

TOWN OF CHESHIRE, CONNECTICUT

INVITATION
TO BID
Bartlem Park South – Phase I
Bid #2223-14

LEGAL NOTICE

TOWN OF CHESHIRE, CONNECTICUT

INVITATION TO BID

Bid #2223-14

Bartlem Park South – Phase I

January 11, 2023

The Town of Cheshire will receive sealed bids for ***Bartlem Park South – Phase I*** until **February 8, 2023**, at **11:00 AM**. At that time bids will be opened in public and read aloud. There will be an optional site walk-through on **January 20, 2023**, at **10:00 AM** at Bartlem Park, 520 South Main Street, Cheshire, CT 06410.

The documents comprising the Invitation to Bid may be obtained on the Town's website, www.cheshirect.org, under "Bids & RFPs."

The Town of Cheshire reserves the rights to amend or terminate this Invitation to Bid, accept all or any part of a bid, reject all bids, waive any informalities or technical defects in a bid. The Town will award the bid to the lowest responsible qualified bidder, as determined by the Town.

TOWN OF CHESHIRE, CONNECTICUT

INVITATION TO BID FOR
Bartlem Park South – Phase I

Bid Number: #2223-14
Bid Opening Date: February 8, 2023
Bid Opening Time: 11:00 AM
Bid Opening Place: Cheshire Town Hall, Room 207/209

The Town of Cheshire is seeking sealed bids for the construction of improvements to the existing Bartlem Park South Recreation Area and consist of a new multi-purpose synthetic turf athletic field, asphalt parking and walkways, a bandstand, a restroom, lighting, associated utilities, lawn, and planting (“Project”).

One (1) original, three (3) copies, and one thumb-drive of sealed bids must be received in the Cheshire Town Hall, Room 213 (Public Works Office), 84 South Main Street, Cheshire, CT 06410 by the date and time noted above. The Town of Cheshire (the “Town”) will not accept submissions by e-mail or fax. The Town will reject bids received after the date and time noted above.

The documents comprising this Invitation to Bid may be obtained on the Town’s website, www.cheshirect.org, under “Bids & RFPs.” **Each bidder is responsible for checking the Town’s website to determine if the Town has issued any addenda and, if so, to complete its bid in accordance with the Invitation to Bid as modified by the addenda.**

Bids must be held firm and cannot be withdrawn for ninety (90) calendar days after the opening date. The Project is being funded, in part, with federal funds. Thus, the Federal Uniform Guidance Procurement Standards, as set forth in Part 200 of the Code of Federal Regulations (“FUGPS”), apply to the procurement for this Project. The Town of Cheshire has adopted a Policy consistent with the FUGPS and all relevant provisions of the FUGPS are incorporated herein and made a part hereof. Bidders are responsible for informing themselves of the applicable FUGPS provisions and for compliance therewith.

The Town reserves the rights to amend or terminate this Invitation to Bid, accept all or any part of a bid, reject all bids, waive any informalities or technical defects in a bid, and will award the bid to the lowest responsible qualified bidder, as determined by the Town. Consideration will be given to such matters as contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

This Invitation to Bid (“ITB”) includes:

- Standard Instructions to Bidders
- Specifications
- Insurance Requirements
- Bid Form
- Bidder’s Legal Status Disclosure
- Bidder’s Certification Concerning Equal Employment Opportunities and Affirmative Action Policy
- Bidder’s Non-Collusion Affidavit
- Bidder’s Statement of References
- Addenda, if any
- The Contract in the form attached (***please note that by submitting a bid, the bidder acknowledges and agrees that if awarded a contract by the Town, the successful bidder shall execute the contract provided by the Town without modification by the bidder, within five days of notice of award.***)

TOWN OF CHESHIRE, CONNECTICUT

STANDARD INSTRUCTIONS TO BIDDERS

1. INTRODUCTION

The Town of Cheshire (the “Town”) is soliciting sealed bids for **Bartlem Park South – Phase I improvements**. This ITB is not a contract offer, and no contract will exist unless and until a written contract is signed by the Town and the successful bidder.

Interested parties should submit a bid in accordance with the requirements and directions contained in this ITB. **Bidders are prohibited from contacting any Town employee, officer or official concerning this ITB, except as set forth in Section 6, below. A bidder’s failure to comply with this requirement may result in disqualification.**

If there are any conflicts between the provisions of these Standard Instructions to Bidders and any other documents comprising this ITB, these Standard Instructions to Bidders shall prevail.

2. RIGHT TO AMEND OR TERMINATE THE ITB OR CONTRACT

The Town may, before or after bid opening and in its sole discretion, clarify, modify, amend or terminate this ITB if the Town determines it is in the Town’s best interest. Any such action shall be effected by a posting on the Town’s website, www.cheshirect.org, under “Bids & RFPs.” **Each bidder is responsible for checking the Town’s website to determine if the Town has issued any addenda and, if so, to complete its bid in accordance with the ITB as modified by the addenda.**

3. KEY DATES

Pre-Bid Conference or Site Visit: **Optional site walk-through on January 20, 2023, at 10:00 AM**

Bid Opening: **February 8, 2023**

Preliminary Notice of Award: **February 15, 2023**

Contract Execution: **February 22, 2023**

The Preliminary Notice of Award and Contract Execution dates are anticipated, not certain, dates.

4. OBTAINING THE ITB

All documents that are a part of this ITB may be obtained on the Town’s website, www.cheshirect.org, under “Bids & RFPs.”

5. BID SUBMISSION INSTRUCTIONS

Bids must be received in the Cheshire Town Hall, **Town Manager’s Office, Room 221, 84 South Main Street, Cheshire, CT 06410** prior to the date and time the bids are scheduled to be opened publicly. Postmarks prior to the opening date and time do **NOT** satisfy this condition. The Town

will not accept submissions by e-mail or fax. Bidders are solely responsible for ensuring timely delivery. The Town will **NOT** accept late bids.

One (1) original, three (3) copies, and one thumb-drive of all bid documents must be submitted in sealed, opaque envelopes clearly labeled with the bidder's name, the bidder's address, the words "**BID DOCUMENTS**," and the **Bid Title, Bid Number and Bid Opening Date**. The Town may decline to accept bids submitted in unmarked envelopes that the Town opens in its normal course of business. The Town may, but shall not be required to, return such bid documents and inform the bidder that the bid documents may be resubmitted in a sealed envelope properly marked as described above.

Bid prices must be submitted on the Bid Form included in this ITB. All blank spaces for bid prices must be completed in ink or be typewritten; bid prices must be stated in both words and figures. The person signing the Bid Form must initial any errors, alterations or corrections on that form. Ditto marks or words such as "SAME" shall not be used in the Bid Form.

Bids may be withdrawn personally or in writing provided that the Town receives the withdrawal prior to the time and date the bids are scheduled to be opened. Bids are considered valid, and may not be withdrawn, cancelled or modified, for ninety (90) days after the opening date, to give the Town sufficient time to review the bids, investigate the bidders' qualifications, secure any required municipal approvals, and execute a binding contract with the successful bidder.

An authorized person representing the legal entity of the bidder must sign the Bid Form and all other forms included in this ITB.

6. QUESTIONS AND AMENDMENTS

Questions concerning the process and procedures applicable to this ITB are to be submitted **in writing** (including by e-mail) and directed **only to**:

Name: Gary J. Fuerstenberg
Department: Public Works and Engineering
E-mail: gfuerstenberg@cheshirect.org

Questions concerning this ITB's Specifications are to be submitted **in writing** (including by e-mail) and directed **only to**:

Name: Gary J. Fuerstenberg
Department: Public Works and Engineering
E-mail: gfuerstenberg@cheshirect.org

Bidders are prohibited from contacting any other Town employee, officer or official concerning this ITB. A bidder's failure to comply with this requirement may result in disqualification.

The appropriate Town representative listed above must receive any questions from bidders no later than seven (7) business days before the bid opening date. That representative will confirm

receipt of a bidder's questions by e-mail. The Town will answer all written questions by issuing one or more addenda, which shall be a part of this ITB and the resulting Contract, containing all questions received as provided for above and decisions regarding same.

At least four (4) calendar days prior to bid opening, the Town will post any addenda on the Town's website, www.cheshirect.org, under "Bids & RFPs." **Each bidder is responsible for checking the website to determine if the Town has issued any addenda and, if so, to complete its bid in accordance with the ITB as modified by the addenda.**

No oral statement of the Town, including oral statements by the Town representative(s) listed above, shall be effective to waive, change or otherwise modify any of the provisions of this ITB, and no bidder shall rely on any alleged oral statement.

7. ADDITIONAL INFORMATION

The Town reserves the right, either before or after the opening of bids, to ask any bidder to clarify its bid or to submit additional information that the Town in its sole discretion deems desirable.

8. COSTS FOR PREPARING BID

Each bidder's costs incurred in developing its bid are its sole responsibility, and the Town shall have no liability for such costs.

9. OWNERSHIP OF BIDS

All bids submitted become the Town's property and will not be returned to bidders.

10. FREEDOM OF INFORMATION ACT

All information submitted in a bid or in response to a request for additional information is subject to disclosure under the Connecticut Freedom of Information Act as amended and judicially interpreted. A bidder's responses may contain financial, trade secret or other data that it claims should not be public (the "Confidential Information"). A bidder must identify specifically the pages and portions of its bid or additional information that contain the claimed Confidential Information by visibly marking all such pages and portions. Provided that the bidder cooperates with the Town as described in this section, the Town shall, to the extent permitted by law, protect from unauthorized disclosure such Confidential Information.

If the Town receives a request for a bidder's Confidential Information, it will promptly notify the bidder in writing of such request and provide the bidder with a copy of any written disclosure request. The bidder may provide written consent to the disclosure, or may object to the disclosure by notifying the Town in writing to withhold disclosure of the information, identifying in the notice the basis for its objection, including the statutory exemption(s) from disclosure. The bidder shall be responsible for defending any complaint brought in connection with the

nondisclosure, including but not only appearing before the Freedom of Information Commission, and providing witnesses and documents as appropriate.

11. REQUIRED DISCLOSURES

In its Bid Form each bidder must disclose, if applicable:

- Its inability or unwillingness to meet any requirement of this ITB, including but not only any of the Contract Terms contained in Section 26, below;
- If it is listed on the State of Connecticut's or United States Government (including any agency thereof) Debarment List;
- If it is ineligible, pursuant to Conn. Gen. Stat. § 31-57b, to be awarded the Contract because of occupational safety and health law violations;
- All resolved and pending arbitration and litigation matters in which the bidder or any of its principals (regardless of place of employment) has been involved within the last seven (7) years;
- All criminal proceedings in which the bidder or any of its principals (regardless of place of employment) has ever been the subject; and
- Each instance in which it or any of its principals (regardless of place of employment) has ever been found to have violated any state or local ethics law, regulation, ordinance, code, policy or standard, or to have committed any other offense arising out of the submission of proposals or bids or the performance of work on public works projects or contracts.

A bidder's acceptability based on these disclosures lies solely in the Town's discretion.

12. REFERENCES

Each bidder must complete and submit the Bidder's Statement of References form included in this ITB.

13. LEGAL STATUS

If a bidder is a corporation, limited liability company, or other business entity that is required to register with the Connecticut Secretary of the State's Office, it must have a current registration on file with that office. The Town may, in its sole discretion, request acceptable evidence of any bidder's legal status.

14. BID SECURITY

Each bid must be accompanied by a certified check of the bidder or a bid bond with a surety acceptable to the Town in an amount equal to at least **TEN PERCENT (10%)** of the bid amount. The bid bond shall be written by a company or companies licensed to issue bonds in the State of Connecticut, which company or companies shall have at least an "A-" VIII policyholders rating as reported in the latest edition of Best Publication's Key Rating Guide. The successful bidder, upon its refusal or failure to execute and deliver the Contract, certificate(s) of insurance, W-9 form, performance security or other documents required by this ITB within **ten (10) business days** of written notification of preliminary award, unless the Town otherwise agrees in writing, shall

forfeit to the Town, as liquidated damages for such failure or refusal, the security submitted with its bid.

Upon the successful bidder's execution of the Contract in the form enclosed with this ITB , the Town shall return the bid security to the successful bidder and to all other bidders. By submitting a bid, the bidder expressly agrees that if awarded a contract for the Project, the bidder shall, within five (5) business days of receipt of notice of award, sign the contract provided by the Town without alteration or modification by the bidder.

15. PRESUMPTION OF BIDDER'S FULL KNOWLEDGE

Each bidder is responsible for having read and understood each document in this ITB and any addenda issued by the Town. A bidder's failure to have reviewed all information that is part of or applicable to this ITB, including but not only any addenda posted on the Town's website, shall in no way relieve it from any aspect of its bid or the obligations related thereto.

Each bidder is deemed to be familiar with and is required to comply with all federal, state and local laws, regulations, ordinances, codes and orders that in any manner relate to this ITB or the performance of the work/provision of the items described herein.

By submitting a bid, each bidder represents that it has thoroughly examined and become familiar with the scope of work/requested items outlined in this ITB, and it is capable of performing the work/providing the items to achieve the Town's objectives. If applicable, each bidder shall visit the site, examine the areas and thoroughly familiarize itself with all conditions of the property before preparing its bid.

16. SUBSTITUTIONS

NOT APPLICABLE TO THIS PROCUREMENT.

17. TAX EXEMPTIONS

The Town is exempt from the payment of federal excise taxes and Connecticut sales and use taxes. Federal Tax Exempt #066-001971. Exemption from State sales tax per Conn. Gen. Stat. Chapter 219, § 12-412(1). No exemption certificates are required, and none will be issued.

18. INSURANCE

The successful bidder shall, at its own expense and cost, obtain and keep in force at least the insurance listed in the Insurance Requirements that are a part of this ITB. The Town reserves the right to request from the successful bidder a complete, certified copy of any required insurance policy.

19. PERFORMANCE SECURITY

The successful bidder shall furnish a performance bond issued by a T-List surety covering the faithful performance of the Contract (the "Performance Security"). The Performance Security shall be in the full amount of the contract and in a form reasonably acceptable to the Town. The Performance Security shall be issued by a company licensed by the State of Connecticut that has at least an "A-" VIII policyholders rating according to Best Publication's latest edition Key Rating Guide." The cost of the Performance Security shall be included in the bid price.

In addition to the Performance Security, the successful bidder shall furnish a bond covering the successful bidder's payment to its subcontractors and suppliers of all obligations arising under the Contract (the "Payment Bond"). The Payment Bond shall be (a) in the full amount of the Contract price; (b) in a form reasonably acceptable to the Town; and (c) issued by a company licensed by the State of Connecticut that has at least an "A-" VIII policyholders rating according to Best Publication's latest edition Key Rating Guide. The cost of the Payment Bond shall be included in the bid price.

20. DELIVERY ARRANGEMENTS

NOT APPLICABLE TO THIS PROCUREMENT.

21. AWARD CRITERIA; SELECTION; CONTRACT EXECUTION

All bids will be publicly opened and read aloud as received on the date, at the time, and at the place identified in this ITB. Bidders may be present at the opening.

The Town reserves the right to correct, after bidder verification, any mistake in a bid that is a clerical or technical error, such as a price extension, decimal point error or FOB terms. If an error exists in an extension of prices, the unit price shall prevail. In the event of a discrepancy between the price quoted in words and in figures, the words shall control.

The Town reserves the rights to accept all or any part of a bid, reject all bids, and waive any informalities or technical defects or deficiencies in a bid. The Town also reserves the right, if applicable, to award the purchase of individual items under this ITB to any combination of separate bids or bidders.

The Town will accept the bid that the Town determines to be submitted by the lowest responsible qualified bidder. Although price will be an important factor in most invitations to bid, it will not be the only basis for award. Due consideration may also be given to a bidder's experience, references, service, ability to respond promptly to requests, past performance, and other criteria relevant to the Town's interests, including compliance with the procedural requirements stated in this ITB.

The Town will not award the bid to any business that or person who is in arrears or in default to the Town with regard to any tax, debt, contract, security, or any other obligation.

If the lowest bidder meets all specifications, is responsive, responsible and qualified, but the bid is not acceptable to the Town Manager or, if applicable, the Public Building Commission, the matter must be referred to the Town Council for its decision on whether to reject all bids, to accept a higher bid, or to take such other action as may be in the Town's best interests.

The Town will select the bid that it deems to be in the Town's best interest and issue a Preliminary Notice of Award to the successful bidder. The award may be subject to further discussions with the bidder. **The making of a preliminary award to a bidder does not provide the bidder with any rights and does not impose upon the Town any obligations. The Town is free to withdraw a preliminary award at any time and for any reason. A bidder has rights, and the Town has obligations, only if and when a Contract is executed by the Town and the bidder.**

If the bidder does not execute the Contract within five (5) business days of the date of the Preliminary Notice of Award, unless extended by the Town, the Town may call any bid security provided by the bidder and may enter into discussions with another bidder.

The Preliminary Notice of Award and Contract Execution dates in Section 3's Key Dates are anticipated, not certain, dates.

22. AFFIRMATIVE ACTION, AND EQUAL OPPORTUNITY

Each bidder must submit a completed Bidder's Certification Concerning Equal Employment Opportunities and Affirmative Action Policy form included with this ITB. Bidders with fewer than ten (10) employees should indicate that fact on the form and return the form with their bids.

23. NONRESIDENT REAL PROPERTY CONSTRUCTION CONTRACTORS

If the successful bidder is a "nonresident contractor" as defined in Conn. Gen. Stat. § 12-430(7)(A) as amended, it shall comply fully with the provisions of § 12-430(7) and, prior to execution of the Contract, shall furnish the Town with a copy of the requisite certificate of compliance set forth in § 12-430(7)(E). The successful bidder agrees to defend, indemnify, and hold harmless the Town, its employees, officers, officials, agents, volunteers and independent contractors, including any of the foregoing sued as individuals (collectively, the "Town Indemnified Parties"), from any and all taxes, interest and penalties that the State of Connecticut asserts are due with respect to the successful bidder's activities under the Contract.

The successful bidder shall also be required to pay any and all attorney's fees incurred by the Town Indemnified Parties in enforcing any of the successful bidder's obligations under this section, whether or not a lawsuit or other proceeding is commenced, which obligations shall survive the termination or expiration of the Contract.

24. COMPLIANCE WITH IMMIGRATION LAWS

By submitting a bid, each bidder confirms that it has complied, and during the term of the Contract will comply, with the Immigration Reform and Control Act ("IRCA") and that each

person it provides under the Contract will at all times be authorized for employment in the United States of America. Each bidder also confirms that it has a properly completed Employment Eligibility Verification, Form I-9, for each person who will be assigned under the Contract and that it will require each subcontractor, if any, to confirm that it has a properly completed Form I-9 for each person who will be assigned under the Contract.

The successful bidder shall defend, indemnify, and hold harmless the Town, its employees, officers, officials, agents, volunteers and independent contractors, including any of the foregoing sued as individuals (collectively, the "Town Indemnified Parties"), against any and all proceedings, suits, actions, claims, damages, injuries, awards, judgments, losses or expenses, including fines, penalties, punitive damages, attorney's fees and costs, brought or assessed against, or incurred by, the Town Indemnified Parties related to or arising from the obligations under IRCA imposed upon the successful bidder or its subcontractor. The successful bidder shall also be required to pay any and all attorney's fees and costs incurred by the Town Indemnified Parties in enforcing any of the successful bidder's obligations under this provision, whether or not a lawsuit or other proceeding is commenced, which obligations shall survive the termination or expiration of the Contract.

25. NON COLLUSION AFFIDAVIT

Each bidder shall submit a completed Bidder's Non Collusion Affidavit that is part of this ITB.

26. MUNICIPAL PUBLIC WORKS CONTRACT REQUIREMENTS

The contractor who is selected to perform this State project must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5. An Affirmative Action Plan must be filed with and approved by the Commission on Human Rights and Opportunities prior to the commencement of construction.

State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to subcontractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals.

For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at http://www.ct.gov/opm/cwp/view.asp?a:=2982&q=390928&opmNav_GID=1806

27. CONTRACT TERMS

A contract template has been provided with this Invitation to Bid. By submitting a bid, the Bidder acknowledges and agrees that it will execute the contract submitted to it for execution by the

Town, without alteration or modification by the Bidder, within five (5) days of receipt of notice of award. The following provisions are among the mandatory terms of the Town's Contract with the successful bidder. If a bidder is unwilling or unable to meet any of these Contract Terms, it must disclose that inability or unwillingness in its Bid Form (see Section 11 of these Standard Instructions to Bidders):

a. DEFENSE, HOLD HARMLESS AND INDEMNIFICATION

The successful bidder agrees, to the fullest extent permitted by law, to defend, indemnify, and hold harmless the Town, its employees, officers, officials, agents, volunteers and independent contractors, including any of the foregoing sued as individuals (collectively, the "Town Indemnified Parties"), from and against all proceedings, suits, actions, claims, damages, injuries, awards, judgments, losses or expenses, including attorney's fees, arising out of or relating, directly or indirectly, to the successful bidder's malfeasance, misconduct, negligence or failure to meet its obligations under the ITB or the Contract. The successful bidder's obligations under this section shall not be limited in any way by any limitation on the amount or type of the successful bidder's insurance. Nothing in this section shall obligate the successful bidder to indemnify the Town Indemnified Parties against liability for damage arising out of bodily injury to persons or damage to property caused by or resulting from the negligence of the Town Indemnified Parties.

In any and all claims against the Town Indemnified Parties made or brought by any employee of the successful bidder, or anyone directly or indirectly employed or contracted with by the successful bidder, or anyone for whose acts or omissions the successful bidder is or may be liable, the successful bidder's obligations under this section shall not be limited by any limitation on the amount or type of damages, compensation or benefits payable by the successful bidder under workers' compensation acts, disability benefit acts, or other employee benefits acts.

The successful bidder shall also be required to pay any and all attorney's fees incurred by the Town Indemnified Parties in enforcing any of the successful bidder's obligations under this section, which obligations shall survive the termination or expiration of this ITB and the Contract.

As a municipal agency of the State of Connecticut, the Town will NOT defend, indemnify, or hold harmless the successful bidder.

b. ADVERTISING

The successful bidder shall not name the Town in its advertising, news releases, or promotional efforts without the Town's prior written approval.

If it chooses, the successful bidder may list the Town in a Statement of References or similar document required as part of its response to a public procurement. The Town's permission to the successful bidder to do so is not a statement about the quality of the successful bidder's work or product or the Town's endorsement of the successful bidder.

c. W-9 FORM

The successful bidder must provide the Town with a completed W-9 form before Contract execution.

d. PAYMENTS

Bidders are encouraged to offer discounts for early payment. All other payments are to be made 30 days after the appropriate Town employee receives and approves the invoice, unless otherwise specified in the Specifications.

In each of its contracts with subcontractors or materials suppliers, the successful bidder shall agree to pay any amounts due for labor performed or materials furnished not later than thirty (30) days after the date the successful bidder receives payment from the Town that encompasses the labor performed or materials furnished by such subcontractor or material supplier. The successful bidder shall also require in each of its contracts with subcontractors that such subcontractor shall, within thirty (30) days of receipt of payment from the successful bidder, pay any amounts due any sub-subcontractor or material supplier, whether for labor performed or materials furnished.

