall be at the discretion of the City.

19. JOB SITE MAINTENANCE, RESTORATION AND CLEANUP

The contractor is responsible to restore all disturbed areas to original or better condition and remove all debris, residuals, trash, and excess materials from the site. The contractor is required to keep the work area clean during construction and remove trash as it accumulates. Roads shall be kept clean and free of mud, debris, and dirt. At the direction of the City Inspector, the contractor is responsible for the cost of street sweeping and maintenance required for upkeep of clean road surfaces.

20. DRAWINGS

Project Drawings are included as Attachment 1.

21. AVAILABLE BACKGROUND INFORMATION

Maps, photographs, closed circuit television (CCTV) inspection videos, and other documents provided herein form a part of this Bid Specification to the extent referenced and provide detailed information about the Project Location, and existing conditions of the site(s). The documentation is provided for informational purposes only and for the sole use of the Contractor. The City makes no claims as to the correctness or accuracy of the data provided therein. The Contractor shall review and determine for themselves the correctness and accuracy of the information before incorporating and relying on the prior work as part of their work product to the City.

CITY OF NEWARK

Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK IMPROVEMENTS

PROPOSAL

To: City of Newark Mayor and City Council

From: _____

We, the undersigned as a lawfully authorized agent for the bidder named herein has carefully examined the Bid Documents to be known as Invitation to Bid No. 24-11 and binds themself on award to the City of Newark by the Mayor and City Council of Newark, Delaware to execute in accordance with such award, a contract of which this Proposal and said General Provision, Specifications, and any Addenda shall be a part, and to furnish the goods as specified F.O.B. destination (Newark, Delaware) in a manner that is in complete accordance with said General Provisions and Specifications at the following named unit price on or before the delivery period stated below:

1. BID ITEMS

Bidders must provide prices on the Proposal form including all adjustment bid items. The Owner reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the Proposal if such additions and/or deletions are made to quantities.

2. BASIS OF PAYMENT

Payment for these items shall be included in the unit prices for each item as described in the Proposal. All other items, methods, and materials necessary to complete the work described in each pay item shall be incidental to the bid item the work is being completed under.

2. METHOD OF MEASUREMENT AND INCIDENTALS DETERMINATION

The measurement of payment shall be for the removal, disposal, and installation of the materials listed in the Proposal in accordance with the units indicated below. All work required to complete the work outlined in the proposal shall be incidental to the unit cost provided for the item the work is being conducted under. **The contractor is to provide a schedule of values for all lump sum bid items with their proposal.**

A. Bid Item 1 – Park Improvements: The lump sum cost for any and all scope of work items including but not limited to demolition, erosion and sedimentation control measures, paving, striping, and landscape improvements. This bid item includes all costs for the scope of work items shown on the plans (EXCEPT Sheet L-107) and **any and all** incidental costs required to complete the project per the contract documents **EXCEPT for the items shown on Sheet L-107**.

B. Bid Item 2 – Add Alternate Trail Extension: The lump sum cost for the trail connection as defined on Sheet L-107. This bid item includes all costs for the scope of work items shown on Sheet L-107 and any and all incidental costs required to complete the project per the contract documents.

Bid Item	Item Description	Units	Quantity	Unit Price	Total
1	Park Improvements	LS	1		
2	Add Alternate Trail Extension	LS	1		
	Total Bid:				

(see next page)

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

PROPOSAL (CONT.)

Project to be Completed by (vendor name): _____

Project to be completed within _____ days, months, years (circle one) from the Notice to Proceed.

DATE: _____ BIDDER: _____

By: _____
Legally authorized representative

PRINT NAME: _____

TITLE: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

TELEPHONE: _____

(see next page)

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

PROPOSAL (CONT.)

We acknowledge that we **are/are not (circle one)** registered on www.sam.gov. We also acknowledge that there are no exceptions noted against us as outlined on www.sam.gov.

Our unique entity identifier (UEI), as outlined on www.sam.gov is (write N/A if none): _____

We acknowledge receipt of addendum(a) numbers: _____

Exceptions: _____

_____

Contact Information for Notice of Award/Rejection (If different from below): _____

_____

Project to be completed within 120 days from the Notice to Proceed.

BIDDER: _____ DATE: _____

SUBMITTED BY:

_____ _____
Legally Authorized Representative Signature Print Name

_____ _____
Title Address Line 1

_____ _____
Email Address Address Line 2

_____ _____
Telephone Number City, State, ZIP Code

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

BOND TO ACCOMPANY PROPOSAL
(Not Required if Certified or Cashier's Check is Used)

KNOW ALL MEN BY THESE PRESENTS THAT _____

of _____ in the County of _____

and State of _____ Principal, and _____

of _____ as surety, legally authorized to do business in the Sate of Delaware, are held and firmly bound unto the City of Newark in the sum of _____ _____ Dollars, to be paid to said City of Newark for use and benefit of the Mayor and City Council of Newark, for which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators, and successors, jointly and separately, for and in the whole, firmly by these presents. Sealed with our seals, dated the day of _____ in the year of our Lord, Two Thousand Twenty Four (2024).

NOW THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that if the above noted bound principal _____ who has submitted to said City of Newark, a certain proposal to enter into a certain contract from Invitation to Bid No. 24-11, Edna C. Dickey Park Site Improvements shall be awarded said Contract, and if said _____ shall well and truly enter into and execute said contract and furnish therewith such surety bond or bonds as may be required by the terms of said contract and approved by said City of Newark, said notice of award thereof in accordance with the terms of said proposal, then this obligation to be void, otherwise shall remain in full force and virtue.

(See next page)

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

BOND TO ACCOMPANY PROPOSAL (CONT.)

SIGNED AND SEALED IN THE PRESENCE OF:

_____
Witness (Print)

_____
Witness (Signature)

SIGNED (#1): _____ (SEAL)
(Signature)

BY (#1): _____ (SEAL)
(Print)

SIGNED (#2): _____ (SEAL)
(Signature)

BY (#2): _____ (SEAL)
(Print)

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

NON-COLLUSION STATEMENT

Date: _____

City of Newark, Delaware

This is to certify that the undersigned bidder _____

Has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted to the City of Newark, Delaware on the _____ day of _____, 20____.

BY LEGALLY AUTHORIZED REPRESENTATIVE: _____
(Signature)

_____
(Print)

Sworn to and subscribed before me on this _____ day of _____, 20____.

NOTARY PUBLIC: _____
(Signature)

_____
(Print)

My Commission expires: _____

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

LISTING OF SUBCONTRACTORS

The submitting bidder shall fill in the following listing of all subcontractors they intend to use in the performance of the work outlined herein. No subcontractor shall be substituted for any listed below without the written consent of the City of Newark. The submitting bidder hereby certifies that they have notified all subcontractors that they are obligated to comply with the provisions of this Invitation to Bid, including liability insurance coverage requirements, and all other federal or state laws as they pertain to this project. The submitting bidder shall submit evidence of such compliance upon notice of request.

1. Subcontractor name: _____

   Address: _____

   Type of work: _____

2. Subcontractor name: _____

   Address: _____

   Type of work: _____

3. Subcontractor name: _____

   Address: _____

   Type of work: _____

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

LISTING OF SUBCONTRACTORS (CONT.)

4. Subcontractor name: _____

   Address: _____

   Type of work: _____

Date: _____ Bidder: _____

Address: _____

_____

Telephone #: _____

Email address: _____

Legally authorized representative: _____
(Signature)

_____
(Print)

CITY OF NEWARK
Delaware

INVITATION TO BID NO. 24-11

EDNA C. DICKEY PARK SITE IMPROVEMENTS

REFERENCES SHEET

Provide the following information for at least three (3) business references consisting of current or previous (within the last five (5) calendar years) customers who will attest to your company's ability to undertake and complete this type of work. Information denoted here must be clearly printed or typed.

1. Reference name: _____

   Address: _____

   Telephone #/email: _____

2. Reference name: _____

   Address: _____

   Telephone #/email: _____

3. Reference name: _____

   Address: _____

   Telephone #/email: _____

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected site elements.
   2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

   1. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
   2. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
5. Continues access to existing park areas.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

A. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

C. Storage or sale of removed items or materials on-site is not permitted.

D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Form liners.
3. Insulating concrete forms.
4. Shoring, bracing, and anchoring.

1.3 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction, movement, contraction, and isolation joints
c. Forms and form-removal limitations.
d. Shoring and reshoring procedures.
e. Anchor rod and anchorage device installation tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Exposed surface form-facing material.

2. Concealed surface form-facing material.
3. Forms for cylindrical columns.
4. Pan-type forms.
5. Void forms.
6. Form liners.
7. Insulating concrete forms.
8. Form ties.
9. Waterstops.
10. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.

    a. Location of construction joints is subject to approval of the Engineer.

3. Indicate location of waterstops.
4. Indicate form liner layout and form line termination details.
5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
6. Indicate layout of insulating concrete forms, dimensions, course heights, form types, and details.

C. Samples:

1. For waterstops.
2. For Form Liners: 12-inch by 12-inch sample, indicating texture.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspection agency.

B. Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC353.

C. Field quality-control reports.

D. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Form Liners: Store form liners under cover to protect from sunlight.

B. Insulating Concrete Forms: Store forms off ground and under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:

a. Plywood, metal, or other approved panel materials.
b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

1) APA HDO (high-density overlay).
2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces not exceeding specified formwork surface class.

1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.3 WATERSTOPS

A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.

1. Profile: Flat dumbbell with center bulb>.
2. Dimensions: 4 inches by 3/16 inch thick; nontapered.

2.4 RELATED MATERIALS

A. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

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

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes

C. Limit concrete surface irregularities as follows:

1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.

1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

F. Do not use rust-stained, steel, form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
2. Use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Engineer prior to forming openings not indicated on Drawings.

L. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.

    a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls 20’-0”.

    a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
4. Secure waterstops in correct position at 12 inches on center.
5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.

    a. Miter corners, intersections, and directional changes in waterstops.
    b. Align center bulbs.

6. Clean waterstops immediately prior to placement of concrete.
7. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Protect exposed waterstops during progress of the Work.

3.4 INSTALLATION OF INSULATING CONCRETE FORMS

A. Comply with ACI 301 and manufacturer's instructions.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Install forms in running bond pattern.

1. Align joints.
2. Align furring strips.

D. Construct forms tight to prevent loss of concrete mortar.

E. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.

2. Obtain written approval of Engineer prior to forming openings not indicated on Drawings.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Shore insulating concrete forms to ensure stability and to resist stressing imposed by construction loads.

3.5 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.6 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

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SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction contraction and isolation joints.
c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Zinc repair material.
4. Bar supports.
5. Mechanical splice couplers.
6. Structural thermal break insulated connection system.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Engineer.

D. Delegated-Design Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Delegated-Design Engineer Qualifications: Include the following:

1. Experience providing delegated-design engineering services of the type indicated.
2. Documentation that delegated-design engineer is licensed in the jurisdiction in which Project is located.

C. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

D. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

E. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

C. Mockups: Reinforcing for cast-concrete formed surfaces, to demonstrate tolerances and standard of workmanship.

1. Build panel approximately 100 sq. ft. for formed surface in the location indicated on Drawings or, if not indicated, as directed by Engineer.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.
2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

C. Headed-Steel Reinforcing Bars: ASTM A970/A970M.

D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60, deformed bars, assembled with clips.

E. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

F. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, ASTM A775/A775M epoxy coated.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
c. For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
d. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
e. For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

D. Mechanical Splice Couplers: ACI 318 Type 1, same material of reinforcing bar being spliced; mechanical-lap type.

E. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain

2.3 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

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

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.

H. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

I. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

J. Dual-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

K. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material in accordance with ASTM A780/A780M.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

    a. Special inspection and testing and inspecting agency procedures for field quality control.
    b. Construction joints, control joints, isolation joints, and joint-filler strips.
    c. Semirigid joint fillers.
    d. Vapor-retarder installation.
    e. Anchor rod and anchorage device installation tolerances.
    f. Cold and hot weather concreting procedures.
    g. Concrete finishes and finishing.
    h. Curing procedures.
    i. Forms and form-removal limitations.
    j. Shoring and reshoring procedures.
    k. Methods for achieving specified floor and slab flatness and levelness.
    l. Floor and slab flatness and levelness measurements.
    m. Concrete repair procedures.
    n. Concrete protection.
    o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
    p. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement
7. Aggregates.
8. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

9. Color pigments.
10. Fiber reinforcement.
11. Vapor retarders.
12. Floor and slab treatments.
13. Liquid floor treatments.
14. Curing materials.

    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.

15. Joint fillers.
16. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

    a. Location of construction joints is subject to approval of the Engineer.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

E. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Slab-On-Ground: Build panel approximately 15 feet by 15 feet in the location indicated or, if not indicated, as directed by Engineer.

a. Divide panel into four equal panels to demonstrate saw joint cutting.

2. Formed Surfaces: Build panel approximately 100 sq. ft. in the location indicated or, if not indicated, as directed by Engineer.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.
f. Permeability.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.

2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I, Type II, or Type III
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C595/C595M
5. Silica Fume: ASTM C1240 amorphous silica.
6. Performance-Based Hydraulic Cement: ASTM C1157/C1157M.

C. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of

forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

9. Permeability-Reducing Admixture: ASTM C494/C494M, Type S, hydrophilic, permeability-reducing crystalline admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure (PRAH).

    a. Permeability: No leakage when tested in accordance with U.S. Army Corps of Engineers CRC C48 at a hydraulic pressure of 200 psi for 14 days.

F. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments, color stable, and resistant to lime and other alkalis.

1. Color: As selected by Engineer from manufacturer's full range.

G. Water and Water Used to Make Ice: ASTM C94/C94M, potable

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Sheet Vapor Retarder, Class C: ASTM E1745, Class C, ; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.5 CURING MATERIALS

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

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

    a. Ambient Temperature Below 50 deg F: Black.
    b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
    c. Ambient Temperature Above 85 deg F: White.

D. Curing Paper: Eight-feet- (2438-mm-) wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable or complying with ASTM C1602/C1602M.

F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

E. Floor Slab Protective Covering: Eight-feet-wide cellulose fabric.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete for parking structure slabs, and concrete with a w/cm below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.9 CONCRETE MIXTURES

A. Class A: Normal-weight concrete.

1. Exposure Class: ACI 318 F3, S0, W1, C2.
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: ASTM C143/C143M, as permitted under ACI 301
5. Air Content:

a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Engineer.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls at 20’-0” o.c. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Engineer and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-3.0:

   a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
   b. Remove projections larger than 1/8 inch.
   c. Patch tie holes.
   d. Surface Tolerance: ACI 117 Class A.
   e. Locations: Apply to concrete surfaces exposed to public view.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

   a. Perform no later than one day after form removal.
   b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
   c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
   d. Maintain required patterns or variances as shown on Drawings or to match mockups.

2. Grout-Cleaned Rubbed Finish:

   a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
   b. Do not clean concrete surfaces as Work progresses.
   c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
   d. Wet concrete surfaces.
   e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
   f. Maintain required patterns or variances as shown on Drawings or to match mockups.

3. Cork-Floated Finish:

    a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
    b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    c. Wet concrete surfaces.
    d. Compress grout into voids by grinding surface.
    e. In a swirling motion, finish surface with a cork float.
    f. Maintain required patterns or variances as shown on Drawings or to match mockups.

4. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi, apply scrubbed finish.

    a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed.
    b. Rinse scrubbed surfaces with clean water.
    c. Maintain continuity of finish on each surface or area of Work.
    d. Remove only enough concrete mortar from surfaces to match mockups.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.

2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
        2) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15.
        3) Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17.
        4) Specified overall values of flatness, F_F 45; and of levelness, F_L 35; with minimum local values of flatness, F_F 30; and of levelness, F_L 24.
        5) Specified Overall Value (SOV): F_F 50 and F_L 25 with minimum local value (MLV): F_F 40 and F_L 17.
        6) Specified Overall Value (SOV): F_F 25 and F_L 20 with minimum local value (MLV): F_F 17 and F_L 15.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Engineer before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

    a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications.
    b. Tamp aggregate flush with surface, but do not force below surface.
    c. After broadcasting and tamping, apply float finish.

d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
b. Continuous Sprinkling: Maintain concrete surface continuously wet.
c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12-inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

d. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than seven days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Engineer.
2. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

    a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

    a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
    b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

    a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
    b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    d. Place, compact, and finish to blend with adjacent finished concrete.
    e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.

e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Engineer, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Engineer, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Engineer.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.

b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Engineer.

1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Engineer.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.

3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 116800 - PLAY FIELD EQUIPMENT AND STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes playground equipment as follows:

1. Freestanding playground equipment.
2. Greenfields Outdoor Fitness Equipment.

B. Related Sections:

1. Section 321816.13 "Playground Protective Surfacing" for protective surfacing under and around playground equipment.
2. Section 321313 “Concrete Paving” for miscellaneous concrete work.

1.3 DEFINITIONS

A. Definitions in ASTM F1487 apply to Work of this Section.

B. IPEMA: International Play Equipment Manufacturers Association.

C. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."

D. CPSC: Consumer Product Safety Commission.

E. HDPE: High-density polyethylene.

F. LLDPE: Linear low-density polyethylene.

G. MDPE: Medium-density polyethylene.

H. Use Zone: According to ASTM F 1487, the "area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of playground equipment, structures, and signs.

1. Include engineered stamped drawings and plans, elevations, sections, foundation designs, and attachment details.
2. Include fall heights and use zones for playground equipment, coordinated with the critical-height values of protective surfacing specified in Section 321816.13 "Playground Protective Surfacing."
3. Extent of surface systems and use zones of equipment.
4. Critical heights for playground surfaces and fall heights for equipment.

C. Samples for Initial Selection: For each type of exposed finish.

1. Manufacturer's color charts.
2. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following products:

1. Include Samples of accessories to verify color and finish selection.
2. Posts and Rails: Minimum 6 inches long.
3. Platforms: Minimum 6 inches square.
4. Molded Plastic: Minimum 3 inches square.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturer and testing agency.

B. Product Certificates: For each type of playground equipment.

C. Material Certificates: For the following items:

1. Shop finishes.
2. Wood-Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

D. Field quality-control reports.

E. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer with at least 5 years of documents experience with projects of similar scope and complexity. All crew leads shall be Certified Playground Safety Inspectors.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain playground equipment from single source from single manufacturer.

B. Playground equipment and components shall have the IPEMA Certification Seal.

C. All playground equipment and components shall have the IPEMA Certification Seal.

2.2 PERFORMANCE REQUIREMENTS

A. Safety Standard: Provide playground equipment according to ASTM F1487, and exercise equipment according to ASTM Standard F3101.

2.3 FREESTANDING PLAYGROUND AND EXERCISE EQUIPMENT

A. Contractor to provide and install 8’ Twing Swing model 2012, with 8’ high belt seat model 2840, and 8’ high 360 degree bucket seat model 2990 as manufactured by Miricle Recreation, 876 E Highway 60, Monett, Missouri, 65708; local representative: Charlie Walker, Liberty Parks and Playgrounds, Inc. (M) 443-497-3126, charlie@libertyparks.com. Equipment colors shall be selected by owner from available standard colors for each equipment and appurtenances.

B. Contractor to provide and install 8’ Twing Swing model 2012, with 8’ high belt seat model 2840, and 8’ high 360-degree bucket seat model 2990 as manufactured by Miricle Recreation, 876 E Highway 60, Monett, Missouri, 65708; local representative: Charlie Walker, Liberty Parks and Playgrounds, Inc. (M) 443-497-3126, charlie@libertyparks.com. Equipment colors shall be selected by the owner from available standard colors for each equipment and appurtenances.

C. Contractor to provide and install exercise equipment package to include SGR003 Push Up Bar, SGR071 3-person static combo bar, and UB shoulder press with ground extensions for in ground embedment, as manufactured by Greenfields Outdoor Fitness; local representative: Charlie Walker, Liberty Parks and Playgrounds, Inc. (M) 443-497-3126, charlie@libertyparks.com. Equipment colors shall be selected by the owner from available standard colors for each equipment and appurtenances.

D. Signs: Manufacturer's standard fitness zone sign panels, attached to freestanding, upright support posts shall be provided and installed by contractor. The text shall be as detailed on Sheet L-504 of the construction plans. Additional text may be necessary. Provide layout and copy via shop drawings to Landscape Architect for review.

2.4 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.

B. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C387/C387M and mixed at site with potable water, according to manufacturer's written instructions, for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch-maximum-size aggregate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground and exercise equipment securely, positioned at locations and elevations indicated.

1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.

C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.

D. Post Set with Concrete Footing: Comply with Section 033000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.

1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.

a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

2. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
3. Finishing Footings: Smooth top, and shape to shed water.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487.

C. Playground equipment items will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

E. Notify Engineer 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 116800

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Stripping and stockpiling topsoil.
4. Clearing and Grubbing
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities abandoning site utilities in place.
7. Temporary erosion and sedimentation control.

B. Related Requirements:

1. Section 312500 "Erosion and Sedimentation Controls" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings indicated and according to requirements in Section 015639 "Temporary Tree and Plant Protection.".

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 FIELD CONDITIONS

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

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

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer.

C. Utility Locator Service: Notify Miss Utility of Delmarva for area where Project is located before site clearing.

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

E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

PART 2 - PRODUCTS

2.1 MATERIALS

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

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

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

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control measures and notes on the Drawings.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

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

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

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 SITE IMPROVEMENTS

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

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

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.5 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

C. All demolition waste and construction debris, unless indicated otherwise, shall be removed by the contractor and disposed of in a state approved waste site and in accordance with all local and state codes and permit requirements.

D. Asbestos or hazardous material, if found on site, shall be removed by a licensed hazardous materials contractor. Contractor shall notify owner immediately if hazardous materials are encountered.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.
3. Excavating and backfilling for structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks pavements.
6. Subbase course and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:
1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
3. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.
4. Section 312317 "Trenching" for utility service trenching and backfilling

1.3 DEFINITIONS

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

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

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

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

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

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

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

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

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

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

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

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

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

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

M. Clean Fill: Uncontaminated, non-water-soluble, non-decomposable inert solid material. The term includes soil, rock, stone, dredged material, used asphalt, and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such.

N. Potentially Contaminated Material: Unclassified excavated soil and material which includes visual evidence of contamination, is emitting an odor, and/or consists of extended Photoionization Detector (PID) readings.

O. Contaminated Materials: Regulated fill including soil, rock, stone, dredged material, used asphalt, historic fill, and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such that has been affected by a spill or release of a regulated substance and the concentrations of regulated substances.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.
4. Documentation of disposal of asphalt pavement at a landfill.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency. Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698.

1.7 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.8 FIELD CONDITIONS

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

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

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" and Section 311000 "Site Clearing" are in place.

D. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

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

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487 Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487 Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.

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

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200sieve.

E. Bedding Course: Refer to sections for sanitary sewerage piping, storm drainage piping and water service connections for bedding and backfill materials specific to the pipe and structures for each use. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

F. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

G. Sand: ASTM C33/C33M; fine aggregate.

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

I. Topsoil: Friable clay loam surface soil. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stone and other objects over one inch in diameter, and without weeds, roots and other objectionable material.

1. Topsoil shall contain not less than 2% or more than 10% organic matter, as determined by AASHTO Designation T-164.
2. On-site topsoil shall not be used.
3. Obtain topsoil from a source where the soil has proven ability to grow crops.
4. Furnished topsoil shall meet the following grade analysis:

Sieve	Minimum Percent Passing
1"	100
No. 4	75
No. 10	60

5. All materials unsuitable for use as topsoil shall become the property of the Contractor.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 incheswide and 4 milsthick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 incheswide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inchesdeep; colored as follows:

1. Red: Electric.

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

D. Care to be exercised during excavation to prepare subgrade to protect and not over excavate to shallow utilities.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

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

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

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

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

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.7 EXCAVATION FOR UTILITY TRENCHES

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

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

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

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

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

E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 EXCAVATION FOR ELEVATOR CYLINDER

3.9 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

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

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

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

3.10 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.11 STORAGE OF SOIL MATERIALS

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

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

3.12 BACKFILL

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

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

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

3.13 UTILITY TRENCH BACKFILL

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

B. Place and compact final backfill using satisfactory material (see DIV 33 sections) to final subgrade elevation.

C. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 SOIL FILL

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

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.

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

3.15 SOIL MOISTURE CONTROL

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

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

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

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

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

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698/ASTM D1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact to at least 97 percent; except that fill placed in the top 12 inches of structure subgrades be compacted to at least 100 percent.
2. Under walkways, scarify and recompact top 6 inchesbelow subgrade and compact each layer of backfill or fill soil material at 97 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 97 percent.

3.17 GRADING

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

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

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

1. Turf or Unpaved Areas: Plus or minus 1 inch.

2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

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

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

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

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

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course and base course to required crown elevations and cross-slope grades.
4. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
5. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698/ASTM D1557.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

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

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

1. Place drainage course 6 inches or less in compacted thickness in a single layer.
2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

4.1 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify materials below all foundations are adequate to achieve the design bearing capacity.
2. Verify excavations are extended to proper depth and have reached proper material.

3. Perform classification and testing of compacted fill materials.
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of compacted fill.
5. Prior to placement of compacted fill, observe subgrade and verify that the site has been prepared properly.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

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

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.

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

4.2 PROTECTION

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

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

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

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

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

4.3 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

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

END OF SECTION 312000

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SECTION 312317 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Compacted fill from top of utility bedding to subgrade elevations.
2. Backfilling and compaction of utility trenches.

B. Related Sections:

1. Section 312000 – Earth Moving.

1.2 REFERENCES

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.1 GENERAL – Refer to sections for storm drainage piping and utility lines for bedding and backfill materials specific to the pipe, conduit and structures for each use.

2.2 DETECTABLE WARNING TAPE: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a

protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

A. Red: Electric.
B. Yellow: Gas, oil, steam, and dangerous materials.
C. Orange: Telephone and other communications.
D. Blue: Water systems.
E. Green: Sewer systems.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

3.2 PREPARATION

A. Call Local Utility Line Information service not less than 3 business days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

3.3 TRENCHING

A. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume.

B. Do not advance open trench more than 60 feet ahead of installed pipe.

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

D. Trench Bottoms: Excavate trenches to depth indicated and 4 to 6 inches deeper than bottom of pipe. Shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit, shape bottom of trench to support bottom and 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill and support pipe and conduit on an undisturbed subgrade with bedding as shown in the drawings.
2. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade with bedding as shown in the drawings.
3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. When subsurface materials at bottom of trench are loose or soft, notify Engineer, and request instructions. Cut out soft areas of subgrade not capable of compaction in place as directed. Backfill with material as directed by the Engineer and compact to density equal to or greater than requirements for subsequent backfill material.

F. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by the Engineer.

G. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

H. Remove water or materials that interfere with Work.

I. Do not interfere with 45 degree bearing splay of foundations.

J. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.

K. Remove excess subsoil not intended for reuse, from site. Stockpile excavated material in area designated on site.

L. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Refer to sections for sanitary sewerage piping, storm drainage piping and water service connections for bedding materials specific to the pipe and structures for each use.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches five (5) deep or deeper that are excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Backfill voids with satisfactory soil while removing shoring and bracing.

C. Place and compact initial backfill to a height of 12 inches over the pipe or conduit. Refer to details/sections for pipe trench for bedding and backfill materials specific to the pipe and structures for each use.

D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

E. Place material in continuous layers not to exceed 8” for heavy compaction equipment and not more than 4” for hand-operated tampers.

F. Employ placement method that does not disturb or damage the utilities in trench.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Do not leave more than 20 feet of trench open at end of working day.

I. Protect open trench to prevent danger to Owner, the public and workers.

J. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.6 FIELD QUALITY CONTROL

A. Perform laboratory material tests in accordance with ASTM D1557 or ASTM D698.

B. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D2922.
2. Moisture Tests: ASTM D3017.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

D. Frequency of Tests: every 200 LF of trench, no fewer than 2 tests per trench.

3.7 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 312317

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SECTION 312500 – EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Sediment and Erosion Control Plan.
2. General Procedures.
3. General Maintenance Provisions.
4. Removal.

B. Related Documents

1. Section 311000 “Site Clearing”.
2. Section 312000 “Earth Moving”.

1.2 SEDIMENT AND EROSION CONTROL PLAN

A. Sediment and Erosion Control measures are shown on the Erosion and Sediment Pollution Control (ESPC) Plans for the Project which is included in the Contract Documents. The approved ESPC Plans shall be kept available on site throughout construction. Activities in this Section are in addition to the requirements outlined on the Drawings.

B. Activities include all work required by Local, State, and Federal rules and regulations to prevent soil erosion and sedimentation. Best available technology (BAT) shall be employed to manage turbid discharges in accordance with requirements of 7. Del C. Ch 60, Regulations Governing the Control of Water Pollution, Section 9.1.02, known as Special Conditions for Stormwater Discharges Associated with Construction Activities, and DNREC policies, procedures, and guidance. All elements of ESPC Plan shall be installed and capable of functioning as intended prior to start of any construction activities within the contributing watershed. Implement the sediment and erosion control methods in the ESPC Plan plus all additional methods as may be necessary due to localized site conditions, or construction procedures occurring during completion of the work in order to assure compliance with applicable law. Maintain all sediment and erosion control facilities throughout construction.

C. Should unforeseen site conditions require a modification to the ESPC Plans, the Contractor shall be responsible for obtaining all approvals of the modifications from the regulating agencies for any changes to the approved ESPC Plans necessary to provide proper sediment and erosion control facilities to ensure work being completed is in accordance with the governing regulations.

D. The Site Contractor is responsible for the erosion and sediment control facilities and procedures for the site, and the activities of the other prime contractors and subcontractors working on the site. Instruct the contractors and subcontractors in the sediment and erosion control procedures

and monitor the earth disturbing operations of those contractors and subcontractors to ensure the ESPC Plan is being properly implemented.

1.3 GENERAL PROCEDURES

A. Disturb smallest area of stable land surface as practical.

B. Divert clean water away from construction area whenever possible.

C. Modify Plan to include temporary and permanent facilities required by construction sequences such that all water leaving the construction area passes through sediment and erosion control facilities.

D. Place stone base material in areas designated to be paved upon completion of subgrade. Limit vehicular access to stone areas.

E. Remove any sediment spilled, dropped or tracked onto a private or public paved area(s) immediately. Maintain at site at all times, proper equipment and manpower to complete such immediate removal.

F. Prevent sediment from entering any stormwater management facility, storm drain, ditch, or water course through use of sediment filter best management practices as depicted in the ESPC Plans.

G. Maintain utility excavations in open condition only long enough to properly install or inspect underground facilities in accordance with applicable specification.

H. Direct dewatering equipment discharges onto a stabilized surface so that erosion does not occur. Direct discharge through a sediment filter structure and discharge in a non-erosive manner.

I. Place excavated material upslope from the excavation whenever possible. Runoff from stockpiles shall be directed through a sediment filter structure and discharged in a non-erosive manner. Stabilize stockpiles if to remain in place longer than 20 days.

J. Place stripped topsoil in stockpiles as indicated on Drawings, separate from all other materials. Stabilize stockpiles it to remain in place longer than 20 days.

K. Restore backfilled excavation surfaces to original cover unless otherwise specified. Provide temporary stabilization for all erodible/soluble areas and materials to be exposed for a period of time exceeding 20 days.

L. Provide temporary cover to stabilize and protect erodible surfaces by seeding with temporary seeding as specified.

1.4 GENERAL MAINTENANCE PROVISIONS

A. Inspect facilities after each rain and make repairs required to ensure facilities continue to function properly. Make replacements and repairs as required throughout construction.

B. Remove sediment behind silt fence, compost sock and other sediment control structures as specified in the Erosion and Sediment Control Plan Narrative.

C. Water temporary seeded areas to promote growth of grass cover. Replace mulch required to maintain protection. Reseed and remulch until stand of grass is observed.

D. Inspect geotextile lining used to cover erodible surfaces and channels to ensure anchoring is satisfactory, overlaps are maintained, and complete coverage is provided.

1.5 REMOVAL

A. Remove only sediment and erosion control facilities upon stabilization of the contributing watershed areas or as approved by the Conservation District.

B. Restore areas occupied by the facilities to either the original condition or condition required by the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 312500

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SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt overlay.
3. Cold milling of existing asphalt pavement.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
3. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.

1.3 ACTION SUBMITTALS

A. Product Data: Include technical data and tested physical and performance properties.

1. Paving geotextile.
2. Joint sealant.

B. Hot-Mix Asphalt Designs:

1. Certification, by authorities having jurisdiction, of approval of each hot-mix asphalt design proposed for the Work.
2. For each hot-mix asphalt design proposed for the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For paving-mix manufacturer.

B. Material Certificates:

1. Aggregates.
2. Asphalt binder.
3. Asphalt cement.
4. Cutback prime coat.
5. Emulsified asphalt prime coat.
6. Tack coat.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or DELDOT.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of DELDOT for asphalt paving work.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 40 deg F and rising.
2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Slurry Coat: Comply with weather limitations in ASTM D3910.
4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: Coarse aggregate shall be that part of the aggregate retained on the No. 8 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall be crushed stone or crushed gravel and shall have a percentage of wear as determined by AASHTO T96 of not more than 40 percent. In the mixture, at least 75 percent, by mass (weight), of the material coarser than the 4.75 mm (No. 4) sieve shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and a not more than 8.0% of flat or elongated pieces (>3:1) as specified in ASTM D4791.

C. Fine Aggregate: The fine aggregate shall be that part of the aggregate mixture passing the No. 8 sieve and shall consist of sand, screenings, or combination thereof with uniform quality throughout. Fine aggregate shall consist of durable particles, free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested in accordance with AASHTO T90. Fine aggregate from the total mixture shall meet plasticity requirements

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320. Hot Mix Asphalt binder designation PG 64-22.

B. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

C. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Paving Geotextile: AASHTO M 288 paving fabric; nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.

2.4 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed in accordance with procedures in AI MS-2, "Asphalt Mix Design Methods"; and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.3 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 3-1/2 inches.
2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, driveway aprons, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.
7. Handle milled asphalt material in accordance with approved waste management plan.
8. Keep milled pavement surface free of loose material and dust.
9. Do not allow milled materials to accumulate on-site.

3.4 SURFACE PREPARATION

A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

3.5 INSTALLATION OF PAVING GEOTEXTILE

A. Place paving geotextile promptly in accordance with manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 4 inches and transverse joints 6 inches.

B. Protect paving geotextile from traffic and other damage, and place hot-mix asphalt overlay the same day.

3.6 HOT-MIX ASPHALT PLACEMENT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 12 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method in accordance with AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density, Marshall Test Method: 96 percent of reference laboratory density in accordance with AASHTO T 245, but not less than 94 percent or greater than 100 percent.
2. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a smooth surface.

3.10 FIELD QUALITY CONTROL

A. Owner’s Representative to be notified prior to paving.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549/D3549M.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216

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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes Concrete Paving. Including the Following:

1. Pavements.
2. Joints.
3. Curbs and gutters.
4. Walks.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
2. Section 321726 "Tactile Warning Surfacing" for detectable warning tiles.

1.3 DEFINITIONS

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

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Curing compounds.

4. Joint fillers.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

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

1.7 FIELD CONDITIONS

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

B. Cold-Weather Concrete Placement: Unless otherwise permitted in writing, discontinue concreting operations when the descending air temperature, away from artificial heat, falls to 40F. Do not resume operations until the air temperature, away from artificial heat, rises above 40F. Do not let water with a temperature above 90F to come in direct contact with the cement, until the cement has been mixed with the aggregates. Place concrete when the concrete temperature is between 50F and 90F. Do not use materials containing frost, lumps, or crusts of hardened materials. Do not place concrete on frozen base, subbase, or subgrade.

C. Hot-Weather Concrete Placement: When the air temperature in the immediate vicinity of concrete operations rises to 85F, take thermometer readings of the plastic concrete, at 1/2-hour intervals and at the conclusion of the mixing cycles. Discontinue concrete operations if the plastic concrete temperature exceeds 90F after mixing. When the plastic concrete temperature rises to 90F, cool the mixing water or aggregates to maintain a plastic concrete temperature within 50F to 90F at the time of placing.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

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

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

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

2.3 STEEL REINFORCEMENT

A. All reinforcement shall be in accordance with DelDOT's Standard Specifications for Road and Bridge Construction, Sections 611 and 1037.

2.4 CONCRETE MATERIALS

A. All aggregate, water, and admixtures shall be in accordance with DelDOT's Standard Specifications for Road and Bridge Construction, Sections 501, 1003, 1004, 1020, 1021, and 1022.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute.

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

C. Water: Potable.

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

E. Curing and Sealing Compound shall be a VOC-compliant and/or water-based, clear, sprayable, non-residual liquid silane or siloxane sealing compound: ASTM C-309, ASTM C-672 (Zero Sealing at 100 cycles) and NCHRP 244 Series II.

F. Sealing Compound to be a waterborne silane or siloxane sealing compound: ASTM E-514, ASTM C-672 (Zero Scaling at 100 cycles) and NCHRP 244 Series II.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber preformed strips.

B. Dowels: #6 smooth, round steel bars.

C. Joint Sealant: Two-part, chemically-curing, cold applied elastomeric, traffic grade, Polyurethane sealant in accordance with DelDOT Standard Specifications for Road and Bridge Construction section 1042.

2.7 CONCRETE MIXTURES

A. For pavement: DelDOT Class A, B, and B/SF, in accordance with DelDOT's Standard Specifications for Road and Bridge Construction, Section 1022.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

1. Furnish batch certificates for each batch discharged and used in the Work.
2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 EDGE FORMS AND SCREED CONSTRUCTION

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

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

3.4 STEEL REINFORCEMENT INSTALLATION

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

B. Place reinforcement at depth shown on the Drawings.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness. Joints shall be straight and continuous, not staggered and as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.

    a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

    a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces

to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: In vehicular pavement, drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: In walkways draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 DETECTABLE WARNING INSTALLATION

A. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 321726 "Tactile Warning Surfacing."

1. Tolerance for Opening Size: Plus 1/4 inch, no minus.

B. Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 321726 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 321726 "Tactile Warning Surfacing" immediately after screeding concrete surface.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by any one or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
3. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer’s written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial applications. Maintain

continuity of coating, and repair damage during curing period. Curing and Sealing compound to be applied in accordance with manufacturer recommendations.

E. Sealing Method: When an acceptable combined curing and sealing compound is not used, concrete pavement and sidewalk is to cure for 28 days and then power-washed and allowed to dry prior to apply sealing compound. Unless otherwise permitted, apply in weather suitable for drying when the air temperature and concrete surface temperature are between (50° F and 95° F). Do not apply when surface and air temperatures are not expected to remain above 50° F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions. Do not apply under windy conditions which may result in uncontrolled and excessive water repellent drift. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

F. Protect concrete from rain before its initial set. If rain is imminent, stop paving and cover the concrete surface with protective material in accordance with DelDOT approved methods.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 1/2 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
4. Lateral Alignment and Spacing of Dowels: 1 inch
5. Vertical Alignment of Dowels: 1/4 inch.
6. Joint Spacing: 3 inches.
7. Contraction Joint Depth: Plus 1/4 inch, no minus.
8. Joint Width: Plus 1/8 inch, no minus.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing agency to perform concrete tests. Tests shall be performed while a representative of the owner is present.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day. Provide a minimum of 4 samples.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four (4) standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days. Hold one in reserve.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Submit test and inspection reports to the Engineer within 24 hours of each test.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.13 SITE RESTORATION

A. If necessary and as indicated, repair adjacent bituminous pavement for smooth transition to the new concrete pavement and repair areas of bituminous pavement damaged during construction. Full depth bituminous repairs to be provided 2 feet wide by the length of repair required.

END OF SECTION 321313

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SECTION 321713 - PARKING BUMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Precast concrete wheel stops.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Precast concrete wheel stops.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 3,500-psi minimum compressive strength, 5 inches high by 9 inches wide by 72 inches long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
2. Mounting Hardware: Galvanized-steel spike or dowel, 1/2-inch diameter, 10-inch minimum length.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation in accordance with manufacturer's written instructions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wheel stops in accordance with manufacturer's written instructions unless otherwise indicated.

B. Securely anchor wheel stops to substrate with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

SECTION 321816.13 - PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Unitary, synthetic poured seamless surfacing.
2. Organic loose-fill surfacing.

B. Related Requirements:
1. Section 312000 "Earth Moving".
2. Section 334600 "Subdrainage" for playground subdrainage system
3. Section 116800 "Play Field Equipment and Structures"

1.3 DEFINITIONS

A. Definitions in ASTM F2223 apply to Work of this Section.

B. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292. According to ASTM F1292, this approximates "the maximum fall height from which a life-threatening head injury would not be expected to occur."

C. SBR: Styrene-butadiene rubber.

D. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.4 PERFORMANCE REQUIREMENTS

A. Impact Attenuation: According to ASTM F 1292.

B. Accessibility of Surface Systems: According to ASTM F 1951.

C. Minimum Characteristics for Organic Loose-Fill Surfaces: According to ASTM F 2075.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of protective surfacing.

1. Include plans, sections, placement and penetration details, and attachment to substrates.
2. Include accessories and edge terminations.
3. Include patterns made by varying colors of surfacing.
4. Include fall heights and use zones for equipment and structures specified in Section 116800 "Play Field Equipment and Structures," coordinated with the critical heights for protective surfacing.

C. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of protective surfacing and exposed finish.

1. Include Samples of accessories to verify color and finish selection.
2. Unitary, Seamless Surfacing: Minimum 6 by 6 inches.
3. Loose-Fill Surfacing: Minimum 1 quart.
4. Drainage/Separation Geotextile: Minimum 12 by 12 inches.
5. Weed-Control Barrier: Minimum 12 by 12 inches

E. Product Schedule: For protective surfacing. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Material Certificates: For each type of loose-fill surfacing.

C. Product Certificates: For each type of unitary surfacing product.

D. Field quality-control reports.

E. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground protective surfacing to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.

1. Provide secondary materials including adhesives, primers, geosynthetics, and repair materials of type and from source recommended by manufacturer of playground surface system materials.

C. Standards and Guidelines: Comply with CPSC No. 325, "Handbook for Public Playground Safety"; ASTM F 1292; and ASTM F 1487.

1.9 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Reduction in impact attenuation as measured by reduction of critical fall height.
b. Deterioration of protective surfacing and other materials beyond normal weathering.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain protective surfacing materials, including loose-fill accessories, from single source from single manufacturer.

1. Provide geosynthetic accessories of each type from source recommended by manufacturer of protective surfacing materials.

2.2 UNITARY, DUAL-DENSITY, SEAMLESS SURFACING

A. Description: Manufacturer's standard, site-mixed and applied, two-layer material with wearing layer over cushioning layer, with combined, overall thickness as required, tested for impact attenuation according to ASTM F1292 and for accessibility according to ASTM F1951.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fibar Group LLC (The); FibarPIP.
b. GameTime; a PlayCore, Inc. company; GT Impax PIP.
c. Hanover Specialties, Inc.; Vitriturf.
d. Play Safe Surfacing, Inc.; EPDM Pour-N-Place.
e. SpectraTurf, Inc; SpectraPour.
f. Surface America Incorporated; PlayBound Poured-in-Place.

2. Wearing Layer: Formulation of EPDM rubber particles or polyurethane granules, binder, and other organic and inorganic components.
3. Cushioning Layer: Formulation of recycled SBR particles and binder.

4. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane.
5. Lacquer Topcoat: Manufacturer's standard polyurethane-based formulation.
6. Critical Height: As indicated on Drawings.
7. Overall Thickness: Not less than as required for critical height indicated.
8. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
9. Wearing Layer Color(s): As selected by Landscape Architect from manufacturer's full range of standard colors and as indicated on drawings.

    a. Design: Where colored pattern and graphic designs is required, provide as indicated on Drawings.

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

2.3 ORGANIC LOOSE-FILL SURFACING

A. Engineered Wood Fiber: ASTM F2075; containing no bark, leaves, twigs, or foreign or toxic materials; tested for accessibility according to ASTM F1951.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Fibar Group LLC (The); Fibar System 300.
    b. GameTime; a PlayCore, Inc. company; GT Impax Engineered Wood Fiber.
    c. Sof'Solutions Inc.; Sof'Fall.
    d. Supreme Forest Products; Playground Safety Fiber.
    e. Zeager Bros., Inc.; WoodCarpet.

2. Critical Height: As indicated on Drawings.
3. Uncompressed Material Depth: Not less than as required for critical height indicated.

2.4 GEOSYNTHETIC ACCESSORIES

A. Drainage/Separation Geotextiles: Comply with Section 312000 "Earth Moving."

B. Drainage/Separation Geotextile: Nonwoven, needle-punched geotextile, manufactured for drainage applications and made from polyolefins or polyesters; with the following minimum properties:

1. Weight: 4 oz./sq. yd.; ASTM D5261.
2. Water Flow Rate: 100 gpm/sq. ft. 150 gpm/sq. ft. according to ASTM D4491.

C. Weed-Control Barrier: Composite fabric geotextile consisting of woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, weighing not less than 4.8 oz./sq. yd.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade elevations, slope, and drainage and for other conditions affecting performance of the Work.

1. Verify that substrates are sound and without high spots, ridges, holes, and depressions.

B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary, protective surfacing installation and that substrate surfaces are dry, cured, and uniformly [level] sloped to drain within recommended tolerances according to protective surfacing manufacturer's written requirements for cross-section profile.

1. Concrete Substrates: Verify that substrates are dry and free from surface defects, laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with protective surfacing or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by protective surfacing manufacturer.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.

B. Hard-Surface Substrates: Clean surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with protective surfacing.

1. Repair: Fill holes and depressions in unsatisfactory surfaces with leveling and patching material.
2. Treatment: Mechanically abrade or otherwise prepare concrete substrates according to protective surfacing manufacturer's written instructions to achieve adequate roughness.
3. Terminal Edges: Saw cut concrete for terminal edges of protective surfacing.
4. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through protective surfacing.

3.3 INSTALLATION OF GEOSYNTHETIC ACCESSORIES

A. Install geosynthetic accessories before edging and according to playground surface system manufacturer's and geosynthetic manufacturer's written instructions and in a manner that cannot become a tripping hazard.

1. Drainage/Separation Geotextile: Completely cover area beneath protective surfacing, overlapping geotextile sides and edges a minimum of 8 inches with manufacturer's standard treatment for overlapping loosely laid adhesively bonded or taped seams.

2. Weed-Control Barrier: Completely cover area beneath loose-fill installation, overlapping barrier edges a minimum of 8 inches with manufacturer's standard treatment for overlapping loosely laid adhesively bonded or taped seams.

3.4 INSTALLATION OF SEAMLESS SURFACING

A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.

1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
2. Poured Cushioning Layer: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
4. Wearing Layer: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes, with no cold joints. Finish surface to produce manufacturer's standard wearing-surface texture.

    a. Design: Where colored pattern graphic design is required, place colored, design material as soon as previously placed material is sufficiently cured, using primer or adhesive if required by manufacturer's written instructions.

5. Lacquer Topcoat: Spray or roller applied at manufacturer's standard coating rate in one continuous operation.
6. Edge Treatment: As indicated on Drawings. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness required to comply with performance requirements.

3.5 INSTALLATION OF LOOSE-FILL SURFACING

A. Apply components of loose-fill surfacing according to manufacturer's written instructions to produce a uniform surface.

B. Edging: Place and permanently secure edging in place, and attach units to each other.

C. Loose Fill: Place loose-fill materials to required depth after installation of playground equipment support posts and foundations. Include manufacturer's recommended amount of additional material to offset natural compaction over time.

D. Grading: Uniformly grade loose fill to an even surface free from irregularities.

E. Compaction: After initial grading, mechanically compact loose fill before finish grading.

F. Finish Grading: Hand rake to a uniformly smooth finished surface and to required elevations.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests.

B. Perform the following tests with the assistance of a factory-authorized service representative:

1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.

C. Playground protective surfacing will be considered defective if it does not pass tests.

D. Remove and replace applications of playground surface system where test results indicate that it does not comply with requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with requirements.

F. Prepare test reports.

3.7 PROTECTION

A. Prevent traffic over seamless surfacing for not less than 48 hours after installation.

END OF SECTION 321816.13

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Shelters.
   2. Picnic Tables
   3. Bench

B. Related Requirements:

   1. Section 033000 "Cast-in-Place Concrete" for installing pipe sleeves cast installing anchor bolts cast formed voids in concrete footings.
   2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.

E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

   1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 SHELTERS

A. Contractor to provide and install 20'x 44' Steelworx Gable Shelter as manufactured by Coverworx Recreation Architecture; local representative: Charlie Walker, Liberty Parks and Playgrounds, Inc. (M) 443-497-3126, charlie@libertyparks.com. Shelter color options shall be selected by the owner from available standard colors for each equipment and appurtenances.

1. Roof Type – 24 Ga. Precut steel panels
2. Provide base plate covers
3. Provide 2 electrical cut outs
4. Provide lightning protection package
5. Column Color – to be selected by Landscape Architect from standard available colors.
6. Roof Color – to be selected by Landscape Architect from standard available colors.
7. Submit true color samples for approval
8. Submit signed and sealed drawings including architectural elevations, structural framing plan, column layout, foundation and base connection details to meet local building codes.

2.2 PICNIC TABLES

A. Tables shall be thermos plastic coated tables as supplied by RJ Thomas Manufacturing Inc., 1.800.7625002. All tables shall include expanded metal surface option. Color to be selected by Landscape Architect from standard available colors.

1. Twelve (12) Movable Picnic Tables – Model# WXT 2-3/8OD 6' Wheelchair accessible, with galvanized frame, and thermos plastic coating heat fused to expanded steel top.

2.3 BENCH

A. Bench shall be powder coated steel model# 302-6 for surface mount; as supplied by local representative: Charlie Walker, Liberty Parks and Playgrounds, Inc. (M) 443-497-3126, charlie@libertyparks.com.. Color to be selected by Landscape Architect from standard available colors.

2.4 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.6 STEEL AND GALVANIZED-STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.7 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run directional finishes with long dimension of each piece.
2. Directional Satin Finish: ASTM A480/A480M, No 4.
3. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 CLEANING AND PROTECTION

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

B. Protect finishes of furnishings from damage during construction period with temporary

protective coverings approved by manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 323300

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes extent of work is shown on drawings and includes but is not limited to:

1. Furnish, mix and install Planting Soil (Imported Topsoil) for lawn and plant beds.
2. Preparation of subgrade and finish grade and compaction mitigation.
3. Furnish and install Erosion Control.
4. Clean up.

B. Related Requirements:

1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
3. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

F. Imported Soil: Soil that is transported to Project site for use.

G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.

H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

M. SSSA: Soil Science Society of America.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

Q. USCC: U.S. Composting Council.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:

    a. Manufacturer's qualified testing agency's certified analysis of standard products.
    b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quartvolume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installation and maintenance foreman on the job shall be experienced in landscape installation and maintenance on projects with similar scope. Perform work with personnel totally familiar with Planting Soil preparation and lawn and planting installations under the supervision of a foreman experienced with landscape work.

B. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1. Testing Agencies: Provide test data from one of the following testing agencies, or an approved equal:

a. Rutgers Agricultural Experiment Station, Soil Testing Laboratory, PO Box 902, Milltown, NJ 08850, phone: 732-932-9295, website: njaes.rutgers.edu/soiltestinglab/.
b. University of Delaware Soil Testing Program, Department of Plant and Soil Sciences, 152 Townsend Hall, 531 South College Avenue, Newark, DE 19716-2170, phone: 302-831-1392, website: ag.udel.edu/dstp/index.html.
c. University of Massachusetts Soil and Plant Tissue Testing Laboratory, West Experiment Station, 682 North Pleasant Street, Amherst, MA 01003, phone: 413-545-2311,website: soiltest.umass.edu.
d. Penn State Agricultural Analytical Services Laboratory, University Park, PA 16802, phone: 814-863-0841, website: www.aasl.psu.edu/Default.htm.
e. Hummel & Co, 35 King Street, Trumansburg, NY 14886, phone: 607-387-5694, website: www.turfdoctor.com.

1.7 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

1. Samples: Submit loose materials in sealed bags labeled with the name of the project title, material, manufacturer/supplier.

a. Planting Soil, 1-gallon re-sealable plastic bag.
b. Compost, 1-gallon re-sealable plastic bag.
c. Erosion Control Matting.

d. Any other soil amendment or conditioner as requested by the Landscape Architect. Submit certificates and product data cut sheets for each type of amendment material.

2. Provide written confirmation that the source of supply can meet the quantities required for the scope of work. Multiple sources for a single item are not acceptable.
3. Quality Control Samples: Maintain a 5-gallon bucket of final approved Planting Soil and Compost on-site in a protected, secure location. If the installed or delivered Planting Soil or Compost deviate from the control samples additional testing will be required at the Contractors expense.

1.8 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

1. Prior to delivery to the site, submit all required soil materials to an approved soil testing laboratory and test as defined herein.
2. Planting Soil test reports shall be submitted for review and approval prior to delivery to
3. the site. If required to bring Planting Soil into Specification conformance, Sand amendment shall be tested. Test reports shall be provided for review and approval to verify amendment conformance prior to blending of Sand with Topsoil.
4. Compost shall also be submitted for testing to verify conformance with Specifications. If required to bring Planting Soil into Specification conformance, Compost amendment test reports shall be submitted for review and approval to verify amendment conformance prior to blending of Compost with Topsoil.
5. Submit Compost test reports for review and approval prior to performing the in-situ Compost amendment.
6. The contractor shall coordinate testing, submittal review, and fabrication allowing enough time to complete the testing and review process, Planting Soil fabrication within
7. the construction timeline and without impacting the schedule. An A2LA Accredited Lab shall perform all soil testing. Submit the testing laboratory credentials for review and approval prior to submitting materials for testing. Utilize a single approved testing laboratory unless approved otherwise or indicated otherwise herein.
8. All test results and samples shall be submitted to the Landscape Architect for review and
9. approval. Test results of samples shall conform to the specifications, or specific soil amendments shall be proposed for approval.
10. All Test Reports must be labeled with the following information.

a. Date material sampled from source/supplier.
b. Date material tested in lab.
c. Project title.
d. Name of contractor.
e. Name of source/supplier and material tested.
f. Testing agency name and contact information.
g. Test type and test result including units reported.
h. Results of test including deviations from acceptable ranges as defined by the specifications. If not defined by the specifications, then as recommended by the testing agency.
i. Test reports must be submitted with sample of the material tested.

11. Test Reports: Submit this specification and sample intended for use for Planting Soil or in-situ Compost amendment to the approved Testing Agency. All reports must be submitted with representative samples. Provide test reports indicating results inclusive of all criteria specified in Part 2 herein.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

B. Planting Soil and organic amendment materials shall be protected from intrusion of contaminants and erosion at all times. Once mixed, cover the final stockpile with filter cloth or store in a covered space.

C. Soil materials shall not be delivered to the site until samples and test reports have been approved by the Landscape Architect. However, such approval does not constitute final acceptance of Planting Soil.

D. Stockpiling: On-site stockpiling shall be restricted to no more than the needs of what can be used in a 24 hour period, unless approved otherwise by the Landscape Architect. Stockpiles should be no more than 6 feet in height to prevent anaerobic conditions within the pile(s). Composts should be turned weekly.

E. Deliver packaged materials to the location where soils are to be mixed, in unopened bags or containers, each bearing the name, guarantee, and trademark or the producer, material composition, manufacturer's certified analysis, and the weight or the material. Retain packages for review by the Landscape Architect.

F. Store and handle packaged materials in compliance with manufacturer's instructions and recommendations. Protect all materials from weather, damage, and theft.

G. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Existing, on-site surface soil, with the duff layer, if any, retained**;** and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with soil amendments and fertilizers to produce planting soil.

1. Compost and/or Sand amendments shall be homogenously blended and uniformly mixed with Topsoil using a mechanical soil blender designed for such purpose or shall be uniformly mixed by wind-rowing.
2. Topsoil that is to be blended with Sand must be screened or shredded before mixing with Sand.
3. Soil materials must be maintained moist, not wet, during mixing.
4. Compost may not be added greater than 20% by volume.
5. Topsoil shall be a natural, loamy, friable mineral soil taken from the O and A Horizons essentially free from heavy or stiff clay lumps, stones, cinders, concrete, brick, roots, sticks brush, litter, plastics, metals, refuse or other deleterious materials in accordance with ASTM D 5286-92. The soil shall be free of herbicides, petroleum-based materials or other substances of a hazardous or toxic nature, which may inhibit plant growth. The soil shall be free of noxious weeds, seeds or vegetative parts of weedy plants that cannot be selectively controlled in the planting.

C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam, loam, silt loam, loamy sand, or, sand and modified to produce viable planting soil.

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Imported Soil shall have a pH 6.5 to 7.5 and minimum of 3 to 6 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration as determined by ASTM- F1647-11.
3. Planting Soil shall be tested for particle size and organic content after passing through a 1/4-inch sieve rather than the standard 2-mm sieve to include larger pieces of organic material.
4. Particle Size Analysis shall be performed and compared to the USDA Soil Classification System per ASTM D422 (hydrometer test) and USDA sand and gravel classifications shall be determined on material retained on the #270 sieve following a wet washing procedure unless specified otherwise herein. Test data shall clearly indicate results in percent passing and percent retained and shall conform to the following particle size distribution:

USDA Particle	Name Size (mm)	%Passing (%Oven Dry Weight)
Sand	0.05 to 2mm	50% - 60%
Silt	0.002 to 0.05 mm	shall not exceed 30%
Clay	Less than 0.002mm	10-20%

D. Unacceptable Properties: Clean soil of the following:

1. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
2. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C602, agricultural liming material containing a not less than 85% total carbonates, 95% passing a 20 mesh sieve, 40% passing a 60 mesh sieve and a minimum of 30% percent passing a 100 mesh sieve, and shall be applied at the rate as recommended by the soil tests. Lime shall be applied mechanically at least 2 weeks prior to planting and fertilizer applications and incorporated into full depth of Planting Soil prior to fine grading.

B. Humic Acid: "TerraVive MHA" as manufactured by Natural Environmental Systems, www.naturalenviro.com, (800) 999-9345. “HUMUS BIO-GRO” as manufactured by Biofix Holding, Inc. www.biofix.com (940) 382-2594. OR, “Humax” as manufactured by JH Biotech, Inc. www.jhbiotech.com (863) 537-1200.

C. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

1. pH shall fall between 6.0 and 7.0.
2. Soluble salt content shall be less than 2.0 millimhos per cm and shall be determined by electrical conductivity of a 1:2 soil/water sample reported in millimhos per cm.
3. Organic matter content shall be less than 1.0%.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. All compost testing shall be done in conformance with the U.S. Compost Council’s publication Test Methods for the Examination of Composting and Compost (TMECC) unless otherwise specified herein.
2. Organic amendments shall be stable, mature, weed-free, aerobically composted yard waste. Woodchip bulked bio-solids, sewage sludge, peat, peat-humus and mushroom compost products are not acceptable.
3. Compost shall be a homogenous material essentially free of soil clods, lumps, roots and stones.