Each payment application or invoice shall be accompanied by a statement showing the status of all pending change orders, pending change directives and approved changes to the Contract. Such statement shall identify the pending change orders and pending change directives, and shall include the date such change orders and change directives were initiated, additional cost and/or time associated with their performance and a description of any work completed. The successful bidder shall require each of its subcontractors and suppliers to include a similar statement with each of their payment applications or invoices.”

e. TOWN INSPECTION OF WORK/PRODUCTS

The Town may inspect the successful bidder’s work or products at all reasonable times. This right of inspection is solely for the Town’s benefit and does not transfer to the Town the responsibility for discovering patent or latent defects. The successful bidder has the sole and exclusive responsibility for performing in accordance with the Contract.

f. REJECTED WORK OR MATERIALS

The successful bidder, at its sole cost and expense, shall remove from the Town’s property rejected items, commodities and/or work within 48 hours of the Town’s notice of rejection. Immediate removal may be required when safety or health issues are present.

g. MAINTENANCE AND AVAILABILITY OF RECORDS

The successful bidder shall maintain all records related to the Contract for a period of five (5) years after final payment under the Contract or until all pending Town, state and federal audits

are completed, whichever is later. Such records shall be available for examination and audit by Town, state and federal representatives during that time.

h. SUBCONTRACTING

Prior to entering into any subcontract agreement(s) for the subject matter of the Contract, the successful bidder shall provide the Town with written notice of the identity (full legal name, street address, mailing address (if different from street address), and telephone number) of each proposed subcontractor. The Town shall have the right to object to any proposed subcontractor by providing the successful bidder with written notice thereof within seven (7) business days of receipt of all required information about the proposed subcontractor. If the Town objects to a proposed subcontractor, the successful bidder shall not use that subcontractor for performance of any portion of the Contract.

All permitted subcontracting shall be subject to the same terms and conditions as are applicable to the successful bidder. The successful bidder shall remain fully and solely liable and responsible to the Town for performance of the Contract. The successful bidder also agrees to promptly pay each of its subcontractors within thirty (30) days of receipt of payment from the Town or otherwise in accordance with law. The successful bidder shall assure compliance with all requirements of the Contract. The successful bidder shall also be fully and solely responsible to the Town for the acts and omissions of its subcontractors and of persons employed, whether directly or indirectly, by its subcontractor(s).

i. PREVAILING WAGES

Compliance with the [Davis-Bacon Act](#) ([40 U.S.C. 3141-3144](#), and [3146-3148](#)) as supplemented by Department of Labor regulations ([29 CFR Part 5](#), "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction") is required for this Project. In accordance with the statute, contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The Town has included a copy of the current prevailing wage determination issued by the Department of Labor in this ITB. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The Town must report all suspected or reported violations to the Federal awarding agency. The contract also includes a provision for compliance with the Copeland "Anti-Kickback" Act ([40 U.S.C. 3145](#)), as supplemented by Department of Labor regulations ([29 CFR Part 3](#), "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The Town must report all suspected or reported violations to the Federal awarding agency.

State law requires that wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker under the Contract and the amount of payment or contribution paid

or payable on behalf of each such person to any employee welfare fund, as defined in Conn. Gen. Stat. § 31-53, as amended, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the Town. A successful bidder who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day. Upon Contract award, the successful bidder must certify under oath to the State Labor Commissioner the pay scale to be used by the successful bidder and its subcontractors. The applicable prevailing wage rates are included with this ITB.

j. PREFERENCES

The successful bidder shall comply with the requirements of Conn. Gen. Stat. § 31-52(b), as amended. Specifically, the successful bidder agrees that in the employment of labor to perform the Contract, preference shall be given to citizens of the United States who are, and have been continuously for at least three (3) months prior to the date of the Contract, residents of the labor market area (as established by the State of Connecticut Labor Commissioner) in which such work is to be done, and if no such qualified person is available, then to citizens who have continuously resided in New Haven County for at least three (3) months prior to the date hereof, and then to citizens of the State who have continuously resided in the State at least three (3) months prior to the date of the Contract.

k. WORKERS COMPENSATION

Prior to commencing work on the Project, the successful bidder shall furnish to the Town (1) sufficient evidence of compliance with the workers' compensation insurance and self-insurance requirements of subsection (b) of Conn. Gen. Stat. section 31-284, and (2) a current statement from the State Treasurer that, to the best of his knowledge and belief, as of the date of the statement, the particular party was not liable to the state for any workers' compensation payments made pursuant to section 31-355..

Contact:

Ursula Tschinkel
Office of the State Treasurer
165 Capitol Avenue, 2nd Floor
Hartford, CT 06106
Tele: (860) 702-3250
Fax: (860) 702-3021
email: ursula.tschinkel@ct.gov

at the State Treasurer's Office for such statements.

Prior to Contract execution, the Town will require the tentative successful bidder to provide a current statement from the State Treasurer that, to the best of the State Treasurer's knowledge and belief, as of the date of the statement, the tentative successful bidder was not liable to the State for any workers' compensation payments made pursuant to Conn. Gen. Stat. § 31-355.

l. SAFETY

The successful bidder and each of its permitted subcontractors shall furnish proof that each employee performing the work of a mechanic, laborer or worker under the Contract has completed a course of at least ten (10) hours in construction safety and health approved by the federal Occupational Safety and Health Administration or has completed a new miner training program approved by the Federal Mine Safety and Health Administration. Such proof shall be provided with the certified payroll submitted for the first week each such employee, mechanic, laborer, or worker begins work under the Contract.

m. COMPLIANCE WITH LAWS

The successful bidder shall comply with all applicable laws, regulations, ordinances, codes and orders of the United States, the State of Connecticut and the Town related to its bid and the performance of the Contract.

n. LICENSES AND PERMITS

The successful bidder certifies that, throughout the Contract term, it shall have and provide proof of all approvals, permits and licenses required by the Town and/or any state or federal authority. The successful bidder shall immediately and in writing notify the Town of the loss or suspension of any such approval, permit or license.

o. AMENDMENTS

The Contract may not be altered or amended except by the written agreement of both parties.

p. ENTIRE AGREEMENT

It is expressly understood and agreed that the Contract contains the entire agreement between the parties, and that the parties are not, and shall not be, bound by any stipulations, representations, agreements or promises, oral or otherwise, not printed or inserted in the Contract or its attached exhibits.

q. VALIDITY

The invalidity of one or more of the phrases, sentences or clauses contained in the Contract shall not affect the remaining portions so long as the material purposes of the Contract can be determined and effectuated.

r. CONNECTICUT LAW AND COURTS

The Contract shall be governed by and construed in accordance with the internal laws (as opposed to the conflicts of law provisions) of the State of Connecticut, and the parties irrevocably submit in any suit, action or proceeding arising out of the Contract to the jurisdiction of any court of the State of Connecticut, as applicable.

s. NON-EMPLOYMENT RELATIONSHIP

The Town and the successful bidder are independent parties. Nothing contained in the Contract shall create, or be construed or deemed as creating, the relationships of principal and agent, partnership, joint venture, employer and employee, and/or any relationship other than that of independent parties contracting with each other solely for the purpose of carrying out the terms and conditions of the Contract. The successful bidder understands and agrees that it is not entitled to employee benefits, including but not limited to workers compensation and employment insurance coverage, and disability. The successful bidder shall be solely responsible for any applicable taxes.

t. Compliance with Solid Waste Disposal Act. The successful bidder shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

u. Non-Discrimination: The successful bidder agrees to comply with Executive Order 11246, including the inclusion of the Equal Employment Opportunity Clause in every contract and purchase order entered into with subcontractors and suppliers as required by 41 CFR 60-1.4, as supplemented by the Department of Labor Regulations. No person shall be discriminated against on the basis of race, color, religion, sex, or national origin in all phases of employment during the performance of the Contract. Bidders agree that contractors and subcontractors on this Project shall take affirmative action to ensure fair treatment in employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay, or other forms of compensation and selection for training and apprenticeship.

v. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). The successful bidder shall comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

w. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended. Bidder agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water

Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

x. Debarment and Suspension (Executive Orders 12549 and 12689). No award will be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

y. Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). Bidders must certify that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Town.

z. Bidders are advised that pursuant to 2 CFR 200.216, the prohibition on certain telecommunications and video surveillance services or equipment is applicable.

END OF STANDARD INSTRUCTIONS TO BIDDERS

TOWN OF CHESHIRE, CONNECTICUT

**INSURANCE REQUIREMENTS FOR
*Bartlem Park South – Phase I***

BID #2223-14

The successful bidder agrees to maintain in force at all times during the Contract the following coverages placed with company(ies) licensed by the State of Connecticut which have at least an “A-” VIII policyholders rating according to Best Publication’s latest edition Key Rating Guide.

		(Minimum Limits)
General Liability*	Each Occurrence	\$2,000,000
	General Aggregate	\$4,000,000
	Products/Completed Operations Aggregate	\$4,000,000
Auto Liability*	Combined Single Limit	
	Each Accident	\$1,000,000
Umbrella* (Excess Liability)	Each Occurrence	\$2,000,000
	Aggregate	\$3,000,000

* The Town of Cheshire shall be named as “Additional Insured.” Coverage is to be provided on a primary, noncontributory basis. Waiver of subrogation must be provided.

If any policy is written on a “Claims Made” basis, the policy must be continually renewed for a minimum of two (2) years from the completion date of the Contract. If the policy is replaced and/or the retroactive date is changed, then the expiring policy must be endorsed to extend the reporting period for claims for the policy in effect during the Contract for two (2) years from the completion date.

Workers’ Compensation and Employers’ Liability	WC Statutory Limits	
	EL Each Accident	\$1,000,000
	EL Disease Each Employee	\$1,000,000
	EL Disease Policy Limit	\$1,000,000

Original, completed Certificates of Insurance must be presented to the Town prior to Contract execution. The successful bidder agrees to provide replacement/renewal certificates at least 60 days prior to the expiration of the policy. Should any of the above described policies be cancelled before the expiration date, written notice must be given to the Town thirty (30) days prior to cancellation.

END OF INSURANCE REQUIREMENTS

TOWN OF CHESHIRE, CONNECTICUT

BID FORM
Bartlem Park South – Phase I

BID #2223-14

BIDDER'S FULL LEGAL NAME: _____

Pursuant to and in full compliance with the ITB, the undersigned bidder, having visited the site or property if applicable, and having thoroughly examined each and every document comprising the ITB, including any addenda, hereby offers and agrees as follows:

To provide the products and/or services specified in, and upon the terms and conditions of, the ITB for the total sum of _____

/100 Dollars

(write out in words)

(\$ _____) (in numbers)

ACKNOWLEDGEMENT

In submitting this Bid Form, the undersigned bidder acknowledges that the price include all labor, materials, transportation, hauling, overhead, fees and insurance(s), bonds or letters of credit, profit, security, permits and licenses, and all other costs to cover the completed work or to provide the items called for in the ITB. Except as otherwise expressly stated in the ITB, no additional payment of any kind will be made for work accomplished or the items provided under the price as proposed.

REQUIRED DISCLOSURES

1. **Exceptions to the ITB**

_____ This bid does not take exception to any requirement of the ITB, including but not only any of the Contract Terms set forth in Section 26 of the Standard Instructions to Bidders.

OR

_____ This bid takes exception(s) to certain of the ITB requirements, including but not only the following Contract Terms set forth in Section 26 of the Standard Instructions to Bidders. **Attached is a sheet fully describing each such exception.**

2. **State Debarment List**

Is the bidder on the State of Connecticut's Debarment List?

_____ Yes
_____ No

3. Occupational Safety and Health Law Violations

Has the bidder or any firm, corporation, partnership or association in which it has an interest (1) been cited for three (3) or more willful or serious violations of any occupational safety and health act or of any standard, order or regulation promulgated pursuant to such act, during the three-year period preceding the bid (provided such violations were cited in accordance with the provisions of any state occupational safety and health act or the Occupational Safety and Health Act of 1970, and not abated within the time fixed by the citation and such citation has not been set aside following appeal to the appropriate agency or court having jurisdiction) or (2) received one or more criminal convictions related to the injury or death of any employee in the three-year period preceding the bid?

_____ Yes
_____ No

If "yes," attach a sheet fully describing each such matter.

4. Arbitration/Litigation

Has either the bidder or any of its principals (regardless of place of employment) been involved for the most recent ten (10) years in any resolved or pending arbitration or litigation?

_____ Yes
_____ No

If "yes," attach a sheet fully describing each such matter.

5. Criminal Proceedings

Has the bidder or any of its principals (regardless of place of employment) ever been the subject of any criminal proceedings?

_____ Yes
_____ No

If "yes," attach a sheet fully describing each such matter.

6. Ethics and Offenses in Public Projects or Contracts

Has either the bidder or any of its principals (regardless of place of employment) ever been found to have violated any state or local ethics law, regulation, ordinance, code, policy or standard, or to have committed any other offense arising out of the submission of proposals or bids or the performance of work on public works projects or contracts?

_____ Yes
_____ No

If "yes," attach a sheet fully describing each such matter.

BID SECURITY

The bidder has included herein the required certified check or bid bond in the amount of 10% of the bid amount.

NOTE: THIS DOCUMENT, IN ORDER TO BE CONSIDERED A VALID BID, MUST BE SIGNED BY A PRINCIPAL OFFICER OR OWNER OF THE BUSINESS ENTITY THAT IS SUBMITTING THE BID. SUCH SIGNATURE CONSTITUTES THE BIDDER'S REPRESENTATIONS THAT IT HAS READ, UNDERSTOOD AND FULLY ACCEPTED EACH AND EVERY PROVISION OF EACH DOCUMENT COMPROMISING THE ITB, UNLESS AN EXCEPTION IS DESCRIBED ABOVE.

BY _____
(PRINT NAME)

TITLE: _____

(SIGNATURE)

DATE: _____

END OF BID FORM

TOWN OF CHESHIRE, CONNECTICUT

BIDDER'S LEGAL STATUS DISCLOSURE

Please fully complete the applicable section below, attaching a separate sheet if you need additional space.

For purposes of this disclosure, "permanent place of business" means an office continuously maintained, occupied and used by the bidder's regular employees regularly in attendance to carry on the bidder's business in the bidder's own name. An office maintained, occupied and used by a bidder only for the duration of a contract will not be considered a permanent place of business. An office maintained, occupied and used by a person affiliated with a bidder will not be considered a permanent place of business of the bidder.

IF A SOLELY OWNED BUSINESS:

Bidder's Full Legal Name _____

Street Address _____

Mailing Address (if different from Street Address) _____

Owner's Full Legal Name _____

Number of years engaged in business under sole proprietor or trade name _____

Does the bidder have a "permanent place of business" in Connecticut, as defined above?

_____ Yes _____ No

If yes, please state the full street address (not a post office box) of that "permanent place of business."

IF A CORPORATION:

Bidder's Full Legal Name _____

Street Address _____

Mailing Address (if different from Street Address) _____

Owner's Full Legal Name _____

Number of years engaged in business _____

Names of Current Officers

President

Secretary

Chief Financial Officer

Does the bidder have a “permanent place of business” in Connecticut, as defined above?

_____ Yes _____ No

If yes, please state the full street address (not a post office box) of that “permanent place of business.”

IF A LIMITED LIABILITY COMPANY:

Bidder’s Full Legal Name _____

Street Address _____

Mailing Address (if different from Street Address) _____

Owner’s Full Legal Name _____

Number of years engaged in business _____

Names of Current Manager(s) and Member(s)

Name & Title (if any)

Residential Address (street only)

Name & Title (if any)

Residential Address (street only)

Name & Title (if any)

Residential Address (street only)

Name & Title (if any)

Residential Address (street only)

Name & Title (if any)

Residential Address (street only)

Does the bidder have a “permanent place of business” in Connecticut, as defined above?

_____ Yes _____ No

If yes, please state the full street address (not a post office box) of that “permanent place of business.”

IF A PARTNERSHIP:

Bidder's Full Legal Name _____

Street Address _____

Mailing Address (if different from Street Address) _____

Owner's Full Legal Name _____

Number of years engaged in business _____

Names of Current Partners

Name & Title (if any) Residential Address (street only)

Name & Title (if any) Residential Address (street only)

Name & Title (if any) Residential Address (street only)

Name & Title (if any) Residential Address (street only)

Does the bidder have a "permanent place of business" in Connecticut, as defined above?

_____ Yes _____ No

If yes, please state the full street address (not a post office box) of that "permanent place of business."

Sign on the next page

Bidder's Full Legal Name

(print)

Name and Title of Bidder's Authorized Representative

(signature)

Bidder's Representative, Duly Authorized

Date

END OF LEGAL STATUS DISCLOSURE FORM

TOWN OF CHESHIRE, CONNECTICUT

BID #2223-14

Bartlem Park South – Phase I

BIDDER’S CERTIFICATION

**Concerning Equal Employment Opportunities
And Affirmative Action Policy**

I/we, the bidder, certify that:

- 1) I/we are in compliance with the equal opportunity clause as set forth in Connecticut state law (Executive Order No. Three, <http://www.cslib.org/xeorder3.htm>) and will comply with federal Executive Order 11246 (<https://www.dol.gov/agencies/ofccp/executive-order-11246/ca-11246>).
- 2) I/we do not maintain segregated facilities.
- 3) I/we have filed all required employer's information reports.
- 4) I/we have developed and maintain written affirmative action programs.
- 5) I/we list job openings with federal and state employment services.
- 6) I/we attempt to employ and advance in employment qualified handicapped individuals.
- 7) I/we are in compliance with the Americans with Disabilities Act.
- 8) I/we (check one):
_____ have an Affirmative Action Program, or
_____ employ 10 people or fewer.

Legal Name of Bidder

(signature)
Bidder’s Representative, Duly Authorized

Name of Bidder’s Authorized Representative

Title of Bidder’s Authorized Representative

Date

TOWN OF CHESHIRE, CONNECTICUT

BIDDER'S NON COLLUSION AFFIDAVIT

BID #2223-14

Bartlem Park South – Phase I

The undersigned bidder, having fully informed himself/herself/itself regarding the accuracy of the statements made herein, certifies that:

- (1) the bid is genuine; it is not a collusive or sham bid;
- (2) the bidder developed the bid independently and submitted it without collusion with, and without any agreement, understanding, communication or planned common course of action with, any other person or entity designed to limit independent competition;
- (3) the bidder, its employees and agents have not communicated the contents of the bid to any person not an employee or agent of the bidder and will not communicate the bid to any such person prior to the official opening of the bid; and
- (4) no elected or appointed official or other officer or employee of the Town of Cheshire is directly or indirectly interested in the bidder's bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

The undersigned bidder further certifies that this affidavit is executed for the purpose of inducing the Town of Cheshire to consider its bid and make an award in accordance therewith.

Legal Name of Bidder

(signature)
Bidder's Representative, Duly Authorized

Name of Bidder's Authorized Representative

Title of Bidder's Authorized Representative

Date

Subscribed and sworn to before me this _____ day of _____, 20__.

Notary Public
My Commission Expires:

TOWN OF CHESHIRE, CONNECTICUT

BID #2223-14

Bartlem Park South – Phase I

BIDDER'S STATEMENT OF REFERENCES

Provide at least three (3) references:

1. BUSINESS NAME _____
ADDRESS _____
CITY, STATE _____
TELEPHONE: _____
INDIVIDUAL CONTACT NAME AND POSITION _____

2. BUSINESS NAME _____
ADDRESS _____
CITY, STATE _____
TELEPHONE: _____
INDIVIDUAL CONTACT NAME AND POSITION _____

3. BUSINESS NAME _____
ADDRESS _____
CITY, STATE _____
TELEPHONE: _____
INDIVIDUAL CONTACT NAME AND POSITION _____

END OF STATEMENT OF REFERENCES

BIDS MUST BE SUBMITTED ON THE FOLLOWING BID FORM:

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
1	Mobilization and Bonding	<p>The work under this item shall include all mobilization and bonding; as required by the Contract Documents;</p> <p>The lump sum price of:</p> <p>_____dollars</p> <p>and _____ cents [in words]</p>	<p>(\$ _____)</p> <p>[in figures]</p>
2	Site Preparation and Demolition	<p>The work under this item shall include all materials, equipment and labor to perform the removal and disposal of all items shown on the plans including, but not limited to the removal of gravel, saw cutting, pavements, trees, limbs, stumps, signs, fencing, gates, foundations, catch basins, yard drains, drainage pipe, timber walls, and materials encountered incidental to construction, and the installation of construction entrance, construction fence, tree protection, stripping, screening and stockpiling of topsoil as required by the Contract Documents;</p> <p>The lump sum price of:</p> <p>_____dollars</p> <p>and _____ cents [in words]</p>	<p>(\$ _____)</p> <p>[in figures]</p>
3	Erosion & Sediment Controls	<p>The work under this item shall include all materials, equipment and labor to install and maintain erosion and sediment controls including but not limited to compost filter tubes, straw bales, inlet protection, silt fence, temporary sediment traps, temporary outlet control structures, temporary drainage swales and dewater excavations, erosion control blankets, and vegetative slope protection, as required by the Contract Documents;</p> <p>The lump sum price of:</p> <p>_____dollars</p> <p>and _____ cents [in words]</p>	<p>(\$ _____)</p> <p>[in figures]</p>
4	Earthwork	<p>The work under this item shall include all materials, equipment and labor to perform the earthwork of all items shown on the plans including, but not limited to cutting, filling, exporting, hauling, formation of subgrade, fine grading and compaction as required by the Contract Documents;</p> <p>The lump sum price of:</p> <p>_____dollars</p> <p>and _____ cents [in words]</p>	<p>(\$ _____)</p> <p>[in figures]</p>

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
5	Site Utilities - Storm	<p>The work under this item shall include all materials, equipment and labor necessary to supply and install storm drainage system complete including but not limited to trenching and backfilling, shoring and bracing, piping, yard drains, catch basins, manholes, forebay berm, water quality structures, plunge-pool, flared end sections, outlets, cleanouts sleeves, and bedding as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]
6	Site Utilities- Sanitary Sewer	<p>The work under this item shall include all materials, equipment and labor necessary to supply and install municipal sewer service by Regional Water Authority complete including but not limited to trenching and backfilling, shoring and bracing, piping as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]
7	Site Utilities- Water	<p>The work under this item shall include all materials, equipment and labor necessary to supply and install water service including but not limited to domestic and fire water mains, fire hydrants, domestic water service and irrigation backflow preventers, meter pit, trenching and backfilling, shoring and bracing, piping and other water related infrastructure as required by Regional Water Authority complete and as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]
8	Site Utilities - Electrical Service and Lighting	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install electrical service and site lighting including but not limited to, primary electrical service from Route 10, secondary service, transformers and pad, meter enclosure, panels, feeders and conduits, parking and sidewalk fixtures, poles, foundations, and receptacles, electrical connections, pull boxes, spider temporary power and, in-ground combobox and feeders, GFI outlets and branch circuits, trenching and backfilling as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
9	Sports Lighting and Controls	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install sports field lighting with control system and related electrical work complete including but not limited to poles, fixtures, footings, wire, conduit, bedding material, trenching, backfilling, disposal of surplus material, light fixtures, control boxes, panels and adjusting hand holes to grade as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]
10	Synthetic Grass Infill System	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install the Synthetic Grass Infill System complete including but not limited to drainage stone base course, perimeter edge concrete turf anchor, flat drains, collector piping, yard drains, manhole, solid HDPE pipe, synthetic turf boxes, synthetic grass system, resilient infill system, field groomer, turf sweeper, as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	(\$ _____) [in figures]
11	Bandshell Footings and Engineering	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install bandshell footings, including but not limited to engineered shop drawings from a pre-engineered bandshell manufacturer, location and installation of the reinforced concrete footings per the engineered shop drawings of the bandshell manufacturer, as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]]</p>	(\$ _____) [in figures]
12	Modular Restroom Building	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install the modular restroom building complete, including but not limited to modular building, concrete foundation and slab, associated mechanical, plumbing and electrical, fixtures, finishes, equipment, doors, windows, roof, gutters, columns, and connection to site utilities, as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]]</p>	(\$ _____) [in figures]