4. Compost shall be a well-aged, black to dark brown color with few identifiable parts.
5. The compost shall have a man-made foreign material (hard plastics, metal, glass, etc.) content less than 1.5% as material retained on a U.S. Std. No. 5 (4 mm) sieve (TMECC 03.06).
6. The compost shall be screened such that a minimum of 90% passes a U.S. Std. 3/4" sieve and that no more than 10% passes a U.S. Std. No. 10 sieve on a dry weight basis.
7. Carbon/ Nitrogen ratio shall be less than 30:1. Optimum ratio is less than 15:1.
8. Degree of maturity: Composted organic matter shall be considered stable as determined by the Solvita compost maturity index. Compost must achieve a maturity index of at least indicating a "finished compost" that is well matured, aged compost, curing grade; few limitations for usage.
9. Organic content shall be 35% minimum as determined by ASTM F1647-11, loss-on-ignition, oven-dry weight.
10. pH of the finished composted organic matter shall be near 7.0, and be within the range of 6.5 to 7.5.
11. Salinity: Soluble salts shall be <3.0 mmhos/cm (dS/m) and shall be determined by electrical conductivity of a 1:2 soil/water sample reported in millimhos per cm.
12. Ammonium content: Ammonium shall be less than 400 ppm on a dry weight basis.

2.4 FERTILIZERS

A. Fertilizer shall be a complete slow-release commercial fertilizer, complying with all Federal and State fertilizer laws. Fifty percent of the fertilizer components shall be derived from natural organic sources. Fertilizer chemical make-up shall be based on the soil test recommendations by the soil-testing laboratory and shall be delivered to the site in the original unopened containers each showing the manufacturer's guaranteed analysis. Store fertilizer so that when used it shall be dry and free flowing. For bidding purposes, assume fertilizer analysis to be 20,20,20 (N,P,K).

2.5 EROSION CONTROL (FOR NON MEADOW AREAS)

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following short-term 100% biodegradable products, or approved comparable product:

1. Erosion Control Blanket:

   a. American Excelsior Company, 850 Avenue H East, Arlington, TX 76011, 800-777-7645, www.americanecelsior.com.

      1) Curlex NetFree for slopes 6:1 to 3:1.
      2) Curlex I FibreNet for slopes 3:1 to 2:1.

   b. North American Green, 5401 St. Wendel-Cynthiana Road, Poseyville, IN 47633, 800-772-2040, www.nagreen.com.

      1) BioNet S75BN for slopes 6:1 to 3:1.
      2) BioNet S150BN for slopes 3:1 to 2:1.

c. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, 888-725-6999, www.nedia.com.

1) S300B for slopes 6:1 to 3:1.
2) S400B for slopes 3:1 to 2:1.

d. Fasteners for securing Erosion Control Blanket:

1) American Excelsior Company, 850 Avenue H East, Arlington, TX 76011, 800-777-7645, www.americanecelsior.com.

a) E-staple fastener, 6-inch.

2) North American Green, 5401 St. Wendel-Cynthiana Road, Poseyville, IN 47633, 800-772-2040, www.nagreen.com.

a) BioStake fastener, 6-inch.

3) Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, 888-725-6999, www.nedia.com.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF SUBGRADE FOR PLANTING SOIL

A. Subgrade shall be defined as 6” below proposed finished grade in lawn areas and groundcover planting areas and 30” below proposed finished grade at tree plantings. Existing grades shall be modified as necessary to fulfill this requirement even if existing grades coincide with the proposed finished grades.

B. Make thorough evaluation of the subgrade to ensure water infiltration and drainage, particularly in areas that are not receiving a subsurface drainage system. If drainage is impeded or excessively slow alert the Landscape Architect immediately for corrective measures. Do not proceed with work until remedial action as be determined and implemented.

C. Do not grade subgrade soil when muddy or excessively wet or frozen. Only work soil when friable. Adhere to environmental requirements as specified herein.

D. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.

E. Remove stones larger than 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter and legally dispose of them off Owner's property.

F. Confirm that the subgrade is at the proper elevation and prepared as required. Subgrade elevations shall slope parallel to the finished grade and or toward the subsurface drain lines as shown on the drawings. Subsurface drains lines, if applicable, shall be installed prior to the installation of the Planting Soil.

1. Install grade stakes on a 20-foot grid in open areas and sufficiently spaced in other areas to insure correct line and grade of subgrade and finished grade. Verify subgrade elevations and do whatever additional grading is necessary to bring the subgrade to a true, smooth slope parallel to the finish grade.

G. Do not proceed with the installation of the Planting Soil until all proposed construction in the area has been installed. For site elements dependent on Planting Soil for foundation support, postpone installation until immediately after the installation of Planting Soil. Excavate area adjacent to walks and structures with care so not to undermine the supporting structure.

H. Once rough grading of subgrade has been completed, the subgrade shall be loosened and fine graded by harrowing, disking, dragging the teeth of a backhoe bucket through the subgrade, or as dictated by the condition of the subgrade to a depth of 6” minimally to mitigate compaction created during grading operations.

1. Loosen subgrade incrementally in bands to the extent which Planting Soil can be installed without traversing the area repeatedly with equipment. Each band shall be equal to the reach of the loader bucket. Work from the interior areas to outside edges to avoid driving over previously loosened subgrade.

I. Request subgrade review by Landscape Architect prior to placing Planting Soil. Clean up subgrade and dispose of all debris prior to review. Planting Soil installation should proceed immediately following subgrade preparation.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Soil Transition Layer: To facilitate soil drainage and de-compaction and to decrease hardpan conditions, spread approximately 3-inches of Planting Soil over loosened subgrade. Till Planting Soil thoroughly into the top 5 to 6 inches of subgrade. Spread the remainder of Planting Soil.

1. Create the Soil Transition Layer incrementally in bands to the extent which Planting Soil can be installed without traversing the area repeatedly with equipment. Each band shall

be equal to the reach of the loader bucket. Work from the interior areas to outside edges to avoid driving over previously loosened subgrade.

2. Install the Soil Transition Layer where soil depths are less than or equal 8-inches.

C. Placing, spreading and compacting of Planting Soil may be done using one the following methods.

1. Place Planting Soil in bands to full depth over approved subgrade as shown on the drawings. Each band shall be equal to the reach of the loader bucket. Work from the interior areas to outside edges to avoid driving over previously placed soil.
2. Place Planting Soil in 6-inch to 8-inch lifts to full depth indicated. Lightly compact each lift of Planting Soil to prevent settlement and to consolidate soil. Compaction shall be 80% standard Proctor density and shall not exceed 85% standard Proctor density as determined by ASTM D698-12. Approved compaction equipment includes a smooth drum roller or plate compactor. Typically one to three passes per lift will achieve approximately 80% to 85% standard Proctor density. Conditions will vary depending on exact soil properties. The Contractor shall adjust installation methods to achieve uniform compaction at the specified rate. Use of vibratory machines is prohibited, as they will create greater compaction levels than specified herein. Minimize driving over the same areas of previously installed lifts of Planting Soil to the greatest extent possible to avoid over-compaction. Back-drag areas that have become compacted with the teeth of the loader bucket before placing the next lift.
3. To confirm specified compaction levels are met, perform one (1) Proctor density test for the first lift of Planting Soil and subsequent Proctor test for every other lift performed in the first band to be installed. Once verification that compaction methodology conforms to the specified levels installation of the remaining soil installation can proceed. To ensure compaction consistency is being maintained over the course of the work for subsequent planting areas, perform one (1) Proctor density test for every 5,000 square feet of material installed. Proctor density test reports shall be provided to the Landscape Architect for verification. Planting Soil installed with compaction levels exceeding 85% standard Proctor shall be removed and reinstalled at the Contractors expense.

D. Final finished grade elevation should be greater than the depth required per the Drawings to allow for initial settlement. Taper additional soil volume as required to meet structures including, but not limited to, walls, paving, and curbs. Coordinate with the Landscape Architect to determine estimated settlement based on final approved Planting Soil and installation methodology in accordance with the following guidelines:

1. Lawn with high sand and low organic amendment soil: almost no settlement.
2. Lawn with loamy sand soil: < 1/2 inch per foot of installed soil depth.
3. Sandy loam soil: 1/2 inch per foot of installed soil depth.
4. Sandy clay loam soil: 1 to 1-1/2 inch per foot of installed soil depth.
5. Clay loam soil and any soil with > 10% by volume of organic amendment: 2 inches or more per foot of installed soil depth.

E. Grading Tolerances: Planting areas shall be fine graded within 1 inch of grades indicated on the Drawings. Tolerances shall be within 1/2-inch of grade when meeting with paved surfaces, curbs, walls, or other structures. Maintain all flat areas and slopes to allow free flow of surface drainage without ponding.

3.4 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Areas with slopes greater than or equal to 6:1, shall be covered with secured erosion control blanket within two (2) days or prior to any precipitation, whichever is shorter in accordance with the product requirements specified herein.

1. Complete lawn seeding operations prior to installation of erosion control blankets.
2. Install erosion control blankets prior to installation of trees, shrubs, herbaceous plants and groundcovers. See Section 'Exterior Plants' for planting requirements.
3. Install erosion-control blanket and fasten per Drawings. Install from top of slope, working downward.

C. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

D. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.5 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Erosion-control materials.

B. Related Requirements:

1. Section 329300 "Plants"
2. Section 329113 “Soil Preparation”
3. Section 312000 “Earth Moving”

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Submit seed mix for review by Landscape Architect. Do not apply any seed until receipt of approval.

C. Certifications: Submit certificate with names of materials and manufacturer.

1. Ground limestone: Include guaranteed analysis, and weight for packaged material.
2. Commercial fertilizers: Include guaranteed analysis.
3. Seed: include origin of seed.

D. Instructions: Submit planting and maintenance schedule.

1. Submit in writing the proposed seed installation schedule including season, delivery of materials to the site and installation of seed at the site.
2. The schedule must be approved by the Owner's Representative and Landscape Architect prior to the beginning of work.

E. Product data: Submit product literature or tear sheets with name of product, and manufacturer for each type of product specified herein.

1. Commercial fertilizer, including type and application rate.

F. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass. Include identification of source and name and telephone number of supplier.

G. Product Certificates: For fertilizers, from manufacturer.

H. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

A. Contractor's superintendent shall consult with the Landscape Architect regarding final lines and grades.

B. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.

2. Experience: Three years' experience in turf and meadow installation and have had experience at least three (3) other projects of similar scope and complexity and shall perform work with personnel totally familiar with lawn and meadow installation and general construction techniques under the supervision of an experience landscape foreperson.
3. Seed producer: manufacturer specializing in grass seed production with a minimum of 5 years' experience.
4. Seed must comply with seed certifications in the state in which they are purchased.
5. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
6. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawn Care Manager.
    c. Landscape Industry Certified Lawn Care Technician.

7. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. Protect materials from deterioration during delivery and during storage.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.
4. Deliver fertilizer and limestone in waterproof bags.
5. All seed shall be labeled to show compliance with requirements of governmental agencies having jurisdiction. All bag tags of seed used shall be retained and submitted to Landscape Architect. Seed shall be kept in dry storage away from contaminants, insects and rodents.

1.8 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods unless otherwise permitted by Landscape Architect.

1. Spring Planting: March 15 to May 30, unless approved by Engineer. No seeding shall be done on frozen ground, when the air temperature is less than 32-degrees Fahrenheit, or when the soil temperature is less than 50-degrees Fahrenheit regardless of the date of seeding.

2. Fall Planting: August 30 to October 30, unless approved by Engineer. No seeding shall be done on frozen ground, when the air temperature is less than 32-degrees Fahrenheit, or when the soil temperature is less than 50-degrees Fahrenheit regardless of the date of seeding.
3. Optimal: The optimal seeding season is in the fall, from August 30 to October 15. More rapid germination will occur for most seed varieties when the soil temperature is between sixty and seventy degrees Fahrenheit.
4. Where seeding or sodding is required outside of the Spring or Fall planting seasons, perform additional maintenance, provide additional mulch, frost protection blanket, compost, increased seeding rate, over-seeding, and other Work as required to improve germination conditions.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

C. Do not seed during adverse weather, windy conditions or on wet or frozen ground.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species:

1. Quality: State-certified seed of grass species as listed below for solar exposure.
2. Quality: Seed shall be a minimum of 85-percent endophyte enhanced, consist of a minimum of 98 percent pure seed with 0 percent weed seed and have a minimum 90 percent germination rate.
3. Seed Mixture: Permanent Suburban Development Seed Mix (Tall Fescue, Red Fescue, and Perennial Ryegrass).

C. Proportioned by weight per acrea as follows:

1. 65 lbs Festuca Elatior Arundinacea (Dwarf Tall Fescue – Mowless Blend)
2. 30 lbs Festuca Rubra (Red Fescue: Pennlawn)
3. 5 lbs Lolium Perenne (Perennial Ryegrass SR4200)

D. Temporary Seed Mixture: Provide in accordance with Table D, DE Standard Specifications for Road and Bridge Construction Publication, August 2016 or latest edition for temporary seeding.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

a. 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition:

a. 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

D. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

E. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

F. Asphalt Emulsion: ASTM D977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.4 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, nonbiodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil.

B. Placing Planting Soil: Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Cultivate and conditioned to a depth of six inches with lime added at the rate determined by soil testing. Final compacted thickness of topsoil not less than six (6") inches. Exercise extreme care to prevent damage to items of construction. All work shall be done by hand immediately adjacent to these installations.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry, do not handle topsoil when frozen or excessively wet.

D. Immediately after cultivating, uniformly spread the basic fertilizer and work in deeply (four to six inches), at the rate determined by soil testing. The areas shall then be carefully dragged and brought to an even, smooth grade, ready for seeding.

E. Remove stones one-inch (1") or larger in any dimension, vegetation, or debris brought to the surface during these operations from the site. The final grade shall be even, smooth and free of lumps or water-collecting pockets.

F. Apply starter fertilizer immediately before seeding by broadcasting and raking into a depth of one-inch (1") at the rate determined by soil testing.

G. Provide smooth finish grades with uniform flow without depressions or arises, with gradual and uniform transition at slopes and embankments. Maximum allowable tolerance in finish grades shall be not more than one inch (1") in ten feet (10') or three inches (3") in one hundred feet (100') when measured.

H. Place topsoil adjacent to all paved surfaces to meet finish grade of pavement and provide a smooth transition to surrounding finish grade.

I. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

J. Before planting, obtain Landscape Architects acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 11 lbs/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 100 lbs. per 1,000 square feet to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, commercial fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.7 TURF RENOVATION

A. Renovate existing turf where indicated.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.8 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow turf-type tall fescue to a height of 2 to 3 inches.

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches Insert coverage.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.12 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sodded Turf: 45 days from date of Substantial Completion.

END OF SECTION 329200

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Root barrier

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants- excluding herbaceous plants within seeded areas.
2. Tree stabilization.
3. Tree-watering devices.
4. Landscape edgings.

B. Related Requirements:

1. Section 329113 "Soil Preparation".
2. Section 329200 "Turf and Grasses"

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than sizes indicated diameter and depth recommended ; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated, diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

G. Finish Grade: Elevation of finished surface of planting soil.

H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

J. Planting Area: Areas to be planted.

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation"

L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

P. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

Q. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

B. Coordination with Meadow Areas: Plant trees, shrubs, after finish grades are established and before planting/seeding meadow areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after seeding/planting meadow areas, protect meadow areas, and promptly repair damage caused by planting operations.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product submit in writing all proposed sources.

1. Locate trees and make all pre-selection arrangements at the source of supply required to ensure an efficient selection procedure. Landscape Architect, with Contractor present, will select plants at nursery on the basis of their compliance with the Drawings. Contractor shall inspect the selected plants on the basis that the plants are free of disease and otherwise conform to the requirements of the Contract Documents. The accuracy of the varieties of species specified for plant material shall be the Contractor's responsibility. Request visit at least 14 days in advance of desired inspection date.

    a. Trees will be inspected and reviewed by Landscape Architect at the nursery for conformity to Specification requirements. Such review shall not affect the right of inspection and rejection during delivery and installation.
    b. All trees specified as B&B must be in the ground at the growing source (nursery) at the time of inspection. Pre-dug trees shall not be acceptable.

2. Plant photographs shall be provided to the Landscape Architect prior to scheduling any nursery visits. Include color photographs in digital format (sent via email) at least 4 by 6-inch of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
3. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
4. Source of supply: Submit in writing all proposed sources.

B. Samples for Verification: For each of the following:

1. Organic soil amendment, 1-gallon re-sealable plastic bag.
2. Mulch for trees: 1-gallon of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on-site; provide an accurate indication of color, texture, and makeup of the material.
3. Weed Control Barrier: 12 by 12 inches.
4. Slow-Release, Tree-Watering Device: One unit of each size required.
5. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
2. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Horticultural Technician.

5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Plant List: Investigate sources of supply prior to submitting bid. Confirm that size, variety and quantity of plants specified on Plant List can be supplied. Failure to take this precaution shall not relieve the successful bidder from responsibility for furnishing and installing all plants in strict accordance with Contract requirements.

    a. Substitutions shall not be permitted unless substantiated written proof is supplied that a specified plant is not available. Proposals to use the nearest equivalent size or variety will only be considered with such substantiated written proof.
    b. Plant substitutions will be permitted only upon approval by the Landscape Architect.
    c. All plants shall be grown on their own roots. No grafted species shall be

acceptable.

d. Plants shall be of the quantity and quality indicated, true to name, properly labeled
e. with botanical name and in accordance with the sizes and grades specified.

D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inchcaliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

E. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Plant B&B deciduous trees and shrubs between April 1 and June 15, and
2. Plant ground cover between March 15 - May 1. If ground cover must be planted in Fall, review proposed planting date with Owner's Representative and Landscape Landscape Architect.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

D. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

E. Coordination with Meadow Areas: Plant trees, shrubs, after finish grades are established and before planting/seeding meadow areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after seeding/planting meadow areas, protect meadow areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY

A. Guarantees shall be in addition to, and not in lieu of, all other liabilities which manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

B. Contractor shall not be held responsible for acts of vandalism occurring after the beginning of Guarantee Period, nor shall Contractor be held responsible for deleterious effects caused by maintenance procedures performed by Owner without concurrence of Contractor.

C. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization edgings and tree grates.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of Substantial Completion.

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Annuals: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 SHRUBS AND GROUNDCOVER

A. Furnish in sizes indicated on plant list and conform to ASNS standards for species and sizes.

B. All container grown plants shall be healthy, vigorous, well rooted and established in the container in which they are sold. Plant development shall be sufficient so that the root mass will hold together when removed from the container.

2.3 TREES

A. Provide freshly dug trees nursery grown in accordance with good horticultural practice.

1. Sound, healthy and vigorous, well-branched and fully foliated when in leaf. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
3. Nomenclature: Agree with SPN or as accepted in the nursery trade for varieties not listed therein.

B. Conform to measurements specified on Plant List. Dimension plants in their natural position. Measure height or spread and quality in accordance with standards specified in ASNS.

C. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Landscape Architect, with a proportionate increase in size of roots or balls.

D. Provide B&B stock with a compact natural ball of earth, firmly wrapped and tied in burlap so that upon delivery the soil in the ball is still firm and compact about the small feeding roots. Root ball sizes shall be in accordance with standards specified in ASNS.

E. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

F. Plants shall be measured before pruning, with branches in normal position. Any necessary pruning shall be done at time of planting. Requirements for the measurement, branching, grading, quality, balling, and burlapping of plants shall be in accordance with standards specified in ASNS.

2.4 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.5 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Double shredded hardwood bark.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural, Dyed mulch is not permitted.

B. Compost Mulch: See Division 32 “Soil Preparation “ for Compost specification requirements

2.6 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.

2.7 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.8 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length required for proper tree support, pointed at one end.
2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles. Turnbuckles: Galvanized steel or zinc coated, size as required for proper tree support.
3. Guys and Tie Wires: ASTM A641/A641M, Class 1, galvanized-steel wire, two-strand, twisted, 12 pr 14 guage galvanized steel; pre qua;, depending on the size of tree.
4. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
5. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
6. Clamps: Galvanized, zinc or vinyl-coated appropriate in size to hold wire or cable.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.

2.9 TREE-WATERING DEVICES

A. Watering Pipe: PVC pipe 4 inches in diameter, site-cut to length as required, and with snug-fitting removable cap.

B. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over two to nine hours; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BIO-PLEX.
b. Engineered Watering Solutions; PQ Partners, LLC.
c. Spectrum Products, Inc.

2. Color: As selected by Landscape Architect from manufacturer's full range.

2.10 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.

B. Root Barrier: Black, molded, modular panels 48” high (deep), .08 inches thick, and with vertical root deflecting ribs protruding 3/4 inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

1. Products: Subject to compliance with requirements, provide the following:

a. Deeproot; UB-48-2 and UB-24-2 Root Barriers as manufactured by DeepRoot Green Infrastructure, LLC, 101 Montgomery Street, Suite 2850, San Francisco, CA 94104, Tel: 415 781 9700.

C. Burlap: Non-synthetic, biodegradable.

D. Organic Soil Amendments: See Division 32 Section 329113 ‘Soil Preparation’ for Compost specification requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

C. Verify that previously installed protection measures are in place.

D. Verify that excavation, grading and paving is complete.

E. Do not begin planting until all other work, except lawn work, is complete.

F. Beginning installation means acceptance of existing conditions.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Verify by testing that planting areas are free draining. If planting areas are not free draining notify Landscape Landscape Architect and submit recommendation to restore drainage for approval.

E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."

B. Placing Planting Soil: Place manufactured planting soil over exposed subgrade Blend planting soil in place.

C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 INSTALLATION OF TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for balled and burlapped or container-grown stock.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated. Backfill shall be comprised of excavated soil mixed with Compost. Mix ratio 4 parts soil to 1 part Compost. Turn Compost into soil with hand shovel.

C. Backfill around root ball in 6-inch deep layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

D. Apply water slowly to ensure penetration into the entire root system.

E. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

F. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

G. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Add planting soil to depths and limits indicated on Drawings. Grade smooth immediately before planting.
2. Dig holes large enough to allow spreading of roots.
3. Work soil around roots to eliminate air pockets.
4. Carefully remove root ball from container without damaging root ball or plant.
5. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
6. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
7. Continue backfilling process. Water again after placing and tamping final layer of soil.
8. Mulch within two (2) days of planting.

D. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Neatly prune trees and shrubs to remove broken or badly bruised branches with a clean cut in accordance with NAA standards, and at the time designated by, and to the satisfaction of Owner and Landscape Architect.

B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

C. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying:

    a. Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 60 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
    b. Stake trees with two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.

2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 INSTALLATION OF ROOT BARRIER

A. Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 10 feet per tree, unless otherwise indicated on Drawings. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier according to manufacturer's written recommendations.
2. Overlap root barrier a minimum of 12 inches at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.

3.9 GROUND COVER AND PLANT PLANTING (EXCLUDING MEADOW PLANTS)

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Dig holes large enough to allow spreading of roots.

C. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

G. Mulch within two (2) days of planting. Install three (3) inches of mulch continuously over entire planting beds. Keep mulch at least 2 inches away from base of plant.

3.10 PLANTING AREA MULCHING (EXCLUDING MEADOW PLANTS)

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 24-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch settled average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 INSTALLATION OF EDGING

A. areas with a 45-degree, 4- to 6-inch-deep, shovel-cut edge.

3.12 INSTALLATION OF SLOW-RELEASE WATERING DEVICE

A. Provide one device for each tree.

B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.13 PLANT MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION

A. Begin maintenance immediately after each planting area is installed.

B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

C. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.14 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.15 REPAIR, REPLACEMENT, AND MAINTENANCE DURING THE GUARANTEE PERIOD

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, within 10 days from notification from Owner or Landscape Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Replacement plants may be installed during the next appropriate planting season.
2. Replacement plants shall be of the same species and size as specified in the Plant List.

3.16 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.17 FINAL ACCEPTANCE

A. At end of Guarantee Period, submit a written request for Inspection for Final Acceptance at least two (2) weeks prior to the day on which inspection is requested.

B. At the end of the one-year Guarantee Period, Owner, Landscape Architect and Contractor shall make an inspection to determine that all plants are living and healthy. Any plant that is dead or not in satisfactory condition, as determined by the Owner, shall be removed from the site and replaced in accordance with the specifications. New plants installed, as part of the original one-year guarantee shall also carry a new one-year guarantee period, which begins at the time of acceptance of the replacements plant(s). Any replacement and repair work that is required shall be re-inspected by the Owner.

END OF SECTION 329300

CONSTRUCTION PLAN
FOR
EDNA C. DICKEY PARK SITE IMPROVEMENTS
NEWARK, NEW CASTLE COUNTY, DELAWARE
CONTRACT ITB 24-11

PROJECT NOTES

1. CONTRACTOR SHALL NOTIFY MISS UTILITY OF DELAWARE 72 HOURS BEFORE START OF CONSTRUCTION AND BEFORE DIGGING. CALL 1(800) 282-8555.

2. CONTRACTOR SHALL NOTIFY PAULA MARTINSON ENNIS, DIRECTOR, PARKS AND RECREATION, AT 302-366-7000 EXT 1042 AT LEAST 72 HOURS BEFORE START OF CONSTRUCTION.

3. UNLESS OTHERWISE NOTED AND AS APPLICABLE TO THE WORK, ALL CONSTRUCTION, MATERIALS, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE:
   - 3.1. CITY OF NEWARK DELAWARE MUNICIPAL CODE
   - 3.2. CITY OF NEWARK DEPARTMENT OF PUBLIC WORKS AND WATER RESOURCES WATER AND WASTEWATER STANDARDS AND SPECIFICATIONS.
   - 3.3. CITY OF NEWARK STANDARD SPECIFICATIONS FOR ROAD AND UTILITY CONSTRUCTION, DETAILS AND SUPPLEMENTS.
   - 3.4. DELAWARE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND DETAILS
   - 3.5. DELAWARE SEDIMENT AND STORMWATER REGULATIONS

4. WHERE REFERENCES ARE MADE TO STANDARDS, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO HAVE IN ITS POSSESSION THE LATEST UP-TO-DATE STANDARDS AS OF THE DATE OF ADVERTISEMENT OF THIS PROJECT.

5. ALL AREAS DISTURBED BY THE CONTRACTOR, WHETHER DISTURBED DIRECTLY OR INDIRECTLY BY THE CONSTRUCTION OR OTHER ACTIVITIES RELATED TO THE PERFORMANCE OF THIS PROJECT, SHALL BE RETURNED TO EQUAL OR BETTER THAN THE ORIGINAL CONDITION PRIOR TO FINAL ACCEPTANCE OF THE WORK. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ALL EXISTING UTILITIES, CURBS, SIDEWALK, PAVING, SHRUBS, FENCING, ETC. ANY AND ALL DAMAGE DONE TO SAME SHALL BE IMMEDIATELY AND COMPLETELY REPAIRED AT CONTRACTOR'S EXPENSE.

6. UNLESS NOTED OTHERWISE, ALL MATERIALS SALVAGED DURING DEMOLITION AND CONSTRUCTION SHALL BECOME THE CONTRACTOR'S PROPERTY AND SHALL BE DISPOSED OF OFF-SITE IN A LAWFUL LOCATION AND MANNER. ALL FEES ASSOCIATED WITH OFF-SITE DISPOSAL SHALL BE PAID BY THE CONTRACTOR.

7. TEMPORARY EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED, MONITORED, AND MAINTAINED BY THE CONTRACTOR IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLANS INCLUDED HEREIN.

8. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH HAVE OCCURRED BY HIS/HER FAILURE NOT TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING HIS/HER WORK. ITEMS SHALL BE REPLACED WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED OR DAMAGED DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE LOCATION AND ACTIVITIES OF HIS FORCES WITH THE OWNER, AND ABUTTING PROPERTY OWNERS TO MINIMIZE INTERFERENCE WITH EXISTING UTILITIES, PEDESTRIAN TRAFFIC, AND PROPERTY ACCESS. PEDESTRIAN AND VEHICLE ACCESS SHALL BE MAINTAINED AT ALL TIMES.

10. THE PLANS AND SPECIFICATIONS DO NOT INCLUDE PROVISIONS FOR CONSTRUCTION SAFETY. A HEALTH AND SAFETY PLAN MUST BE DEVELOPED BY CONTRACTOR PRIOR TO STARTING WORK.

11. METHODS, PROCEDURES AND THE SEQUENCES OF CONSTRUCTION (OTHER THAN THAT NOTED ON THE DRAWINGS) ARE THE RESPONSIBILITY OF THE CONTRACTORS.

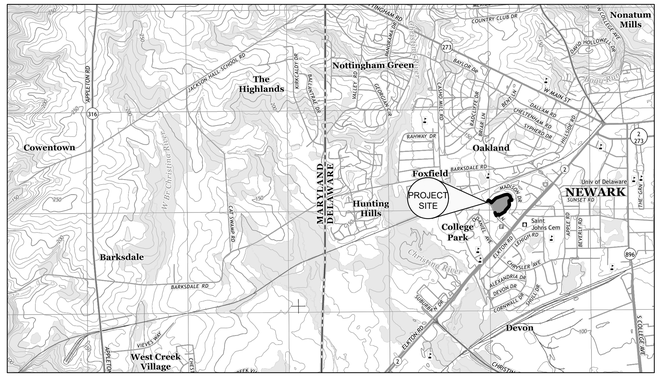
12. THE CONTRACTOR SHALL KEEP ROADWAYS CLEAN AT ALL TIMES. ALL SOIL SPILLED, DROPPED, WASHED OR TRACKER ONTO ROADWAYS OR OTHER IMPERVIOUS SURFACES MUST BE REMOVED IMMEDIATELY BY CONTRACTOR.

13. THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN A JOB SITE FREE OF LITTER AND TRASH. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THE SITE AT THE END OF THE DAY TO CLEAN UP ANY TRASH OR LITTER GENERATED BY THE PERSONNEL AND SUBCONTRACTORS WORKING FOR THE CONTRACTOR AND DISPOSE OF DEBRIS PROPERLY.