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
13	Cast-in-place Concrete	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install concrete site improvements complete including but not limited to site work, subbase, base, backfill, reinforcement, concrete pavements, sidewalks, curb ramps, detectable warning strips, concrete curbing, site work, site retaining wall at bandshell, sand as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	<p>(\$ _____) [in figures]</p>
14	Bituminous Paving Base	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install subbase and base for bituminous concrete pavements including but not limited to site work, processed aggregate base (base) and compacted granular fill (subbase), as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	<p>(\$ _____) [in figures]</p>
15	Bituminous Paving	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install 2,760 Tons of bituminous pavement and curbing (HMA) as required by the Contract Documents. Liquid asphalt priced at \$587.50/Standard Ton as derived from CTDOT Asphalt Price Adjustment Sheet https://portal.ct.gov/DOT/Office-of-Construction/Material-Price-Adjustments;</p> <p>The lump sum price of: _____dollars and _____cents [in words]</p>	<p>(\$ _____) [in figures]</p>
16	Signage & Pavement Markings	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install signage and pavement markings complete, including but not limited to signs, posts, footings, and pavement markings as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____cents [in words]]</p>	<p>(\$ _____) [in figures]</p>

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
17	Maintenance & Protection of Traffic	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install maintenance and protection of traffic as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____ cents [in words]]</p>	<p>(\$ _____) [in figures]</p>
18	Irrigation System	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install the irrigation system complete as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____ cents [in words]]</p>	<p>(\$ _____) [in figures]</p>
19	Fencing	<p>The work under this item shall include all materials, equipment and labor to supply and install fencing including but not limited to chain link fencing, three round rail fencing (salvaged), ball safety netting, posts and foundations, chain link gates, sonotubes, fabric, fittings, latches, pipe, drop-bar assemblies, sleeves, hardware, fence toppers, and fasteners, and timber guiderail as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____ cents [in words]]</p>	<p>(\$ _____) [in figures]</p>
20	Landscaping	<p>The work under this item shall include all materials, equipment and labor necessary to furnish and install landscaping improvements including but not limited to tree, shrub, perennial plantings, loaming, seeding, turf establishment, bio-retention areas seeding and establishment, maintenance, temporary irrigations/watering, warranty as required by the Contract Documents;</p> <p>The lump sum price of: _____dollars and _____ cents [in words]]</p>	<p>(\$ _____) [in figures]</p>

The Total Base Bid Price (sum of Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 ,16, 17, 18, 19 and 20) equals:

_____dollars

and _____cents [in words]

(\$ _____) [in figures]

ADD ALTERNATE PAYMENT ITEMS

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
1	Bandshell	<p>The work under this item shall include all materials, equipment and labor to furnish and install the pre-engineered bandshell, acoustic walls and doors, and electrical wire, boxes, and fixtures within the bandshell as shown on the Contract Drawings and as specified in the Specifications;</p> <p>The lump sum price of: _____ dollars and _____ cents [in words]</p>	<p>(\$ _____) [in figures]</p>

UNIT PRICE PAYMENT ITEMS

Item No.	Item Name	Brief Description; Lump Sum Bid Price in Words	Lump Sum Bid Price in Figures
1	Rock Removal	<p>The work under this item shall include all materials, equipment, and labor to remove 1 cubic yard of rock as specified in the Contract Documents up to an estimated 100 cubic yards. If the actual quantity of rock varies more than fifteen percent (15%) above the 100 c.y. estimated quantity, an equitable adjustment in the Contract Price shall be made upon demand of either Party. The equitable adjustment shall be made upon any increase in costs due solely to the variation above one hundred fifteen percent (115%) of the estimated quantity.</p> <p>The unit price of: _____ dollars and _____ cents [in words]</p>	<p>(\$ _____) [in figures]</p>

Bids Submitted By: _____ Date: _____

 Name of Firm Telephone # Fax #

 Address Printed Name Title

 City, State, Zip Authorized Signature



AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the _____ day of February in the year 2023
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Town of Cheshire
84 South Main Street
Cheshire, Connecticut 06410
and the Contractor:

(Name, legal status, address and other information)

for the following Project:
(Paragraph Deleted)

*Bartlem Park South – Phase I
520 South Main Street
Cheshire, CT 06410*

The Architect/Engineer:
(Paragraph Deleted)

Weston + Sampson Engineers, Inc.
712 Brook Street, Suite 103
Rocky Hill, Connecticut 06067

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

The Owner and Contractor agree as follows.
(Paragraph Deleted)

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS**
- 2 THE WORK OF THIS CONTRACT**
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**
- 4 CONTRACT SUM**
- 5 PAYMENTS**
- 6 DISPUTE RESOLUTION**
- 7 TERMINATION OR SUSPENSION**
- 8 MISCELLANEOUS PROVISIONS**
- 9 ENUMERATION OF CONTRACT DOCUMENTS**

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, the Bidding Documents (including Owner’s Instructions to Bidders, Owner’s Invitation to Bid #23-__ and all Bidding Documents issued in conjunction therewith, including Addenda thereto), Contractor’s Bid dated February __, 2023, the Owner’s Purchasing Policies (including the Federal Uniform Guidance Procurement Standards, Part 200 of Title 2 of the Code of Federal Regulations), other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner or Architect. Contractor shall coordinate the scheduling and performance of the Work with the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

Init.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[X] Not later than _____ days from the date of commencement of the Work.

[] By the following date: _____

TIME IS OF THE ESSENCE WITH REGARD TO THE TIMELY PERFORMANCE OF THE AGREEMENT, ACHIEVEMENT OF ALL MILESTONES, SUBSTANTIAL COMPLETION AND FINAL COMPLETION OF THE PROJECT BY THE CONTRACTOR. If, in the sole opinion of the Owner, the Contractor is not adhering to the Project schedule and/or is not supplying sufficient labor and/or equipment to complete the Work by the Substantial Completion date contained herein, upon forty-eight (48) hours written notice, the Town shall have the right to direct the Contractor to increase its labor and/or equipment to meet established project schedules without additional compensation provided the Town is not responsible or in any way liable for the Contractor not adhering to the Project schedule. Any and all such additional labor or supervision shall be at Contractor's sole cost and expense and may include, but shall not be limited to, Town directing the Contractor to increase the workers on its crews, supply additional equipment, work overtime, work a second shift during a single day, work weekends, or any combination thereof, without any additional compensation being due to Contractor for such additional personnel. Any costs incurred or arising due to the Contractor's failure to achieve timely Substantial Completion shall be borne solely by the Contractor.

§ 3.3.1.1 Contractor expressly agrees, notwithstanding any provision in this Agreement to the contrary, that: (i) a COVID-19 pandemic exists worldwide as of the execution date of this Agreement; (ii) the existence of such pandemic, and its effects, now, and for the duration of Contractor's performance under the Agreement, shall not in and of itself be cause for Contractor to rely upon, invoke, or avail itself to, any rights or remedies under this Agreement, at law, or in equity, for a claim, or an adjustment to the price, schedule, quantities, specifications, or other material terms of this Agreement; (iii) the material terms of this Agreement, particularly terms relating to price, schedule, quantities, availability and specifications, take into consideration, and fully account for, the existence of such pandemic and its effects, as of the date of this Agreement; and (iv) such pandemic shall not render Contractor unable to fulfill any of its obligations under the Agreement, and Contractor shall not have any claim, action, or cause of action against the Owner in connection with such pandemic, including any claim for frustration of purpose change in circumstances, economic balance, or impossibility. This provision shall survive the completion or earlier termination of this Agreement.

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$ _____), subject to additions and deductions as provided in the Contract Documents.

Init.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
N/A		

§ 4.3 Allowances, if any, included in the Contract Sum: *(Identify each allowance.)*

Item	Price
As indicated in the Bid Proposal	

§ 4.4 Unit prices, if any: *(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

Item	Units and Limitations	Price per Unit (\$0.00)
As indicated in the Bid Proposal		

§ 4.5 Liquidated damages, if any: *(Insert terms and conditions for liquidated damages, if any.)*

See A201 as modified.

§ 4.6 Other: *(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)*

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than thirty (30) days after the Owner approves the Application for Payment. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than thirty (30) days after the approves the Application for Payment certified by the Architect. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported

Init.

by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Five percent (5%)

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

N/A

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

At the Owner's sole discretion.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

Owner shall be entitled to retain two hundred percent (200%) of the estimated cost to complete punchlist items to reach Final Completion.

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner’s prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect and all conditions precedent to final payment have been satisfied.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

§ 5.3 Intentionally Deleted.

(Paragraphs Deleted)

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker. *(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

Litigation in Connecticut Superior Court in and for the Judicial District of New Haven unless the Owner, in its sole discretion, elects to arbitrate a dispute.

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

Init.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1

(Paragraph Deleted)

Intentionally
Deleted.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

To be named by the Owner in writing within ten (10) days of the execution of this Agreement.

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

To be named by the Contractor in writing within ten (10) days of the execution of this Agreement

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

§8.7.1. The Project is being funded, in part, with federal funds. Thus, the Federal Uniform Guidance Procurement Standards, as set forth in Part 200 of the Code of Federal Regulations (“FUGPS”), apply to this Project. The Town of Cheshire has adopted a Policy consistent with the FUGPS and all relevant provisions of the FUGPS are incorporated herein and made a part hereof. Contractor is responsible for informing itself of the applicable FUGPS provisions and for compliance therewith.

§8.7.2. Compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”) is required for this Project. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination.

§8.7.3. Compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

1. §8.7.4. Compliance with Solid Waste Disposal Act. Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

§8.7.5. Non-Discrimination: Contractor agrees to comply with Executive Order 11246, including the inclusion of the Equal Employment Opportunity Clause in every contract and purchase order entered into with subcontractors and suppliers as required by 41 CFR 60-1.4, as supplemented by the Department of Labor Regulations. No person shall be discriminated against on the basis of race, color, religion, sex, or national origin in all phases of employment during the performance of the Contract. Bidders agree that contractors and subcontractors on this Project shall take affirmative action to ensure fair treatment in employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay, or other forms of compensation and selection for training and apprenticeship.

1. §8.7.6. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). The Contractor shall comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous.
1. §8.7.7. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended. Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387).
1. §8.7.8. Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). Contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier of subcontractor must also disclose to the party with

whom it is in privity any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Town.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction, as modified
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings Dated _____

Number	Title	Date
See List of Drawings		

.6 Specifications

Section	Title	Date	Pages
See Table of Contents			

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

(Paragraphs Deleted)

(Table Deleted)

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

Town of Cheshire, Project Manual, dated _____, including all Addenda
Instructions to Bidders, AIA A701, and Supplemental Instructions to Bidders
State of CT, Prevailing Wage Rates
Contractor's Bid Proposal
Town of Cheshire – Bartlem Park South – Phase I Project
520 South Main Street, Cheshire, CT Drawings and Specifications dated _____

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)

Init.

Additions and Deletions Report for AIA® Document A101® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 12:40:31 ET on 12/28/2022.

PAGE 1

AGREEMENT made as of the _____ day of February in the year 2023

...

Town of Cheshire
84 South Main Street
Cheshire, Connecticut 06410

...

(Name, location and detailed description)

...

Bartlem Park South – Phase I

...

520 South Main Street

...

Cheshire, CT 06410

...

The Architect: Architect/Engineer:

...

(Name, legal status, address and other information)

...

Weston + Sampson Engineers, Inc.
712 Brook Street, Suite 103
Rocky Hill, Connecticut 06067

PAGE 2

The Owner and Contractor agree as follows.-----PageBreak-----

...

The Owner and Contractor agree as follows.

...

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, the Bidding Documents (including Owner's Instructions to Bidders, Owner's Invitation to Bid #23- and all Bidding Documents issued in conjunction therewith, including Addenda thereto), Contractor's Bid dated February 2023, the Owner's Purchasing Policies (including the Federal Uniform Guidance Procurement Standards, Part 200 of Title 2 of the Code of Federal Regulations), other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

...

A date set forth in a notice to proceed issued by the Owner or Architect. Contractor shall coordinate the scheduling and performance of the Work with the Owner.

PAGE 3

Not later than ~~()~~ calendar days _____ days from the date of commencement of the Work.

...

By the following date: _____

...

TIME IS OF THE ESSENCE WITH REGARD TO THE TIMELY PERFORMANCE OF THE AGREEMENT, ACHIEVEMENT OF ALL MILESTONES, SUBSTANTIAL COMPLETION AND FINAL COMPLETION OF THE PROJECT BY THE CONTRACTOR. If, in the sole opinion of the Owner, the Contractor is not adhering to the Project schedule and/or is not supplying sufficient labor and/or equipment to complete the Work by the Substantial Completion date contained herein, upon forty-eight (48) hours written notice, the Town shall have the right to direct the Contractor to increase its labor and/or equipment to meet established project schedules without additional compensation provided the Town is not responsible or in any way liable for the Contractor not adhering to the Project schedule. Any and all such additional labor or supervision shall be at Contractor's sole cost and expense and may include, but shall not be limited to, Town directing the Contractor to increase the workers on its crews, supply additional equipment, work overtime, work a second shift during a single day, work weekends, or any combination thereof, without any additional compensation being due to Contractor for such additional personnel. Any costs incurred or arising due to the Contractor's failure to achieve timely Substantial Completion shall be borne solely by the Contractor.

...

§ 3.3.1.1 Contractor expressly agrees, notwithstanding any provision in this Agreement to the contrary, that: (i) a COVID-19 pandemic exists worldwide as of the execution date of this Agreement; (ii) the existence of such pandemic, and its effects, now, and for the duration of Contractor's performance under the Agreement, shall not in

and of itself be cause for Contractor to rely upon, invoke, or avail itself to, any rights or remedies under this Agreement, at law, or in equity, for a claim, or an adjustment to the price, schedule, quantities, specifications, or other material terms of this Agreement; (iii) the material terms of this Agreement, particularly terms relating to price, schedule, quantities, availability and specifications, take into consideration, and fully account for, the existence of such pandemic and its effects, as of the date of this Agreement; and (iv) such pandemic shall not render Contractor unable to fulfill any of its obligations under the Agreement, and Contractor shall not have any claim, action, or cause of action against the Owner in connection with such pandemic, including any claim for frustration of purpose change in circumstances, economic balance, or impossibility. This provision shall survive the completion or earlier termination of this Agreement.

PAGE 4

N/A

...

As indicated in the Bid Proposal

...

As indicated in the Bid Proposal

...

See A201 as modified.

...

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month thirty (30) days after the Owner approves the Application for Payment. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than thirty (30) days after the Architect receives the Application for Payment. approves the Application for Payment certified by the Architect.

PAGE 5

Five percent (5%)

...

N/A

...

At the Owner's sole discretion.

...

Owner shall be entitled to retain two hundred percent (200%) of the estimated cost to complete punchlist items to reach Final Completion.

PAGE 6

.2 a final Certificate for Payment has been issued by the ~~Architect~~ Architect and all conditions precedent to final payment have been satisfied.

...

§ 5.3 Interest~~Intentionally Deleted.~~

...

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

...

(Insert rate of interest agreed upon, if any.)

...

Other *(Specify)*

...

Litigation in Connecticut Superior Court in and for the Judicial District of New Haven unless the Owner, in its sole discretion, elects to arbitrate a dispute.

PAGE 7

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201-2017, then the Owner shall pay the Contractor a termination fee as follows:

...

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

...

Intentionally

...

Deleted.

...

To be named by the Owner in writing within ten (10) days of the execution of this Agreement.

...

To be named by the Contractor in writing within ten (10) days of the execution of this Agreement

PAGE 8

§8.7.1. The Project is being funded, in part, with federal funds. Thus, the Federal Uniform Guidance Procurement Standards, as set forth in Part 200 of the Code of Federal Regulations ("FUGPS"), apply to this Project. The Town of Cheshire has adopted a Policy consistent with the FUGPS and all relevant provisions of the FUGPS are incorporated herein and made a part hereof. Contractor is responsible for informing itself of the applicable FUGPS provisions and for compliance therewith.

§8.7.2. Compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction") is required for this Project. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination.

§8.7.3. Compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

1. §8.7.4. Compliance with Solid Waste Disposal Act. Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

§8.7.5. Non-Discrimination: Contractor agrees to comply with Executive Order 11246, including the inclusion of the Equal Employment Opportunity Clause in every contract and purchase order entered into with subcontractors and suppliers as required by 41 CFR 60-1.4, as supplemented by the Department of Labor Regulations. No person shall be discriminated against on the basis of race, color, religion, sex, or national origin in all phases of employment during the performance of the Contract. Bidders agree that contractors and subcontractors on this Project shall take affirmative action to ensure fair treatment in employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay, or other forms of compensation and selection for training and apprenticeship.

1. §8.7.6. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). The Contractor shall comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous.

1. §8.7.7. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended. Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387).

1. §8.7.8. Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). Contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier of subcontractor must also disclose to the party with whom it is in privity any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Town.

PAGE 9

.3 AIA Document A201™-2017, General Conditions of the Contract for ~~Construction~~Construction, as modified

...

.5 Drawings Dated _____

...

See List of Drawings

...

See Table of Contents

...

AIA Document E204™ 2017, Sustainable Projects Exhibit, dated as indicated below:

...

(Insert the date of the E204 2017 incorporated into this Agreement.)

...

The Sustainability Plan:

...

Title	Date	Pages
-------	------	-------

PAGE 10

Town of Cheshire, Project Manual, dated _____, including all Addenda

...

Instructions to Bidders, AIA A701, and Supplemental Instructions to Bidders

...

State of CT, Prevailing Wage Rates

...

Contractor's Bid Proposal

...

Town of Cheshire – Bartlem Park South – Phase I Project

...

520 South Main Street, Cheshire, CT Drawings and Specifications dated _____

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jeffrey M. Donofrio, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:40:31 ET on 12/28/2022 under Order No. 2114331888 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ - 2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

AIA[®] Document A201[®] – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

*Bartlem Park South – Phase I
520 South Main Street
Cheshire, CT 06410*

THE OWNER:

(Name, legal status and address)

Town of Cheshire
84 South Main Street
Cheshire, Connecticut 06410

THE ARCHITECT/ENGINEER:

Weston + Sampson Engineers, Inc.
712 Brook Street, Suite 103
(Paragraph Deleted)

Rocky Hill, Connecticut 06067

TABLE OF ARTICLES

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- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503[™], Guide for Supplementary Conditions.

Init.

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, the Bidding Documents (including the Owner's Project Manual for Invitation to Bid #23-___, including the Project Drawings and Specifications and accompanying documents), Contractor's Bid Proposal dated February __, 2023, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties. Subcontractors are not intended third-party beneficiaries to the Contract and shall have no direct cause of action against the Owner.

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

- .1 Modifications, with those of later date having precedence over those of earlier date.
- .2 The Agreement, including any amendment to the Agreement included in the bid package.
- .3 Addenda to the Specifications and Drawings, with those of later date having precedence over those of earlier date.
- .4 The General Conditions of the Contract for Construction.
- .5 Specifications and Drawings.

Further, stated dimensions shall take precedence over scaled dimensions; large-scale detail drawings shall take precedence over small-scale drawings; schedules shall take precedence over other data on the drawings.

In the case of an inconsistency between Drawings and Specifications or within either Document in describing the Work, the better quality, greater quantity, or more costly work shall be provided in accordance with the Architect's interpretation.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether performed on or off the site of the Project and whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor, its Subcontractors, Sub-Subcontractors, material suppliers or any other entity for whom the Contractor is responsible to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Contractor's Standard of Care

The Contractor shall be responsible for the performance of the Work as an independent contractor and in a good and workmanlike manner (i) consistent with the Contract Documents; (ii) consistent with the instructions, guidance and direction of the Owner and Architect; (iii) consistent with the highest prevailing applicable professional or industry standards; (iv) consistent with sound practices; (v) as expeditiously as is consistent with such professional skill and care and the orderly progress of the Work and with the Contract Documents and the instructions, guidance and direction of the Owner and Architect; (vi) in a manner that will not exceed the Contract Sum as set forth in the Agreement, and (vii) in strict compliance with applicable laws (the standards of this Section 1.1.8 shall be referred to herein as the "Contractor's Standard of Care"). The Contractor shall exercise the Contractor's Standard of Care in performing all aspects of the Work. All references in the Contract Documents to the knowledge, inference, reliance, awareness, determination, belief, observation, recognition or discovery of the Contractor or reference to any similar term shall include the constructive knowledge, inference, reliance, awareness, determination, belief, observation and recognition attributed to the Contractor ("constructive knowledge"). Such constructive knowledge shall include the knowledge, inference, reliance, awareness, determination, belief, observation and recognition the Contractor would have obtained upon the exercise of the Contractor's Standard of Care.

§ 1.1.9 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

.1 Before ordering materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of minor differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the Work.

.2 If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

§ 1.2.1.2 The Architect may, as he deems desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work reasonably inferable from the Contract Documents; such drawings or instructions may be effected by notice to the Contractor without modification of the contract Time or contract Sum. If the Contractor claims additional cost or delay on account of such additional drawings or instructions, he shall give notice as provided in Subparagraph 15.1.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid

or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the Work of the mechanical, electrical and other specialized trades, and to all of the sections of the Specifications, and shall perform all Work reasonably inferable there from as being necessary to produce the indicated results.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Instruments of Service, including the Drawings and Specifications, are and shall be the property of the Owner. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the reserved rights of the Owner.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service for any purpose outside the scope of the Work without the specific written consent of the Owner.

§ 1.5.3 Prior to execution of the Agreement, the Contractor evaluated and satisfied itself as to the condition and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Subparagraph 1.5.3.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

(Paragraph Deleted)

§

1.9 Any information obtained by the Contractor from the Owner or Architect may not be used, published, distributed, sold or divulged by the Contractor or its Subcontractor or Sub-subcontractors for such party's own purposes or for the benefit of any person, firm, corporation or other entity other than the Owner, without the **prior written consent of the Owner**. Any information obtained by the Contractor of its Subcontractors or Sub-Subcontractors that is designated by the Owner in accordance with applicable law as confidential shall not be disclosed to any other parties without the prior written consent of the Owner.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 INTENTIONALLY OMITTED

§ 2.1.2 INTENTIONALLY OMITTED

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1

INTENTIONALLY OMITTED

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. The Owner has agreed to waive the fees of all required building permits related to the completion of this project with the exception of the State's Education Fee.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control

and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. The Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15. The Owner's right to stop the Work is in addition to and not in restriction or derogation of any and all remedies available to the Owner. The Owner shall have full access to and the right to inspect all portions of the Work for quality, progress, and conformance of the Contract Documents. Any testing or inspections (including commissioning) performed by or on behalf of the Owner shall in no way relieve or replace the obligations of the Contractor in its fulfillment of its obligations hereunder. Any commissioning activities are at the sole discretion of the Owner and shall not be a requirement of the Agreement.

§ 2.6 In no event shall the Owner have control over, charge or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 The Contractor shall comply with the Conditions and all local, state, and federal laws, rules and regulations applicable to the Contractor, including without limitation those relating to equal opportunity, labor, wage (including prevailing wage laws) and employment. Contractor certifies that it is eligible to perform work funded by the United States government and is not currently debarred or suspended from performing federal contract. Contractor, in performing the Work, shall comply with the Federal Uniform Guidance Procurement Standards, 2 CFR Part 200 et seq., as applicable. Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to

Equal Employment Opportunity,” and implementing regulations at 41 CFR part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor” are incorporated herein and made a part hereof.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, conducted its own due diligence, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary and extensive, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor’s review is made in the Contractor’s capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or surveys furnished by the Owner, is not guaranteed by the Architect or the Owner. The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations. Any errors due to the Contractor’s failure to so verify all such grades, elevations, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 3.2.3 Owner assumes no contractual liability or responsibility for the physical condition or safety of the Project site or of any improvement thereon. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor’s notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies, or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities. . If the Contractor or a Subcontractor fails to submit a Claim in accordance with the requirements of Article 15, the Contractor or Subcontractor knowingly and irrevocably waives any Claim for additional compensation or time.

§ 3.2.5 The Contractor shall give the Architect timely notice of any additional Drawings, Specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

§ 3.2.6 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in subparagraph 3.2.5. If the Contractor proceeds with such Work without obtaining further Drawings, Specifications or instructions, the Contractor shall correct Work incorrectly done at the Contractor’s own expense.

§ 3.2.7 Except as to any reported errors, inconsistencies or omissions, and as to any concealed or unknown conditions as defined in Paragraph 3.7.4. by executing the Agreement, the Contractor represents the following:

1. The Contract Documents are sufficiently complete and detailed for the Contractor to (1) perform the Work required to produce the results intended by the Contract Documents and (2) comply with all the requirements of the Contract Documents.
2. The Work required by the Contract Documents, including, without limitation, all construction details,

construction means, methods, procedures and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to the Work; and (3) requirements of any warranties applicable to the Work.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor shall schedule and perform the Work so as not to unreasonably interfere with any other related or unrelated work being performed by the Owner in or about the Project premises or with the Owner's continued use and operation of the Project premises as a fully operational athletics complex. The Contractor shall protect and prevent damage to all unfinished phases of the Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 Approval by the Owner or Architect of any such substitution shall not relieve the Contractor requesting the substitution of responsibility for any additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

§ 3.4.2.2 By making requests for substitutions based on subparagraph 3.4.2 above, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to substitution which subsequently become apparent; and
- .4 shall coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense.

§ 3.4.5 In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, the Contractor shall furnish the product of the named manufacturer(s) without substitution.

§ 3.4.6 The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project. The Contractor shall also use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.2 Contractor agrees to assign to the Owner as a condition precedent to Substantial Completion of the Work any and all manufacturer's warranties relating to materials and equipment installed in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

§ 3.5.3 The warranty provided in this Paragraph 3.5 shall be in addition to and not in limitation of any other warranty or guaranty required by the Contract Documents or otherwise prescribed by law.

§ 3.5.4 The Contractor shall procure and deliver to the Architect, no later than thirty (30) calendar days after the Date of Substantial Completion, all warranties required by the Contract Documents.

§ 3.5.5 The Warranty shall include the repair and/or replacement of all damaged materials resulting from the defective materials and/or workmanship. This shall include but not be limited to furniture, fixtures, equipment, finishes or any other affected materials or property.

§ 3.6 Taxes

The Owner is a tax-exempt entity. The Contractor shall be familiar with the current regulations of the Connecticut Department of Revenue Services and the sales or use tax on materials or supplies exempted by such regulations shall not be included as part of the bid or the Contract Sum. A sales tax certificate is available upon written request.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure the building permit as well as for other permits, licenses, and inspections by government agencies necessary for proper execution and completion of the Work, including, without limitation, all building permits, subsidiary trade permits, and occupancy permits. All inspection fees as may be imposed by any municipal agency are waived by the Owner with the exception of the State's Education Fee.

§ 3.7.1.1 The "Agencies" are the Department of Public Works for the Town of Cheshire (the "Department"), and all other governmental authorities having regulatory or administrative jurisdiction over the Work and/or Project and all representatives or designees of the Department or such other governmental authorities. The term "Agencies" shall also include an individuals or entities designated by the Owner to monitor or oversee compliance of the Project's design with the requirements of **governmental authorities having jurisdiction over the Project**.

§ 3.7.1.2 The term "Agencies" shall also include an individual or entity not described in Section 3.7.1.1 from whom the Owner intends to request certification of the Project's design, to the extent included in the Contract Documents.

§3.7.1.3 Non-Discrimination and Affirmative Action Provisions

The Contractor agrees and warrants that in the performance of the Contract the Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, sexual orientation, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut. The Contractor further agrees to take affirmative action to ensure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission; (3) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e, 46a-68f and 46a-86; (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this section and section 46a-56.

Any Contractor who is a party to a municipal public works contract or quasi-public agency project, where any such contract is valued at less than \$50,000 for each year of the contract, shall provide the Commission on Human Rights and Opportunities with a written or electronic representation that complies with the nondiscrimination agreement and warranty under subsection (A)(1) above, provided if there is any change in such representation, the Contractor shall provide the updated representation to the Commission not later than 30 days after such change. Any Contractor who is a party to a municipal public works contract or a quasi-public agency project, where any such contract is valued at \$50,000 or more for any year of the contract, shall provide the Commission with any one of the following: (1) Documentation in the form of a company or corporate policy adopted by resolution of the board of directors, shareholder, managers, members or other governing body of such Contractor that complies with the nondiscrimination agreement and warranty under subsection (A)(1) of this section; (2) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such Contractor if (a) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and the executive director of the Commission on Human Rights and Opportunities or designee certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section; or (3) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination

agreement and warranty under subdivision (A)(1) of this section and is in effect on the date the affidavit is signed.. The Contractor shall include the provisions hereof in every subcontract or purchase order entered into to fulfill any obligation of a municipal public works contract or contract for a quasi-public agency project, and such provisions shall be binding on a Contractor, vendor or manufacturer, unless exempted by regulations or orders of the Commission on Human Rights and Opportunities. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions, including sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a Contractor or vendor as a result of such direction by the Commission regarding a state contract, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

"Minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements. Determination of the Contractor's good faith efforts shall include, but shall not be eliminated to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission on Human Rights and Opportunities may prescribe that are designed to ensure the participation of minority business enterprises in municipal public works contracts or quasi-public agency projects. "Municipal public works project" means that portion of an agreement entered into on or after October 1, 2015, between any individual, firm or corporation and a municipality for the construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, which is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees but excluding any project of an alliance district, as defined in section 10-262u, finance by the state funding in an amount equal to fifty thousand dollars or less. "Quasi-public agency project" means the construction, rehabilitation, conversion, extension, demolition or repair of a building or other changes or improvements in real property pursuant to a contract entered into on or after October 1, 2015, which is financed in whole or in part by a quasi-public agency using state funds, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

§ 3.7.1.4 If this Project is being funded in whole or in part with State of Connecticut funds, the Contractor must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session e Commission on Human Rights he commencement of construction. State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to Contractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals. For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at: http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. The Contractor shall procure and obtain all bonds required of the Owner or the Contractor by the municipality in which the Project is located or any public or private body with jurisdiction over the Project. In connection with such bonds, the Contractor shall prepare all applications, supply all necessary backup material, and furnish the surety with any required personal undertakings. The Owner will pay the price of all such bond premiums.

§ 3.7.3 If the Contractor performs Work which it knows or should know is contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall bear responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide written notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.7.6 If any governmental body having jurisdiction over the Work requires licenses or registrations for the performance of the Work or any part thereof, the Contractor shall hold such valid licenses or registrations as may be required by law to prosecute the Work to completion. If any part of the Work for which such a license or registration is required is to be performed by Subcontractors of any tier, the Contractor shall ensure that such Subcontractors hold such valid licenses or registrations as may be required by law to prosecute said Work to completion.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Owner or Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of Work and the storage of materials.

§ 3.9.5 Contractor shall at all times enforce strict discipline and good order among its employees (and those of its Subcontractors) and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to them. All labor shall be performed by workmen skilled in their respective trades and workmanship shall be of good quality in accordance with the standards of construction set forth in the Contract Documents.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information and approval a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The schedule shall set forth milestone dates agreed to by the parties and the failure of the Contractor to achieve a milestone shall constitute a material default hereunder. Failure to meet a milestone date shall entitle but not require the Owner to supplement the Contractor's forces, at the sole cost and expense of the Contractor, and the Contractor shall be solely responsible for coordinating its efforts with and supervising the work of any supplemental manpower.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 The construction schedule shall be in a detailed precedence-style critical path management ("CPM") format satisfactory to the Owner and the Architect that shall also (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner and the Architect of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions, as set forth in Subparagraph 3.10.1 or if requested by either the Owner

or the Architect. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

1. The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subparagraph 3.10.5.
2. The Owner may exercise the rights furnished the Owner under or pursuant to this Subparagraph 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with the completion date set forth in the Contract Documents.

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are in operation. Any postponement or rescheduling under Subparagraph 3.10.5. may be grounds for an extension of the Contract Time if permitted under Subparagraph 8.3.1.

§ 3.10.7 The Contractor shall schedule and conduct construction and progress meetings, on a frequency required to effect coordination, to discuss such matters as procedures, progress, problems, and scheduling. The Contractor shall prepare and distribute minutes within three working days of such meetings.

§ 3.10.8 The Contractor shall record the progress of the Project, including information on each Subcontractor and each Subcontractor's Work, as well as the entire Project, showing percentages of completion and the number and amounts of Change Orders. The Contractor will keep a daily log containing a record of weather, Subcontractors' Work on the site, number of workers, Work accomplished, problems encountered and other similar relevant data as the Owner may require. Upon request, Contractor shall make the logs available to the Owner and the Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action. The Contractor's approval shall be noted on the submitted item or in its transmittal letter, together with written notice of any deviation in the submitted item from the requirements of the Work and of the Contract Documents. In collaboration with the Architect, Contractor shall establish and implement procedures for expediting the processing and approval of Shop Drawings, Product Data, Samples, and other submittals.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Each Shop Drawing, Product Data, Sample, and similar submittals shall have a cover sheet identifying the project name and address, contractor information, drawing and/or specification reference, submission date and contents of the submittal. Ample space shall be provided on this cover sheet to allow for the Contractor's and Architect's review stamps. The Contractor's approval shall be noted on the submitted items or in its transmittal letter, together with written notice of any deviation in the submitted item from the requirements of the Work and of the Contract Documents.

§ 3.12.6 By submitting and approving Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall indicate approval on the submittals as evidence of such review and coordinate submittals made to the Architect without such indications of approval may be returned to the Contractor for resubmission. The accuracy of all such information is the responsibility of the Contractor. In approving Shop Drawings, Product Data, Samples, and similar submittals, the Architect shall be entitled to rely upon the Contractor's representation that such information is accurate and in compliance with the Contract.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect. If the Contractor procures, performs, or installs portions of the Work without required approvals, the Contractor does so at its own risk and such Work may be removed or replaced with approved Work at no cost to the Owner.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. Any submittals forwarded to the Architect for review that include a deviation from the requirements of the Contract Documents or is not the specific make, model or manufacturer that was listed in the Contract Documents shall have a completed Substitution Request Form attached to the submittal. This Substitution Request Form shall be provided by the Owner. Unless such deviation is identified by utilizing the Substitution Request Form, the Contractor shall not be relieved of the responsibility for the specific requirements of the Contract Documents even though the subject submittal was approved by the Architect. The Contractor shall not be relieved of responsibility for the Contractor's subcontractor's or vendor's errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional who shall have and maintain reasonable limits of insurance, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.12.10.3 Services provided by the Architect to evaluate Contractor product substitution requests or to review shop drawings or other project submittals which are required to be submitted more than three (3) times shall be paid for by the Contractor to the Owner.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that occupied areas adjacent to the site of the Work shall at all time remain free from all debris and building materials.

§ 3.13.3 Other than those reasonably required for safety purposes, the Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner, which may be withheld in the sole discretion of the Owner.

§ 3.13.4 Without limitation of any other provision of the Contract Documents, the Contractor shall use best efforts to minimize any interference with the occupancy or beneficial use of any areas and buildings adjacent to the site of the Work. Without prior written approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project and shall clean and/or remove all stains, spots, work, blemishes, foreign matter and dirt from other surfaces not part of the Work but where such conditions resulted from the Contractor's operations.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor for the full cost of such cleanup.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 The Contractor's indemnity obligations under this Paragraph 3.18 shall also specifically include, without limitation, all fines, penalties, damages, liability, costs, expenses (including, without limitation, reasonable attorneys' fees), and punitive damages (if any) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible, (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work, and (iii) failure to secure and pay for permits, fees, approvals, licenses, and inspections as required under the Contract Documents, or any violation of any permit or other approval of a public authority applicable to the Work, by the Contractor, a Subcontractor, or any person or entity for whom either is responsible.

§ 3.18.3 The Contractor acknowledges that the subject property upon which the Project is being performed is not lienable because it is municipal government property used for governmental purposes. The Contractor shall indemnify, defend and hold harmless the Owner and the Architect against any and all mechanic's liens placed on the premises or on Owner's interest in the premises by any Subcontractor of any tier or material supplier. In the event

that a Subcontractor of any tier or material supplier places a mechanic's lien on the premises, the Contractor shall, with thirty (30) days of the filing of any mechanic's lien, substitute a bond for such lien or cause the lien to be discharged. If the Contractor shall fail to do so, the Owner may, at its option and at the expense of the Contractor, bond such lien or cause the lien to be discharged, and the Contractor will reimburse the Owner for all costs and expenses incurred, including but not limited to attorneys' fees and court costs.

§ 3.18.4 The Contractor shall indemnify, defend, and hold harmless the Owner and the Architect from and against any additional costs or expenses incurred by Owner, including attorneys' fees and court costs, as a result of any claim or cause of action by any Subcontractor or supplier of any tier asserted directly against the Owner to recover payment for labor or materials supplied to the Project, unless such claim or cause of action arises from the failure of the Owner to make payments in accordance with the applicable provisions of the Contract Documents.

§ 3.18.5 The Contractor shall indemnify and hold harmless the Owner, its agents and employees from and against any costs and expenses, including attorneys' fees and court costs, incurred in enforcing any of the Contractor's defense, indemnity, and hold harmless obligations under this Contract.

§ 3.18.6 The Contractor, for itself, its insurers and all subcontractors and their insurers, shall waive governmental immunity as a defense and shall not use the defense of governmental immunity in the adjustment of claims or in the defense of any suit, action or claim brought against the Owner. Nothing herein shall limit the Owner from utilizing the defense of governmental immunity.

§ 3.19 MEETINGS

The Contractor shall send a qualified representative to periodic progress meetings held at such time and at such place as the Architect or the Owner shall designate in accordance with the Contract Documents and to such other meetings as are necessary to comply with the Contract Documents.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, (i) until the final payment is due, (ii) from time to time during the one-year period for Correction of Work described in Section 12.2, and (iii) while review or certification of the Project from any of the Agencies is pending. The Architect will have authority to act on behalf of the Owner only to the extent specified in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not

have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 through 13.4.4, whether or not the Work is fabricated, installed or completed.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of assuring conformity with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract Documents and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 The Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of these interpretations or decisions rendered in good faith which were necessitated by a reason other than an act or omission of the Architect.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. Requests for information shall include, at a minimum, a detailed written statement that indicates the specific element of the Contract Documents in need of clarification and the nature of the clarification requested. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

§ 4.2.15 Each Subcontract executed by the Contractor shall include language that instructs the Subcontractor that the Subcontractor is to submit written information requests regarding Contract Document interpretation only to the Contractor and not the Architect. The Contractor shall timely review each such information request and only as necessary, submit to the Architect any information request that in the Contractor's professional judgment is not clearly and unambiguously answered in the Contract Documents.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Owner or Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) either requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.1.1 To facilitate and expedite the investigations of such proposed persons or entities, the Contractor shall submit a statement in writing in sufficient detail to establish that each has the capacity to carry out the portion of the Work such person or entity is proposing to provide. All such submittals shall include a list of principal personnel of any such entity, and an analysis of the financial condition, construction plant, equipment and facilities of any such person or entity. The Contractor shall terminate, at no cost to Owner, any contract with a person or entity to whom the Owner has a reasonable objection if such proposed and rejected subcontractor or such terminated.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 If the Contractor proposes to substitute a Subcontractor, person, or entity for one previously selected, the parties shall follow the procedures outlined in Section 5.2.1.

§ 5.3 Subcontractual Relations

§ 5.3.1 Any part of the Work performed for the Contractor by a Subcontractor shall be pursuant to a written Subcontract between the Contractor and Subcontractor, which shall be prepared on a form of Subcontract reasonably satisfactory to the Owner in all respects. The Owner shall be a third-party beneficiary of all contracts between the Contractor and Subcontractor and all such contracts shall require that the Owner be a third-party beneficiary of all contracts between Subcontractors and Sub-Subcontractors. Copies of all Subcontractor bids or proposals shall, upon request of Owner, be submitted to the Owner and Architect.

§ 5.3.2 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and remedies against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.3 The Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors, and shall employ the necessary and qualified personnel to produce the required quality of labor and materials and to prevent delays in the progress of the Project. The Contractor shall afford each trade with all reasonable opportunities for the installation of its work and for the storage and handling of its materials. The Contractors shall include in the Contractor's bid, any work, in connection with the mechanical trades, to be done by other trades under the Contractor's direct control.

§ 5.3.4 Within thirty (30) calendar days after payment to Contractor by the Owner, the Contractor shall pay any amounts due any Subcontractor, whether for labor performed or materials furnished when such labor or material has been included in requisition submitted by such Contractor and paid by Owner. The Contractor shall promptly give notice to the Owner of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor or claiming any default by the Contractor in any of the Contractor's obligations to such Subcontractor.

§ 5.3.5 The Contractor shall include in each of the subcontracts a provision requiring each Subcontractor to pay amounts due to any Sub-Subcontractors, whether for labor performed or materials furnished, within thirty (30) days after such Subcontractor receives a payment from the Contractor which encompasses labor or materials furnished by such Sub-subcontractor and a provision requiring each Subcontractor to promptly any claim or demand by a Sub-subcontractor claiming that any amount is due to such Sub-Subcontractor or claiming any default by such Subcontractor in any of its obligations to such Sub-subcontractor which notice the Contractor shall promptly relay to the Owner.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract but does not accept and shall not be liable for Contractor's obligations prior to the effective date of the assignment. The Contractor agrees to execute any and all other documents required to affect this assignment.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in direct costs resulting from the suspension, provided, however, that no such adjustment will be made to the compensation of a Subcontractor who is compensated as a proportion of the total project cost or a Subcontractor who is in default of its subcontract at the time of assignment.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, to supplement the Contractor's forces and to award separate contracts in connection with other portions of the Project or other construction or operations on the site. If the Contractor claims that delay or is involved because of such action by the Owner, the Contractor shall make such Claim as is permitted in Articles 8 and 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 INTENTIONALLY OMITTED

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. The decision as to whether the Change Work is executed via a Change Order, Construction Change Directive, or a minor change in the Work is the decision of the Owner.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 Except as permitted in Paragraph 7.3, a change in the Contract Sum or the Contract Time shall be accomplished only by a written Change Order executed before the Work is performed. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time.

§7.2.3 Proposed changes in the Work requested during the construction phase shall be priced by the Contractor and submitted to the Architect and Owner for review, in such form as the Architect and Owner may require, within ten (10) calendar days following the Contractor's receipt of the request. The Contractor shall promptly revise and resubmit such proposal if the Architect and Owner determine that it is not in compliance with the requirements of this Article, or that contains errors of fact or mathematical errors. If required by the Architect or Owner, in order to establish the exact cost of new Work added or previously required Work omitted, the Contractor shall obtain and furnish to the Architect and Owner bona fide proposals from recognized suppliers for furnishing and material included in such Work. Such proposals shall be furnished at the Contractor's expense.

§ 7.2.4 The Contractor's proposal for a change in the Work (Change Order Proposal) shall be itemized completely and shall include: Specific number of calendar days for additional time (if applicable); all material costs and quantities accompanied by the original manufacturer invoices; labor wages; unit prices; subcontractor costs; mark ups; equipment costs, profit, overhead, general conditions, fees, bond costs and approved daily time sheet tickets for work performed under the utilization of labor rates. The Architect's and Owner's refusal to approve a Change Order or Change Order Proposal due to the Contractor's lack of itemized backup information shall not be used to substantiate a claim for additional time.

§ 7.2.5 If the method utilized to execute the Change in the Work is based on labor rates, unit prices and material costs, then actual daily time sheets / tickets, approved by the Superintendent and the Owner, must accompany the Change Order, Construction Change Directive, or minor change in the Work. Not including the actual daily time sheets / tickets, approved by the Superintendent and the Owner, with the Change Order, Construction Change Directive, or minor change in the Work may be cause for their rejection.

§ 7.2.6 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both addition and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly. The Owner may also by Construction Change Directive order work to be performed that has been interpreted by the Owner and Architect to be part of the Work but is disputed by the Contractor through submission of a Claim.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order or work interpreted by the Owner or Architect to be part of the Contract.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices and rates stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect, in writing, of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be necessary for the Contractor to proceed with the Work. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work. The Contract Specifications state the Contractor shall substantially complete all Work under the Contract in one hundred and twenty (120) days from the Notice of Proceed.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement. . **TIME IS OF THE ESSENCE** of all Milestone Dates, the Substantial Completion date and the Final Completion date in the accepted Construction Schedule, as such Schedule may be revised and approved by the Owner.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not commence the Work prior to receiving written notice to commence from the Owner or prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.2.4 The Contractor shall proceed expeditiously in accordance with the construction schedule with adequate forces and shall achieve Substantial Completion within the Contract Time. The Contractor shall at all times ensure that each Subcontractor is providing and maintaining sufficient skilled workmen, materials and equipment to achieve Substantial Completion within the Contract Time. Absent Change Orders signed by the Owner or a delay for which the Contractor is entitled to an extension of time by § 8.3.1, the Contractor shall not make any claims for additional payment of straight time, overtime or premium time in undertaking to achieve Substantial Completion of the Work in accordance with the construction schedule. The burden of lost time and costs related to any Subcontractor’s nonperformance shall not be charged to Owner.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor’s control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine. Nothing in this Section 8.3.1 shall absolve the Architect of liability for delays due to the negligence of the Architect or its employees or consultants, or failure to comply with the agreement between the Owner and the Architect or the Contract Documents by the Architect or by the Architect’s employees or consultants. Under no circumstances shall Owner be responsible or liable for any delay damages, including any *Eichleay* or other type of extended overhead or lost profit claims or damages, idle equipment costs, lost productivity or labor inefficiency costs, acceleration damages, suspension damages, consequential damages, incidental damages, or lost opportunity costs. Contractor acknowledges that it is aware of and considered this provision when submitting and pricing its Proposal and Contractor accepts the risk of delays.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Extensions of time shall be Contractor’s sole remedy in the event of delays.

§ 8.3.3 Notwithstanding anything to the contrary in the Contract Documents, an extension of the Contract Time, to the extent permitted under Subparagraph 8.3.1, shall be the sole and exclusive remedy of the Contractor for any delay, hindrance, disruption, interference or obstruction to the Work (collectively referred to in this Subparagraph 8.3.3 as “Delays”). Except as provided in Section 6.2.6 of the Contract, in no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any Delay, including, without limitation, consequential damages, loss of efficiency or productivity costs, acceleration costs, lost opportunity costs, impact damages, extended overhead costs, or other similar remuneration.

§8.3.4 TIME IS OF THE ESSENCE in the completion of the Work by the Contractor.

§ 8.3.5 No extension of time, or increase in the Contract Sum, shall be granted because of seasonal variations in temperature, humidity or precipitation, which conditions, excepting force majeure, shall be wholly at the risk of the Contractor.