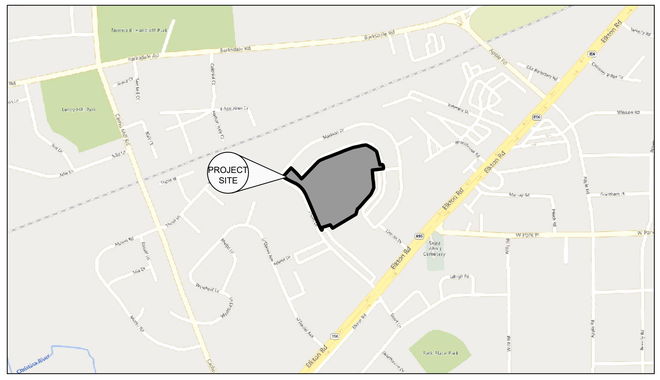
14. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING UP AND MAINTAINING ROAD CLOSURE SIGNS AND NOTIFYING THE PUBLIC/ADJOINING NEIGHBORS OF THE ROAD CLOSURE. ALL ROAD AND SIDEWALK CLOSURES SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

15. THE CONTRACTOR IS RESPONSIBLE FOR SITE SECURITY WHICH INCLUDES MEASURES TO ENSURE CARS/VEHICLES CANNOT DRIVE INTO THE CONSTRUCTION SITE.

16. ANY DAMAGE TO CITY ROADS, SIDEWALKS, CURB, STORM SEWER, WATER, OR SANITARY SEWER INFRASTRUCTURE SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE PUBLIC WORKS AND WATER RESOURCES AT THE CONTRACTOR'S SOLE EXPENSE.



LOCATION MAP
SCALE: 1" = 2,000'
USGS 7.5 MINUTE IMAGE MAP FOR NEWARK, DELAWARE



SITE MAP
SCALE: 1" = 500'

MISS UTILITY
OF
DELMARVA
BEFORE YOU DIG CALL
1-800-282-8555
PROTECT YOURSELF, GIVE TWO WORKING DAYS NOTICE

OWNER / DEVELOPER

CITY OF NEWARK
220 S MAIN STREET
NEWARK, DE 19711
PHONE: 302-366-7000

PLAN PREPARER

JMT
121 CONTINENTAL DRIVE, SUITE 300
NEWARK, DE, 19713
PHONE: 302-266-9600

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ES-102	DETAILS

JMT
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NEWARK, DE 19713
P: (302) 266-9600 www.jmt.com

SEAL:

CHRISTOPHER A. BRUNO LICENSED No. 18168 DELAWARE PROFESSIONAL ENGINEER

SEAL:

PREPARED FOR:
CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:
EDNA C. DICKEY PARK SITE IMPROVEMENTS

PROJECT LOCATION:
60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:
20-03026-030

DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

DRAWING TITLE:
COVER SHEET

DRAWING NUMBER:
L-001

C:\pw\work\eright\mf08864699\Cover Sheet.dwg 7/25/2024

PLAN DATA

TAX PARCEL NUMBER: 18-025.00-336

OWNER: CITY OF NEWARK

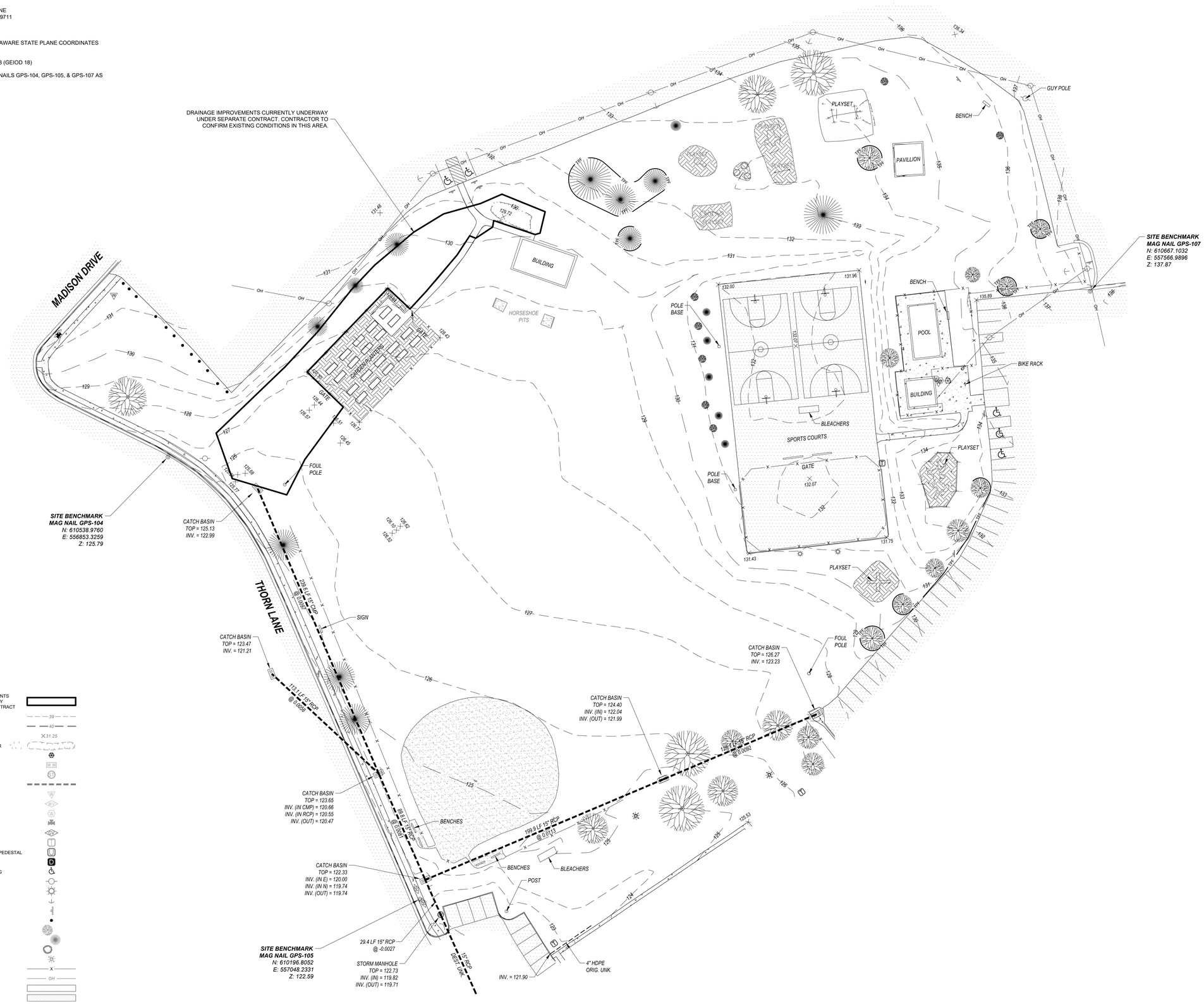
ADDRESS: 100 THORN LANE
NEWARK, DE 19711

ZONING: PL

HORIZONTAL DATUM: DELAWARE STATE PLANE COORDINATES (NAD83-2011, USFT)

VERTICAL DATUM: NAVD88 (GEOID 18)

SITE BENCHMARKS: MAG NAILS GPS-104, GPS-105, & GPS-107 AS DEPICTED ON PLAN.



LEGEND

- DRAINAGE IMPROVEMENTS CURRENTLY UNDERWAY UNDER SEPARATE CONTRACT
- CONTOUR
- INDEX CONTOUR
- SPOT ELEVATION
- DEPRESSION CONTOUR
- SANITARY CLEANOUT
- CATCH BASIN
- STORM MANHOLE
- STORM PIPE
- WATER METER
- WATER VALVE
- WATER SERVICE
- FIRE HYDRANT
- GAS VALVE
- TELECOMM PEDESTAL
- UNIDENTIFIED UTILITY PEDESTAL
- DOT VAULT
- HANDICAPPED PARKING
- UTILITY POLE
- LIGHT POLE
- GUY WIRE
- SIGN
- BOLLARD
- DECIDUOUS TREE
- EVERGREEN TREE
- SHRUB/BUSH
- TREE STUMP
- FENCELINE
- OVERHEAD WIRES
- CONCRETE
- BLACKTOP PAVING
- SAND
- LANDSCAPING

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DATE:	SCALE:
07/26/2024	AS NOTED

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CONSTRUCTION PLAN

DRAWING TITLE:

EXISTING CONDITIONS

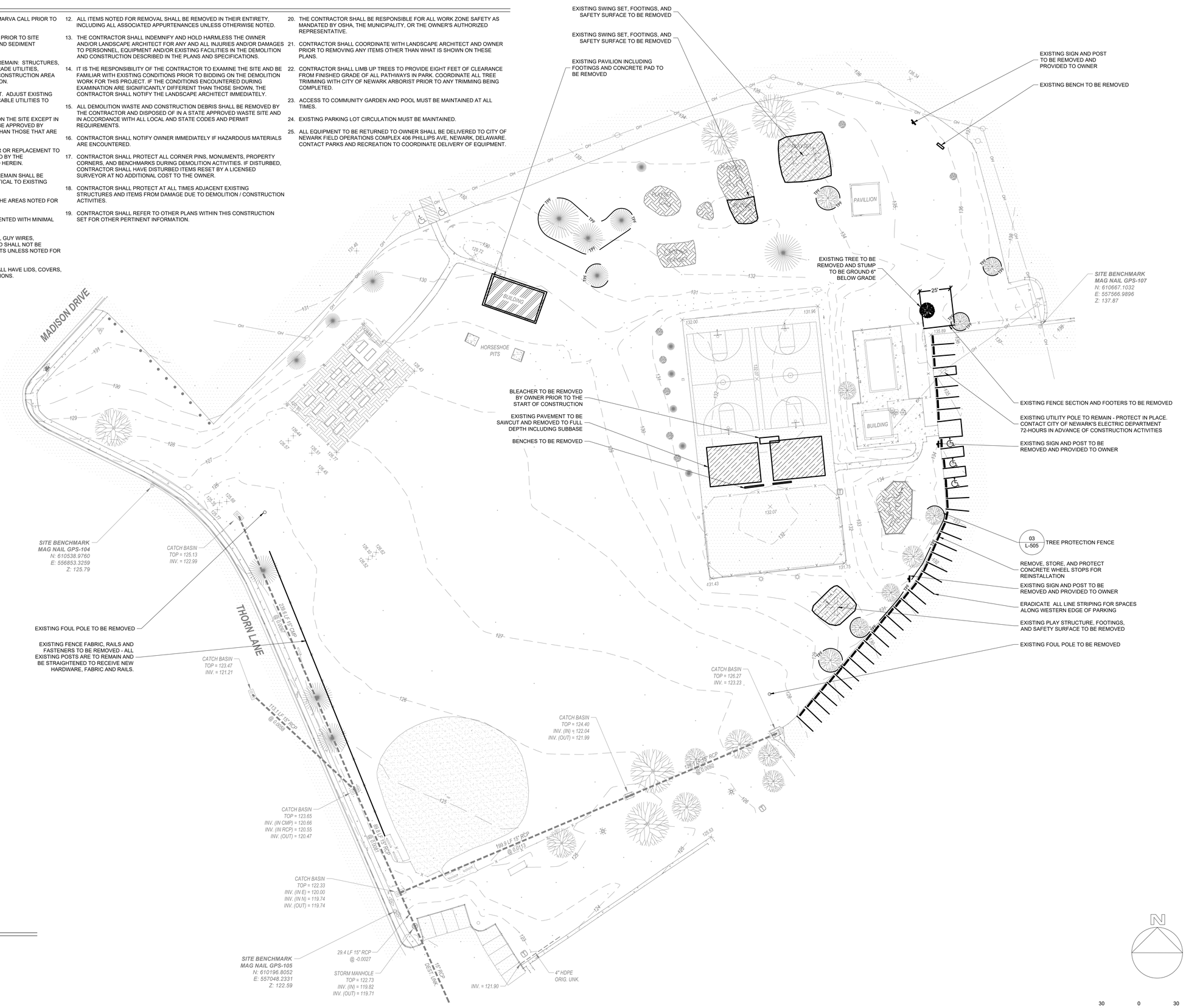
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L-101

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DEMOLITION NOTES

1. CONTRACTOR SHALL PERFORM A MISS UTILITY OF DELMARVA CALL PRIOR TO ANY DEMOLITION ACTIVITIES.
2. INSTALL EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO SITE CLEARING OR DEMOLITION ACTIVITIES. SEE EROSION AND SEDIMENT CONTROL PLANS.
3. PRESERVE AND PROTECT ALL EXISTING FEATURES TO REMAIN: STRUCTURES, LIGHTING, SURFACE MATERIALS, ABOVE AND BELOW GRADE UTILITIES, FOOTING AND VEGETATION WITHIN AND ADJACENT TO CONSTRUCTION AREA DURING ALL PHASES OF DEMOLITION AND CONSTRUCTION.
4. MEET ALL EXISTING GRADES AT ALL EDGES OF PROJECT. ADJUST EXISTING INLETS, DRAINS, VENTS, VALVE, AND ANY OTHER APPLICABLE UTILITIES TO MEET FINISH GRADES.
5. DO NOT DRIVE OR PARK, STORE MATERIAL OR DEBRIS ON THE SITE EXCEPT IN AREAS APPROVED BY OWNER. STAGING AREAS SHALL BE APPROVED BY OWNER. DO NOT STAGE MATERIALS IN AREAS OTHER THAN THOSE THAT ARE PREVIOUSLY DESIGNATED BY THE OWNER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT TO ANY EXISTING ANY FEATURES DISTURBED OR DAMAGED BY THE CONSTRUCTION OR DEMOLITION ACTIVITIES PROPOSED HEREIN.
7. CUTTING AND PATCHING OF EXISTING PAVEMENTS TO REMAIN SHALL BE COMPLETED WITH CARE. PATCH WITH MATERIALS IDENTICAL TO EXISTING MATERIALS.
8. REMOVE EXISTING PAVEMENT TO FULL DEPTH WITHIN THE AREAS NOTED FOR DEMOLITION.
9. DEMOLITION WORK SHALL BE SCHEDULED AND IMPLEMENTED WITH MINIMAL DISRUPTION TO ADJACENT OCCUPIED AREAS.
10. ALL EXISTING UNDERGROUND UTILITIES, UTILITY POLES, GUY WIRES, MANHOLES, AND HYDRANTS UNLESS OTHERWISE NOTED SHALL NOT BE DISTURBED BY THE CONTRACTORS DEMOLITION EFFORTS UNLESS NOTED FOR REMOVAL.
11. ANY EXISTING UTILITIES NOT NOTED FOR REMOVAL SHALL HAVE LIDS, COVERS, GRATES, TOPS, ETC. RESET TO THE PROPOSED ELEVATIONS.
12. ALL ITEMS NOTED FOR REMOVAL SHALL BE REMOVED IN THEIR ENTIRETY, INCLUDING ALL ASSOCIATED APPURTENANCES UNLESS OTHERWISE NOTED.
13. THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND/OR LANDSCAPE ARCHITECT FOR ANY AND ALL INJURIES AND/OR DAMAGES TO PERSONNEL, EQUIPMENT AND/OR EXISTING FACILITIES IN THE DEMOLITION AND CONSTRUCTION DESCRIBED IN THE PLANS AND SPECIFICATIONS.
14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THE DEMOLITION WORK FOR THIS PROJECT. IF THE CONDITIONS ENCOUNTERED DURING EXAMINATION ARE SIGNIFICANTLY DIFFERENT THAN THOSE SHOWN, THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT IMMEDIATELY.
15. ALL DEMOLITION WASTE AND CONSTRUCTION DEBRIS SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF IN A STATE APPROVED WASTE SITE AND IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
16. CONTRACTOR SHALL NOTIFY OWNER IMMEDIATELY IF HAZARDOUS MATERIALS ARE ENCOUNTERED.
17. CONTRACTOR SHALL PROTECT ALL CORNER PINS, MONUMENTS, PROPERTY CORNERS, AND BENCHMARKS DURING DEMOLITION ACTIVITIES. IF DISTURBED, CONTRACTOR SHALL HAVE DISTURBED ITEMS RESET BY A LICENSED SURVEYOR AT NO ADDITIONAL COST TO THE OWNER.
18. CONTRACTOR SHALL PROTECT AT ALL TIMES ADJACENT EXISTING STRUCTURES AND ITEMS FROM DAMAGE DUE TO DEMOLITION / CONSTRUCTION ACTIVITIES.
19. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK ZONE SAFETY AS MANDATED BY OSHA, THE MUNICIPALITY, OR THE OWNER'S AUTHORIZED REPRESENTATIVE.
21. CONTRACTOR SHALL COORDINATE WITH LANDSCAPE ARCHITECT AND OWNER PRIOR TO REMOVING ANY ITEMS OTHER THAN WHAT IS SHOWN ON THESE PLANS.
22. CONTRACTOR SHALL LIMB UP TREES TO PROVIDE EIGHT FEET OF CLEARANCE FROM FINISHED GRADE OF ALL PATHWAYS IN PARK. COORDINATE ALL TREE TRIMMING WITH CITY OF NEWARK ARBORIST PRIOR TO ANY TRIMMING BEING COMPLETED.
23. ACCESS TO COMMUNITY GARDEN AND POOL MUST BE MAINTAINED AT ALL TIMES.
24. EXISTING PARKING LOT CIRCULATION MUST BE MAINTAINED.
25. ALL EQUIPMENT TO BE RETURNED TO OWNER SHALL BE DELIVERED TO CITY OF NEWARK FIELD OPERATIONS COMPLEX 406 PHILLIPS AVE, NEWARK, DELAWARE. CONTACT PARKS AND RECREATION TO COORDINATE DELIVERY OF EQUIPMENT.



LEGEND

- TREE PROTECTION FENCE
- BITUMINOUS PAVEMENT DEMOLITION
- CONCRETE PAVEMENT DEMOLITION
- SAFETY SURFACE DEMOLITION

30 0 30 60
1 INCH = 30 FEET

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220 S MAIN STREET
NEWARK, DE 19711

REVISIONS

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NEWARK, DELAWARE, 19711

PROJECT NUMBER:

20-03026-030

DATE:	SCALE:
07/26/2024	AS NOTED

PLAN SET:

CONSTRUCTION PLAN

DRAWING TITLE:

DEMOLITION PLAN

DRAWING NUMBER:

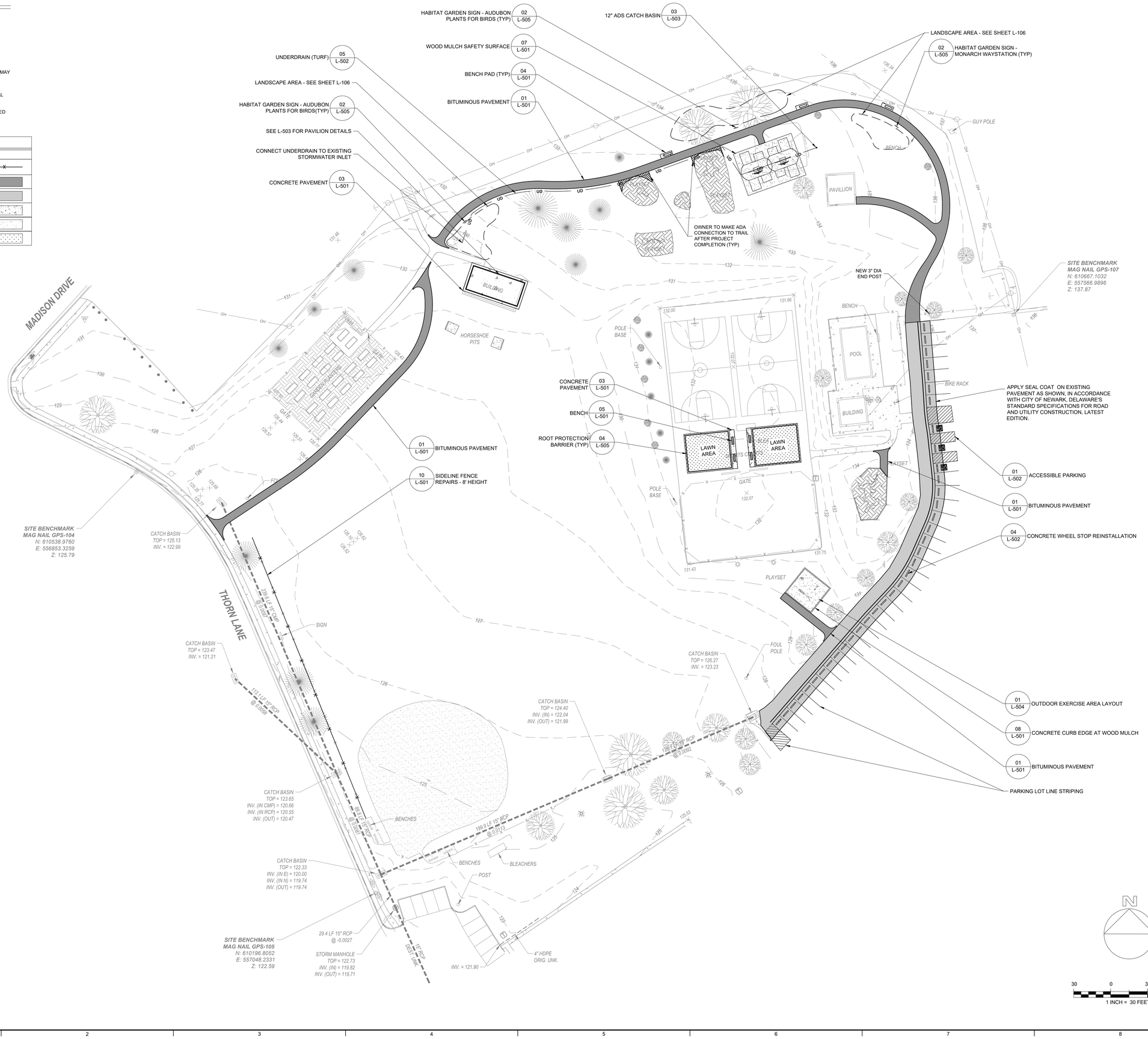
L-102

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SHEET NOTES

1. DO NOT SCALE DRAWINGS.
2. ALL DISTURBED AREAS OF SITE WITHOUT PROPOSED SITE FEATURES, SHALL RECEIVE TOPSOIL AND BE SEEDED PER SPECIFICATIONS
3. THE CONTRACTOR SHALL HAVE ALL REQUIRED SUBMITTAL APPROVALS PRIOR TO BEGINNING THE WORK OF ORDERING MATERIALS.
4. DRAWINGS FOR DESIGN INTENT ONLY. FIELD ADJUSTMENTS MAY BE REQUIRED WITH WRITTEN AUTHORIZATION BY OWNER AND/OR LANDSCAPE ARCHITECT.
5. CONSULT OWNER AND/OR LANDSCAPE ARCHITECT FOR FINAL IN-THE-FIELD PLACEMENT OF SITE AMENITIES.
6. LINE STRIPING TO BE EPOXY RESIN (WHITE) EXCEPT AS NOTED IN DETAIL 01/L-502 FOR ACCESSIBLE PARKING.

LEGEND	
MATERIALS PLAN	
SIDELINE FENCE	X — X
BITUMINOUS PAVEMENT	
BITUMINOUS SEAL COATING	
CONCRETE PAVEMENT	
SAFETY SURFACING	
LAWN	



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07/26/2024	AS NOTED

PLAN SET:

CONSTRUCTION PLAN

DRAWING TITLE:

MATERIALS PLAN

DRAWING NUMBER:

L-103

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CURVE #	START STATION	END STATION	RADIUS	LENGTH	CHORD DIRECTION	START POINT	END POINT
C100	100+00.58	100+50.73	75.00	50.15	N15° 08' 10.13"E	N: 610,661.5954, E: 557,484.8846	N: 610,709.1125, E: 557,497.7378
C101	100+50.73	102+59.37	83.00	208.64	N37° 43' 05.50"W	N: 610,709.1125, E: 557,497.7378	N: 610,834.0048, E: 557,401.1467
C102	104+07.38	104+85.39	197.00	78.01	S81° 36' 52.36"W	N: 610,784.0393, E: 557,261.8278	N: 610,772.7369, E: 557,185.1535
C103	104+85.39	105+89.65	93.00	104.26	S60° 50' 27.93"W	N: 610,772.7369, E: 557,185.1535	N: 610,724.5546, E: 557,098.7961
C200	200+09.41	200+83.71	75.00	74.30	S15° 20' 54.99"W	N: 610,692.2724, E: 557,089.4565	N: 610,623.5167, E: 557,070.5844
C201	201+61.05	202+16.24	250.00	55.19	S50° 03' 12.38"W	N: 610,567.6324, E: 557,017.1258	N: 610,532.2681, E: 556,974.9004
C300	300+00.00	300+78.28	81.00	78.28	N66° 40' 57.43"W	N: 610,730.1924, E: 557,508.0922	N: 610,759.9843, E: 557,438.9741

LINE #	START STATION	END STATION	LENGTH	DIRECTION	START POINT	END POINT
L100	100+00.00	100+00.58	0.58	N04° 01' 16.57"W	N: 610,661.0171, E: 557,484.9252	N: 610,661.5954, E: 557,484.8846
L101	102+59.37	104+07.38	148.01	S70° 16' 12.16"W	N: 610,834.0048, E: 557,401.1467	N: 610,784.0393, E: 557,261.8278
L200	200+00.00	200+09.41	9.41	S13° 01' 54.77"E	N: 610,701.4438, E: 557,087.3338	N: 610,692.2724, E: 557,089.4565
L201	200+83.71	201+61.05	77.34	S43° 43' 44.74"W	N: 610,623.5167, E: 557,070.5844	N: 610,567.6324, E: 557,017.1258
L202	202+16.24	202+84.98	68.74	S56° 22' 40.02"W	N: 610,532.2681, E: 556,974.9004	N: 610,494.2054, E: 556,917.6595



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DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:

CONSTRUCTION PLAN

DRAWING TITLE:

LAYOUT PLAN

DRAWING NUMBER:

L-104

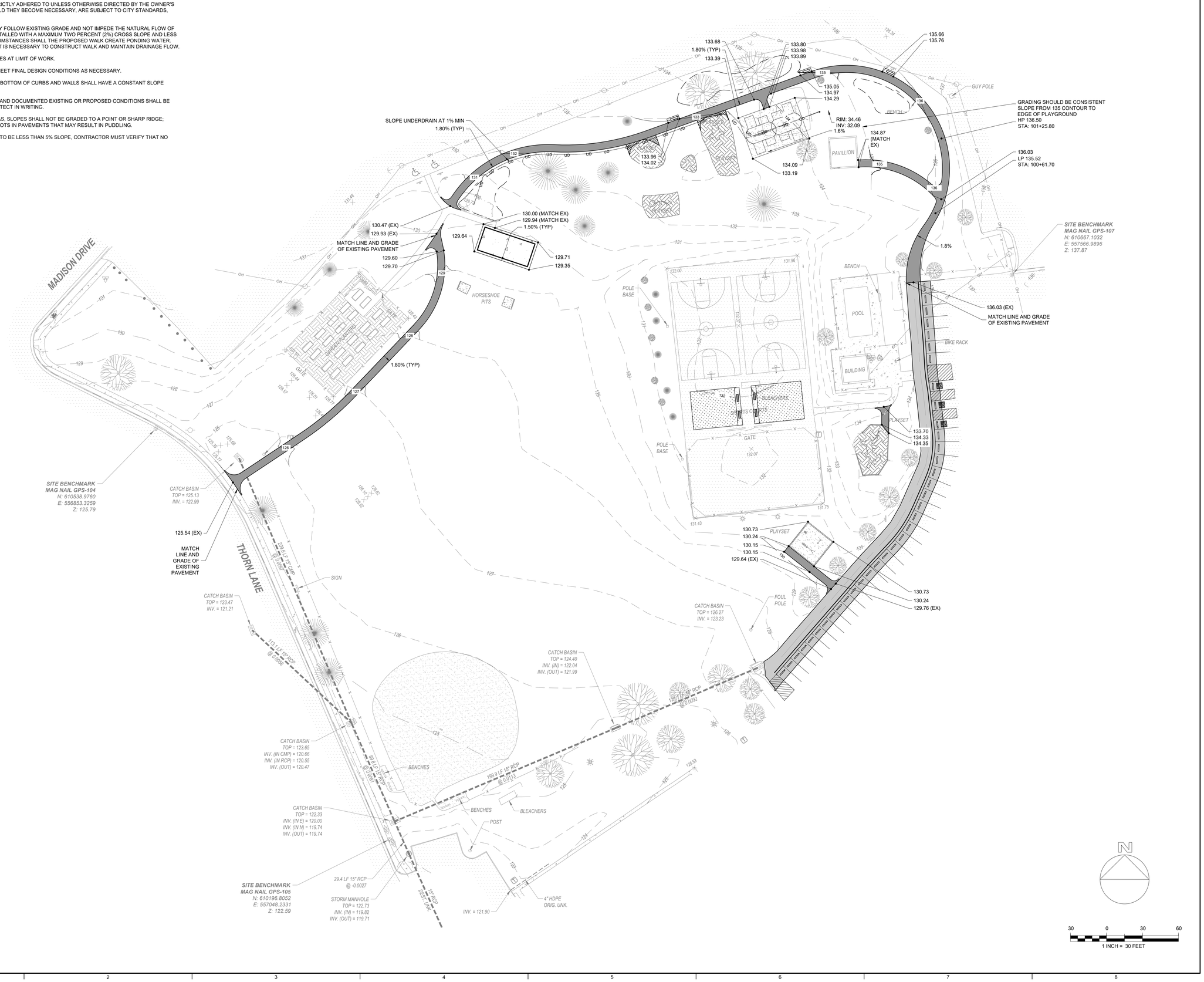
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GRADING NOTES

1. WHERE PROPOSED PAVEMENT ABUTS EXISTING PAVEMENT, MATCH LINE AND GRADE OF THE EXISTING PAVEMENT.
2. ALL GRADING SHALL BE SMOOTH AND CONTINUOUS. TOPS AND BOTTOMS OF ALL SLOPES SHALL BE ROUND.
3. PLAN LOCATIONS AND DIMENSIONS SHALL BE STRICTLY ADHERED TO UNLESS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVES. SUCH PLAN CHANGES, SHOULD THEY BECOME NECESSARY, ARE SUBJECT TO CITY STANDARDS, SPECIFICATIONS, AND ORDINANCES.
4. PROPOSED WALKS AND TRAILS SHALL GENERALLY FOLLOW EXISTING GRADE AND NOT IMPEDE THE NATURAL FLOW OF WATER ACROSS THE WALK. WALKS SHALL BE INSTALLED WITH A MAXIMUM TWO PERCENT (2%) CROSS SLOPE AND LESS THAN 5% LONGITUDINAL SLOPE. UNDER NO CIRCUMSTANCES SHALL THE PROPOSED WALK CREATE PONDING WATER. GRADING FOR WALKS SHALL ONLY DISTURB WHAT IS NECESSARY TO CONSTRUCT WALK AND MAINTAIN DRAINAGE FLOW.
5. PROPOSED GRADES SHALL MEET EXISTING GRADES AT LIMIT OF WORK.
6. ADJUST EXISTING AND PROPOSED UTILITIES TO MEET FINAL DESIGN CONDITIONS AS NECESSARY.
7. FINISH GRADES OF PAVEMENTS AND SOIL ALONG BOTTOM OF CURBS AND WALLS SHALL HAVE A CONSTANT SLOPE UNLESS INDICATED BY SPOT ELEVATIONS.
8. ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND DOCUMENTED EXISTING OR PROPOSED CONDITIONS SHALL BE REPORTED TO ENGINEER AND LANDSCAPE ARCHITECT IN WRITING.
9. AT HIGH POINTS AND LOW POINTS IN PAVED AREAS, SLOPES SHALL NOT BE GRADED TO A POINT OR SHARP RIDGE; GRADES SHALL BE TRANSITIONED. AVOID LOW SPOTS IN PAVEMENTS THAT MAY RESULT IN PUDDLING.
10. ALL WALKWAYS AND PAVED AREAS ARE GRADED TO BE LESS THAN 5% SLOPE, CONTRACTOR MUST VERIFY THAT NO SLOPES EXCEED 5% MAXIMUM.