§ 8.3.6 The Contractor shall not be entitled to an adjustment of the Contract Time on account of delays: (i) that it could have avoided or mitigated using its best professional efforts; (ii) that do not impact the critical path; (iii) for which there is available float in the chain of activities affected by the delay; (iv) that were caused by or could have been reasonably anticipated by the Contractor or those for whom it is responsible; or (v) that could have been mitigated or avoided by the Contractor's timely notice to the Owner as required hereunder.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

The Contractor shall submit a schedule of values to the Architect within thirty (30) days of the first of the Contract Award or Preconstruction Meeting, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The description of the Work shall be sufficiently broken down to indicate labor and material costs associated with each area of Work. Any breakdown that fails to include sufficient detail, is unbalanced, or exhibits "front-loading" of the value of the Work, will be rejected. The Schedule of Values shall be revised if later determined by the Owner or Architect to be inaccurate. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner: (i) a duly executed Contractor's partial lien waiver; (ii) duly executed partial lien waivers from all Subcontractors and, when reasonably required, from material suppliers and lower tier Subcontractors establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and (iii) all information and materials required to comply with the requirements of the Contract Documents or reasonably requested by the Owner or the Architect.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect solely to the Owner, based on the Architect's evaluation of the Work as provided in the Contract Documents and/or the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; or (3) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum. Notwithstanding anything herein to the contrary, issuance of a Certificate for Payment by the Architect is a recommendation only; payment to the Contractor of amounts certified in a Certificate for Payment is subject to the Owner's approval.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of:

- .1 Defective Work not remedied;
- .2 Third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 Failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 Damage to the Owner or a Separate Contractor;

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- .6 Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 Repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 Failure to comply with or adhere to the requirements of the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15. The Owner shall not be deemed to be in default by reason of withholding payment while any of the above grounds remain uncured, nor shall any interest accrue or be payable with respect to any payments so withheld.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than five (5) days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. Notwithstanding anything in this Subparagraph 9.6.2 to the contrary, the Owner may elect, in the Owner's **reasonable** discretion, to make any payment requested by the Contractor on behalf of a Subcontractor or material supplier of any tier jointly payable to the Contractor and such Subcontractor or material supplier, or directly payable to such Subcontractor or material supplier. The Contractor and such Subcontractor or material supplier shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint payment be construed to create any (i) contract between the Owner and a subcontractor or material supplier of any tier, (ii) obligations from the Owner to such subcontractor or material supplier, or (iii) rights in such subcontractor or material supplier against the Owner. All such payments by the Owner shall be a pro tanto discharge of sums due the Contractor.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. The Owner may contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both,

under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.8.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment or provide the Contractor with a written explanation for the reason for withholding such Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the properly submitted Application for Payment, or if the Owner does not pay the Contractor or provide the Contractor with a written explanation of the reason for withholding payment within seven days after the date established in the Contract Documents, the amount certified by the Architect or if the Owner does not so pay an amount awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing or an explanation of the reason for withholding such payments has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. As a condition precedent to Substantial Completion, the Contractor shall assemble and deliver to the Owner (1) all maintenance and operating manuals; (2) marked sets of field record drawings and specifications reflecting as-built conditions; (3) drawings reflecting the location of any concealed utilities, mechanical or electrical systems and components; (4) any special guaranties or warranties required by the Contract Documents; (5) all guaranties and warranties from Subcontractors, vendors, suppliers or manufacturers; (6) a list of the names, addresses and telephone numbers of all subcontractors and any other persons providing guarantees or warranties; (7) a permanent Certificate of Occupancy; (8) Operating permits for any mechanical equipment; and (9) any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial use and occupancy of the Project.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Architect and the Owner in writing and shall prepare and submit to the Architect (1) a comprehensive list of items to be completed or corrected prior to final payment and (2) all Certificates of Occupancy and applicable permits required by the Contract Documents, endorsed by the Contractor and in a form reasonably acceptable to the Architect and Owner. Promptly after receiving such notice, the Architect will conduct a preliminary review to determine whether or not the Documents are generally complete and correct. If the Architect finds on the basis of this review that the Contractor's notice and supporting documents are not generally complete or correct, the Architect will return them to the Contractor for revision and resubmittal, describing in general the additions or corrections required. If the Architect finds on one preliminary review of the Contractor's resubmittal that the resubmitted notice and supporting documents are still not generally complete and correct, the Contractor shall again correct and resubmit them, and shall, in addition, reimburse the Owner for the cost of any change in the Architect's services resulting from such a second and any subsequent preliminary reviews. When the Architect finds on the basis of a preliminary review that the Contractor's notice and supporting documents are substantially complete, the Architect will proceed as stated in Section 9.8.3 below. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will inspect to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the

Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents. Owner shall be entitled to retain two hundred percent (200%) of the estimated cost of incomplete or unsatisfactory Work to reach Final Completion.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the

Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), statements in a form satisfactory to the Owner that in consideration of all prior payments and of final payment, the Contractor and its Subcontractors release and forever discharge the Owner from all mechanic's liens, claims, demands, obligations and liabilities of every kind arising out of or relating to the Contract or the Project other than those Claims specifically enumerated in the statement. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 INTENTIONALLY OMITTED
(Paragraphs Deleted)

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:

- .1 Employees on the Work and other persons who may be affected thereby;
- .2 The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by the Conditions and applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss. Contractor acknowledges that public health, safety, and security are of the utmost importance in connection with its performance of the Work. Contractor shall, at all times, implement and maintain commercially reasonable safety, health, and security protocol with respect to its personnel on site, including implementing best practices as defined by the United States Centers for Disease Control and state and local public health agencies to avoid exposure to and protection against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) aka COVID-19. Contractor shall also take such actions as are necessary to protect the health, safety and security of the occupants and users of the subject property in connection with the Work and the Project, including adherence to guidelines promulgated by the State of Connecticut.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures

necessary to protect any property adjacent to the Project and improvements thereon. Any damage to such property or improvements shall be promptly repaired by the Contractor at its sole cost and expense.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.4.1 When there are indications that the use of explosives or other hazardous material, equipment or unusual methods is necessary for execution of the Work, the Contractor shall give the Owner and Architect reasonable advance notice of the conditions.

§ 10.2.4.2 The Contractor shall be solely responsible for the handling, storage and use of explosive or other hazardous materials when their use is permitted.

§ 10.2.4.3 The Contractor shall not bring explosives onto the site or use such in the Work without the prior written permission of the Architect and the Owner. For such use, the Contractor shall obtain necessary permits with copies to the Architect and the Owner. The Contractor shall furnish the Owner and Architect with certificates indicating proper and adequate insurance.

§ 10.2.5 The Contractor shall promptly remedy damage and loss to property referred to in subparagraphs 10.2.1.2, 10.2.1.3 and 10.2.1.4. If the damage or loss is due in whole or in part to the Contractor's failure to take the precautions required by this paragraph 10.2, the Contractor shall bear the cost. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 The Contractor shall at all times provide protection against weather (snow, rain, wind, storms or heat) so as to maintain all Work, materials, apparatus and fixtures free from damage. At the end of the day's work, all new Work likely to be damaged shall be reasonably protected against such weather.

§ 10.2.9 The Contractor shall provide adequate fire protection for all operations associated with the Work, and such protection must meet all applicable federal (including OSHA), State and municipal regulations.

§ 10.2.10 The Contractor shall remove and replace with new work at the Contractor's own expense, any Work damaged by failure to provide protection.

§ 10.2.11 The Contractor shall be responsible, to the extent not covered by insurance, for damage, loss, or liability due to theft or vandalism to the Work and stored materials when work is not in progress at night, on weekends or holidays.

§ 10.2.12 No visitors shall be allowed on the work site without prior written permission from the Owner.

§ 10.2.13 Cutting and welding to be performed in or immediately adjacent to existing spaces shall not be performed without written approval of the Owner for each instance.

§ 10.2.14 All employees at the worksite shall have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work. The Contractor and all Subcontractors shall furnish documentation of successful completion of said course with the first certified payroll report for each employee. The Contractor shall indemnify and hold harmless the Owner from any and all fines, costs and expenses, including but not limited to reasonable attorney's fees, incurred by Owner due to the Contractor's violation of such Acts, standards and/or regulations. Such indemnity shall not be construed to limit the indemnity required under Subparagraph 3.18.1.

§ 10.2.15 The Contractor shall comply with the requirements of the Occupational Safety and Health Act and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the governmental authorities which administer such Acts and said requirements, standards and regulations are incorporated herein by reference. The Contractor shall be directly responsible for compliance therewith on the part of its agents, employees, subcontractors, and material suppliers and shall directly receive and be responsible for all citations, assessments, fines, or penalties which may be incurred by reason of its agents, employees, material suppliers or subcontractors, to so comply.

§ 10.2.16 The Contractor shall at all times protect excavations, trenches, buildings, and materials from rainwater, ground water, ice, snow, back-up or leakage of sewers, drains, or other piping, and from water of any other origin and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping, and other equipment necessary to this end.

§ 10.2.17 MOLD GROWTH. The Contractor shall establish and maintain a program and safeguards to prevent growth of mold.

§10.2.18 Contractor and its Subcontractors shall not make news releases or publicize or issue advertising pertaining to the Work of this Agreement without first obtaining the written approval of the Owner.

§ 10.2.19 If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.20 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner and the Architect.

§ 10.2.21 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

§ 10.2.22 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work, as necessary, from injury by any cause.

§ 10.2.23 The Contractor shall at all times protect excavations, trenches, buildings and materials, from rainwater, ground water, backup or leakage of sewers, drains and other piping, and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

§ 10.2.24 The Contractor shall remove snow and ice which might result in damage or delay to the Work.

§ 10.2.25 During the progress of the Work and at all times prior to the date of Substantial Completion or occupancy of the Work by the Owner, whichever is earlier, the Contractor shall provide temporary heat, ventilation, and enclosure, adequate to permit the Work to proceed in a timely fashion, and to prevent damage to completed Work or Work in progress, or to materials stored on the premises. The permanent heating and ventilation systems may be used for these purposes when available and appropriate, but the fuel cost shall be paid by the Owner.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents the Contractor shall immediately report the condition to the Owner and the

Architect in writing and take reasonable precautions to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB). If such reasonable precautions will be inadequate to prevent foreseeable bodily injury and death, the Contractor shall immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, any Work that has been stopped in the affected area shall resume. By Change Order, the Contract Time shall be extended appropriately. Termination of the Contract by the Owner due to the discovery of Hazardous Materials on the Project site shall be Termination for Cause. The term "rendered harmless" shall be interpreted to mean that levels of hazardous materials including, but not limited to asbestos and polychlorinated biphenyl, are less than any applicable exposure standards set forth in OSHA regulations. In no event, however, shall the Owner have any responsibility for any substance or material that is brought to the Project site by the Contractor, any Subcontractor or any materialman or supplier or any entity for whom any of them is responsible. The Contractor agrees not to use any fill or other materials to be incorporated into the Work which are hazardous, toxic or comprised of any items that are hazardous or toxic except to the extent provided in Section 10.3.7.

§ 10.3.3 The Contractor shall not be liable for pre-existing, environmental matters on, under or about the premises which constitute the Project, including without limitation, those relating to fines, orders, injunctions, penalties, damages, contribution, cost recovery compensation, losses or injuries resulting from the release or threatened release of hazardous materials, special wastes or other contaminants into the environment, the development or growth of mold within or on any structures, air quality levels, and to the generation, use, storage, transportation or illegal disposal of solid wastes, hazardous materials, special wastes or other contaminants. This disclaimer of liability shall apply to all such claims against the Contractor, whether direct or indirect, including without limitation, third party claims for which the Owner is seeking indemnification from the Contractor, excluding, however, any such claims that are caused by the negligence of the Contractor or subcontractor for which the Contractor is responsible.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence or intentional acts on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of properly performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.3.7 The Contractor will be solely responsible for compliance with laws and regulations governing the handling, storage, use or disposal of hazardous materials or wastes used, stored, generated, or disposed of in connection with construction of the Work, and shall obtain all permits and approvals, give all required notices, and observe all applicable procedures prescribed by the U.S. Environmental Protection Agency, the State of Connecticut and other governmental authorities having jurisdiction with respect to such activities. At Owner's request, Contractor shall furnish the Owner promptly with evidence satisfactory to Owner demonstrating the Contractor's compliance with such procedures, the giving of such notices, and the issuance of such permits and approvals, and shall indemnify Owner and hold Owner harmless with respect to any loss, damage or liability resulting from Contractor's failure to observe such procedures, give such notices, or obtain such permits and approvals. Contractor will be responsible for removal and disposal only of such "hazardous material" as is required to be removed by the Contract Documents or any such materials placed on the site by the Contractor or any party for which the Contractor is responsible.

§ 10.3.8 All material and equipment furnished under the Contract shall be free of asbestos and polychlorinated biphenyl (PCB). Any material or equipment containing these hazardous materials shall be considered defective and

shall be removed by the Contractor at the Contractor's sole expense.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. The Contractor shall promptly notify insurers as applicable, the Architect and the Owner of the nature of the emergency. Immediately thereafter, the Contractor shall submit to the Architect and the Owner a written report including a description of circumstances of the emergency and details of action taken.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies that are acceptable to the Owner and that are lawfully authorized to issue insurance in Connecticut. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

The insurance required shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and with respect to Contractor's completed operations coverages, as specified in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies that are acceptable to the Owner and that are lawfully authorized to issue surety bonds in Connecticut.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents; the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.1.5 The limits specified in the Contract Documents are minimum requirements and shall not be construed in any way as limits of liability or as constituting acceptance by the Owner of responsibility for losses in excess of such limits. The Contractor shall be responsible for all deductibles applicable to any insurance. No acceptance and/or approval of any insurance by Owner shall be construed as relieving or excusing Contractor from any liability or obligation imposed by the provisions of the Contract Documents.

§11.1.6 The Contractor shall not commence the Work under the Contract nor permit any Subcontractor to commence work on a subcontract until all the insurance required is obtained. The Contractor may carry, at its own expense, such additional coverage as it may deem necessary. The Contractor shall not be deemed to be relieved of any responsibility by the fact it carries insurance. Should the Contractor at any time neglect or refuse to provide the insurance required herein or should such insurance be cancelled or should the full annual aggregate or any policy not be available to satisfy the requirements of the Contract, the Owner shall have the right to procure such insurance and the cost thereof shall be deducted from monies then due or thereafter to become due the Contractor.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in Connecticut.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner does not intend to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents; the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The

Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner in good faith for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly and at its own expense correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. This obligation shall survive termination of the Contract under Paragraph 14 of the General Conditions. Nothing in this Section 12.2.1 shall absolve the Architect of its liability for failure to fulfill its obligations under the agreement between the Owner and the Architect.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within

a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2. Upon completion of any work under or pursuant to this Section 12.2, the one-year correction period in connection with the Work requiring correction shall be renewed and recommence.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 AUDITS

Upon request of the Owner or the Architect, the Contractor will cooperate, and secure the cooperation of all Subcontractors and Sub-subcontractors and assist the Owner and Architect during any audit of the Project conducted by the Owner at any time after Substantial Completion.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be affected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the State of Connecticut.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. The Contractor may not assign the Contract without the Owner's prior written consent, which consent the Owner may withhold in its absolute discretion. If the Contractor attempts to make an assignment without such consent, the Contractor shall nevertheless remain legally responsible for all of the Contractor's obligations under the Contract.

§ 13.2.2 Contractor shall execute all consents reasonably required to facilitate an assignment by the Owner.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law or in equity.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.3.3 No provision contained in the Contract Documents shall create or give to third parties any claim or right of action against the Owner or the Contractor except as specifically provided herein.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, certifications and approvals of portions of the Work shall be made as required by the Contract Documents and by the Conditions, applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3 and 13.4.4, shall be at the Owner's expense.

§ 13.4.3 If inspections and tests conducted under this Section 13.4 reveal failure in a portion of the Work, the Owner may order the inspection and testing, at the Contractor's expense, of any and all portions of the Work that are identical or similar to the failing portion.

§ 13.4.4 Required certificates of testing, certification, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.4.7 If any of the Work is required to be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed. No inspection performed or failed to be performed by the Owner hereunder shall be a waiver of any of the Contractor's obligations hereunder or be construed as an approval or acceptance of the work or any parts thereof.

§ 13.5 Interest

INTENTIONALLY OMITTED

§ 13.6 Wherever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portion of such provision, which are hereby deemed severable.

§ 13.7 The parties expressly understand and agree that any provision in this Contract related to job site safety, supervision, inspections or compliance with ordinances, laws, statutes, rules, regulations and/or protocols are solely for the benefit of the Contractor and Owner and do not create any rights, claims, or causes of action in third parties, separate contractors, Subcontractors or Sub-subcontractors, or any of their employees performing work on or at the Project. Nothing in this Agreement is intended to confer any rights in any other contractor, Subcontractor of any tier material supplier, or their employees, as there are no intended third-party beneficiaries of this Agreement.

§ 13.8 Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to

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be inserted herein and the contract shall be read and enforced as though it were included herein.

§ 13.9 If the Contractor is a "nonresident contractor" as defined in Section 12-430(7)(A) of the Connecticut General Statutes, as revised, the Contractor shall comply fully with the provisions of Section 12-430(7) and, prior to commencing the Work, shall furnish the Owner with a copy of the requisite certificate of compliance set forth in subparagraph (E) of Section 12-430(7). Contractor agrees to indemnify Owner as to any and all taxes, interest and penalties that the State of Connecticut asserts are due with respect to the Contractor's activities.

§ 13.10 Contractor shall comply with the requirements of Connecticut General Statutes Section 31-52. Specifically, Contractor agrees that in the employment of labor to perform the work specified herein, preference shall be given to citizens of the United States, who are, and continuously for at least three months prior to the date hereof have been, residents of the labor market area, as established by the Labor Commissioner, in which such work is to be done, and if no such qualified person is available, then to citizens who have continuously resided in the county in which the work is to be performed for at least three months prior to the date hereof, and then to citizens of the state who have continuously resided in the state at least three months prior to the date hereof.

§ 13.11 The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in Section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

§ 13.12 Contractor and each of its Subcontractors shall furnish proof that each employee performing the work of a mechanic, laborer or worker on the Project has completed a course of at least ten (10) hours in construction safety and health approved by the federal Occupational Safety and Health Administration (OSHA) or has completed a new miner training program approved by the Federal Mine Safety and Health Administration. Such proof shall be provided with the certified payroll submitted for the first week each such employee, mechanic, laborer, or worker, begins work on the Project.

§ 13.13 Contractor hereby confirms that it has complied with the obligations under the Immigration Reform and Control Act (IRCA) and that the workers provided under this Agreement are authorized for employment in the United States. Contractor further confirms that it has properly completed I-9's for all of its workers assigned to the Project and that it will require each of its Subcontractors to confirm that they have properly completed I-9's for all of their workers assigned to the Project. Contractor agrees to indemnify, defend, and hold harmless the Owner in the event that any of the workers assigned to the Project are found not to be authorized to work under the law or in the event that there is a determination that the obligations set forth under IRCA, including the obligation to correctly prepare and maintain I-9s, have not been complied with, including but not limited to all damages, fines and penalties, punitive damages, attorneys' fees and costs.

§ 13.14 Since the Contractor was required to be prequalified by the Connecticut Department of Administrative Services in the bidding for this Project, in the event the surety assumes the contract or obtains a bid or bids for completion of the contract, the surety shall ensure that the contractor chosen to complete the contract is prequalified pursuant to section 4a-100 of the Connecticut General Statutes in the requisite classification and has the aggregate work capacity rating and single project limit necessary to complete the contract.

§ 13.15 Each payment application shall be accompanied by a statement showing the status of all pending Change Orders, pending Change Directives and approved changes to the Contract. Such statement shall identify the pending Change Orders and pending Change Directives, and shall include the date such Change Orders and Change Directives were initiated, additional cost and/or time associated with their performance and a description of any work completed. The Contractor shall require each of its Subcontractors and suppliers to include a similar statement with each of their payment applications or invoices.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents and has not notified the Contractor of the reason for withholding payment.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon thirty (30) additional days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed. The notice of termination must state with specificity the means by which the Owner may cure its nonperformance, and the Contractor shall not terminate this Agreement if, within thirty (30) days of the notice, the Owner substantially undertakes such curative measures.

§ 14.1.4 INTENTIONALLY OMITTED

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may, without prejudice to any right or remedy available to the Owner under the Contract Documents or at law or in equity terminate the Contract if the Contractor:

- .1 Institutes proceedings or consents to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable Federal or state law, or if a petition under any Federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or if the Contractor admits in writing its inability to pay its debts generally as they become due, or if it makes a general assignment for the benefit of its creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of bankruptcy or insolvency; or if a receiver of all or any substantial portion of the Contractor's properties is appointed;
- .2 Abandons the Work; or if it fails, except in cases for which extension of time prosecute promptly and diligently the Work;
- .3 Fails to supply enough properly skilled workers or proper materials for the Work;
- .4 Submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified;
- .5 Fails to make payment to Subcontractors for materials or labor in accordance with the Contract Documents and the respective agreements between the Contractor and the Subcontractors;
- .6 Disregards the Conditions, applicable laws, statutes, ordinances, codes; rules and regulations, or lawful orders of a public and appropriate authority;
- .7 Otherwise commits a substantial breach of a provision of the Contract Documents or
- .8 If a mechanic's or materialmen's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor after the receipt of notice thereof in a manner reasonably satisfactory to the Owner.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 If the Owner terminates the Contractor for cause and it is thereafter determined that the Owner did not have the right to terminate the Contractor for cause, such termination for cause shall automatically be converted into a termination for convenience under Article 14.4 hereto.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the direct costs and time caused by suspension, delay, or interruption under Section 14.3.1. No adjustment shall be made to the extent:

- .1 That performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 That an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

- .1 Cease operations as directed by the Owner in the notice;
- .2 Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 Except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits and consequential damages. In no event shall Contractor claim or be entitled to payment of overhead or profit on Work not performed. The Owner shall be credited for (i) payments previously made to the Contractor for the terminated portion of the Work, (ii) claims that the Owner has against the Contractor under the Contract, and (iii) the value of the materials, supplies, equipment, or other items that are to be disposed of

by the Contractor that are part of the Contract Sum

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

Failure to give such timely written notice will bar any claims by the Contractor. The Owner's prior written consent to proceed with any Work for which the Contractor will claim it is entitled to additional compensation is a condition precedent to recovery for such work. Any notice of Claim must clearly identify the alleged cause and the nature of the Claim and include date and information then available to the claimant that will facilitate prompt verification and evaluation of the Claim.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case, not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Failure by the Contractor to give such notice within the time specified shall greatly prejudice the Owner, and the failure to submit proper and timely notice shall constitute a waiver and abandonment of such Claim.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Owner shall have no obligation to make payments to the Contractor on or against such claims, disputes, or other matters in question during the pendency of any mediation, arbitration, or other proceedings to resolve such matters. Owner shall continue to make payments of undisputed amounts.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

Init.

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. The Contractor shall have the burden of demonstrating the effect of the claimed delay on the Contract Time, and shall furnish the Owner and the Architect with such documentation relating thereto as the Owner and the Architect may reasonably require. In the case of a continuing delay, only one Claim is necessary. Any request seeking an extension of time contain:

- .1 A detailed description of the nature of each cause of delay, the date or dates upon which each cause of delay began and ended (as known or as projected), the number of days of delay attributable to each such cause, and the impact of such delay upon the construction schedule;
- .2 The construction schedule in effect at the start of the delay, showing that the portion of the Work that was, or will be, delayed is on the critical path and that no float remains or will be available for the delayed activities at the start of the delay;
- .3 A schedule analysis of the impact of the delay on the critical path in the construction schedule at the time of the delay, including any proposed adjustment to the Contract Time; and
- .4 Such other supporting data that the Owner may request.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

INTENTIONALLY OMITTED

§ 15.1.6 LIQUIDATED DAMAGES

It is mutually agreed that if the Contractor fails to reach Substantial Completion of the Work WITHIN ONE HUNDRED TWENTY(120) from the Owner's Notice to

Proceed, the Owner will be damaged; and because the amount of the Owner's damages is difficult if not impossible to definitely ascertain and prove, it is hereby agreed that the amount of such damages shall be liquidated at the rate of One Thousand Five Hundred Dollars (\$1,500) for each Day, or part thereof, of delay in substantially completing the Work. The Contractor agrees that said sum shall be deducted from monies due the

Contractor under the Contract, or, if no money is due the Contractor, the Contractor hereby agrees to pay the Owner as liquidated damages, and not by way of penalty, such total sum as shall be due for such delay.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial

Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may demand or file for mediation of a Claim.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

(Paragraph Deleted)

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1. All claims, disputes and other matters in question between the Owner and the Contractor arising out of or related to the Contract or the breach thereof, except for claims which have been waived by the making and acceptance of final payments, shall be decided, at the sole option of the Owner, by one of the following dispute resolution procedures: (1) arbitration in accordance with rules agreed to by the Owner and the Contractor, (2)

Init.

arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining, or (3) litigation.

§ 15.4.1.1 INTENTIONALLY OMITTED

§ 15.4.2 If a demand for arbitration is filed by the Contractor, the Owner will advise the Contractor within thirty days after the receipt of such a demand for arbitration if the Owner elects to arbitrate or rejects arbitration; such election, once made, shall be binding. The filing of a demand for arbitration by the Owner shall be deemed an election to arbitrate and shall constitute the exercise of the option of the Owner to proceed with arbitration. The Owner, but not the Contractor, may join or consolidate with any arbitration with the Contractor any disputes with the Architect, any Subcontractor, or any other party having an interest in the proceeding. This agreement to arbitrate shall be specifically enforceable under applicable law in any court having jurisdiction thereof. The award rendered by the arbitrator or arbitrators shall be final and judgment may be entered upon it in accordance with the applicable law in any court having jurisdiction thereof

§ 15.4.3 The Contractor agrees to continue performance of the Contract Work and shall proceed in accordance with the directives of the Owner, under protest, in the event of a dispute or controversy. Failure to so proceed shall constitute a material breach of the Contract, regardless of the ultimate decision on the dispute, it being understood and agreed that any controversy between the parties shall not be deemed a basis to delay or suspend the Contract Work, unless directed otherwise by the Owner.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 INTENTIONALLY OMITTED

§ 15.4.4.2 INTENTIONALLY OMITTED

§ 15.4.4.3

. INTENTIONALLY OMITTED

Additions and Deletions Report for AIA® Document A201® – 2017

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PAGE 1

Bartlem Park South – Phase I

...

520 South Main Street

...

Cheshire, CT 06410

...

Town of Cheshire

84 South Main Street

Cheshire, Connecticut 06410

...

~~THE ARCHITECT:~~ARCHITECT/ENGINEER:

...

Weston + Sampson Engineers, Inc.

712 Brook Street, Suite 103

...

(Name, legal status and address)

...

Rocky Hill, Connecticut 06067

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ARTICLE 1 GENERAL PROVISIONS

...

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, the Bidding Documents (including the Owner's Project Manual for Invitation to Bid #23- , including the Project Drawings and Specifications and accompanying documents), Contractor's Bid Proposal dated February , 2023, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include ~~the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal,~~ or portions of Addenda relating to bidding or proposal requirements.

...

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties. Subcontractors are not intended thirty-party beneficiaries to the Contract and shall have no direct cause of action against the Owner.

...

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

...

.1 Modifications, with those of later date having precedence over those of earlier date.

...

.2 The Agreement, including any amendment to the Agreement included in the bid package.

...

.3 Addenda to the Specifications and Drawings, with those of later date having precedence over those of earlier date.

...

.4 The General Conditions of the Contract for Construction.

...

.5 Specifications and Drawings.

...

Further, stated dimensions shall take precedence over scaled dimensions; large-scale detail drawings shall take precedence over small-scale drawings; schedules shall take precedence over other data on the drawings.

...

In the case of an inconsistency between Drawings and Specifications or within either Document in describing the Work, the better quality, greater quantity, or more costly work shall be provided in accordance with the Architect's interpretation.

...

The term "Work" means the construction and services required by the Contract Documents, whether performed on or off the site of the Project and whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor, its Subcontractors, Sub-Subcontractors, material suppliers or any other entity for whom the Contractor is responsible to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

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§ 1.1.8 Contractor's Standard of Care

...

The Contractor shall be responsible for the performance of the Work as an independent contractor and in a good and workmanlike manner (i) consistent with the Contract Documents; (ii) consistent with the instructions, guidance and direction of the Owner and Architect; (iii) consistent with the highest prevailing applicable professional or industry standards; (iv) consistent with sound practices; (v) as expeditiously as is consistent with such professional skill and care and the orderly progress of the Work and with the Contract Documents and the instructions, guidance and direction of the Owner and Architect; (vi) in a manner that will not exceed the Contract Sum as set forth in the Agreement, and (vii) in strict compliance with applicable laws (the standards of this Section 1.1.8 shall be referred to herein as the "Contractor's Standard of Care"). The Contractor shall exercise the Contractor's Standard of Care in performing all aspects of the Work. All references in the Contract Documents to the knowledge, inference, reliance, awareness, determination, belief, observation, recognition or discovery of the Contractor or reference to any similar term shall include the constructive knowledge, inference, reliance, awareness, determination, belief, observation and recognition attributed to the Contractor ("constructive knowledge"). Such constructive knowledge shall include the knowledge, inference, reliance, awareness, determination, belief, observation and recognition the Contractor would have obtained upon the exercise of the Contractor's Standard of Care.

...

§ 1.1.9 Initial Decision Maker

...

.1 Before ordering materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of minor differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the Work.

...

.2 If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

...

§ 1.2.1.2 The Architect may, as he deems desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work reasonably inferable from the Contract Documents; such drawings or instructions may be effected by notice to the Contractor without modification of the contract Time or contract Sum. If the Contractor claims additional cost or delay on account of such additional drawings or instructions, he shall give notice as provided in Subparagraph 15.1.

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§ 1.2.4 The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the Work of the mechanical, electrical and other specialized trades, and to all of the sections of the Specifications, and shall perform all Work reasonably inferable there from as being necessary to produce the indicated results.

...

In the interest of ~~brevity~~ brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

...

~~§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights, are and shall be the property of the Owner. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.~~ reserved rights of the Owner.

...

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project for any purpose outside the scope of the Work without the specific written consent of the Owner, Architect, Owner.

...

§ 1.5.3 Prior to execution of the Agreement, the Contractor evaluated and satisfied itself as to the condition and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and the Architect's consultants, (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Subparagraph 1.5.3.

ARTICLE 2 – OWNER

...

§ 2.1 General

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§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative. 1.9 Any information obtained by the Contractor from the Owner or Architect may not be used, published, distributed, sold or divulged by the Contractor or its Subcontractor or Sub-subcontractors for such party's own purposes or for the

...

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein. benefit of any person, firm, corporation or other entity other than the Owner, without the

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§ 2.2 Evidence of the Owner's Financial Arrangements prior written consent of the

...

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately. Owner. Any information obtained by the Contractor of its Subcontractors or Sub-Subcontractors that is

...

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents. designated by the Owner in accordance with applicable law as confidential shall not be disclosed to any other parties without the prior written consent of the Owner.

...

ARTICLE 2 OWNER

...

~~§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~ 2.1 General

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~~§ 2.1.1 INTENTIONALLY OMITTED~~

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~~§ 2.1.2 INTENTIONALLY OMITTED~~

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~~§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as “confidential,” the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose “confidential” information, after seven (7) days’ notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose “confidential” information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.~~ 2.2 Evidence of the Owner’s Financial Arrangements

...

~~§ 2.2.1~~

...

~~INTENTIONALLY OMITTED~~

...

~~§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. The Owner has agreed to waive the fees of all required building permits related to the completion of this project with the exception of the State’s Education Fee.~~

...

~~§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.~~

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If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or ~~repeatedly~~ fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, ~~until the cause for such order has been eliminated~~; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

...

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ~~ten-day~~ seven-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. ~~Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the~~ The Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15. The Owner's right to stop the Work is in addition to and not in restriction or derogation of any and all remedies available to the Owner. The Owner shall have full access to and the right to inspect all portions of the Work for quality, progress, and conformance of the Contract Documents. Any testing or inspections (including commissioning) performed by or on behalf of the Owner shall in no way relieve or replace the obligations of the Contractor in its fulfillment of its obligations hereunder. Any commissioning activities are at the sole discretion of the Owner and shall not be a requirement of the Agreement.

...

§ 2.6 In no event shall the Owner have control over, charge or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

PAGE 15

§ 3.1.4 The Contractor shall comply with the Conditions and all local, state, and federal laws, rules and regulations applicable to the Contractor, including without limitation those relating to equal opportunity, labor, wage (including prevailing wage laws) and employment. Contractor certifies that it is eligible to perform work funded by the United States government and is not currently debarred or suspended from performing federal contract. Contractor, in performing the Work, shall comply with the Federal Uniform Guidance Procurement Standards, 2 CFR Part 200 et seq., as applicable. Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor" are incorporated herein and made a part hereof.

...

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, conducted its own due diligence, and correlated personal observations with requirements of the Contract Documents.

...

§ 3.2.2 Because the Contract Documents are ~~complementary~~, complementary and extensive, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

...

§ 3.2.3 ~~The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect. The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or surveys furnished by the Owner, is not guaranteed by the Architect or the Owner. The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations. Any errors due to the Contractor's failure to so verify all such grades, elevations, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner.~~

...

~~any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.~~ **§ 3.2.3** Owner assumes no contractual liability or responsibility for the physical condition or safety of the Project site or of any improvement thereon. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work.

...

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, ~~inconsistencies~~ inconsistencies, or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities. If the Contractor or a Subcontractor fails to submit a Claim in accordance with the requirements of Article 15, the Contractor or Subcontractor knowingly and irrevocably waives any Claim for additional compensation or time.

...

§ 3.2.5 The Contractor shall give the Architect timely notice of any additional Drawings, Specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

...

§ 3.2.6 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in subparagraph 3.2.5. If the Contractor proceeds with such Work without obtaining further Drawings, Specifications or instructions, the Contractor shall correct Work incorrectly done at the Contractor's own expense.

...

§ 3.2.7 Except as to any reported errors, inconsistencies or omissions, and as to any concealed or unknown conditions as defined in Paragraph 3.7.4. by executing the Agreement, the Contractor represents the following:

...

1. The Contract Documents are sufficiently complete and detailed for the Contractor to (1) perform the Work required to produce the results intended by the Contract Documents and (2) comply with all the requirements of the Contract Documents.

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2. The Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedures and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to the Work; and (3) requirements of any warranties applicable to the Work.

...

§ 3.3.4 The Contractor shall schedule and perform the Work so as not to unreasonably interfere with any other related or unrelated work being performed by the Owner in or about the Project premises or with the Owner's continued use and operation of the Project premises as a fully operational athletics complex. The Contractor shall protect and prevent damage to all unfinished phases of the

...

§-Work.

...

§ 3.4 Labor and Materials

...

§ 3.4.2.1 Approval by the Owner or Architect of any such substitution shall not relieve the Contractor requesting the substitution of responsibility for any additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

...

§ 3.4.2.2 By making requests for substitutions based on subparagraph 3.4.2 above, the Contractor:

...

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

...

.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

...

.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to substitution which subsequently become apparent; and

...

.4 shall coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects.

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§ 3.4.4 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense.

...

§ 3.4.5 In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, the Contractor shall furnish the product of the named manufacturer(s) without substitution.

...

§ 3.4.6 The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project. The Contractor shall also use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance.

...

§ 3.6 Taxes 3.5.2 Contractor agrees to assign to the Owner as a condition precedent to Substantial Completion of the Work any and all manufacturer's warranties relating to materials and equipment installed in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

...

§ 3.5.3 The warranty provided in this Paragraph 3.5 shall be in addition to and not in limitation of any other warranty or guaranty required by the Contract Documents or otherwise prescribed by law.

...

~~The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the~~ § 3.5.4 The Contractor shall procure and deliver to the Architect, no later than thirty (30) calendar days after the Date of Substantial Completion, all warranties required by the Contract Documents.

...

§3.5.5 The Warranty shall include the repair and/or replacement of all damaged materials resulting from the defective materials and/or workmanship. This shall include but not be limited to furniture, fixtures, equipment, finishes or any other affected materials or property.

...

§ 3.6 Taxes

...

~~Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. The Owner is a tax-exempt entity. The Contractor shall be familiar with the current regulations of the Connecticut Department of Revenue Services and the sales or use tax on materials or supplies exempted by such regulations shall not be included as part of the bid or the Contract Sum. A sales tax certificate is available upon written request.~~

PAGE 18

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work, including, without limitation, all building permits, subsidiary trade permits, and occupancy permits. All inspection fees as may be imposed by any municipal agency are waived by the Owner with the exception of the State's Education Fee.

...

§ 3.7.1.1 The "Agencies" are the Department of Public Works for the Town of Cheshire (the "Department"), and all other governmental authorities having regulatory or administrative jurisdiction over the Work and/or Project and all representatives or designees of the Department or such other governmental authorities. The term "Agencies" shall also include an individuals or entities designated by the Owner to monitor or oversee compliance of the Project's design with the requirements of governmental authorities having jurisdiction over the Project.

...

§ 3.7.1.2 The term "Agencies" shall also include an individual or entity not described in Section 3.7.1.1 from whom the Owner intends to request certification of the Project's design, to the extent included in the Contract Documents.

...

§3.7.1.3 Non-Discrimination and Affirmative Action Provisions

...

The Contractor agrees and warrants that in the performance of the Contract the Contractor will not

...

discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious

...

creed, age, marital status, national origin, ancestry, sex, gender identity or expression, sexual orientation, intellectual

...

disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such

...

Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws

...

of the United States or of the state of Connecticut. The Contractor further agrees to take affirmative action to

...

are customarily secured ensure that applicants with job-related qualifications are employed and that employees are treated when employed

...

without regard to of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or

...

expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness,

...

unless it is shown by such Contractor that such disability prevents performance of the work involved; (2) the

...

Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor,

...

to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the

...

commission; (3) the Contractor agrees to provide each labor union or representative of workers with which such

...

Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which

...

such Contractor has a contract or understanding, a notice to be provided by the commission advising the labor

...

union or workers' representative of the Contractor's commitments under this section, and to post copies of the

...

notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to

...

comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant

...

order issued by said commission pursuant to sections 46a-56, 46a-68e, 46a-68f and 46a-86; (5) the Contractor

...

agrees to provide the Commission on Human Rights and Opportunities with such information requested by the

...

commission, and permit access to pertinent books, records and accounts, concerning the employment practices and

...

procedures of the Contractor as relate to the provisions of this section and section 46a-56.

...

Any Contractor who is a party to a municipal public works contract or quasi-public agency project, where any

...

such contract is valued at less than \$50,000 for each year of the contract, shall provide the Commission on Human

...

Rights and Opportunities with a written or electronic representation that complies with the nondiscrimination

...

agreement and warranty under subsection (A)(1) above, provided if there is any change in such representation, the

...

after execution Contractor shall provide the updated representation to the Commission not later than 30 days after such

...

change. Any Contractor who is a party to a municipal public works contract or a quasi-public agency project,

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where any such contract is valued at \$50,000 or more for any year of the contract, shall provide the Commission with any one of the following: (1) Documentation in the form of a company or corporate policy adopted

by resolution of the board of directors, shareholder, managers, members or other governing body of such Contractor that complies with the nondiscrimination agreement and warranty under subsection (A)(1) of this section; (2) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such Contractor if (a) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and the executive director of the Commission on Human Rights and Opportunities or designee certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section; or (3) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section and is in effect on the date the affidavit is signed..

...

The Contractor shall include the provisions hereof in every subcontract or purchase order entered into to fulfill any obligation of a municipal public works contract or contract for a quasi-public agency project, and such provisions shall be binding on a Contractor, vendor or manufacturer, unless exempted by regulations or orders of the Commission on Human Rights and Opportunities. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions, including sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a Contractor or vendor as a result of such direction by the Commission regarding a state contract, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

...

of the Contract and legally required at the time bids are received

"Minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements. Determination of the Contractor's good faith efforts shall include, but shall not be eliminated to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission on Human Rights and Opportunities may prescribe that are designed to ensure the participation of minority business enterprises in municipal public works contracts or quasi-public agency projects. "Municipal public works project" means that portion of an agreement entered into on or after October 1, 2015, between any individual, form or corporation and a municipality for the construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, which is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees but excluding any project of an alliance district, as defined in section 10-262u, finance by the state funding in an amount equal to fifty thousand dollars or less. "Quasi-public agency project" means the construction, rehabilitation, conversion, extension, demolition or repair of a building or other changes or improvements in real property pursuant to a contract entered into on or after October 1, 2015, which is financed in whole or in part by a quasi-public agency using state funds, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

...

or negotiations concluded. § 3.7.1.4 If this Project is being funded in whole or in part with State of Connecticut funds, the Contractor must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session e Commission on Human Rights he commencement of construction. State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to Contractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals. For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at:http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806.

...

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. The Contractor shall procure and obtain all bonds required of the Owner or the Contractor by the municipality in which the Project is located or any public or private body with jurisdiction over the Project. In connection with such bonds, the Contractor shall prepare all applications, supply all necessary backup material, and furnish the surety with any required personal undertakings. The Owner will pay the price of all such bond premiums.

...

§ 3.7.3 If the Contractor performs Work knowing it to be which it knows or should know is contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate bear responsibility for such Work and shall bear the costs attributable to correction.

...

correction.

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If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide written notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

...

§ 3.7.6 If any governmental body having jurisdiction over the Work requires licenses or registrations for the performance of the Work or any part thereof, the Contractor shall hold such valid licenses or registrations as may be required by law to prosecute the Work to completion. If any part of the Work for which such a license or registration is required is to be performed by Subcontractors of any tier, the Contractor shall ensure that such Subcontractors hold such valid licenses or registrations as may be required by law to prosecute said Work to completion.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Owner or Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

...

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable ~~and timely~~ objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

...

§ 3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of Work and the storage of materials.

...

§ 3.9.5 Contractor shall at all times enforce strict discipline and good order among its employees (and those of its Subcontractors) and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to them. All labor shall be performed by workmen skilled in their respective trades and workmanship shall be of good quality in accordance with the standards of construction set forth in the Contract Documents.

...

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information and approval a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The schedule shall set forth milestone dates agreed to by the parties and the failure of the Contractor to achieve a milestone shall constitute a material default hereunder. Failure to meet a milestone date shall entitle but not require the Owner to supplement the Contractor's forces, at the sole cost and expense of the Contractor, and the Contractor shall be solely responsible for coordinating its efforts with and supervising the work of any supplemental manpower.

§ 3.10.4 The construction schedule shall be in a detailed precedence-style critical path management ("CPM") format satisfactory to the Owner and the Architect that shall also (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner and the Architect of the Milestone Dates, the construction schedule shall be deemed part of

the Contract Documents. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions, as set forth in Subparagraph 3.10.1 or if requested by either the Owner or the Architect. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

...

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

...

1. The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subparagraph 3.10.5.

...

2. The Owner may exercise the rights furnished the Owner under or pursuant to this Subparagraph 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with the completion date set forth in the Contract Documents.

...

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are in operation. Any postponement or rescheduling under Subparagraph 3.10.5. may be grounds for an extension of the Contract Time if permitted under Subparagraph 8.3.1.

...

§ 3.10.7 The Contractor shall schedule and conduct construction and progress meetings, on a frequency required to effect coordination, to discuss such matters as procedures, progress, problems, and scheduling. The Contractor shall prepare and distribute minutes within three working days of such meetings.

...

§ 3.10.8 The Contractor shall record the progress of the Project, including information on each Subcontractor and each Subcontractor's Work, as well as the entire Project, showing percentages of completion and the number and amounts of Change Orders. The Contractor will keep a daily log containing a record of weather, Subcontractors'

Work on the site, number of workers, Work accomplished, problems encountered and other similar relevant data as the Owner may require. Upon request, Contractor shall make the logs available to the Owner and the Architect.

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§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action. The Contractor's approval shall be noted on the submitted item or in its transmittal letter, together with written notice of any deviation in the submitted item from the requirements of the Work and of the Contract Documents. In collaboration with the Architect, Contractor shall establish and implement procedures for expediting the processing and approval of Shop Drawings, Product Data, Samples, and other submittals.

...

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Each Shop Drawing, Product Data, Sample, and similar submittals shall have a cover sheet identifying the project name and address, contractor information, drawing and/or specification reference, submission date and contents of the submittal. Ample space shall be provided on this cover sheet to allow for the Contractor's and Architect's review stamps. The Contractor's approval shall be noted on the submitted items or in its transmittal letter, together with written notice of any deviation in the submitted item from the requirements of the Work and of the Contract Documents.

...

§ 3.12.6 By submitting and approving Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall indicate approval on the submittals as evidence of such review and coordinate submittals made to the Architect without such indications of approval may be returned to the Contractor for resubmission. The accuracy of all such information is the responsibility of the Contractor. In approving Shop Drawings, Product Data, Samples, and similar submittals, the Architect shall be entitled to rely upon the Contractor's representation that such information is accurate and in compliance with the Contract.

...

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect. If the Contractor procures, performs, or installs portions of the Work without required approvals, the Contractor does so at its own risk and such Work may be removed or replaced with approved Work at no cost to the Owner.

...

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing

the deviation. Any submittals forwarded to the Architect for review that include a deviation from the requirements of the Contract Documents or is not the specific make, model or manufacturer that was listed in the Contract Documents shall have a completed Substitution Request Form attached to the submittal. This Substitution Request Form shall be provided by the Owner. Unless such deviation is identified by utilizing the Substitution Request Form, the Contractor shall not be relieved of the responsibility for the specific requirements of the Contract Documents even though the subject submittal was approved by the Architect. The Contractor shall not be relieved of responsibility for the Contractor's subcontractor's or vendor's errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

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§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. ~~The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents.~~ The Contractor shall cause such services or certifications to be provided by ~~an appropriately licensed design professional,~~ a properly licensed design professional who shall have and maintain reasonable limits of insurance, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner ~~and the Architect~~ shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, ~~provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy.~~ Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

...

§ 3.12.10.3 Services provided by the Architect to evaluate Contractor product substitution requests or to review shop drawings or other project submittals which are required to be submitted more than three (3) times shall be paid for by the Contractor to the Owner.

...

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

...

§ 3.13.2 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that occupied areas adjacent to the site of the Work shall at all time remain free from all debris and building materials.

...

§ 3.13.3 Other than those reasonably required for safety purposes, the Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

which may be withheld in the sole discretion of the Owner.

...

§ 3.13.4 Without limitation of any other provision of the Contract Documents, the Contractor shall use best efforts to minimize any interference with the occupancy or beneficial use of any areas and buildings adjacent to the site of the Work. Without prior written approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner.

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§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. Project and shall clean and/or remove all stains, spots, work, blemishes, foreign matter and dirt from other surfaces not part of the Work but where such conditions resulted from the Contractor's operations.

...

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor-Contractor for the full cost of such cleanup.

...

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall ~~indemnify~~ indemnify, defend and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

...

§ 3.18.2 ~~In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed~~The Contractor's indemnity obligations under this Paragraph 3.18 shall also specifically include, without limitation, all fines, penalties, damages, liability costs, expenses (including, without limitation, reasonable attorneys' fees), and punitive damages (if any) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible, (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work, and (iii) failure to secure and pay for permits, fees, approvals, licenses, and inspections as required under the Contract Documents, or any violation of any permit or other approval of a public authority applicable to the Work, by the Contractor, a Subcontractor, or any person or entity for whom either is responsible.