LEGEND

HP HIGH POINT
LP LOW POINT
EX ASSUMED EXISTING ELEVATION



30 0 30 60
1 INCH = 30 FEET

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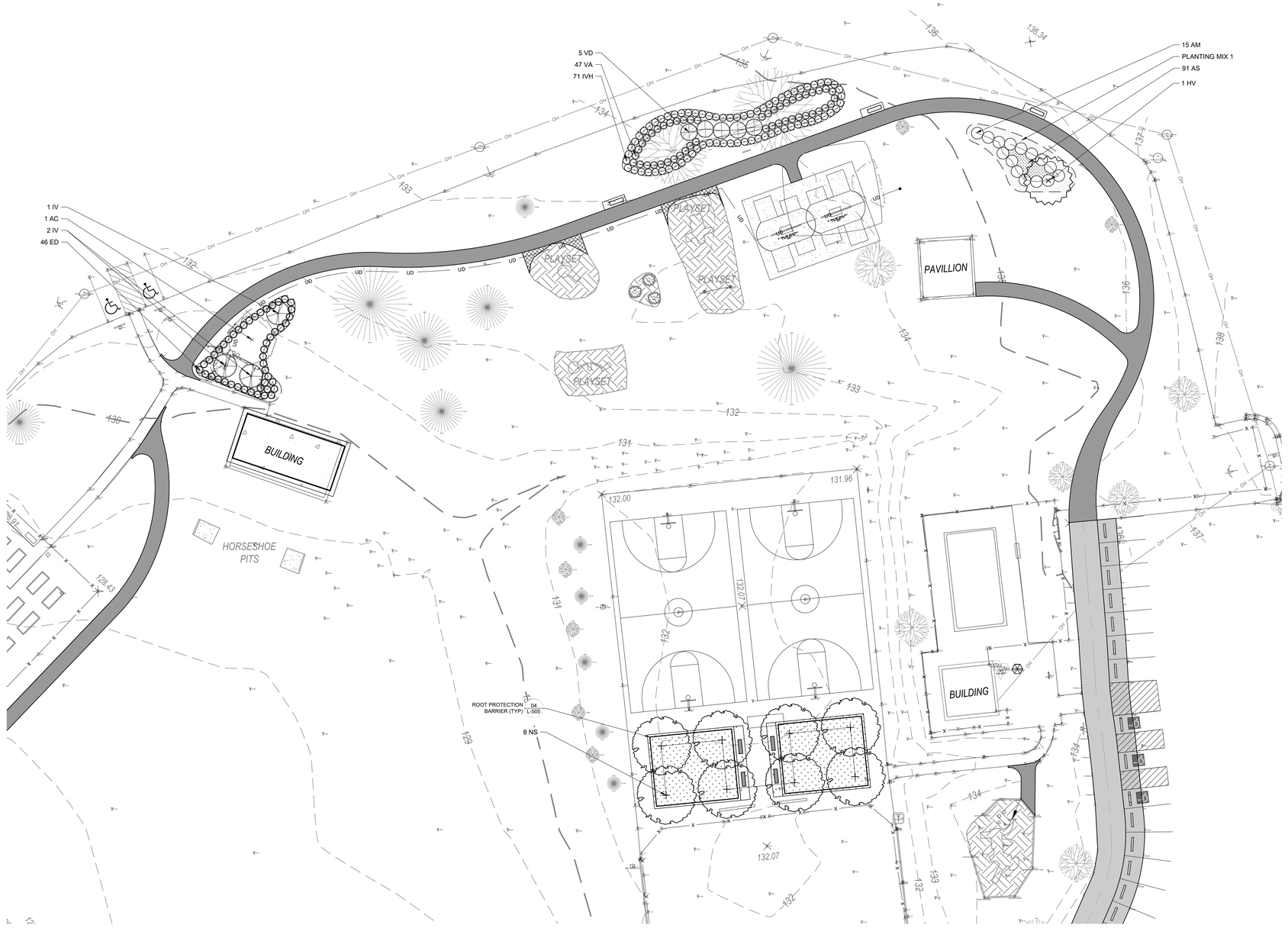
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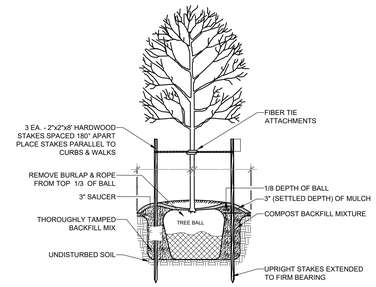
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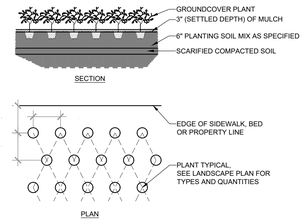
L-105

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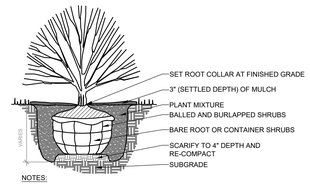




01 L-106 **TREE PLANTING - BALL & BURLAP**
NOT TO SCALE



02 L-106 **GROUNDCOVER PLANTING**
NOT TO SCALE



NOTES:

1. DO NOT PRUNE EVERGREEN SHRUBS EXCEPT TO REMOVE DAMAGED BRANCHES.
2. THIN BRANCHES AND FOLIAGE (NOT ALL BRANCH TIPS) BY 1/3, RETAINING NORMAL PLANT SHAPE (EXCEPT EVERGREEN).
3. REMOVE BURLAP FROM TOP 1/3 OF BALL, OR WITH CONTAINER PLANTS REMOVE POTS AND LOOSEN BALLS.

03 L-106 **SHRUB PLANTING**
NOT TO SCALE

TREES								
SYMBOL	**QUANTITY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**	**SPACE**	**MATURE SPREAD**	**COMMENTS**
AC	1	Amelanchier canadensis	Canadian Serviceberry	6' HT.	B&B/CONT.	AS SHOWN	15' - 20'	Clump
HV	1	Hamamelis virginiana	Witch Hazel	6' HT.	B&B/CONT.	AS SHOWN	15 '- 20'	
NS	8	Nyssa sylvatica	Black Gum	2" CAL.	B&B	AS SHOWN	20' - 30'	

SHRUBS								
SYMBOL	**QUANTITY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**	**SPACE**	**MATURE SPREAD**	**COMMENTS**
AM	15	Aronia melanocarpa 'Morton'	Black Chokeberry 'Morton'	#3	CONT.	AS SHOWN	3' - 4'	
IV	3	Ilex verticallata	Winter Berry	#5	CONT.	AS SHOWN	6' - 10'	
IVH	71	Itea virginicia 'Little Henry'	Virginia Sweetberry 'Little Henry'	#3	CONT.	AS SHOWN	2' - 3'	
VA	47	Viburnum acerifolium	Maple Leaf Viburnum	#3	CONT.	AS SHOWN	2' - 4'	
VD	5	Viburnum dentatum 'Blue Muffin'	Arrowwood Viburnum 'Blue Muffin'	#4	CONT.	AS SHOWN	5' - 7'	

INTERIOR - BUTTERFLY GARDEN								
SYMBOL	**QUANTITY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**	**SPACE**	**MATURE SPREAD**	**COMMENTS**
AS	91	Asclepias syriaca	Common Milkweed	#1	CONT.	1'	0'-9" - 1'	
ED	46	Eutrochium dubium	Joe-Pye Weed "Little Joe"	#3	CONT.	AS SHOWN	3'-0"	

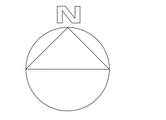
PLANTING MIX 1								
SYMBOL	**QUANTITY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**	**SPACE**	**MATURE SPREAD**	**COMMENTS**
AV	86	Asclepias verticillata	Whorled Milkweed	#1	CONT.	2'	1' - 2'	
CG	57	Chelone glabra	Turtle Head	#1	CONT.	3'	1' - 3'	

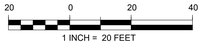
LEGEND

PLANT MIX 1 - WHORLED MILKWEED AND TURTLE HEAD

PLANTING NOTES

1. LANDSCAPE PLANS ARE ONLY FOR LANDSCAPE PLANTING PURPOSES. REFER TO OTHER PLAN SHEETS FOR GRADING, DRAINAGE, EXISTING TREES TO BE REMOVED, ETC.
2. CONTRACTOR TO COORDINATE WITH LANDSCAPE ARCHITECT FOR RELOCATION OF PLANTINGS DUE TO ELECTRICAL / UTILITY CONFLICTS.
3. RESEED ALL DISTURBED AREAS.
4. IF THE QUANTITIES LISTED IN THE PLANTING SCHEDULE DO NOT REFLECT THE QUANTITIES SHOWN IN THE ON THE PLANTING PLAN, PROVIDE THE QUANTITY OF EACH PLANT AS INDICATED ON THE PLANTING PLAN





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PROJECT NUMBER:
20-03026-030

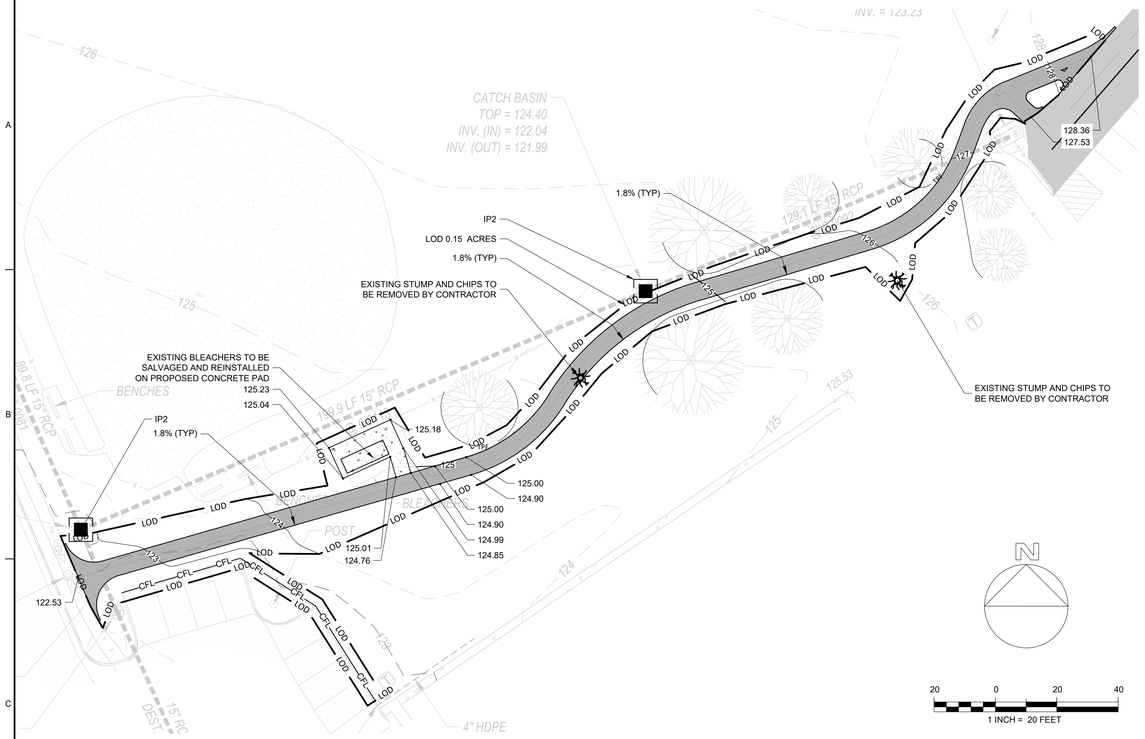
DATE: 07/26/2024
SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

DRAWING TITLE:
LANDSCAPE PLAN

DRAWING NUMBER:
L-106

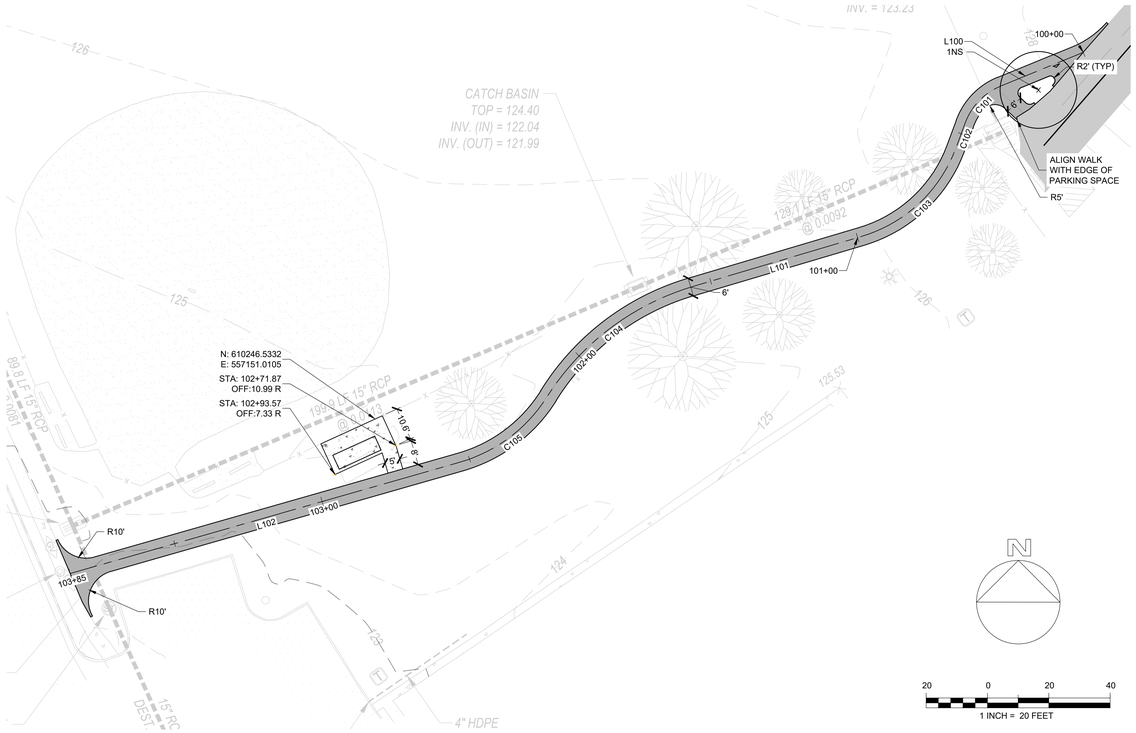
C:\jmtwork\eng\mfc\d0858469\Planting Plan.dwg 7/25/2024



01 L-107

DEMOLITION, EROSION AND SEDIMENT CONTROL, AND GRADING PLAN

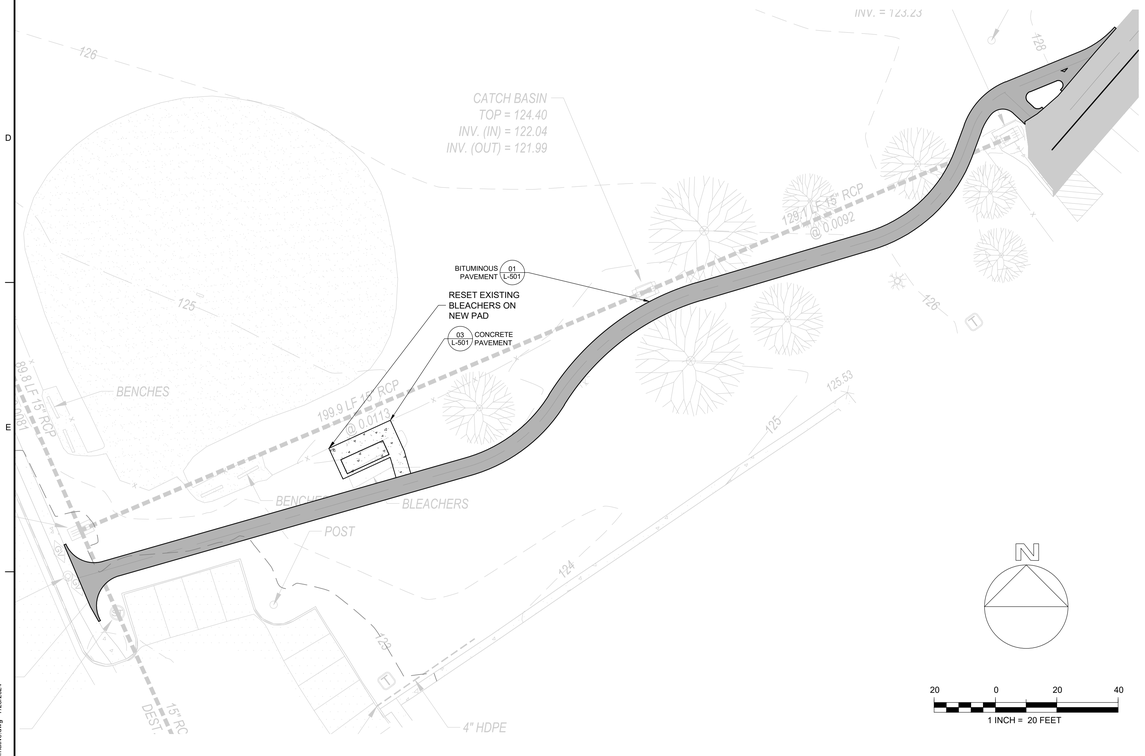
1" = 20'



02 L-107

SITE LAYOUT AND PLANTING PLAN

1" = 20'



03 L-107

MATERIALS PLAN

1" = 20'

CURVE #	START STATION	END STATION	RADIUS	LENGTH	CHORD DIRECTION	START POINT	END POINT
C101	100+28.92	100+46.54	21.00	17.62	S43° 44' 29.29"W	N: 610,355.1417, E: 557,355.1133	N: 610,342.7800, E: 557,343.2831
C102	100+46.54	100+55.52	427.00	8.98	S20° 18' 10.96"W	N: 610,342.7800, E: 557,343.2831	N: 610,334.3579, E: 557,340.1672
C103	100+55.52	100+98.64	47.00	43.12	S47° 11' 14.18"W	N: 610,334.3579, E: 557,340.1672	N: 610,306.0715, E: 557,309.6343
C104	101+56.00	102+17.01	85.00	61.01	S52° 54' 23.20"W	N: 610,289.7519, E: 557,254.6495	N: 610,253.7403, E: 557,207.0225
C105	102+17.01	102+53.41	50.00	36.41	S53° 12' 13.19"W	N: 610,253.7403, E: 557,207.0225	N: 610,232.4119, E: 557,178.5085

LINE #	START STATION	END STATION	LENGTH	DIRECTION	START POINT	END POINT
L100	100+00.00	100+28.92	28.92	S67° 46' 56.60"W	N: 610,366.0767, E: 557,381.8851	N: 610,355.1417, E: 557,355.1133
L101	100+98.64	101+56.00	57.36	S73° 28' 08.41"W	N: 610,306.0715, E: 557,309.6343	N: 610,289.7519, E: 557,254.6495
L102	102+53.41	103+85.44	132.02	S74° 03' 48.39"W	N: 610,232.4119, E: 557,178.5085	N: 610,196.1615, E: 557,051.5579

TREES								
SYMBOL	**QUANTITY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**	**SPACE**	**MATURE SPREAD**	**COMMENTS**
NS	1	Nyssa sylvatica	Black Gum	6' HT	B&B	AS SHOWN	20' - 30'	

LEGEND	
MATERIALS PLAN	
SIDELINE FENCE	x x
BITUMINOUS PAVEMENT	
CONCRETE PAVEMENT	

NOTES

1. ALL NOTES FROM CORRESPONDING DRAWINGS ARE APPLICABLE TO ADD ALTERNATE PLAN OPTIONS. PLEASE SEE EROSION AND SEDIMENT CONTROL PLAN, DEMOLITION PLAN, SITE LAYOUT PLAN, PLANTING PLAN, AND MATERIALS PLAN FOR MORE INFORMATION.

JMT
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SEAL:

CHRISTOPHER A BRUNO LICENSED No. 18168 DELAWARE PROFESSIONAL ENGINEER

SEAL:

PREPARED FOR:

CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:

EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:

60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:

20-03026-030

DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:

CONSTRUCTION PLAN

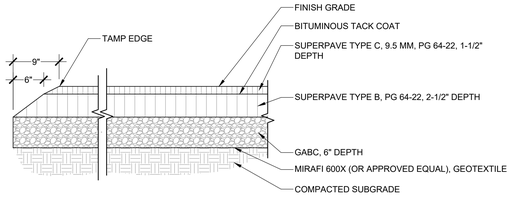
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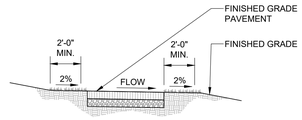
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L-107

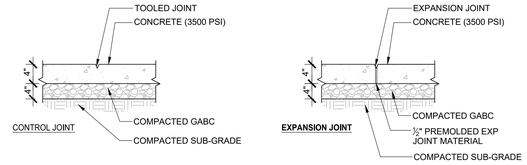
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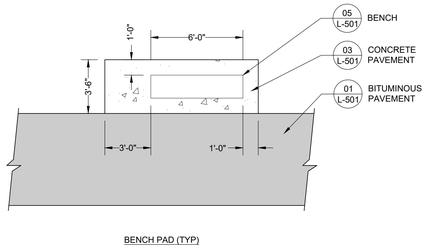
01 L-501 **BITUMINOUS PAVEMENT**
NOT TO SCALE



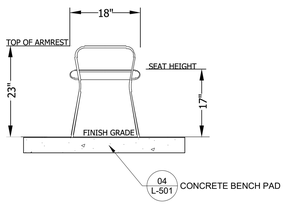
02 L-501 **TRAIL SHOULDER GRADING**
NOT TO SCALE



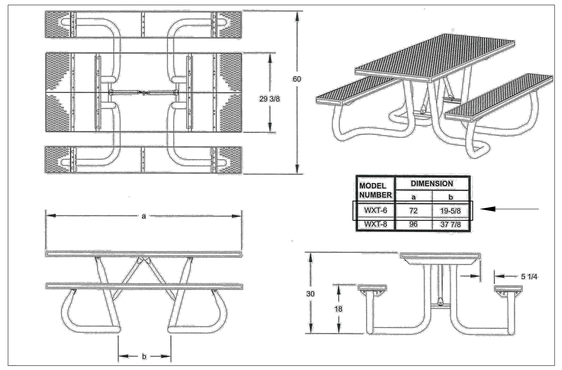
03 L-501 **CONCRETE PAVEMENT**
NOT TO SCALE



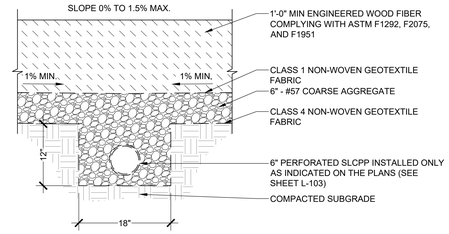
04 L-501 **BENCH PAD**
NOT TO SCALE



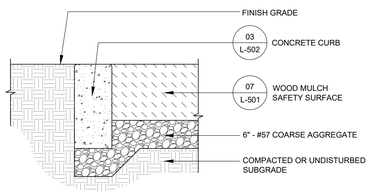
05 L-501 **BENCH**
NOT TO SCALE



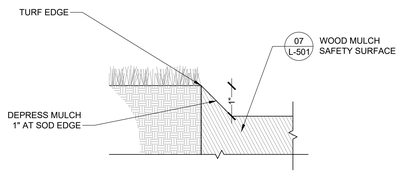
06 L-501 **MOVEABLE PICNIC TABLE**
NOT TO SCALE



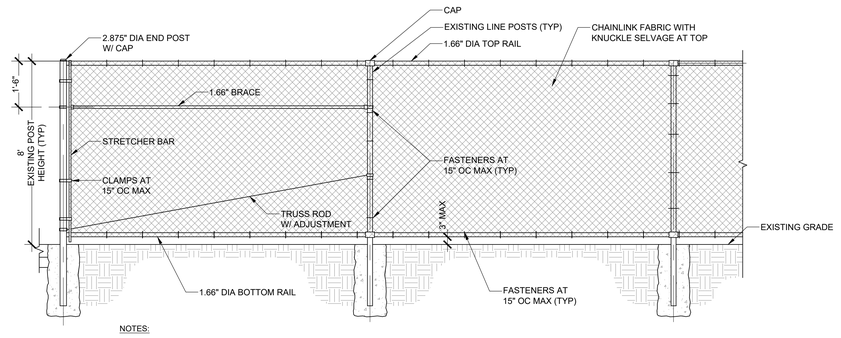
07 L-501 **WOOD MULCH SAFETY SURFACE**
NOT TO SCALE



08 L-501 **CONCRETE CURB EDGE AT WOOD MULCH**
NOT TO SCALE



09 L-501 **WOOD MULCH TRANSITION DETAIL**
NOT TO SCALE



NOTES:

1. ALL PIPE MEASUREMENTS GIVEN ARE OUTSIDE DIAMETER.
2. ALL CHAINLINK FENCE COMPONENTS SHALL MATCH EXISTING FENCE MATERIALS - SUBMIT MATERIALS FOR APPROVAL PRIOR TO ORDERING.
3. EXISTING LINE AND END POSTS TO BE STRAIGHTENED AND PLUMB BEFORE INSTALLING FABRIC, RAILS, AND FASTENERS.

10 L-501 **SIDELINE FENCE REPAIRS**
NOT TO SCALE

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SEAL:



SEAL:

PREPARED FOR:

CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:

EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:

60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:

20-03026-030

DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:

CONSTRUCTION PLAN

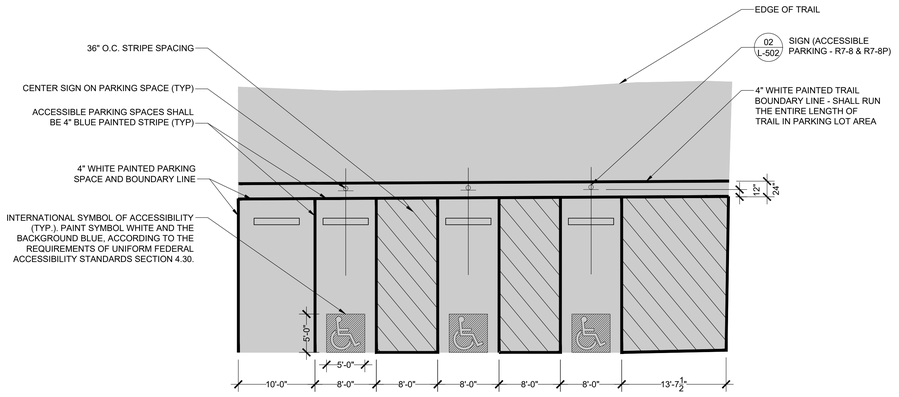
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DETAILS

DRAWING NUMBER:

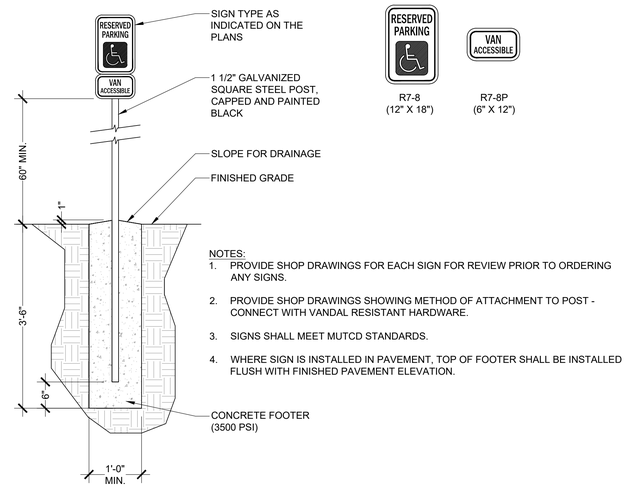
L-501

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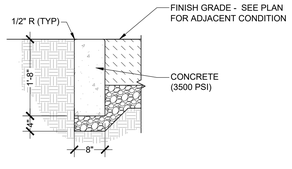
NOTES:
1. FOLLOW LAYOUT PLAN FOR SPACE DIMENSIONS AND LOCATION.
2. RESERVED PARKING SIGNS SHALL BE INSTALLED PER THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
3. ALL PAINT SHALL BE PERMANENT EPOXY RESIN COMPLYING WITH MATERIALS, WORKMANSHIP, AND OTHER APPLICABLE REQUIREMENTS OF DELDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION 2016 OR LATEST EDITION FOR PAVEMENT-MARKING WORK.