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~~by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited.~~ § 3.18.3 The Contractor acknowledges that the subject property upon which the Project is being performed is not lienable because it is municipal government property used for governmental purposes. The Contractor shall indemnify, defend and hold harmless the Owner and the Architect against any and all mechanic's liens placed on the premises or on Owner's interest in the premises by any Subcontractor of any tier or material supplier. In the event that a Subcontractor of any tier or material supplier places a mechanic's lien on the premises, the Contractor shall, with thirty (30) days of the filing of any mechanic's lien, substitute a bond for such lien or cause the lien to be discharged. If the Contractor shall fail to do so, the Owner may, at its option and at the expense of the Contractor, bond such lien or cause the lien to be discharged, and the Contractor will reimburse the Owner for all costs and expenses incurred, including but not limited to attorneys' fees and court costs.

...

~~by a limitation on amount or type of damages, compensation, or benefits payable by or for the~~ § 3.18.4 The Contractor shall indemnify, defend, and hold harmless the Owner and the Architect from and against any additional costs or expenses incurred by Owner, including attorneys' fees and court costs, as a result of any claim or cause of action by any Subcontractor or supplier of any tier asserted directly against the Owner to recover payment for labor or materials supplied to the Project, unless such claim or cause of action arises from the failure of the Owner to make payments in accordance with the applicable provisions of the Contract Documents.

...

§ 3.18.5 The Contractor shall indemnify and hold harmless the Owner, its agents and employees from and against any costs and expenses, including attorneys' fees and court costs, incurred in enforcing any of the Contractor's defense, indemnity, and hold harmless obligations under this Contract.

...

§ 3.18.6 The Contractor, for itself, its insurers and all subcontractors and their insurers, shall waive governmental immunity as a defense and shall not use the defense of governmental immunity in the adjustment of claims or in the defense of any suit, action or claim brought against the Owner. Nothing herein shall limit the Owner from utilizing the defense of governmental immunity.

...

§ 3.19 MEETINGS

...

~~a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.~~ The Contractor shall send a qualified representative to periodic progress meetings held at such time and at such place as the Architect or the Owner shall designate in accordance with the Contract Documents and to such other meetings as are necessary to comply with the Contract Documents.

...

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. construction, (i) until the final payment is due, (ii) from time to time during the one-year period for Correction of Work described in Section 12.2, and (iii) while review or certification of the Project from any of the Agencies is pending. The Architect will have authority to act on behalf of the Owner only to the extent provided specified in the Contract Documents.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and ~~13.4.3, through 13.4.4,~~ whether or not the Work is fabricated, installed or completed. ~~However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.~~

...

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of ~~checking for conformance~~ assuring conformity with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

...

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract Documents and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

...

§ 4.2.10 ~~If the Owner and Architect agree, the~~ The Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

...

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of these interpretations or decisions rendered in good ~~faith.~~ faith which were necessitated by a reason other than an act or omission of the Architect.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. Requests for information shall include, at a minimum, a detailed written statement that indicates the specific element of the Contract Documents in need of clarification and the nature of the clarification requested. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

...

§ 4.2.15 Each Subcontract executed by the Contractor shall include language that instructs the Subcontractor that the Subcontractor is to submit written information requests regarding Contract Document interpretation only to the Contractor and not the Architect. The Contractor shall timely review each such information request and only as necessary, submit to the Architect any information request that in the Contractor's professional judgment is not clearly and unambiguously answered in the Contract Documents.

...

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Owner or Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) either requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

...

§ 5.2.1.1 To facilitate and expedite the investigations of such proposed persons or entities, the Contractor shall submit a statement in writing in sufficient detail to establish that each has the capacity to carry out the portion of the Work such person or entity is proposing to provide. All such submittals shall include a list of principal personnel of any such entity, and an analysis of the financial condition, construction plant, equipment and facilities of any such person or entity. The Contractor shall terminate, at no cost to Owner, any contract with a person or entity to whom the Owner has a reasonable objection if such proposed and rejected subcontractor or such terminated.

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§ 5.2.4 ~~The Contractor shall not~~ If the Contractor proposes to substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution, selected, the parties shall follow the procedures outlined in Section 5.2.1.

...

§ 5.3.1 Any part of the Work performed for the Contractor by a Subcontractor shall be pursuant to a written Subcontract between the Contractor and Subcontractor, which shall be prepared on a form of Subcontract reasonably satisfactory to the Owner in all respects. The Owner shall be a third-party beneficiary of all contracts between the Contractor and Subcontractor and all such contracts shall require that the Owner be a third-party beneficiary of all contracts between Subcontractors and Sub-Subcontractors. Copies of all Subcontractor bids or proposals shall, upon request of Owner, be submitted to the Owner and Architect.

...

By appropriate written agreement, § 5.3.2 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that Subcontractor's Work, which the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, Subcontractor, unless specifically provided

otherwise in the subcontract agreement, the benefit of all rights, ~~remedies, and redress~~ remedies and remedies against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where **appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with ~~Sub-subcontractors.~~ Sub-subcontractors.** The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract ~~agreement, agreement,~~ copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

...

§ 5.3.3 The Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors, and shall employ the necessary and qualified personnel to produce the required quality of labor and materials and to prevent delays in the progress of the Project. The Contractor shall afford each trade with all reasonable opportunities for the installation of its work and for the storage and handling of its materials. The Contractors shall include in the Contractor's bid, any work, in connection with the mechanical trades, to be done by other trades under the Contractor's direct control.

...

§ 5.3.4 Within thirty (30) calendar days after payment to Contractor by the Owner, the Contractor shall pay any amounts due any Subcontractor, whether for labor performed or materials furnished when such labor or material has been included in requisition submitted by such Contractor and paid by Owner. The Contractor shall promptly give notice to the Owner of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor or claiming any default by the Contractor in any of the Contractor's obligations to such Subcontractor.

...

§ 5.3.5 The Contractor shall include in each of the subcontracts a provision requiring each Subcontractor to pay amounts due to any Sub-Subcontractors, whether for labor performed or materials furnished, within thirty (30) days after such Subcontractor receives a payment from the Contractor which encompasses labor or materials furnished by such Sub-subcontractor and a provision requiring each Subcontractor to promptly any claim or demand by a Sub-subcontractor claiming that any amount is due to such Sub-Subcontractor or claiming any default by such Subcontractor in any of its obligations to such Sub-subcontractor which notice the Contractor shall promptly relay to the Owner.

...

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant ~~to~~ Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

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- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

...

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the ~~subcontract.~~ subcontract but does not accept and shall not be liable for Contractor's obligations prior to the effective date of the assignment. The Contractor agrees to execute any and all other documents required to affect this assignment.

...

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in ~~cost resulting from the suspension.~~ direct costs resulting from the suspension, provided, however, that no such adjustment will be made to the compensation of a Subcontractor who is compensated as a proportion of the total project cost or a Subcontractor who is in default of its subcontract at the time of assignment.

...

§ 5.4.3 Upon assignment to the Owner under this Section 5.1, the Owner may further assign the subcontract to a successor contractor or other entity. ~~If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~

...

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, ~~and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.~~ to supplement the Contractor's forces and to award separate contracts in connection with other portions of the Project or other construction or operations on the site. If the Contractor claims that delay or is involved because of such action by the Owner, the Contractor shall make such Claim as is permitted in Articles 8 and 15.

...

§ 6.1.4 ~~Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.~~ INTENTIONALLY OMITTED

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§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

...

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. The decision as to whether the Change Work is executed via a Change Order, Construction Change Directive, or a minor change in the Work is the decision of the Owner.

...

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

...

§ 7.1.4 Except as permitted in Paragraph 7.3, a change in the Contract Sum or the Contract Time shall be accomplished only by a written Change Order executed before the Work is performed. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

...

§ 7.2.2 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time.

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§ 7.2.3 Proposed changes in the Work requested during the construction phase shall be priced by the Contractor and submitted to the Architect and Owner for review, in such form as the Architect and Owner may require, within ten (10) calendar days following the Contractor's receipt of the request. The Contractor shall promptly revise and resubmit such proposal if the Architect and Owner determine that it is not in compliance with the requirements of this Article, or that contains errors of fact or mathematical errors. If required by the Architect or Owner, in order to establish the exact cost of new Work added or previously required Work omitted, the Contractor shall obtain and furnish to the Architect and Owner bona fide proposals from recognized suppliers for furnishing and material included in such Work. Such proposals shall be furnished at the Contractor's expense.

...

§ 7.2.4 The Contractor's proposal for a change in the Work (Change Order Proposal) shall be itemized completely and shall include: Specific number of calendar days for additional time (if applicable); all material costs and quantities accompanied by the original manufacturer invoices; labor wages; unit prices; subcontractor costs; mark ups; equipment costs, profit, overhead, general conditions, fees, bond costs and approved daily time sheet tickets for work performed under the utilization of labor rates. The Architect's and Owner's refusal to approve a Change Order or Change Order Proposal due to the Contractor's lack of itemized backup information shall not be used to substantiate a claim for additional time.

...

§ 7.2.5 If the method utilized to execute the Change in the Work is based on labor rates, unit prices and material costs, then actual daily time sheets / tickets, approved by the Superintendent and the Owner, must accompany the Change Order, Construction Change Directive, or minor change in the Work. Not including the actual daily time sheets / tickets, approved by the Superintendent and the Owner, with the Change Order, Construction Change Directive, or minor change in the Work may be cause for their rejection.

...

§ 7.2.6 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both addition and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

...

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly. The Owner may also by Construction Change Directive order work to be performed that has been interpreted by the Owner and Architect to be part of the Work but is disputed by the Contractor through submission of a Claim.

...

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order. Order or work interpreted by the Owner or Architect to be part of the Contract.

...

.2 Unit prices and rates stated in the Contract Documents or subsequently agreed upon;

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§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect ~~Architect~~, in writing, of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

...

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be ~~reasonably justified, necessary for the Contractor to proceed with the Work.~~ The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

...

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work. The Contract Specifications state the Contractor shall substantially complete all Work under the Contract in one hundred and twenty (120) days from the Notice of Proceed.

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§ 8.1.2 The date of commencement of the Work is the date established in the Agreement. TIME IS OF THE ESSENCE of all Milestone Dates, the Substantial Completion date and the Final Completion date in the accepted Construction Schedule, as such Schedule may be revised and approved by the Owner.

...

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work commence the Work prior to receiving written notice to commence from the Owner or prior to the effective date of insurance required to be furnished by the Contractor and Owner.

...

§ 8.2.4 The Contractor shall proceed expeditiously in accordance with the construction schedule with adequate forces and shall achieve Substantial Completion within the Contract Time. The Contractor shall at all times ensure that each Subcontractor is providing and maintaining sufficient skilled workmen, materials and equipment to achieve Substantial Completion within the Contract Time. Absent Change Orders signed by the Owner or a delay for which the Contractor is entitled to an extension of time by § 8.3.1, the Contractor shall not make any claims for additional payment of straight time, overtime or premium time in undertaking to achieve Substantial Completion of the Work in accordance with the construction schedule. The burden of lost time and costs related to any Subcontractor's nonperformance shall not be charged to Owner.

...

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine. Nothing in this Section 8.3.1 shall absolve the Architect of liability for delays due to the negligence of the Architect or its employees or consultants, or failure to comply with the agreement between the Owner and the Architect or the Contract Documents by the Architect or by the Architect's employees or consultants. Under no circumstances shall Owner be responsible or liable for any delay damages, including any *Eichleay* or other type of extended overhead or lost profit claims or damages, idle equipment costs, lost productivity or labor inefficiency costs, acceleration damages, suspension damages, consequential damages, incidental damages, or lost opportunity costs. Contractor acknowledges that it is aware of and considered this provision when submitting and pricing its Proposal and Contractor accepts the risk of delays.

...

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Extensions of time shall be Contractor's sole remedy in the event of delays.

...

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay Notwithstanding anything to the contrary in the Contract Documents, an extension of the Contract Time, to the extent permitted under Subparagraph 8.3.1, shall be the sole and exclusive remedy of the Contractor for any delay, hindrance, disruption, interference or obstruction to the Work (collectively referred to in this Subparagraph 8.3.3 as "Delays"). Except as provided in Section 6.2.6 of the Contract, in no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any Delay, including, without limitation, consequential damages, loss of efficiency or productivity costs, acceleration costs, lost opportunity costs, impact damages, extended overhead costs, or other similar remuneration.

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~~by either party under other provisions.~~ **§8.3.4 TIME IS OF THE ESSENCE** in the completion of the Work by the Contractor.

...

~~§ 8.3.5 No extension of the Contract Documents, time, or increase in the Contract Sum, shall be granted because of seasonal variations in temperature, humidity or precipitation, which conditions, excepting force majeure, shall be wholly at the risk of the Contractor.~~

...

~~§ 8.3.6 The Contractor shall not be entitled to an adjustment of the Contract Time on account of delays: (i) that it could have avoided or mitigated using its best professional efforts; (ii) that do not impact the critical path; (iii) for which there is available float in the chain of activities affected by the delay; (iv) that were caused by or could have been reasonably anticipated by the Contractor or those for whom it is responsible; or (v) that could have been mitigated or avoided by the Contractor's timely notice to the Owner as required hereunder.~~

...

~~Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, within thirty (30) days of the first of the Contract Award or Preconstruction Meeting, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The description of the Work shall be sufficiently broken down to indicate labor and material costs associated with each area of Work. Any breakdown that fails to include sufficient detail, is unbalanced, or exhibits "front-loading" of the value of the Work, will be rejected. The Schedule of Values shall be revised if later determined by the Owner or Architect to be inaccurate. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.~~

...

~~§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, notarized and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.~~

...

~~§ 9.3.1.3 Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner: (i) a duly executed Contractor's partial lien waiver; (ii) duly executed partial lien waivers from all Subcontractors and, when reasonably required, from material suppliers and lower tier Subcontractors establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and (iii) all information and materials required to comply with the requirements of the Contract Documents or reasonably requested by the Owner or the Architect.~~

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§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for

Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, shall be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

...

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect solely to the Owner, based on the Architect's evaluation of the Work and as provided in the Contract Documents and/or the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; ~~(3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) or (3) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.~~ Notwithstanding anything herein to the contrary, issuance of a Certificate for Payment by the Architect is a recommendation only; payment to the Contractor of amounts certified in a Certificate for Payment is subject to the Owner's approval.

...

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of:

...

.1 ~~defective~~-Defective Work not remedied;

...

.2 ~~third~~-Third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

...

.3 ~~failure~~-Failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

...

.4 ~~reasonable~~-Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

...

.5 ~~damage~~ Damage to the Owner or a Separate Contractor;

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.6 ~~reasonable~~ Reasonable evidence that the Work will not be completed within the Contract Time, and that the ~~unpaid~~ unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~

...

.7 ~~repeated~~ Repeated failure to carry out the Work in accordance with the Contract Documents; or

...

.8 Failure to comply with or adhere to the requirements of the Contract Documents.

...

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15. The Owner shall not be deemed to be in default by reason of withholding payment while any of the above grounds remain uncured, nor shall any interest accrue or be payable with respect to any payments so withheld.

...

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than ~~seven-five (5)~~ five (5) days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. Notwithstanding anything in this Subparagraph 9.6.2 to the contrary, the Owner may elect, in the Owner's reasonable discretion, to make any payment requested by the Contractor on behalf of a Subcontractor or material supplier of any tier jointly payable to the Contractor and such Subcontractor or material supplier, or directly payable to such Subcontractor or material supplier. The Contractor and such Subcontractor or material supplier shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint payment be construed to create any (i) contract between the Owner and a subcontractor or material supplier of any tier, (ii) obligations from the Owner to such subcontractor or material supplier, or (iii) rights in such subcontractor or material supplier against the Owner. All such payments by the Owner shall be a pro tanto discharge of sums due the Contractor.

...

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. ~~If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to~~ The Owner may contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

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If the Architect does not issue a Certificate for Payment or provide the Contractor with a written explanation for the reason for withholding such Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the ~~Contractor's properly submitted~~ Application for Payment, or if the Owner does not pay the Contractor or provide the Contractor with a written explanation of the reason for withholding payment within seven days after the date established in the Contract Documents, the amount certified by the Architect or if the Owner does not so

pay an amount awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing or an explanation of the reason for withholding such payments has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

...

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. As a condition precedent to Substantial Completion, the Contractor shall assemble and deliver to the Owner (1) all maintenance and operating manuals; (2) marked sets of field record drawings and specifications reflecting as-built conditions; (3) drawings reflecting the location of any concealed utilities, mechanical or electrical systems and components; (4) any special guaranties or warranties required by the Contract Documents; (5) all guaranties and warranties from Subcontractors, vendors, suppliers or manufacturers; (6) a list of the names, addresses and telephone numbers of all subcontractors and any other persons providing guaranties or warranties; (7) a permanent Certificate of Occupancy; (8) Operating permits for any mechanical equipment; and (9) any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial use and occupancy of the Project.

...

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Architect and the Owner in writing and shall prepare and submit to the Architect (1) a comprehensive list of items to be completed or corrected prior to final payment. payment and (2) all Certificates of Occupancy and applicable permits required by the Contract Documents, endorsed by the Contractor and in a form reasonably acceptable to the Architect and Owner. Promptly after receiving such notice, the Architect will conduct a preliminary review to determine whether or not the Documents are generally complete and correct. If the Architect finds on the basis of this review that the Contractor's notice and supporting documents are not generally complete or correct, the Architect will return them to the Contractor for revision and resubmittal, describing in general the additions or corrections required. If the Architect finds on one preliminary review of the Contractor's resubmittal that the resubmitted notice and supporting documents are still not generally complete and correct, the Contractor shall again correct and resubmit them, and shall, in addition, reimburse the Owner for the cost of any change in the Architect's services resulting from such a second and any subsequent preliminary reviews. When the Architect finds on the basis of a preliminary review that the Contractor's notice and supporting documents are substantially complete, the Architect will proceed as stated in Section 9.8.3 below. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

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§ 9.8.3 Upon receipt of the Contractor's list, the Architect will ~~make an inspection~~ inspect to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

...

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents. Owner shall be entitled to retain two hundred percent (200%) of the estimated cost of incomplete or unsatisfactory Work to reach Final Completion.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, ~~effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner.~~ (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. ~~payment and (5), statements in a form satisfactory to the Owner that in consideration of all prior payments and of final payment, the Contractor and its Subcontractors release and forever discharge the Owner from all mechanic's liens, claims, demands, obligations and liabilities of every kind arising out of or relating to the Contract or the Project other than those Claims specifically enumerated in the statement. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, such lien, including all costs and reasonable attorneys' fees.~~

...

§ 9.10.4 ~~The making of final payment shall constitute a waiver of Claims by the Owner except those arising from~~ INTENTIONALLY OMITTED

...

~~.1~~ liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;

...

~~.2~~ failure of the Work to comply with the requirements of the Contract Documents;

...

~~.3~~ terms of special warranties required by the Contract Documents; or

...

~~.4~~ audits performed by the Owner, if permitted by the Contract Documents, after final payment.

...

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss ~~to~~ to:

...

.1 ~~employees~~ Employees on the Work and other persons who may be affected thereby;

...

- 2. ~~the~~ The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

...

- 3. ~~other~~ Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

...

§ 10.2.2 The Contractor shall comply with, and give notices required by the Conditions and applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss. Contractor acknowledges that public health, safety, and security are of the utmost importance in connection with its performance of the Work. Contractor shall, at all times, implement and maintain commercially reasonable safety, health, and security protocol with respect to its personnel on site, including implementing best practices as defined by the United States Centers for Disease Control and state and local public health agencies to avoid exposure to and protection against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) aka COVID-19. Contractor shall also take such actions as are necessary to protect the health, safety and security of the occupants and users of the subject property in connection with the Work and the Project, including adherence to guidelines promulgated by the State of Connecticut.

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§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements thereon. Any damage to such property or improvements shall be promptly repaired by the Contractor at its sole cost and expense.

...

~~§ 10.2.5~~ **10.2.4.1** When there are indications that the use of explosives or other hazardous material, equipment or unusual methods is necessary for execution of the Work, the Contractor shall give the Owner and Architect reasonable advance notice of the conditions.

...

~~The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by § 10.2.4.2~~ The Contractor shall be solely responsible for the handling, storage and use of explosive or other hazardous materials when their use is permitted.

...

~~the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to~~ **§ 10.2.4.3** The Contractor shall not bring explosives onto the site or use such in the Work without the prior written permission of the Architect and the Owner. For such use, the Contractor shall obtain necessary permits with copies to the Architect and the Owner. The Contractor shall furnish the Owner and Architect with certificates indicating proper and adequate insurance.

...

~~remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.~~ § 10.2.5 The Contractor shall promptly remedy damage and loss to property referred to in subparagraphs 10.2.1.2, 10.2.1.3 and 10.2.1.4. If the damage or loss is due in whole or in part to the Contractor's failure to take the precautions required by this paragraph 10.2, the Contractor shall bear the cost. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

...

§ 10.2.8 ~~Injury~~ The Contractor shall at all times provide protection against weather (snow, rain, wind, storms or heat) so as to maintain all Work, materials, apparatus and fixtures free from damage. At the end of the day's work, all new Work likely to be damaged shall be reasonably protected against such weather.

...

§ 10.2.9 The Contractor shall provide adequate fire protection for all operations associated with the Work, and such protection must meet all applicable federal (including OSHA), State and municipal regulations.

...

§ 10.2.10 The Contractor shall remove and replace with new work at the Contractor's own expense, any Work damaged by failure to provide protection.

...

§ 10.2.11 The Contractor shall be responsible, to the extent not covered by insurance, for damage, loss, or liability due to theft or vandalism to the Work and stored materials when work is not in progress at night, on weekends or holidays.

...

§ 10.2.12 No visitors shall be allowed on the work site without prior written permission from the Owner.

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§ 10.2.13 Cutting and welding to be performed in or immediately adjacent to existing spaces shall not be performed without written approval of the Owner for each instance.

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§ 10.2.14 All employees at the worksite shall have successfully completed a course in construction safety and health

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approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at

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the time the employee begins work. The Contractor and all Subcontractors shall furnish documentation of

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successful completion of said course with the first certified payroll report for each employee. The Contractor shall

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indemnify and hold harmless the Owner from any and all fines, costs and expenses, including but not limited to

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reasonable attorney's fees, incurred by Owner due to the Contractor's violation of such Acts, standards and/or

...

regulations. Such indemnity shall not be construed to limit the indemnity required under Subparagraph 3.18.1.

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§ 10.2.15 The Contractor shall comply with the requirements of the Occupational Safety and Health Act and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the governmental authorities which administer such Acts and said requirements, standards and regulations are incorporated herein by reference. The Contractor shall be directly responsible for compliance therewith on the part of its agents, employees, subcontractors, and material suppliers and shall directly receive and be responsible for all citations, assessments, fines, or penalties which may be incurred by reason of its agents, employees, material suppliers or subcontractors, to so comply.

...

~~or-Damage~~ § 10.2.16 The Contractor shall at all times protect excavations, trenches, buildings, and materials from rainwater, ground water, ice, snow, back-up or leakage of sewers, drains, or other piping, and from water of any other origin and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping, and other equipment necessary to this end.

...

~~to Person~~ § 10.2.17 MOLD GROWTH. The Contractor shall establish and maintain a program and safeguards to prevent growth of mold.

...

~~or-Property~~ §10.2.18 Contractor and its Subcontractors shall not make news releases or publicize or issue advertising pertaining to the Work of this Agreement without first obtaining the written approval of the Owner.

...

§ 10.2.19 If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

...

§ 10.2.20 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner and the Architect.

...

§ 10.2.21 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

...