01 L-502 **ACCESSIBLE PARKING**
NOT TO SCALE



NOTES:
1. PROVIDE SHOP DRAWINGS FOR EACH SIGN FOR REVIEW PRIOR TO ORDERING ANY SIGNS.
2. PROVIDE SHOP DRAWINGS SHOWING METHOD OF ATTACHMENT TO POST - CONNECT WITH VANDAL RESISTANT HARDWARE.
3. SIGNS SHALL MEET MUTCD STANDARDS.
4. WHERE SIGN IS INSTALLED IN PAVEMENT, TOP OF FOOTER SHALL BE INSTALLED FLUSH WITH FINISHED PAVEMENT ELEVATION.

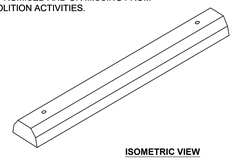
02 L-502 **SIGN**
NOT TO SCALE



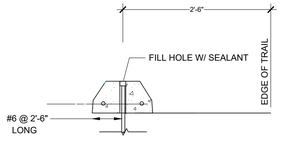
03 L-502 **CONCRETE CURB (TYP)**
NOT TO SCALE

EXISTING WHEEL STOP

NOTE:
CONTRACTOR TO PROVIDE NEW WHEEL STOPS FOR ANY STOPS THAT ARE COMPROMISED AND OR MISSING FROM DEMOLITION ACTIVITIES.

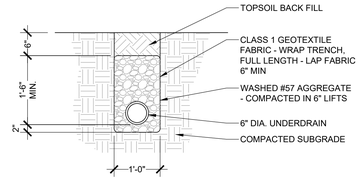


ISOMETRIC VIEW



SECTION

04 L-502 **CONCRETE WHEEL STOP REINSTALLATION**
NOT TO SCALE



05 L-502 **UNDERDRAIN (TURF)**
NOT TO SCALE

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SEAL:



SEAL:

PREPARED FOR:
CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

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REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:
EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:
60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:
20-03026-030

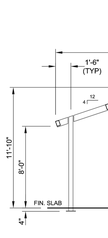
DATE: 07/26/2024
SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

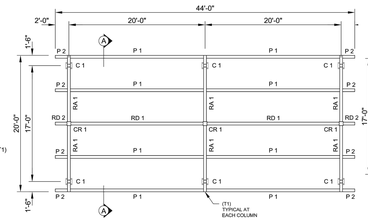
DRAWING TITLE:
DETAILS

DRAWING NUMBER:
L-502

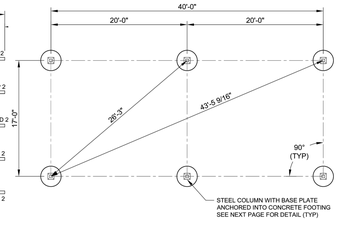
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A FRAMING SECTION
SCALE: 3/16" = 1'-0"



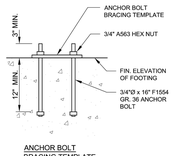
FRAMING PLAN



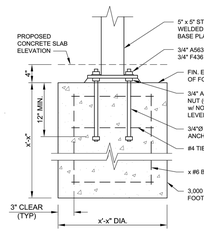
FOOTING LAYOUT PLAN



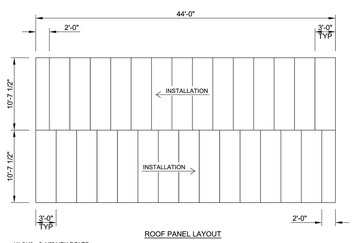
BASE PLATE ANCHOR LAYOUT



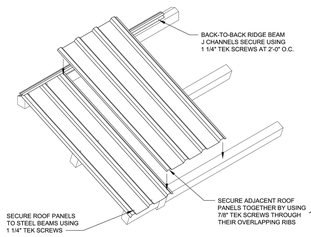
ANCHOR BOLT BRACING TEMPLATE



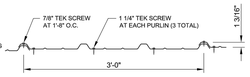
FOOTING DETAIL



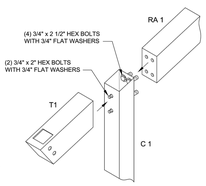
ROOF PANEL LAYOUT



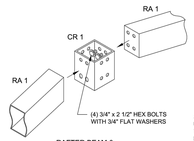
ROOF PANEL INSTALLATION



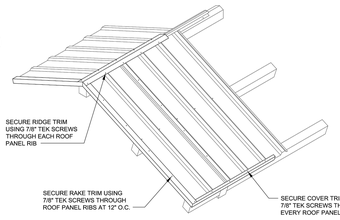
FASTENING PATTERN



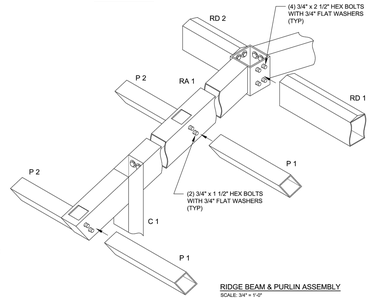
COLUMN & RAFTER BEAM ASSEMBLY



RAFTER BEAM & COMPRESSION RING ASSEMBLY
SCALE: 3/4" = 1'-0"



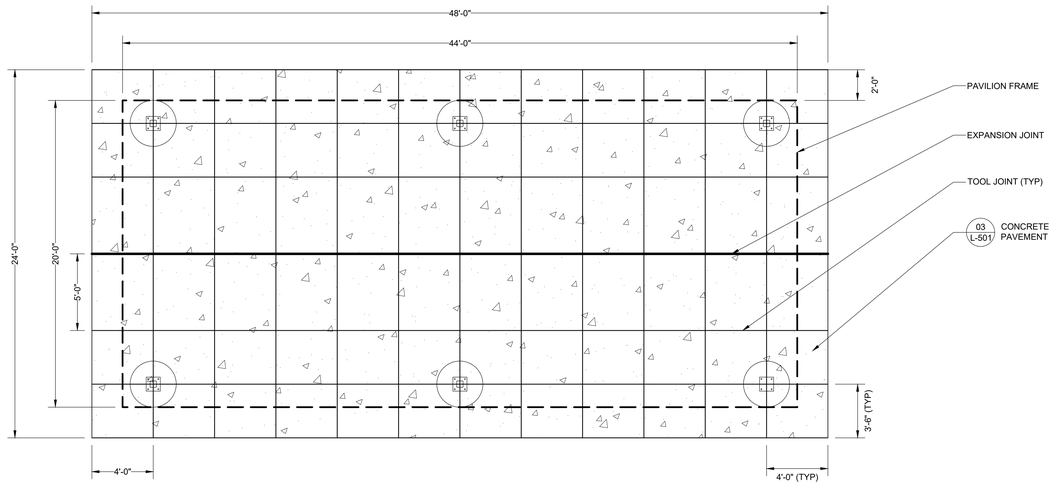
TRIM INSTALLATION



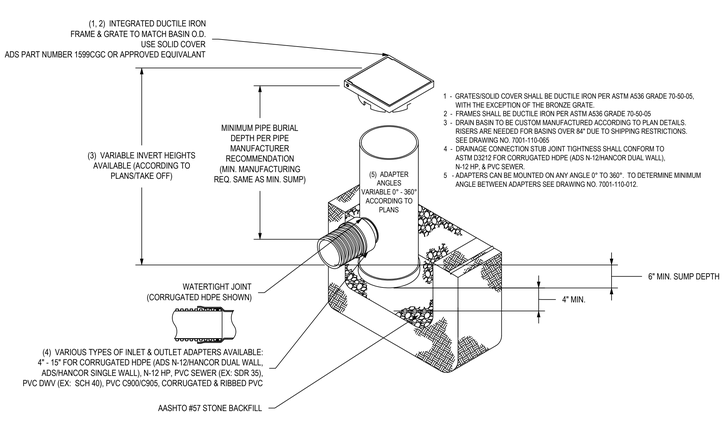
RIDGE BEAM & PURLIN ASSEMBLY
SCALE: 3/4" = 1'-0"

FOR REFERENCE ONLY

01 L-503 **GABLE SHELTER - 20'x44'**
NOT TO SCALE



02 L-503 **SHELTER BASE JOINT PLAN**
NOT TO SCALE



03 L-503 **12" CATCH BASIN**
NOT TO SCALE

NOTES

1. INFORMATION FOR SHELTER IS FOR REFERENCE AND BIDDING PURPOSES ONLY. SEALED DRAWINGS BY AN ENGINEER LICENSED IN THE STATE OF DELAWARE SHALL BE PROVIDED BY CONTRACTOR FOR INSTALLATION.
2. A LICENSED ENGINEER IN THE STATE OF DELAWARE MUST PERFORM A FOUNDATION DESIGN AND BASE CONNECTION DETAILS TO BE SUBMITTED WITH SEALED DRAWING PACKAGE.
3. PAVILION TO INCLUDE KNOCKOUTS IN EACH COLUMN FOR ELECTRIC OUTLETS AND RIDGE BEAMS FOR SECURITY LIGHT INSTALLATION.

JMT
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P: (302) 266-8600 www.jmt.com

SEAL:



SEAL:

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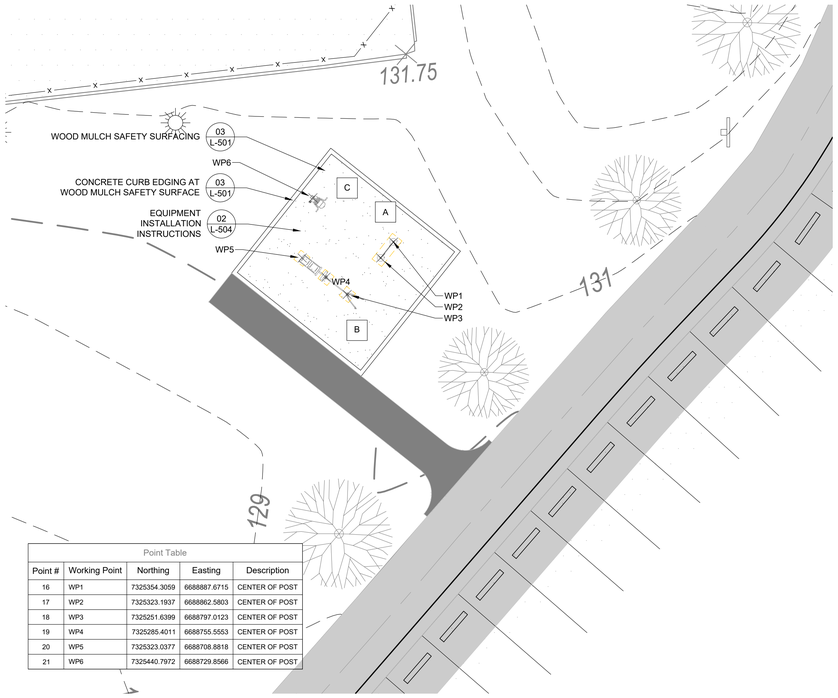
SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

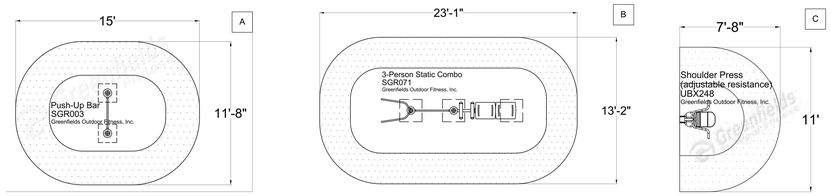
DRAWING TITLE:
DETAILS

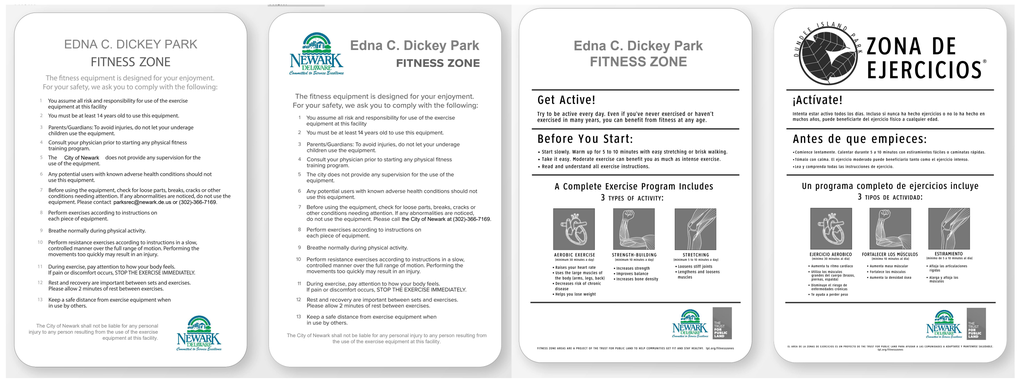
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L-503

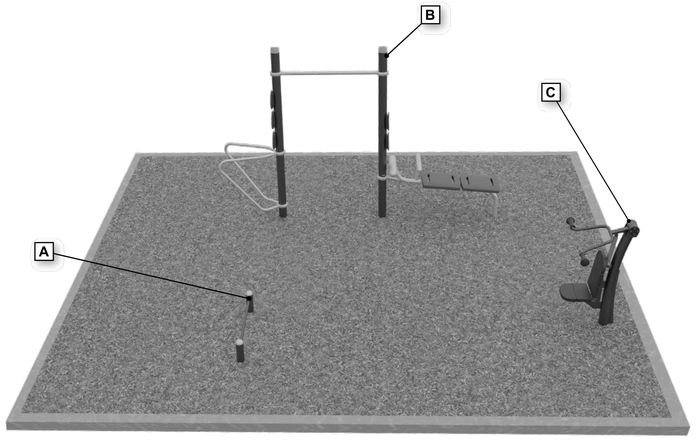
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Point Table				
Point #	Working Point	Northing	Easting	Description
16	WP1	7325354.3059	6688887.6715	CENTER OF POST
17	WP2	7325323.1937	6688862.5803	CENTER OF POST
18	WP3	7325251.6399	6688797.0123	CENTER OF POST
19	WP4	7325285.4011	6688755.5553	CENTER OF POST
20	WP5	7325323.0377	6688708.8818	CENTER OF POST
21	WP6	7325440.7972	6688729.8566	CENTER OF POST





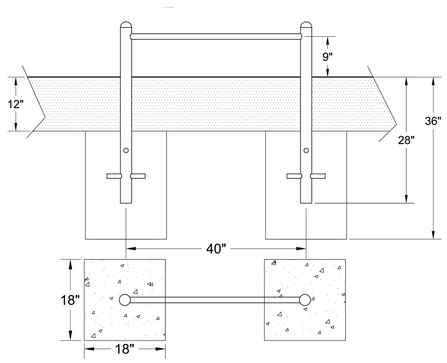


UNITS		
A	SGR003	Push-Up Bar
B	SGR071	3-Person Static Combo
C	UBX248	Shoulder Press (adjustable resistance)

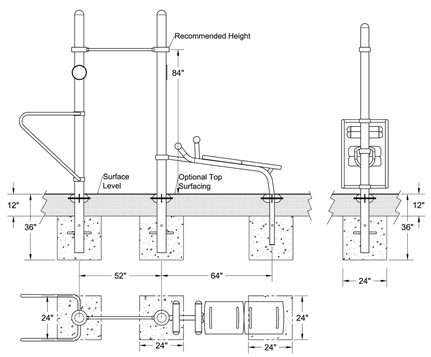
These 3 units may serve up to 5 people at a time.

01 L-504 **EXERCISE AREA LAYOUT**
NOT TO SCALE

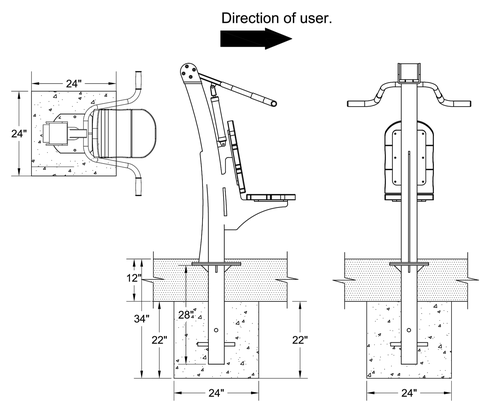
A



B



C



02 L-504 **EXERCISE INSTALLATION INSTRUCTIONS**
NOT TO SCALE

JMT
1198-B SOUTH GOVERNORS AVE, SUITE B-101
DOVER, DE 19904
P: (302) 698-3830 | www.jmt.com

SEAL:

CHRISTOPHER A BRINK
LICENSED
No. 18168
DELAWARE
PROFESSIONAL ENGINEER

SEAL:

PREPARED FOR:
CITY OF NEWARK
PARKS AND
RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:
EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:
60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:
20-03026-030

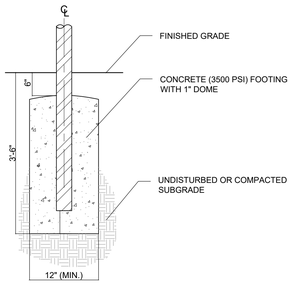
DATE: 07/26/2024
SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

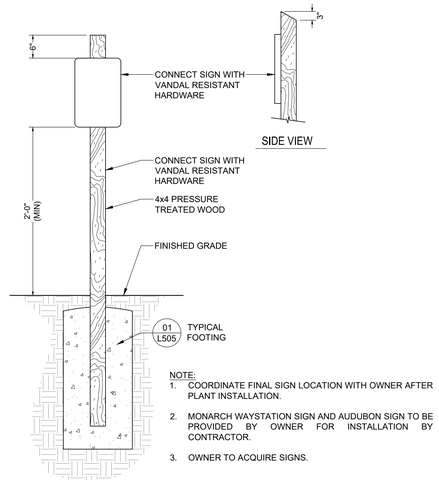
DRAWING TITLE:
DETAILS

DRAWING NUMBER:
L-504

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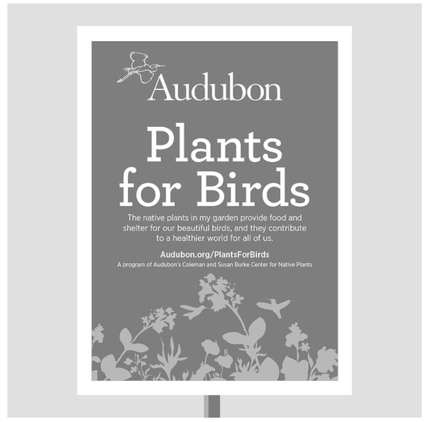
01 L-505 **TYPICAL FOOTER**
NOT TO SCALE



NOTE:
1. COORDINATE FINAL SIGN LOCATION WITH OWNER AFTER PLANT INSTALLATION.
2. MONARCH WAYSTATION SIGN AND AUDUBON SIGN TO BE PROVIDED BY OWNER FOR INSTALLATION BY CONTRACTOR.
3. OWNER TO ACQUIRE SIGNS.

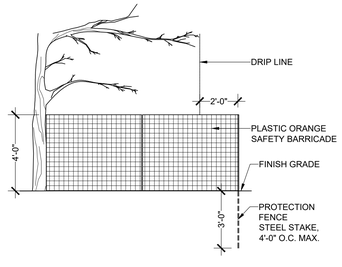
02 L-505 **HABITAT GARDEN SIGNS**
NOT TO SCALE



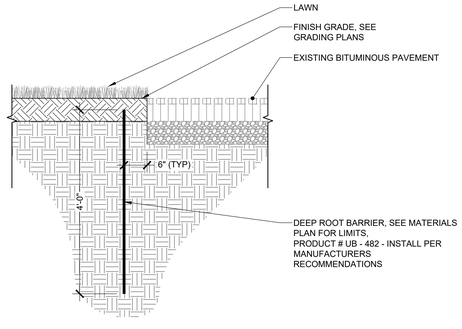


TREE PROTECTION NOTES

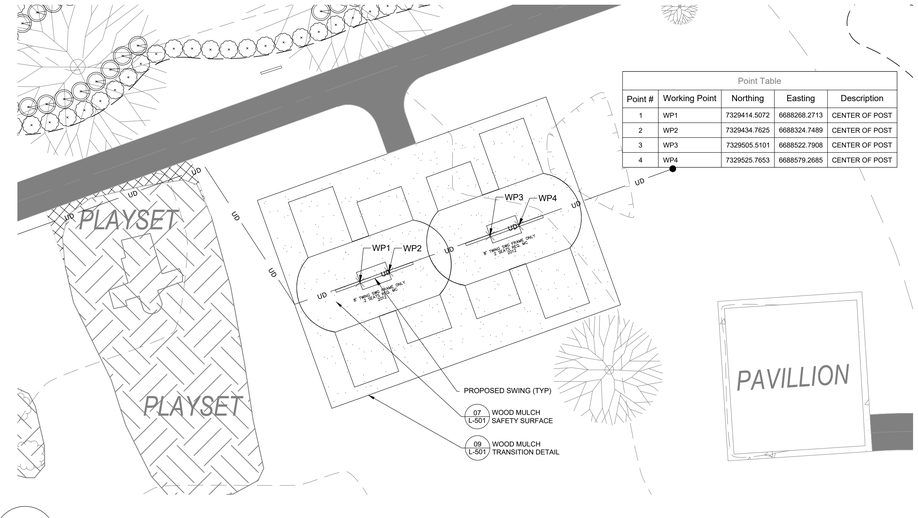
1. ALL EXISTING TREES TO REMAIN SHALL BE PROTECTED WITH TREE PROTECTION FENCING. LOCATION OF TREE PROTECTION FENCE IS INDICATED ON DRAWINGS.
2. TREE PROTECTION FENCE SHALL BE MAINTAINED FOR THE DURATION OF THE CONSTRUCTION PROCESS. IF TREE PROTECTION IS MOVED OR REMOVED FOR THE INSTALLATION OF THE WORK REPLACE IT IMMEDIATELY AT THE COMPLETION OF THE WORK.
3. EXERCISE EXTREME CAUTION IN REMOVING PAVEMENT WITHIN DRIP LINE OF EXISTING TREES TO REMAIN.
4. EXERCISE EXTREME CAUTION WHEN REMOVING TREES, ADJACENT TO EXISTING TREES TO REMAIN. USE HAND METHODS IN CANOPIES AND ROOT ZONES OF EXISTING TREES.
5. TRENCHING OR EXCAVATION WITHIN THE TREE PROTECTION FENCE SHALL BE COMPLETED WITH EXTREME CARE. USE HAND TOOLS ONLY.
6. AVOID DAMAGING EXISTING TREES. DAMAGE INCLUDES BUT IS NOT LIMITED TO: CUTTING, BREAKING, SKINNING OR COMPACTING OF ROOTS, SKINNING AND BRUISING OF BARK AND BREAKING OF BRANCHES AND LIMBS.
7. CONTRACTOR SHALL NOT PARK OR STORE EQUIPMENT AND SUPPLIES WITHIN THE TREE PROTECTION FENCING.



03 L-505 **TREE PROTECTION FENCE**
NOT TO SCALE



04 L-505 **ROOT PROTECTION BARRIER**
NOT TO SCALE



Point Table				
Point #	Working Point	Northing	Easting	Description
1	WP1	7329414.5072	6688268.2713	CENTER OF POST
2	WP2	7329434.7625	6688324.7489	CENTER OF POST
3	WP3	7329505.5101	6688522.7908	CENTER OF POST
4	WP4	7329525.7653	6688579.2685	CENTER OF POST

05 L-505 **TWIN SWING LAYOUT INFORMATION**
NOT TO SCALE

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SEAL:



SEAL:

PREPARED FOR:
CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:
EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:
60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:
20-03026-030

DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:
CONSTRUCTION PLAN

DRAWING TITLE:
DETAILS

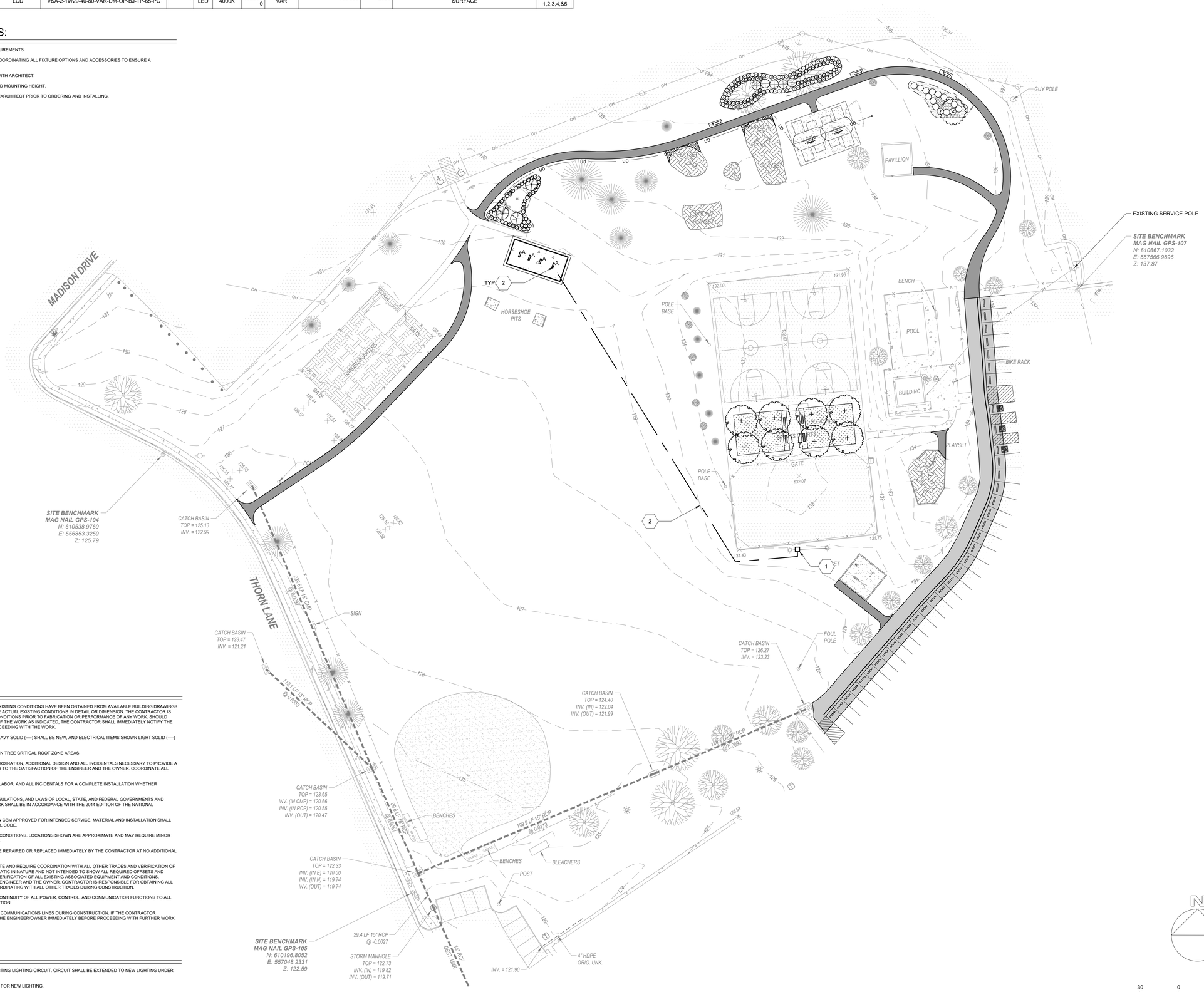
DRAWING NUMBER:
L-505

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LIGHTING FIXTURE SCHEDULE - BEAR TRAFFIC												
TYPE	DESCRIPTION	BASIS OF DESIGN OR APPROVED EQUAL	BASIS OF DESIGN MODEL	COUNT	LAMP	COLOR	LIFE	VOLTAGE	MAXIMUM WATTAGE	LUMENS	MOUNTING	COMMENTS
A	VANDAL RESISTANT LINEAR FIXTURE WITH PHOTOCELL CONTROLS	LCD	VSA-2-1W29-40-80-VAR-DM-OP-BJ-TP-65-PC	4	LED	4000K	100,000	VAR	100,000	2929	SURFACE	SEE 1,2,3,4,&5

FIXTURE SCHEDULE NOTES:

1. COORDINATE ALL FIXTURE QUANTITIES AND PLACEMENT REQUIREMENTS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ORDERING AND COORDINATING ALL FIXTURE OPTIONS AND ACCESSORIES TO ENSURE A COMPLETE QUALITY INSTALLATION.
3. FOR ALL LIGHT FIXTURES, FINISH SHOULD BE COORDINATED WITH ARCHITECT.
4. FOR ALL LIGHT FIXTURES, COORDINATE EXACT LOCATIONS AND MOUNTING HEIGHT.
5. ALL LIGHTING FIXTURES SHALL BE APPROVED BY THE OWNER/ARCHITECT PRIOR TO ORDERING AND INSTALLING.



GENERAL SHEET NOTES:

1. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAVE BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
2. UNLESS OTHERWISE NOTED, ELECTRICAL ITEMS SHOWN HEAVY SOLID (▬) SHALL BE NEW, AND ELECTRICAL ITEMS SHOWN LIGHT SOLID (—) SHALL BE EXISTING TO REMAIN.
3. REFER TO DEMOLITION PLAN FOR WORK LIMITATIONS WITHIN TREE CRITICAL ROOT ZONE AREAS.
4. PROVIDE ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, COORDINATION, ADDITIONAL DESIGN AND ALL INCIDENTALS NECESSARY TO PROVIDE A COMPLETE AND OPERABLE SYSTEM AS DETAILED ON PLANS TO THE SATISFACTION OF THE ENGINEER AND THE OWNER. COORDINATE ALL WORK WITH THE ENGINEER BEFORE THE START OF WORK.
5. CONTRACTOR SHALL INCLUDE IN THEIR BID ALL MATERIAL, LABOR, AND ALL INCIDENTALS FOR A COMPLETE INSTALLATION WHETHER SPECIFICALLY CALLED FOR OR NOT.
6. PERFORM WORK AS REQUIRED BY APPLICABLE CODES, REGULATIONS, AND LAWS OF LOCAL, STATE, AND FEDERAL GOVERNMENTS AND OTHER AUTHORITIES WITH LAWFUL JURISDICTION. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2014 EDITION OF THE NATIONAL ELECTRICAL CODE.
7. MATERIAL AND EQUIPMENT SHALL BE UL, NEMA, ANSI, ADA & CBM APPROVED FOR INTENDED SERVICE. MATERIAL AND INSTALLATION SHALL MEET REQUIREMENTS OF NATIONAL AND STATE ELECTRICAL CODE.
8. COORDINATE ALL ELECTRICAL ITEMS WITH EXISTING FIELD CONDITIONS. LOCATIONS SHOWN ARE APPROXIMATE AND MAY REQUIRE MINOR ADJUSTMENT IN THE FIELD TO SATISFY THE DESIGN INTENT.
9. DAMAGE TO EXISTING FACILITIES AND EQUIPMENT SHALL BE REPAIRED OR REPLACED IMMEDIATELY BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.
10. THE LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE AND REQUIRE COORDINATION WITH ALL OTHER TRADES AND VERIFICATION OF EXISTING CONDITIONS. ROUTING OF CONDUIT IS DIAGRAMMATIC IN NATURE AND NOT INTENDED TO SHOW ALL REQUIRED OFFSETS AND DETAILS. THE CONTRACTOR IS RESSPONSIBLE FOR FIELD VERIFICATION OF ALL EXISTING ASSOCIATED EQUIPMENT AND CONDITIONS. COORDINATE THE LOCATION OF ALL EQUIPMENT WITH THE ENGINEER AND THE OWNER. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL OTHER TRADES' DRAWINGS AND SPECIFICATIONS AND COORDINATING WITH ALL OTHER TRADES DURING CONSTRUCTION.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING CONTINUITY OF ALL POWER, CONTROL, AND COMMUNICATION FUNCTIONS TO ALL AREAS AFFECTED BY DEMOLITION AND/OR NEW CONSTRUCTION.
12. CONTRACTOR SHALL NOT CUT ANY ACTIVE ELECTRICAL OR COMMUNICATIONS LINES DURING CONSTRUCTION. IF THE CONTRACTOR ACCIDENTALLY CUTS A LINE, THEN THEY SHALL CONTACT THE ENGINEER/OWNER IMMEDIATELY BEFORE PROCEEDING WITH FURTHER WORK.

SHEET KEYNOTES:

1. PROVIDE NEW 2X2 JUNCTION WELL FOR INTERCEPTING EXISTING LIGHTING CIRCUIT. CIRCUIT SHALL BE EXTENDED TO NEW LIGHTING UNDER CANOPY.
2. PROVIDE 1: PVC SCHEDULE 40 CONDUIT WITH 2 #10 + 1 #10G FOR NEW LIGHTING.
3. VANDAL RESISTANT LINEAR FIXTURES SHALL BE CONTROLLED BY FACTORY PROVIDED PHOTOCELLS.

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P: (302) 678-3600 | www.jmt.com

SEAL:

CHRISTOPHER A. BRUNO LICENSED No. 18168 DELAWARE PROFESSIONAL ENGINEER

SEAL:

PREPARED FOR:

CITY OF NEWARK
PARKS AND RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:

EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:

60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:

20-03026-030

DATE:	SCALE:
07/26/2024	AS NOTED

PLAN SET:

CONSTRUCTION PLAN

DRAWING TITLE:

ELECTRICAL & LIGHTING PLAN

DRAWING NUMBER:

E-101

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Submitted by Penn Lighting Associates			
Penn Lighting Associates	**Job Name:** City of Newark - Rodney Complex	**Catalog Number:** VSA-2-1W29-40-80-VAR-DM-OP-BK-TP-65 Notes:	**Type:** S4 PENN20-160648

VSA-LED

Vandal Resistant High Abuse NSF Surface Mount LED Linear

PRODUCT SPECIFICATION

The VSA is designed for general purpose, high abuse areas where an architectural look is required. Also for use in kitchen areas, stairwells, locker rooms, showers, parking garages, and natatoriums.

Mounting
Surface mounts to ceilings or walls.
Able to be Pendant Mounted. Please consult factory.

Housing
Marine grade aluminum extruded housing and die-cast end caps.

Lens Frame
Marine grade aluminum extruded side rails and die-cast ends captivates lens.

Finish
Polyester powder-coated after phosphate pretreatment for superior adhesion and corrosion resistance.

Lens
.125 in. thick extruded polycarbonate snap-fits into lens frame for ease of replacement. Opal lens completely hides diode image while maintaining excellent transmission.

Gasket
Closed cell foam gasket continuously seals lens frame to housing for up to IP67 rating.

Hardware
Stainless steel, tamperproof fasteners finished to match housing.

Driver
0-10Vdc dimming, Range 1%-100%. Factory programmable -40°C Min. starting temperature, >0.9 PF, <20% THD

Wiring
Driver provided with pre-wired 3-wire self-aligning input power quick disconnect and 2-wire quick disconnect to LED module.

Certifications
UL Listed wet location. Covered ceilings only. IP65 Rated, optional IP66 and IP67 Ratings available. Constructed to pass MIL-S-901 Grade A, Type A, High Impact Shock Test and MIL-S-167 Type 1, Vibration Test. Certified NSF2 for splash/non-food zones (option). Suitable for use in Natatorium Environments.

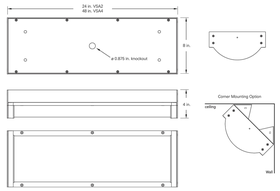
Job Name

Fixture Type

Catalog No.

Approval Date





VSA | one | two | three | four | five | six | DM | seven | eight | nine | ten | eleven

one Luminaire Size
2 2 ft. fixture
4 4 ft. fixture

two LED Source
Refer to the LED Source Table on Page 2 for available options.

three Color Temperature
30 3000K
35 3500K
40 4000K
50 5000K

four CRI
80 80 CRI
90 90 CRI

five Voltage
120 120 V, 60 Hz
277 277 V, 60 Hz
VAR Variable, 120-277 V, 50/60Hz

six Driver
DM 0-10Vdc Dimming, standard

seven Lens
OP Opal polycarbonate, standard

eight Finish
WH White
BK Matte Black
LG Light Gray
CC Custom Color (Consult Factory)

nine Hardware
TP torx head, standard
PH Phillips head**

ten IP Rating
65 IP65 Rated, standard
66 IP66 Rated
67 IP67 Rated (Natatorium*)
* *IP67 Rated option suitable for use in Natatorium application*

eleven Options
2C Two circuit wired
CM Corner mounting bracket
CU Canadian UL Listing
EM Emergency battery backup
FH Fuse holder
IMS Integral Occ Sensor
NL-LED LED night light
NS NSF Listing**
PC Photocell
RMxx* Row mounting
Includes Chase Nipple(s), PVC Gasket(s), and Sealing Locknut(s)

** xx = Length of row in feet*
*** Phillips head must use PH fasteners with NSF option.*

PROVIDE MATTE BLACK FINISH AS INDICATED IN THE CATALOG NUMBER

Modifications are available to meet custom requirements.
Specifications and dimensions are subject to change without notice.

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Submitted by Penn Lighting Associates | Penn Lighting Associates | Job Name: City of Newark - Rodney Complex | Catalog Number: VSA-2-1W29-40-80-VAR-DM-OP-BK-TP-65 Notes: | Type: S4 PENN20-160648

VSA-LED

PRODUCT SPECIFICATION

CRI	LED Life
>80	>100,000

LED Source (Box 2)	3000K Delivered Lumens	3000K L/W	3500K Delivered Lumens	3500K L/W	4000K Delivered Lumens	4000K L/W	5000K Delivered Lumens	5000K L/W	Input Watts
VSA2									
1W18	1812	105	1839	107	1893	110	1947	113	17.2
1W29	2803	105	2845	106	2929	109	3013	112	26.8
2W41	3842	114	3899	115	4014	119	4129	122	33.8
2W51	4852	113	4924	115	5069	118	5214	121	43.0
2W60	5970	109	6059	111	6238	114	6416	117	54.8
VSA4									
1W29	2782	115	2823	117	2906	120	2989	124	24.2
1W43	4117	115	4178	117	4301	120	4424	124	35.8
1W57	5497	113	5580	114	5744	118	5908	121	48.8
2W76	7348	115	7458	117	7678	121	7897	124	63.7
2W90	8642	115	8771	116	9029	120	9287	123	75.4
2W100	9840	114	9986	116	10280	120	10574	123	86.0
2W120	12107	110	12288	112	12649	115	13011	119	109.6

Specified Output Option

LC Doane programmable drivers allows us to deliver a specific lumen output. If none of the options in the chart above fit your application, let us know the desired lumen output and we will do the rest. See the example below on how this will be specified:

Example Model:

VSA2-XX[1]SO40/80-VARDM-OP-(XX[2]/LUMENS)

LUMENS = You provide the lumens.
XX[1] = We will determine the number of rows.
XX[2] = We will provide the wattage information.

Photometric Data @ 80 CRI

90 CRI multiplier	.83

The L.C. Doane Company
PO Box 700, Ivoryton, CT 06442
tel: 860.767.8295 fax: 860.767.1397
www.lcdoane.com

Rev.120619

PART 1 - GENERAL

1.1 REFERENCES

A. EXAMINE DRAWINGS AND OTHER SECTIONS OF SPECIFICATIONS FOR REQUIREMENTS THAT AFFECT WORK OF THIS SECTION.

B. AS USED IN THIS SECTION, "PROVIDE" MEANS "FURNISH AND INSTALL" AND "POS" MEANS PROVIDED UNDER OTHER SECTIONS." "FURNISH" MEANS "TO PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE WITH EVERY NECESSARY APPURTENANCE AND SUPPORT," AND "INSTALL" MEANS "TO UNLOAD" AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT."

C. PERFORM WORK AND PROVIDE MATERIAL AND EQUIPMENT AS SHOWN ON DRAWINGS AND AS SPECIFIED OR INDICATED IN THIS SECTION OF THE SPECIFICATIONS. COMPLETELY COORDINATE WORK OF THIS SECTION WITH WORK OF OTHER TRADES AND PROVIDE A COMPLETE AND FULLY FUNCTIONAL INSTALLATION. DRAWINGS AND SPECIFICATIONS FORM COMPLIMENTARY REQUIREMENTS; PROVIDE WORK SPECIFIED & NOT SHOWN, AND WORK SHOWN AND NOT SPECIFIED AS THOUGH EXPLICITLY REQUIRED BY BOTH. ALTHOUGH WORK IS NOT SPECIFICALLY SHOWN OR SPECIFIED, PROVIDE SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES, DEVICES AND MATERIALS OBVIOUSLY NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION. REMOVE ALL DEBRIS CAUSED BY CONTRACTORS WORK.

D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN CONTRACT. IT IS NOT INTENDED TO SPECIFY OR TO SHOW EVERY OFFSET, FITTING OR COMPONENT; HOWEVER, CONTRACT DOCUMENTS REQUIRE COMPONENTS AND MATERIALS WHETHER OR NOT INDICATED OR SPECIFIED AS NECESSARY TO MAKE INSTALLATION COMPLETE AND OPERATIONAL.

E. PERFORM WORK STRICTLY AS REQUIRED BY RULES, REGULATIONS, STANDARDS, CODES, ORDINANCES, AND LAWS OF LOCAL, STATE, AND FEDERAL GOVERNMENTS, AND OTHER AUTHORITIES THAT HAVE LAWFUL JURISDICTION.

F. GIVE NOTICES, FILE PLANS, OBTAIN PERMITS AND LICENSES (IF REQUIRED), PAY FEES AND BACK CHARGES AND OBTAIN NECESSARY APPROVALS FROM AUTHORITIES THAT HAVE JURISDICTION.

G. AS WORK PROGRESSES AND FOR DURATION OF PROJECT, MAINTAIN COMPLETE AND SEPARATE SET OF PRINTS OF CONTRACT DRAWINGS AT JOB SITE AT ALL TIMES. RECORD WORK COMPLETED AND ALL CHANGES FROM ORIGINAL CONTRACT DRAWINGS CLEARLY AND ACCURATELY INCLUDING WORK INSTALLED AS A MODIFICATION OR ADDITION TO THE ORIGINAL DESIGN.

H. WORK SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO THE FOLLOWING:

2. CONDUIT AND RACEWAYS.
3. WIRE AND CABLE.
4. BRANCH CIRCUIT WIRING.

I. REMOVE, EXTEND, ALTER AND RECONNECT EXISTING CONDUITS AS DIRECTED BY ENGINEERING. RECONNECT EXISTING CONDUIT THAT IS CUT AND DISCONNECTED TO ACCOMMODATE WORK. PULL IN NEW WIRES BETWEEN NEAREST ACCESSIBLE OUTLETS INTENDED FOR REUSE. PROVIDE NEW CONDUIT WHERE WIRE CANNOT BE PULLED IN EXISTING. CONNECT NEW AND EXISTING WORK TO FUNCTION AS COMPLETE, CONTINUOUSLY GROUNDED SYSTEM. REMOVE CONDUIT AND EQUIPMENT NOT INTENDED FOR REUSE AND STORE WHERE DIRECTED. USE CONDUIT EXPOSED BY WORK OF THIS CONTRACT IN CONJUNCTION WITH NEAREST OUTLET INTENDED FOR REUSE AS DIRECTED.

1.2 CONTRACT DOCUMENTS

A. WORK TO BE PERFORMED UNDER THIS SECTION IS SHOWN PRIMARILY ON THE FOLLOWING ELECTRICAL DRAWINGS: E-101 & E-102.

B. LISTING OF DRAWINGS DOES NOT LIMIT RESPONSIBILITY OF DETERMINING FULL EXTENT OF WORK REQUIRED BY CONTRACT DOCUMENTS. REFER TO MECHANICAL, ELECTRICAL, AND OTHER DRAWINGS AND OTHER SECTIONS THAT INDICATE TYPES OF CONSTRUCTION IN WHICH WORK SHALL BE INSTALLED AND WORK OF OTHER TRADES WITH WHICH WORK OF THIS SECTION MUST BE COORDINATED.

C. EXCEPT WHERE MODIFIED BY A SPECIFIC NOTATION TO THE CONTRARY, IT SHALL BE UNDERSTOOD THAT THE INDICATION AND/OR DESCRIPTION OF ANY ITEM, IN THE DRAWINGS OR SPECIFICATIONS OR BOTH, CARRIES WITH IT THE INSTRUCTION TO FURNISH AND INSTALL THE ITEM, REGARDLESS OF WHETHER OR NOT THIS INSTRUCTION IS EXPLICITLY STATED AS PART OF THE INDICATION OR DESCRIPTION.

D. ITEMS REFERRED TO IN SINGULAR NUMBER IN CONTRACT DOCUMENTS SHALL BE PROVIDED IN QUANTITIES NECESSARY TO COMPLETE WORK.

E. DRAWINGS ARE DIAGRAMMATIC. THEY ARE NOT INTENDED TO BE ABSOLUTELY PRECISE; THEY ARE NOT INTENDED TO SPECIFY OR TO SHOW EVERY OFFSET, FITTING, AND COMPONENT. THE PURPOSE OF THE DRAWINGS IS TO INDICATE A SYSTEMS CONCEPT, THE MAIN COMPONENTS OF THE SYSTEMS, & THE APPROXIMATE GEOMETRICAL RELATIONSHIPS. BASED ON THE SYSTEMS CONCEPT, THE MAIN COMPONENTS, AND THE APPROXIMATE GEOMETRICAL RELATIONSHIPS, THE CONTRACTOR SHALL PROVIDE ALL OTHER COMPONENTS AND MATERIALS NECESSARY TO MAKE THE SYSTEMS FULLY COMPLETE AND OPERATIONAL.

1.3 SUBMITTALS

A. WITHIN TWO WEEKS (EXCEPT AS NOTED OTHERWISE) AFTER AWARD OF CONTRACT AND BEFORE ORDERING MATERIALS OR EQUIPMENT. SUBMIT LIST OF PROPOSED MATERIALS AND EQUIPMENT AND INDICATE MANUFACTURER'S NAMES, ADDRESSES AND IDENTIFYING DATA. NO CONSIDERATION WILL BE GIVEN TO PARTIAL LISTS SUBMITTED OUT OF SEQUENCE.

B. MATERIAL AND EQUIPMENT REQUIRING SHOP DRAWING AND PRODUCT DATA SUBMITTAL SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO:

4. CONDUIT AND RACEWAYS
5. WIRE AND CABLE

PART 2 - PRODUCTS

2.1 RACEWAYS

A. ELECTRICAL METALLIC TUBING (EMT) SHALL BE ELECTRO-GALVANIZED AND MANUFACTURED IN ACCORDANCE WITH NEMA TL2.

B. FLEXIBLE METAL CONDUIT SHALL CONSIST OF CONTINUOUS LENGTHS OF SPIRAL WOUND & INTERLOCKED GALVANIZED STEEL, MANUFACTURED IN ACCORDANCE WITH UL 1. FLEXIBLE METAL CONDUIT SHALL BE LIMITED TO 6 LINEAR FEET OR LESS AT LIGHT FIXTURES. SHORT SECTION ARE PERMITTED AT VIBRATING EQUIPMENT SUCH AS TRANSFORMERS AND MOTORS.

C. CONDUIT EXPANSION FITTINGS SHALL BE THREADED HOT-DIPPED GALVANIZED MALLEABLE IRON WITH INTERNAL BONDING ASSEMBLY.

D. PROVIDE THREADED MALLEABLE IRON OR STEEL CONNECTORS AND COUPLINGS WITH INSULATED THROATS; MANUFACTURED ELBOWS; LOCKNUTS; AND PLASTIC OR BAKELITE BUSHINGS AT TERMINATIONS, AS NECESSARY. COUPLINGS AND CONNECTORS SHALL BE GLAND AND RING COMPRESSION, COMPRESSION COUPLINGS & CONNECTORS SHALL FORM POSITIVE GROUND. BUSHINGS FOR RIGID STEEL AND CONNECTORS FOR EMT SHALL HAVE INSULATING INSERTS THAT MEET REQUIREMENTS OF UL 514 FLAME TEST.

E. MINIMUM CONDUIT SIZE SHALL BE 3/4" DIAMETER UNLESS SPECIFIED OTHERWISE.

F. A MAXIMUM OF THREE BRANCH CIRCUITS PER CONDUIT WITH WIRING DERATED AS PER NEC TABLE 310.15.

2.3 JUNCTION BOXES AND PULL BOXES

A. PROVIDE CODE GAUGE GALVANIZED STEEL JUNCTION AND PULL BOXES FOR CONDUIT 1-1/4" TRADE SIZE AND LARGER, WHERE INDICATED AND AS NECESSARY TO FACILITATE INSTALLATION, OF REQUIRED DIMENSIONS, WITH ACCESSIBLE, REMOVABLE SCREW-ON COVERS. PROVIDE JUNCTION AND PULL BOXES IN SPECIAL SIZES AND SHAPES DETERMINED IN FIELD WHERE NECESSARY.

B. JUNCTION BOX COVERS SHALL BE ACCESSIBLE. DO NOT INSTALL JUNCTION BOXES ABOVE SUSPENDED CEILINGS EXCEPT WHERE CEILING IS REMOVABLE OR WHERE ACCESS PANEL IS PROVIDED.

2.4 WIRE AND CABLE (600 V INSULATION)

A. PROVIDE SINGLE CONDUCTOR, ANNEALED COPPER WIRE AND CABLE WITH INSULATION RATED 600 V, OF SIZES SPECIFIED AND SCHEDULED ON DRAWINGS, FOR SECONDARY SERVICE, FEEDERS, BRANCH AND SYSTEM WIRING. WIRE SIZES SHOWN AND SPECIFIED ARE AMERICAN WIRE GAUGE FOR COPPER.

B. ARMORED CABLE SHALL BE TYPE AC 600 V COPPER WITH FULL SIZED INSULATED GROUND CONDUCTOR. USE IS RESTRICTED BY REQUIREMENTS OF PARAGRAPH ENTITLED WIRING METHODS IN PART 3 OF THIS SECTION. MINIMUM SIZE SHALL BE #12 UNLESS SPECIFIED OTHERWISE.

C. WIRE #8 AND LARGER SHALL BE STRANDED; #10 AND SMALLER SHALL BE SOLID. WIRE AND CABLE SHALL HAVE THWN-THHN INSULATION RATED 75°C.

D. WIRING WITHIN LIGHT FIXTURES AND OTHER HIGH-TEMPERATURE EQUIPMENT SHALL HAVE 150°C INSULATION AS REQUIRED BY NEC.

E. SPLICES AND TERMINATIONS

1. MAKE SPLICES IN BRANCH CIRCUIT WIRING WITH UL LISTED, SOLDERLESS CONNECTORS RATED 600V, OF SIZES AND TYPES REQUIRED BY MANUFACTURER'S RECOMMENDATIONS WITH TEMPERATURE RATINGSEQUAL TO THOSE OF WIRES. SPLICE CONNECTORS SHALL BE SCREW ON. INSULATE SPLICES WITH INTEGRAL COVERS OR WITH PLASTIC OR RUBBER FRICTION TAPE TO PRESERVE CHARACTERISTICS OF WIRE AND CABLE INSULATION.

2. PROVIDE STANDARD BOLT ON LUGS WITH HEX SCREWS TO ATTACH COPPER WIRE AND CABLE TO PANELBOARDS AND ELECTRICAL EQUIPMENT.

3. AMPACITY OF SPLICES AND CONNECTORS SHALL BE EQUAL TO THOSE OF ASSOCIATED WIRES AND CABLES.

2.5 COLOR CODING

A. COLOR CODE SECONDARY SERVICE, FEEDERS AND BRANCH CIRCUIT CONDUCTORS AS FOLLOWS:

208Y/120V
BLACK FOR PHASE A,
RED FOR PHASE B,
BLUE FOR PHASE C,
WHITE FOR NEUTRAL.
PROVIDE WITH SOLID GREEN GROUNDING CONDUCTOR.

B. BRANCH CIRCUIT CONDUCTORS #12 AND #10 SHALL HAVE SOLID COLOR COMPOUND. SOLID COLOR COATING. NEUTRALS AND EQUIPMENT GROUNDS SHALL HAVE SOLID COMPOUND OR SOLID COLOR COATING (WHITE, GRAY AND GREEN), EXCEPT THAT NEUTRALS WITH COLORED STRIPE SHALL BE USED WHERE REQUIRED BY NEC. CONDUCTORS #8 AND LARGER WITH STRIPES, BANDS OR HASH MARKS SHALL MATCH EXISTING BUILDING COLOR CODE.

2.6 WIRE PULLING EQUIPMENT

A. PROVIDE POLYETHYLENE ROPES FOR PULLING WIRE.

B. PROVIDE FISH WIRES FOR DATA AND OTHER EMPTY CONDUIT SYSTEMS REQUIRED, WITHOUT SPLICES AND WITH AMPLE EXPOSED LENGTHS AT EACH END.

2.7 NON-FUSIBLE SWITCHES

A. NON-FUSIBLE SWITCHES SHALL BE TYPE HD, HEAVY DUTY, SINGLE THROW, THREE POLE, HORSEPOWER RATED, 600V WITH LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT THREE PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.

B. NON-FUSIBLE SWITCH SHALL COMPLY WITH UL 98 AND NEMA KS1.

C. PROVIDE NON-FUSIBLE SWITCHES IN NEMA 4X ENCLOSURE.

2.8 DISTRIBUTION PANELBOARDS

A. MAINS: CIRCUIT BREAKER OR LUGS ONLY, AS INDICATED.

B. PANELBOARDS: NEMA PB 1, POWER AND FEEDER DISTRIBUTION TYPE.

C. BRANCH OVERCURRENT PROTECTION DEVICE: BOLT-ON CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.

D. DOORS: SECURED WITH VAULT-TYPE LATCH WITH TUMBLER LOCK; KEYED ALIKE.

1. FOR DOORS MORE THAN 36 INCHES (914 mm) HIGH, PROVIDE TWO LATCHES, KEYED ALIKE.

E. PHASE, NEUTRAL, AND GROUND BUSSES: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.

F. SHORT-CIRCUIT RATING; FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINALS.

2.9 HEAT TRACE

A. HEATING ELEMENT: PAIR OF PARALLEL NO. 16 AWG, NICKEL-COATED, STRANDED COPPER BUS WIRES EMBEDDED IN CROSSLINKED CONDUCTIVE POLYMER CORE, WHICH VARIES HEAT OUTPUT IN RESPONSE TO TEMPERATURE ALONG ITS LENGTH. TERMINATE WITH WATERPROOF, FACTORY-ASSEMBLED, NONHEATING LEADS WITH CONNECTORS AT ONE END, AND SEAL THE OPPOSITE END WATER TIGHT. CABLE SHALL BE CAPABLE OF CROSSING OVER ITSELF ONCE WITHOUT OVERHEATING.

B. ELECTRICAL INSULATING JACKET: FLAME-RETARDANT POLYOLEFIN.

C. CABLE COVER: STAINLESS-STEEL BRAID AND POLYOLEFIN OUTER JACKET WITH ULTRAVIOLET INHIBITOR.

D. MAXIMUM OPERATING TEMPERATURE (POWER ON): 60°F

E. MAXIMUM EXPOSURE TEMPERATURE (POWER OFF): 105°F

F. CAPACITIES AND CHARACTERISTICS

1. MAXIMUM HEAT OUTPUT: 5W/FT.

2. NUMBER OF PARALLEL CABLES: TWO (2).

G. ELECTRICAL CHARACTERISTICS FOR SINGLE-CIRCUIT CONNECTION: 120V, 1Ø, 60HZ; MAXIMUM OVERCURRENT PROTECTION: 20A.

PART 3 - EXECUTION

3.1 MATERIALS AND WORKMANSHIP

A. WORK SHALL BE EXECUTED IN WORKMANLIKE MANNER AND SHALL PRESENT NEAT, RECTILINEAR AND MECHANICAL APPEARANCE WHEN COMPLETED. MAINTAIN MAXIMUM HEADROOM AT ALL TIMES. DO NOT RUN PIPES AND DUCTS EXPOSED UNLESS SHOWN EXPOSED ON DRAWINGS. MATERIAL AND EQUIPMENT SHALL BE NEW AND INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDED BEST PRACTICE SO THAT COMPLETED INSTALLATION SHALL OPERATE SAFELY AND EFFICIENTLY.

3.2 CONTINUITY OF SERVICES

A. DO NOT INTERRUPT EXISTING SERVICES WITHOUT OWNER'S APPROVAL.

3.3 TESTING, INSPECTION AND CLEANING

A. TEST WIRING AND CONNECTIONS FOR CONTINUITY AND GROUNDS BEFORE FIXTURES ARE CONNECTED.

B. FAILURE OR DEFECTS IN WORKMANSHIP OR MATERIALS REVEALED BY TESTS OR INSPECTION SHALL BE CORRECTED PROMPTLY AND RETESTED. REPLACE DEFECTIVE MATERIAL.

C. CLEAN PANELS AND OTHER EQUIPMENT. PANELBOARD INTERIORS SHALL BE CLEANED AND VACUUMED. DO NOT USED COMPRESSED AIR TO ASSIST IN CLEANING.

E. EQUIPMENT

1.AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING CONCRETE RESIDUE.

F. PROVIDE A DC MEGGER TEST FOR ALL NEW AND REUSED 600V WIRING TO TEST FOR OPEN/SHORT CIRCUIT CONDITIONS AND FOR INSULATION INTEGRITY. IN ACCORDANCE TO NETA TESTING SPECIFICATIONS.

3.4 NAMEPLATES

A. PROVIDE NAMEPLATES IN OR ON PANELBOARDS, JUNCTION BOXES AND CABINETS, AND FOR SPECIAL PURPOSE SWITCHES OR OTHER CONTROLS FURNISHED OR INSTALLED UNDER THIS SECTION. NAMEPLATES SHALL DESIGNATE EQUIPMENT CONTROLLED AND FUNCTION.

B. NAMEPLATES SHALL BE LAMINATED BLACK BAKELITE WITH 1/4" HIGH WHITE RECESSED LETTERS. NAMEPLATES SHALL BE SECURELY ATTACHED TO THE EQUIPMENT WITH STAINLESS STEEL SCREWS. ADHESIVES OR CEMENTS SHALL NOT BE USED.

3.5 WIRING METHODS

A. INSTALL WIRE AND CABLE IN APPROVED RACEWAYS AS SPECIFIED AND AS APPROVED BY AUTHORITY HAVING JURISDICTION. SURFACE METAL RACEWAYS SHALL NOT BE USED UNLESS EXPLICITLY SPECIFIED AND SHOWN ON DRAWINGS. DO NOT USE SURFACE RACEWAYS ON FLOOR. DO NOT USE ARMORED CABLE EXCEPT AS APPROVED BY LOCAL CODE FOR LIGHTING AND RECEPTACLE CIRCUITS IN SUSPENDED CEILINGS AND STUD-WALL PARTITIONS.

B. WIRE FROM POINT OF SERVICE CONNECTION TO RECEPTACLES, LIGHTING FIXTURES, DEVICES, EQUIPMENT, OUTLETS FOR FUTURE EXTENSION, AND OTHER ELECTRICAL APPARATUS AS SHOWN ON DRAWINGS. PROVIDE SLACK WIRE FOR CONNECTIONS. TAPE ENDS OF WIRES AND PROVIDE BLANK COVERS FOR OUTLET BOXES DESIGNATED FOR FUTURE USE.

C. FOLLOW HOMERUN CIRCUIT NUMBERS SHOWN ON DRAWINGS TO CONNECT CIRCUITS TO PANELBOARDS. WHERE HOMERUN CIRCUIT NUMBERS ARE NOT SHOWN ON DRAWINGS, DIVIDE SIMILAR TYPES OF CONNECTED LOADS AMONG PHASE BUSES SO THAT CURRENTS ARE APPROXIMATELY EQUAL. PROVIDE A NEUTRAL CONDUCTOR WITH EACH PHASE WIRE. COMMON NEUTRALS ARE NOT ALLOWED. PANELBOARD CABINETS ARE SURFACE MOUNTED. PROVIDE CONDUITS WITH SUFFICIENT CAPACITY FOR FUTURE CONDUCTORS FOR SPARE BRANCH CIRCUIT CIRCUIT PROTECTIVE DEVICES AND SPACES IN PANELBOARD; STUB UP CONCEALED TO JUNCTION BOX, PROVIDE EXTENSIONS ABOVE CEILING.

D. ELECTRICAL METALLIC TUBING MAY BE USED GENERALLY, IF APPROVED BY LOCAL CODES, FOR LIGHTING FIXTURE AND RECEPTACLE CIRCUITS, TELEPHONE, INTERCOMMUNICATIONS, SIGNAL AND INSTRUMENTATION CIRCUITS, & FOR CONTROL CIRCUITS. EMT MAY BE USED GENERALLY, IF APPROVED BY AUTHORITIES, IN MASONRY WALLS, ABOVE HUNG CEILINGS, IN EQUIPMENT ROOMS, IN MECHANICAL AND ELECTRICAL CHASES AND CLOSETS, IN EXPOSED LOCATIONS ALONG CEILINGS OR WALLS ABOVE NORMAL TRAFFIC LEVEL AND WHERE NOT SUBJECT TO ACCIDENTAL DAMAGE OR ABUSE.

E. INSTALL CONNECTORS AND COUPLINGS AS RECOMMENDED BY MANUFACTURERS.

F. PROVIDE FLEXIBLE CONDUITS FOR CONNECTIONS TO ELECTRICAL EQUIPMENT AND TO MECHANICAL EQUIPMENT THAT ARE SUBJECT TO MOVEMENT, VIBRATION OR MISALIGNMENT; WHERE AVAILABLE SPACE DICTATES; AND WHERE NOISE TRANSMISSION MUST BE ELIMINATED OR REDUCED. MAXIMUM LENGTH SHALL NOT EXCEED 6 FEET.

G. RUN CONCEALED CONDUIT IN AS DIRECT LINES AS POSSIBLE WITH MINIMUM NUMBER OF BENDS OF LONGEST POSSIBLE RADIUS. RUN EXPOSED CONDUIT AND EMT PARALLEL TO OR AT RIGHT ANGLES TO BUILDING LINES. ENDS SHALL BE FREE FROM DENTS OR FLATTENING.

H. CONDUIT AND EMT RUNS SHALL BE MECHANICALLY AND ELECTRICALLY CONTINUOUS FROM SOURCE PANEL TO OUTLETS. CONDUIT SHALL ENTER AND BE SECURED TO CABINET, JUNCTION BOX, PULL BOX OR OUTLET BOX WITH LOCKNUT OUTSIDE AND BUSHING INSIDE, OR WITH LIQUID-TIGHT, THREADED, SELF-LOCKING, COLD-WELD WEDGE ADAPTER. PROVIDE ADDITIONAL WRENCH-TIGHTEN LOCKNUT FOR EMT OR FLEXIBLE CONDUIT WHERE CIRCUIT VOLTAGE EXCEEDS 250 V. LOCKNUTS AND BUSHINGS OR SELF-LOCKING ADAPTERS WILL NOT BE REQUIRED WHERE CONDUITS ARE SCREWED INTO TAPPED CONNECTIONS. VERTICAL CONDUIT RUNS THAT TERMINATE IN BOTTOMS OF WALL BOXES OR CABINETS SHALL BE PROTECTED FROM ENTRANCE OF FOREIGN MATERIAL BEFORE INSTALLATION OF CONDUCTORS.

I. SIZE CONDUIT AND FLEXIBLE METALLIC CONDUIT AS REQUIRED BY NEC EXCEPT AS SPECIFIED OR SHOWN ON DRAWINGS OTHERWISE.

J. UNLESS SPECIFIED OR SHOWN ON DRAWINGS OTHERWISE, INSTALL CONDUIT AND EMT CONCEALED. UNLESS SPECIFIED OR SHOWN OTHERWISE, CONDUIT MAY BE RUN EXPOSED ON UNFINISHED WALLS AND UNFURRED BASEMENT CEILINGS AND IN UNFINISHED PENTHOUSES, ATTICS AND ROOF SPACES. PROVIDE STAND-OFF CLIPS FOR CONDUITS ON EXTERIOR MASONRY WALLS.

K. INSTALL CONDUIT SYSTEMS COMPLETE BEFORE DRAWING IN CONDUCTORS. BLOW THROUGH AND SWAB AFTER PLASTER IS FINISHED AND DRY, AND BEFORE CONDUCTORS ARE INSTALLED.

L. ATTACH PULL ROPES TO CONDUCTORS WITH BASKET-WEAVE GRIPS ON PULLING EYES. PULL CABLES THAT SHARE CONDUIT AT SAME TIME.

M. PROVIDE INSERTS, HANGERS, ANCHORS AND STEEL SUPPORTS AS NECESSARY.

N. RUN MC, FLEXIBLE METAL CONDUIT, AND/OR PLENUM RATED CABLES PARALLEL TO OR AT RIGHT ANGLES TO BUILDING LINES. SUPPORT ALL FROM STRUCTURE AND KEEP TIGHT TO BOTTOM OF STRUCTURE.

O. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRAL.

3.7 GROUNDING

A. PER CODE: PROVIDE JUMPERS OR BONDING CONDUCTORS WHERE RACEWAY IS ELECTRICALLY DISCONTINUOUS. PROVIDE COPPER GROUND CONDUCTOR MINIMUM #12 IN ALL 120 VOLT BRANCH CIRCUITS. EACH BRANCH CIRCUIT OR MULTI-WIRE CIRCUIT, TO HAVE A SEPARATE, DEDICATED CONDUCTOR.

B. PROVIDE GROUND BUS INDICATED ON DRAWINGS.

3.8 VOLTAGE CHECK

A. AT COMPLETION OF JOB AND AFTER FULL BUILDING OCCUPANCY. CHECK VOLTAGE AT SEVERAL POINTS OF UTILIZATION ON THE SYSTEM WHICH HAS BEEN INSTALLED UNDER THIS CONTRACT. DURING THE TEST, ENERGIZE ALL LOADS INSTALLED.

3.5 PANELBOARDS

A. REVISE ALL EXISTING PANELBOARD DIRECTORIES WITH NEW TYPE WRITTEN INDEX SHOWING CIRCUIT CHANGES UNDER THIS CONTRACT, INCLUDING UPDATING OF EXISTING CIRCUITS NOT BEING CHANGED. PLACE DIRECTORY IN CLEAR PLASTIC SLEEVE AND POSITIVELY ATTACH TO THE INSIDE OF THE PANELBOARD DOOR. DO NOT GLUE DIRECTORY IN PLACE.

B. PROVIDE TERMINAL STRIPS IN EXISTING PANELS TO ACCOMMODATE THE INCREASE IN NEUTRAL AND GROUND WIRES.

C. PROVIDE NEW CIRCUIT BREAKERS OF TYPE AND SHORT CIRCUIT RATING TO MATCH EXISTING WHERE REQUIRED TO SUPPLEMENT EXISTING QUANTITY.

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SEAL:

PREPARED FOR:

CITY OF NEWARK
PARKS AND
RECREATION
220 S MAIN STREET
NEWARK, DE 19711

NEWARK DELAWARE
Committed to Service Excellence

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:

EDNA C. DICKEY PARK
SITE IMPROVEMENTS

PROJECT LOCATION:

60 MADISON DRIVE
NEWARK, DELAWARE, 19711

PROJECT NUMBER:

20-03026-030

DATE: 07/26/2024

SCALE: AS NOTED

PLAN SET:

CONSTRUCTION PLAN

DRAWING TITLE:

CUT SHEETS

DRAWING NUMBER:

E-102

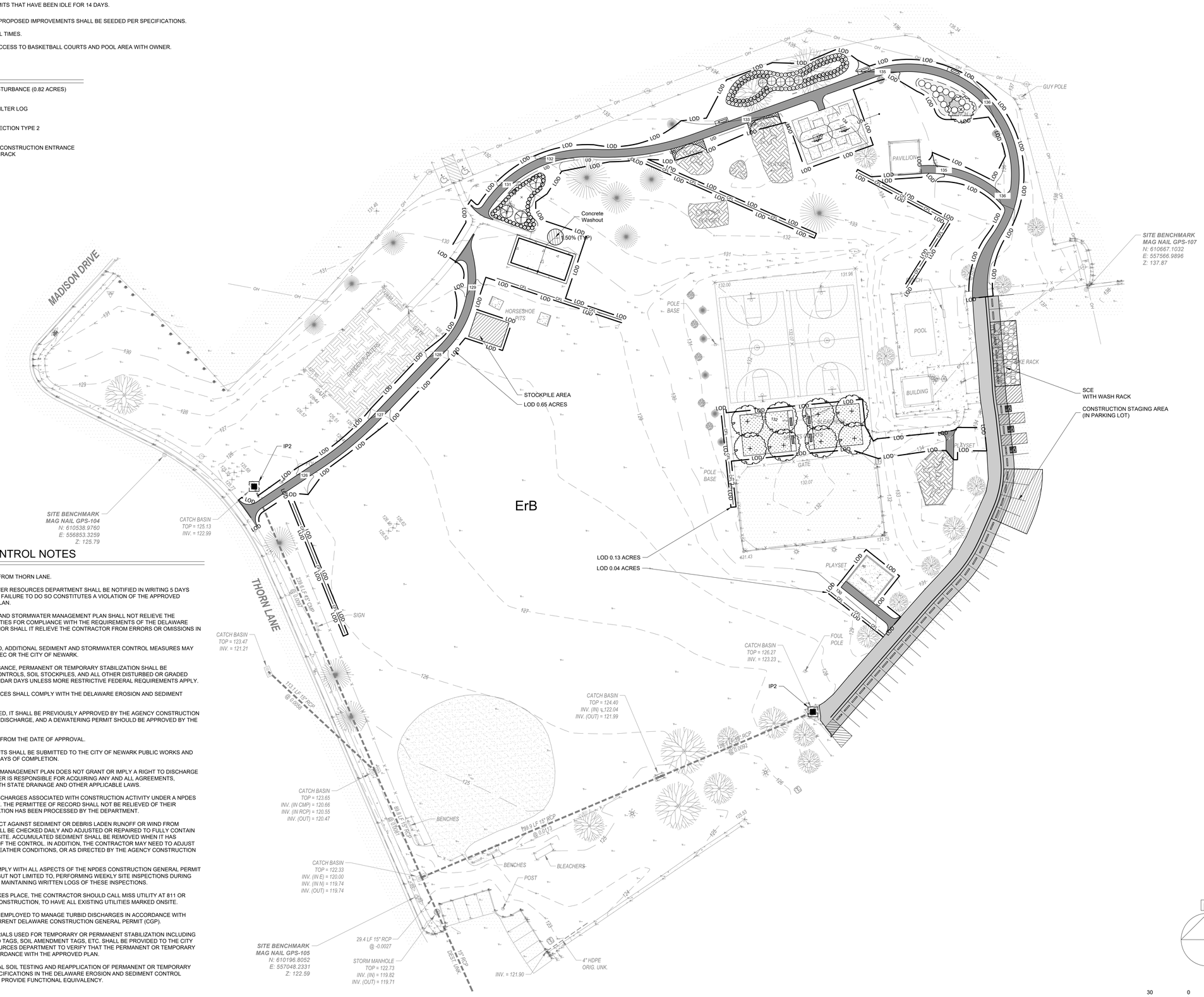
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SHEET NOTES

1. STABILIZED CONSTRUCTION ENTRANCE IS SHOWN AT RECOMMENCED LOCATION. CONTRACTOR MAY DETERMINE APPROPRIATE PLACEMENT DURING CONSTRUCTION, MOVING AS NECESSARY. STABILIZED CONSTRUCTION ENTRANCES WILL BE PLACED WHERE CONSTRUCTION VEHICLES WILL BE LEAVING THE SITE.
2. STABILIZE ALL AREAS WITHIN THE PROJECT LIMITS THAT HAVE BEEN IDLE FOR 14 DAYS.
3. ALL DISTURBED AREAS OF THE SITE WITHOUT PROPOSED IMPROVEMENTS SHALL BE SEEDED PER SPECIFICATIONS.
4. MAINTAIN ACCESS TO EXISTING GARDEN AT ALL TIMES.
5. CONTRACTOR TO COORDINATE TEMPORARY ACCESS TO BASKETBALL COURTS AND POOL AREA WITH OWNER.

LEGEND

LOD	LIMIT OF DISTURBANCE (0.82 ACRES)
CFL	COMPOST FILTER LOG
	INLET PROTECTION TYPE 2
SCE	STABILIZED CONSTRUCTION ENTRANCE WITH WASH RACK



EROSION & SEDIMENT CONTROL NOTES

1. THERE SHALL BE NO CONSTRUCTION ACCESS FROM THORN LANE.
2. THE CITY OF NEWARK PUBLIC WORKS AND WATER RESOURCES DEPARTMENT SHALL BE NOTIFIED IN WRITING 5 DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
3. REVIEW AND/OR APPROVAL OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM ERRORS OR OMISSIONS IN THE APPROVED PLAN.
4. IF THE APPROVED PLAN NEEDS TO BE MODIFIED, ADDITIONAL SEDIMENT AND STORMWATER CONTROL MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY DNREC OR THE CITY OF NEWARK.
5. FOLLOWING SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED FOR ALL PERIMETER SEDIMENT CONTROLS, SOIL STOCKPILES, AND ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE WITHIN 14 CALENDAR DAYS UNLESS MORE RESTRICTIVE FEDERAL REQUIREMENTS APPLY.
6. ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL COMPLY WITH THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
7. AT ANY TIME A DEWATERING OPERATION IS USED, IT SHALL BE PREVIOUSLY APPROVED BY THE AGENCY CONSTRUCTION SITE REVIEWER FOR A NON-EROSIVE POINT OF DISCHARGE, AND A DEWATERING PERMIT SHOULD BE APPROVED BY THE DNREC WELL PERMITTING BRANCH.
8. APPROVED PLANS REMAIN VALID FOR 5 YEARS FROM THE DATE OF APPROVAL.
9. POST CONSTRUCTION VERIFICATION DOCUMENTS SHALL BE SUBMITTED TO THE CITY OF NEWARK PUBLIC WORKS AND WATER RESOURCES DEPARTMENT WITHIN 60-DAYS OF COMPLETION.
10. APPROVAL OF A SEDIMENT AND STORMWATER MANAGEMENT PLAN DOES NOT GRANT OR IMPLY A RIGHT TO DISCHARGE STORMWATER RUNOFF. THE OWNER/DEVELOPER IS RESPONSIBLE FOR ACQUIRING ANY AND ALL AGREEMENTS, EASEMENTS, ETC., NECESSARY TO COMPLY WITH STATE DRAINAGE AND OTHER APPLICABLE LAWS.
11. THE NOTICE OF INTENT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER A NPDES GENERAL PERMIT FOR THIS PROJECT IS # XXXX. THE PERMITTEE OF RECORD SHALL NOT BE RELIEVED OF THEIR RESPONSIBILITIES UNTIL A NOTICE OF TERMINATION HAS BEEN PROCESSED BY THE DEPARTMENT.
12. THE CONTRACTOR SHALL AT ALL TIMES PROTECT AGAINST SEDIMENT OR DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SITE. PERIMETER CONTROLS SHALL BE CHECKED DAILY AND ADJUSTED OR REPAIRED TO FULLY CONTAIN AND CONTROL SEDIMENT FROM LEAVING THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. IN ADDITION, THE CONTRACTOR MAY NEED TO ADJUST OR ALTER MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, OR AS DIRECTED BY THE AGENCY CONSTRUCTION SITE REVIEWER.
13. THE OWNER SHALL BE FAMILIAR WITH AND COMPLY WITH ALL ASPECTS OF THE NPDES CONSTRUCTION GENERAL PERMIT ASSOCIATED WITH THE PROJECT, INCLUDING, BUT NOT LIMITED TO, PERFORMING WEEKLY SITE INSPECTIONS DURING CONSTRUCTION AND AFTER RAIN EVENTS, AND MAINTAINING WRITTEN LOGS OF THESE INSPECTIONS.
14. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHOULD CALL MISS UTILITY AT 811 OR 1-800-282-8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.
15. BEST AVAILABLE TECHNOLOGY (BAT) SHALL BE EMPLOYED TO MANAGE TURBID DISCHARGES IN ACCORDANCE WITH REQUIREMENTS OF 7 DEL.C.CH.60 AND THE CURRENT DELAWARE CONSTRUCTION GENERAL PERMIT (CGP).
16. DOCUMENTATION OF SOIL TESTING AND MATERIALS USED FOR TEMPORARY OR PERMANENT STABILIZATION INCLUDING BUT NOT LIMITED TO SOIL TEST RESULTS, SEED TAGS, SOIL AMENDMENT TAGS, ETC. SHALL BE PROVIDED TO THE CITY OF NEWARK PUBLIC WORKS AND WATER RESOURCES DEPARTMENT TO VERIFY THAT THE PERMANENT OR TEMPORARY STABILIZATION HAS BEEN COMPLETED IN ACCORDANCE WITH THE APPROVED PLAN.
17. THE CITY OF NEWARK MAY REQUIRE ADDITIONAL SOIL TESTING AND REAPPLICATION OF PERMANENT OR TEMPORARY STABILIZATION IN ACCORDANCE WITH THE SPECIFICATIONS IN THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, OR ALTERNATIVE MEASURES THAT PROVIDE FUNCTIONAL EQUIVALENCY.

HYDROLOGIC SOIL GROUP

ErB: Elsinboro-Delanco-Urban land complex, 0 to 8 percent slopes.
(Entire site compromised of ErB soil.)

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PREPARED FOR:

CITY OF NEWARK
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220 S MAIN STREET
NEWARK, DE 19711

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REVISIONS

NO.	DATE	DESCRIPTION

PROJECT:

EDNA C. DICKEY PARK
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60 MADISON DRIVE
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PROJECT NUMBER:

20-03026-030

DATE:	SCALE:
07/26/2024	AS NOTED

PLAN SET:

EROSION & SEDIMENT CONTROL PLAN

DRAWING TITLE:

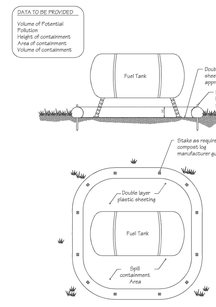
E&S PLAN

DRAWING NUMBER:

ES-101

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Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control



Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.1** Sheet 1 of 5 Effective FEB 2019

Pollution Prevention – Spill Prevention

1. Fueling should only take place in signed designated areas, away from downstream drainage facilities and waterways.
2. Fueling must be with nozzles equipped with automatic shut-off to control drips. Do not top off.
3. Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.
4. Use barriers such as berms to prevent storm water run-on and runoff, and to contain spills.
5. Place a "Fueling Area" sign next to each fueling area.
6. Store hazardous materials such as fuel, solvents, oil and chemicals in secondary containment.
7. Inspect vehicles and equipment for leaks on each day of use. Repair fluid and oil leaks immediately.
8. Absorbent spill clean-up materials and spill kits must be available in fueling areas and on fuel trucks.
9. If fueling is to take place at night, make sure the fueling area is sufficiently illuminated.
10. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.

CLEAN UP SPILLS

1. If it is safe to do so, immediately contain and clean up any chemical and/or hazardous material spills.
2. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.
3. Do not bury spills or wash them down with water.

LEAKS AND DRIPS

1. Use drip pans or absorbent pads at all times. Place under and around leaky equipment.
2. Do not allow oil, grease, fuel or chemicals to drip onto the ground.
3. Have spill kits and clean up material on-site.
4. Repair leaky equipment promptly or remove problem vehicles and equipment from the site. Clean up contaminated soil immediately.
5. Store contaminated waste in sealed containers constructed of suitable material. Label these containers properly.
6. Clean up all spills and leaks. Promptly dispose of waste and spent clean up materials.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.1** Sheet 2 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control

Notes:

The Construction Site Pollution Prevention Plan should include the following elements:

1. **Material Inventory**

   Document the storage and use of the following materials:

   a. Concrete
   b. Detergents
   c. Paints (enamel and latex)
   d. Cleaning solvents
   e. Pesticides
   f. Wood scraps
   g. Fertilizers
   h. Petroleum based products

2. **Good housekeeping practices**

   a. Store only enough product required to do the job.
   b. All materials shall be stored in a neat, orderly manner in their original labeled containers and covered.
   c. Substances shall not be mixed.
   d. When possible, all of a product shall be used up prior to disposal of the container.
   e. Manufacturers' instructions for disposal shall be strictly adhered to.
   f. The site foreman shall designate someone to inspect all BMPs daily.

3. **Waste management practices**

   a. All waste materials shall be collected and stored in securely lidded dumpsters in a location that does not drain to a waterbody.
   b. Waste materials shall be salvaged and/or recycled whenever possible.
   c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:	Symbol:	Detail No.
Adopted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 3 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control

Notes (cont.)

d. Trash shall be disposed of in accordance with all applicable Delaware laws.
e. Trash cans shall be placed at all lunch spots and littering is strictly prohibited. Recycle bins shall be placed near the construction trailer.
f. If fertilizer bags can not be stored in a weather-proof location, they shall be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. **Equipment maintenance practices**

   a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
   b. If performed on-site, vehicles shall be washed with high-pressure water spray without detergents in an area contained by an impervious berm.
   c. Drip pans shall be used for all equipment maintenance.
   d. Equipment shall be inspected for leaks on a daily basis.
   e. Washout from concrete trucks shall be disposed of in a temporary pit for hardening and proper disposal.
   f. Fuel nozzles shall be equipped with automatic shut-off valves.
   g. All used products such as oil, antifreeze, solvents and tires shall be disposed of in accordance with manufacturers' recommendations and local, state and federal laws and regulations.

5. **Spill prevention practices**

   a. Potential spill areas shall be identified and contained in covered areas with no connection to the storm drain system.
   b. Warning signs shall be posted in hazardous material storage areas.
   c. Preventive maintenance shall be performed on all tanks, valves, pumps, pipes and other equipment as necessary.
   d. Low or non-toxic substances shall be prioritized for use.

Source:	Symbol:	Detail No.
Adopted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 4 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control

Notes (cont.)

e. Contact information for reporting spills through the DNREC 24-Hour Toll Free Number shall be prominently posted.

6. **Education**

   a. Best management practices for construction site pollution control shall be a part of regular progress meetings.
   b. Information regarding waste management, equipment maintenance and spill prevention shall be prominently posted in the construction trailer.

CONTACT INFORMATION

DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Management Section	**302-739-9403**

Source:	Symbol:	Detail No.
Adopted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 5 of 5 Effective FEB 2019

Standard Detail & Specifications
Mulching

1. **Materials and Amounts**

   a. *Straw* - Straw shall be unrotted small grain straw applied at the rate of 1-1/2 to 2 tons per acre, or 70 to 90 pounds two baled per 1,000 square feet. Mulch materials shall be relatively free of weeds and shall be free of noxious weeds such as; thistles, Johnsongrass, and quackgrass. Spread mulch uniformly by hand or mechanically. For uniform distribution of hand spread mulch, divide area into approximately 1,000 square feet sections and place 70-90 pounds (two bales) of mulch in each section.

   b. *Wood chips* - Apply at the rate of approximately 6 tons per acre or 275 pounds per 1,000 square feet when available and when feasible. These are particularly well suited for utility and road rights-of-way. If wood chips are used, increase the application rate of nitrogen fertilizer by 20 pounds of N per acre (200 pounds of 50-0-0 per acre).

   c. *Hydraulically applied mulch* - The following conditions apply to hydraulically applied mulch:

      i. Definitions:
         a. Wood fiber mulch shall consist of specially prepared wood that has been processed to a uniform state, is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment, and consists of a minimum of 70% virgin or recycled wood fiber combined with 30% paper fiber and additives.
         b. Blended fiber mulch shall consist of any hydraulic mulch that contains greater than 30% paper fiber. The paper component must consist of specially prepared paper that has been processed to a uniform fibrous state and is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment.
         c. A bonded fiber matrix (BFM) consists of long strand, specially prepared wood fibers that have been processed to a uniform state held together by a water resistant bonding agent. BFMs shall contain no paper (cellulose) mulch but may contain small percentages of synthetic fibers to enhance performance.
         d. Refer to **Figure 3.4.5a** for conditions and limitations of use for each of the above categories of hydraulic mulch.
      ii. All components of the hydraulically applied mulches shall be pre-packaged by the manufacturer to assure material performance. Field mixing of the mulch components is acceptable, but must be done per manufacturers recommendations to ensure the proper results.
      iii. Hydraulic mulches shall be applied with a viable seed and of manufacturer's recommended rates. Increased rates may be necessary based on site conditions.
      iv. Hydraulically applied mulches and additives shall be mixed according to manufacturers recommendations.
      iv. *Materials within this category shall only be used when hydraulically applied mulch has been specified* for use on the approved Sediment and Stormwater Plan, or supplemental approval from the plan approval agency has been obtained in writing for a specific area.

Source:	Symbol:	Detail No.
Delaware ESC Handbook & Filtrexx™ International		**DE-ESC-3.4.5** Sheet 1 of 3 Effective FEB 2019

Standard Detail & Specifications
Mulching

v. Application:
   a. Apply product to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope.
   b. Do not apply to saturated soils, or if precipitation is anticipated within 24-48 hours.
   c. During the spring (March 1 to May 31) and fall (September 1 to November 30) seasons, hydraulic mulches may be applied in a one-step process where all components are mixed together in single-tank loads. It is recommended that the product be applied from opposing directions to achieve optimum soil coverage.
   d. During the summer (June 1 to August 31) and winter (December 1 to February 28) seasons, the following two-step process is required:
      Step One - Mix and apply seed and soil amendments with a small amount of mulch for tackifier/mulching.
      Step Two - Mix and apply mulch at manufacturers recommended rates over freshly seeded surfaces. Apply from opposing directions to achieve optimum soil coverage.
   e. Minimum curing temperature is 40°F (4°C). The best results and more rapid curing are achieved at temperatures exceeding 60°F (15°C). Curing times may be accelerated in high temperatures, low humidity conditions on dry soils.
vi. Recommended application rates are for informational purposes only. Conformance with this standard and specification shall be performance-based and requires **100% soil coverage**. Any areas with bare soil showing shall be top dressed until full coverage is achieved.

d. *Compost blanket (CB)* - Loosely applied with a pneumatic blower so that a 1" compost blanket uniformly covers the **soil with 100% coverage**. This application can be used with seed to promote germination by applying the approved seed mix directly into the loosely blown compost. The compost blanket performs best on slopes less than 2:1 and requires no mulch anchoring.

2. **Anchoring mulch** - Mulch must be anchored immediately to minimize loss by wind or water. This may be done by one of the following methods, depending upon size of area, erosion hazard, and cost.
   a. *Crimping* - A crimper is a tractor drawn implement designed to punch and anchor mulch into the top two (2) inches of soil. This practice affords maximum erosion control but is limited to flatter slopes where equipment can operate safely. On sloping land, crimping should be done on the contour whenever possible.
   b. *Tracking* – Tracking is the process of cutting mulch lusually strawl into the soil using a bulldozer or other equipment that runs on cleated tracks. Tracking is used primarily on slopes 3:1 or steeper and should be done up and down the slope with cleat marks running across the slope.
   c. *Liquid mulch binders* - Applications of liquid mulch binders should be heavier at edges, in valleys, and at crests of banks and other areas where the mulch will be moved by wind or water. All other areas should have a uniform application of binder. The use of synthetic binders is the preferred method of mulch binding and should be applied at the rates recommended by the manufacturer.
   d. *Paper fiber* - The fiber binder shall be applied at a net dry weight of 750 lbs/ac. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons.
   e. *Nettings* - Synthetic or organic nettings may be used to secure straw mulch. Install and secure according to the manufacturers recommendations.

Source:	Symbol:	Detail No.
Delaware ESC Handbook & Filtrexx™ International		**DE-ESC-3.4.5** Sheet 2 of 3 Effective FEB 2019

Standard Detail & Specifications
Mulching

MULCHING MATERIAL SELECTION GUIDE

Type of Mulch / Apx. Rate	Sept. 1 to Nov. 30	Dec. 1 to Feb. 28(29)	March 1 to May 31	June 1 to Aug. 31
Straw (2 tons/ac)	OK	OK	OK	OK
Wood Fiber @ 1000 lbs/ac - min. (Hydraulic Mulch, Tackifier Required)	OK		OK	OK
Wood Fiber @ 1500 lbs/ac - min. (Hydraulic Mulch, Tackifier Required)	OK		OK	OK
Wood Fiber @ 2000 lbs/ac - min. (Hydraulic Mulch, Tackifier Required)	OK		OK	OK
Compost Blanket (CB) @ 1" Depth	OK	OK	OK	OK
Compost Blanket (CB) @ 2" Depth	OK	OK	OK	OK
Compost Blanket (CB) @ 3" Depth	OK	OK	OK	OK
Compost Blanket (CB) @