§ 10.2.22 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work, as necessary, from injury by any cause.

...

§ 10.2.23 The Contractor shall at all times protect excavations, trenches, buildings and materials, from rainwater, ground water, backup or leakage of sewers, drains and other piping, and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

...

§ 10.2.24 The Contractor shall remove snow and ice which might result in damage or delay to the Work.

...

§ 10.2.25 During the progress of the Work and at all times prior to the date of Substantial Completion or occupancy of the Work by the Owner, whichever is earlier, the Contractor shall provide temporary heat, ventilation, and enclosure, adequate to permit the Work to proceed in a timely fashion, and to prevent damage to completed Work or Work in progress, or to materials stored on the premises. The permanent heating and ventilation systems may be used for these purposes when available and appropriate, but the fuel cost shall be paid by the

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§-Owner.

...

§ 10.3 Hazardous Materials and Substances

PAGE 43

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. ~~If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate the Contractor shall immediately report the condition to the Owner and the Architect in writing and take reasonable precautions to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, (PCB). If such reasonable precautions will be inadequate to prevent foreseeable bodily injury and death, the Contractor shall immediately stop Work in the affected area and notify the Owner and Architect of the condition.~~

...

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. ~~Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, any Work that has been stopped in the affected area shall resume upon written agreement of the Owner and Contractor. resume. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up appropriately. appropriately. Termination of the Contract by the Owner due to the discovery of Hazardous Materials on the Project site shall be Termination for Cause. The term "rendered harmless" shall be interpreted to mean that levels of hazardous materials including, but not limited to asbestos and~~

...

§ 10.3.3 ~~To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has polychlorinated biphenyl, are less than any applicable exposure standards set forth in OSHA regulations. In no event, however, shall the Owner have any responsibility for any substance or material that is brought to the Project site by the Contractor, any Subcontractor or any materialman or supplier or any entity for whom any of them is responsible. The Contractor agrees not to use any fill or other materials to be incorporated into the Work which are hazardous, toxic or comprised of any items that are hazardous or toxic except to the extent provided in Section 10.3.7.~~

...

~~not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.~~
§ 10.3.3 ~~The Contractor shall not be liable for pre-existing, environmental matters on, under or about the premises which constitute the Project, including without limitation, those relating to fines, orders, injunctions, penalties, damages, contribution, cost recovery compensation, losses or injuries resulting from the release or threatened release of hazardous materials, special wastes or other contaminants into the environment, the development or growth of mold within or on any structures, air quality levels, and to the generation, use, storage,~~

transportation or illegal disposal of solid wastes, hazardous materials, special wastes or other contaminants. This disclaimer of liability shall apply to all such claims against the Contractor, whether direct or indirect, including without limitation, third party claims for which the Owner is seeking indemnification from the Contractor, excluding, however, any such claims that are caused by the negligence of the Contractor or subcontractor for which the Contractor is responsible.

...

§ 10.3.6 If, without negligence or intentional acts on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of properly performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

...

§ 10.3.7 The Contractor will be solely responsible for compliance with laws and regulations governing the handling, storage, use or disposal of hazardous materials or wastes used, stored, generated, or disposed of in connection with construction of the Work, and shall obtain all permits and approvals, give all required notices, and observe all applicable procedures prescribed by the U.S. Environmental Protection Agency, the State of Connecticut and other governmental authorities having jurisdiction with respect to such activities. At Owner's request, Contractor shall furnish the Owner promptly with evidence satisfactory to Owner demonstrating the Contractor's compliance with such procedures, the giving of such notices, and the issuance of such permits and approvals, and shall indemnify Owner and hold Owner harmless with respect to any loss, damage or liability resulting from Contractor's failure to observe such procedures, give such notices, or obtain such permits and approvals. Contractor will be responsible for removal and disposal only of such "hazardous material" as is required to be removed by the Contract Documents or any such materials placed on the site by the Contractor or any party for which the Contractor is responsible.

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§ 10.3.8 All material and equipment furnished under the Contract shall be free of asbestos and polychlorinated biphenyl (PCB). Any material or equipment containing these hazardous materials shall be considered defective and shall be removed by the Contractor at the Contractor's sole expense.

...

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. The Contractor shall promptly notify insurers as applicable, the Architect and the Owner of the nature of the emergency. Immediately thereafter, the Contractor shall submit to the Architect and the Owner a written report including a description of circumstances of the emergency and details of action taken.

...

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies that are acceptable to the Owner and that are lawfully authorized to issue insurance in the jurisdiction where the Project is located. ~~Connecticut.~~ The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

...

The insurance required shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and with respect to Contractor's completed operations coverages, as specified in the Contract Documents.

...

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies that are acceptable to the Owner and that are lawfully authorized to issue surety bonds in the jurisdiction where the Project is located-Connecticut.

...

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the ~~Contract Documents, Documents;~~ the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

...

§ 11.1.5 The limits specified in the Contract Documents are minimum requirements and shall not be construed in any way as limits of liability or as constituting acceptance by the Owner of responsibility for losses in excess of such limits. The Contractor shall be responsible for all deductibles applicable to any insurance. No acceptance and/or approval of any insurance by Owner shall be construed as relieving or excusing Contractor from any liability or obligation imposed by the provisions of the Contract Documents.

...

§11.1.6 The Contractor shall not commence the Work under the Contract nor permit any Subcontractor to commence work on a subcontract until all the insurance required is obtained. The Contractor may carry, at its own expense, such additional coverage as it may deem necessary. The Contractor shall not be deemed to be relieved of any responsibility by the fact it carries insurance. Should the Contractor at any time neglect or refuse to provide the insurance required herein or should such insurance be cancelled or should the full annual aggregate or any policy not be available to satisfy the requirements of the Contract, the Owner shall have the right to procure such insurance and the cost thereof shall be deducted from monies then due or thereafter to become due the

...

§-Contractor.

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§ 11.2 Owner's Insurance

...

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located-Connecticut.

...

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner ~~fails~~ does not intend to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

...

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract ~~Documents, Documents~~; the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

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§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner ~~as fiduciary~~ in good faith for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

...

The Contractor shall promptly and at its own expense correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. This obligation shall survive termination of the Contract under Paragraph 14 of the General Conditions. Nothing in this Section 12.2.1 shall absolve the Architect of its liability for failure to fulfill its obligations under the agreement between the Owner and the Architect.

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§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2. Upon completion of any work under or pursuant to this Section 12.2, the one-year correction period in connection with the Work requiring correction shall be renewed and recommence.

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§ 12.2.6 AUDITS

...

Upon request of the Owner or the Architect, the Contractor will cooperate, and secure the cooperation of all Subcontractors and Sub-subcontractors and assist the Owner and Architect during any audit of the Project conducted by the Owner at any time after Substantial

...

§-Completion.

...

§ 12.3 Acceptance of Nonconforming Work

...

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be ~~effected~~affected whether or not final payment has been made.

...

~~The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.State of Connecticut.~~

...

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. ~~Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party~~ The Contractor may not assign the Contract without the Owner's prior written consent, which consent the Owner may withhold in its absolute discretion. If the Contractor attempts to make an assignment without such consent, that party ~~the Contractor shall nevertheless remain legally responsible for all of the Contractor's obligations under the Contract.~~

...

§ 13.2.2 ~~The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.~~ an assignment by the Owner.

...

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by ~~law~~law or in equity.

PAGE 48

§ 13.3.3 No provision contained in the Contract Documents shall create or give to third parties any claim or right

of action against the Owner or the Contractor except as specifically provided herein.

...

§ 13.4.1 Tests, inspections, certifications and approvals of portions of the Work shall be made as required by the Contract Documents and by the Conditions, applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

...

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section ~~13.4.3~~, 13.4.3 and 13.4.4, shall be at the Owner's expense.

...

§ 13.4.3 ~~If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.~~ inspections and tests conducted under this Section 13.4 reveal failure in a portion of the Work, the Owner may order the inspection and testing, at the Contractor's expense, of any and all portions of the Work that are identical or similar to the failing portion.

...

§ 13.4.4 Required certificates of testing, ~~inspection, certification,~~ inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

...

§ 13.4.7 If any of the Work is required to be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed. No inspection performed or failed to be performed by the Owner hereunder shall be a waiver of any of the Contractor's obligations hereunder or be construed as an approval or acceptance of the work or any parts thereof.

...

Payments due ~~INTENTIONALLY OMITTED~~

...

and unpaid under the § 13.6 Wherever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof, is

prohibited by law or found invalid under any law, only such provision or portion therefore shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portion of such provision, which are hereby deemed severable.

...

Contract Documents § 13.7 The parties expressly understand and agree that any provision in this Contract related to job site safety, supervision, inspections or compliance with ordinances, laws, statutes, rules, regulations and/or protocols are solely for the benefit of the Contractor and Owner and do not create any rights, claims, or causes of action in third parties, separate contractors, Subcontractors or Sub-subcontractors, or any of their employees performing work on or at the Project. Nothing in this Agreement is intended to confer any rights in any other contractor, Subcontractor of any tier material supplier, or their employees, as there are no intended third-party beneficiaries of this Agreement.

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§ 13.8 Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein.

...

shall bear interest from § 13.9 If the Contractor is a "nonresident contractor" as defined in Section 12-430(7)(A) of the Connecticut General Statutes, as revised, the Contractor shall comply fully with the provisions of Section 12-430(7) and, prior to commencing the Work, shall furnish the Owner with a copy of the requisite certificate of compliance set forth in subparagraph (E) of Section 12-430(7). Contractor agrees to indemnify Owner as to any and all taxes, interest and penalties that the State of Connecticut asserts are due with respect to the Contractor's activities.

...

the date payment is due at the rate the parties agree upon in writing or, § 13.10 Contractor shall comply with the requirements of Connecticut General Statutes Section 31-52. Specifically, Contractor agrees that in the employment of labor to perform the work specified herein, preference shall be given to citizens of the United States, who are, and continuously for at least three months prior to the date hereof have been, residents of the labor market area, as established by the Labor Commissioner, in which such work is to be done, and if no such qualified person is available, then to citizens who have continuously resided in the county in which the work is to be performed for at least three months prior to the date hereof, and then to citizens of the state who have continuously resided in the state at least three months prior to the date hereof.

...

in the absence thereof, at the legal rate prevailing from time to time § 13.11 The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in Section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

...

§ 13.12 Contractor and each of its Subcontractors shall furnish proof that each employee performing the work of a mechanic, laborer or worker on the Project has completed a course of at the place where least ten (10) hours in construction safety and health approved by the federal Occupational Safety and Health Administration (OSHA) or has completed a new miner training program approved by the Federal Mine Safety and Health Administration. Such proof shall be provided with the certified payroll submitted for the first week each such employee, mechanic, laborer, or worker, begins work on the Project.

...

§ 13.13 Contractor hereby confirms that it has complied with the obligations under the Immigration Reform and Control Act (IRCA) and that the workers provided under this Agreement are authorized for employment in the United States. Contractor further confirms that it has properly completed I-9's for all of its workers assigned to the Project and that it will require each of its Subcontractors to confirm that they have properly completed I-9's for all of their workers assigned to the Project. Contractor agrees to indemnify, defend, and hold harmless the Owner in the event that any of the workers assigned to the Project is located, are found not to be authorized to work under the law or in the event that there is a determination that the obligations set forth under IRCA, including the obligation to correctly prepare and maintain I-9s, have not been complied with, including but not limited to all damages, fines and penalties, punitive damages, attorneys' fees and costs.

...

§ 13.14 Since the Contractor was required to be prequalified by the Connecticut Department of Administrative Services in the bidding for this Project, in the event the surety assumes the contract or obtains a bid or bids for completion of the contract, the surety shall ensure that the contractor chosen to complete the contract is prequalified pursuant to section 4a-100 of the Connecticut General Statutes in the requisite classification and has the aggregate work capacity rating and single project limit necessary to complete the contract.

...

§ 13.15 Each payment application shall be accompanied by a statement showing the status of all pending Change Orders, pending Change Directives and approved changes to the Contract. Such statement shall identify the pending Change Orders and pending Change Directives, and shall include the date such Change Orders and Change Directives were initiated, additional cost and/or time associated with their performance and a description of any work completed. The Contractor shall require each of its Subcontractors and suppliers to include a similar statement with each of their payment applications or invoices.

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.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

...

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

...

~~4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2 Documents and has not notified the Contractor of the reason for withholding payment.~~

...

~~§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven-thirty (30) additional days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination, executed. The notice of termination must state with specificity the means by which the Owner may cure its nonperformance, and the Contractor shall not terminate this Agreement if, within thirty (30) days of the notice, the Owner substantially undertakes such curative measures.~~

...

~~§ 14.1.4 IF INTENTIONALLY OMITTED~~

...

~~the Work is stopped for a period of 60 consecutive days through no act § 14.2 Termination by the Owner for Cause~~

...

~~or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed § 14.2.1 The Owner may, without prejudice to any right or remedy available to the Owner under the Contract Documents or at law or in equity terminate the Contract if the Contractor:~~

...

~~to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.1 Institutes proceedings or consents to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable Federal or state law, or if a petition under any Federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or if the Contractor admits in writing its inability to pay its debts generally as they become due, or if it makes a general assignment for the benefit of its creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of bankruptcy or insolvency; or if a receiver of all or any substantial portion of the~~

...

~~Contractor's properties is~~

...

~~appointed;~~

...

~~§ 14.2 Termination by the Owner for Cause.2 Abandons the Work; or if it fails, except in cases for~~

...

~~§ 14.2.1 The Owner may terminate the Contract if the Contractor~~which extension of time prosecute promptly and diligently the Work;

...

~~.1 repeatedly refuses or fails .3 Fails to supply enough properly skilled workers or proper materials;~~materials for the Work;

...

~~.4 Submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified;~~

...

~~.2 fails to make payment to Subcontractors or suppliers in accordance with .5 Fails to make payment to Subcontractors for materials or labor in accordance with the Contract Documents and the respective agreements between the Contractor and the Subcontractors or suppliers;~~Subcontractors;

...

~~.3 repeatedly disregards .6 Disregards the Conditions, applicable laws, statutes, ordinances, codes, codes; rules and regulations, or lawful orders of a public authority;~~or and appropriate authority;

...

~~.4 otherwise is guilty of .7 Otherwise commits a substantial breach of a provision of the Contract Documents;~~Documents or

...

~~.8 If a mechanic's or materialmen's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor after the receipt of notice thereof in a manner reasonably satisfactory to the Owner.~~

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~~§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:~~

...

~~§ 14.2.5 If the Owner terminates the Contractor for cause and it is thereafter determined that the Owner did not have the right to terminate the Contractor for cause, such termination for cause shall automatically be converted into a termination for convenience under Article 14.4 hereto.~~

...

~~§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost direct costs and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent extent;~~

...

- .1 ~~that-That~~ performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

...

- .2 ~~that-That~~ an equitable adjustment is made or denied under another provision of the Contract.

...

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner’s convenience, the Contractor ~~shall~~shall:

...

- .1 ~~cease-Cease~~ operations as directed by the Owner in the notice;

...

- .2 ~~take-Take~~ actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

...

- .3 ~~except-Except~~ for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

PAGE 52

§ 14.4.3 ~~In case of such termination for the Owner’s convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement. Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner’s instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits and consequential damages. In no event shall Contractor claim or be entitled to payment of overhead or profit on Work not performed. The Owner shall be credited for (i) payments previously made to the Contractor for the terminated portion of the Work, (ii) claims that the Owner has against the Contractor under the Contract, and (iii) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum~~

...

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term “Claim” also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents. Failure to give such timely written notice will bar any claims by the Contractor. The Owner’s prior written consent to proceed with any Work for which the Contractor will claim it is entitled to additional compensation is a condition precedent to recovery for such work. Any notice of Claim must clearly identify the alleged cause and the nature of the Claim and include date and information then available to the claimant that will facilitate prompt verification and evaluation of the Claim.

...

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any ~~ease-case~~, not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

...

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Failure by the Contractor to give such notice within the time specified shall greatly prejudice the Owner, and the failure to submit proper and timely notice shall constitute a waiver and abandonment of such Claim.

...

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. -The Owner shall have no obligation to make payments to the Contractor on or against such claims, disputes, or other matters in question during the pendency of any mediation, arbitration, or other proceedings to resolve such matters. Owner shall continue to make payments of undisputed amounts.

PAGE 53

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, ~~notice as provided in Section 15.1.3~~ written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. The Contractor shall have the burden of demonstrating the effect of the claimed delay on the Contract Time, and shall furnish the Owner and the Architect with such documentation relating thereto as the Owner and the Architect may reasonably require. In the case of a continuing delay, only one Claim is necessary. Any request seeking an extension of time contain:

...

.1 A detailed description of the nature of each cause of delay, the date or dates upon which each cause of delay began and ended (as known or as projected), the number of days of delay attributable to each such cause, and the impact of such delay upon the construction schedule;

...

.2 The construction schedule in effect at the start of the delay, showing that the portion of the Work that was, or will be, delayed is on the critical path and that no float remains or will be available for the delayed activities at the start of the delay;

...

.3 A schedule analysis of the impact of the delay on the critical path in the construction schedule at the time of the delay, including any proposed adjustment to the Contract Time; and

...

.4 Such other supporting data that the Owner may request.

...

§ 15.1.7 Waiver of Claims for Consequential Damages

...

~~The~~ **INTENTIONALLY OMITTED**

...

§ 15.1.6 LIQUIDATED DAMAGES

...

~~Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes~~ It is mutually agreed that if the Contractor fails to reach Substantial Completion of the Work WITHIN ONE HUNDRED TWENTY(120) from the Owner's Notice to

...

~~.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and~~ Proceed, the Owner will be damaged; and because the amount of the Owner's damages is difficult if not impossible to definitely ascertain and prove, it is hereby agreed that the amount of such

...

~~.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work, damages shall be liquidated at the rate of One Thousand Five Hundred Dollars (\$1,500) for each Day, or part thereof, of delay in substantially completing the Work. The Contractor agrees that said sum shall be deducted from monies due the~~

...

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. Contractor under the Contract, or, if no money is due the Contractor, the Contractor hereby agrees to pay the Owner as liquidated damages, and not by way of penalty, such total sum as shall be due for such delay.

PAGE 54

§ 15.2.6.1 ~~Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for~~

mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision. may demand or file for mediation of a Claim.

...

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

...

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, 9.10.4 shall be subject to mediation as a condition precedent to binding dispute resolution.

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§ 15.4.1 ~~If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A. All claims, disputes and other matters in question between the Owner and the Contractor arising out of or related to the Contract or the breach thereof, except for claims which have been waived by the making and acceptance of final payments, shall be decided, at the sole option of the Owner, by one of the following dispute resolution procedures: (1) arbitration in accordance with rules agreed to by the Owner and the Contractor. (2) arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining, or (3) litigation.~~

...

§ 15.4.1.1 INTENTIONALLY OMITTED

...

~~demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. § 15.4.2 If a demand for arbitration is filed by the Contractor, the Owner will advise the Contractor within thirty days after the receipt of such a demand for arbitration if the Owner elects to~~

...

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim. arbitrate or rejects arbitration; such election, once made, shall be binding. The filing of a demand for arbitration by the Owner shall be deemed an election to arbitrate and shall constitute the exercise of the option of the Owner to proceed with arbitration. The Owner, but not the Contractor, may join or consolidate with any arbitration with the Contractor any disputes with the Architect, any Subcontractor, or any other party having an interest in the proceeding. This agreement to arbitrate shall~~

...

~~§ 15.4.2~~ be specifically enforceable under applicable law in any court having jurisdiction thereof. The award rendered by the arbitrator or arbitrators shall be ~~final~~, final and judgment may be entered upon it in accordance with the applicable law in any court having jurisdiction thereof.

...

~~§ thereof~~

...

~~15.4.3~~ The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof. § 15.4.3 The Contractor agrees to continue performance of the Contract Work and shall proceed in accordance with the directives of the Owner, under protest, in the event of a dispute or controversy. Failure to so proceed shall constitute a material breach of the Contract, regardless of the ultimate decision on the dispute, it being understood and agreed that any controversy between the parties shall not be deemed a basis to delay or suspend the Contract Work, unless directed otherwise by the Owner.

...

~~§ 15.4.4.1~~ Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s). INTENTIONALLY OMITTED

...

~~§ 15.4.4.2~~ Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent. INTENTIONALLY OMITTED

...

~~§ 15.4.4.3~~ The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

...

. INTENTIONALLY OMITTED

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Jeffrey M. Donofrio, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:41:08 ET on 12/28/2022 under Order No. 2114331888 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ - 2017, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

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SUBSURFACE DATA

PART I - GENERAL

1.01 SCOPE:

- A. A subsurface exploration program consisting of soil borings, test pits, and geotechnical laboratory testing has been performed, with reasonable care. The results of the exploration program are part of the Contract documents, and the following geotechnical report is appended hereto for informational purposes as described below.

“Geotechnical Engineering Report, Improvements to Bartlem Recreational Area, Cheshire, Connecticut” dated November 8, 2022.

- B. Samples of the materials encountered may be seen upon request during the bidding period only at the office of Weston & Sampson Engineers, Inc., 55 Walkers Drive, Suite 100, Reading, MA .
- C. The attached subsurface data is provided for informational purposes only. The Contractor shall not rely on the interpretations, opinions, conclusions, or recommendations included in the report, only the factual data relative to the specific times, locations, and depths/elevations. Specific project requirements are referenced only in the drawings and specifications.
- D. If Contractors deem the subsurface information insufficient, they may, after obtaining Owner’s permission, carry out additional subsurface explorations, at no expense to the Owner.
- E. Subsurface information provided in the Contract Documents is limited by the methods used for obtaining and expressing such data and is subject to various interpretations. The terms used to describe soils, rock, groundwater, and such other conditions are subject to local usage and individual interpretation.
- F. Borings and test pits have been completed substantially at the locations indicated on the drawings and advanced to the depths shown on the logs. Soil information presented in the boring logs, as to classification, gradation, properties, density and consistency, is based on visual observation of recovered samples. Reported groundwater levels are those measured in the field at the particular location and at the time measurements were made, and do not necessarily represent permanent or seasonal groundwater elevations. Groundwater elevations may be affected by temperature, rainfall, tidal fluctuation, and other factors that may not have been present at the time the measurements were made. The Contractors should be aware that groundwater level fluctuations may affect methods of construction.

- G. Subsurface exploration data are for the general information of the Contractors. The Contractors are obligated to examine the site, review boring and test pit logs, all available information and records of explorations, investigations and other pertinent data for the site, and then based upon their own interpretations and investigations decide the character of material to be encountered and excavated, the suitability of the materials to be used for backfilling and such other purposes, the groundwater conditions, difficulties or obstacles likely to be encountered, and other conditions affecting the work. The subsurface data is accurate only at the particular locations and times the subsurface explorations were made. No other warranty either expressed or implied by the Owner, Engineer or their agents is made as to the accuracy of the subsurface information and data shown on the drawings or presented in the Contract Documents.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

\\Wse03.local\WSE\Projects\CT\Cheshire CT\Bartlem Park Design Documents\Specifications\00 31 32 Subsurface Data_etc.docx

SECTION 00 31 43

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this project.

1.02 RELATED WORK:

- A. Section 01 11 00, CONTROL OF WORK AND MATERIALS
- B. Section 01 14 19.16, DUST CONTROL
- C. Section 01 55 26.13, SIGNAGE (TRAFFIC CONTROL)
- D. Section 01 57 19, ENVIRONMENTAL PROTECTION
- E. Section 31 00 00, EARTHWORK
- F. Section 31 23 19, DEWATERING

1.03 GENERAL REQUIREMENTS:

- A. The Owner has obtained or will obtain and pay for the permits listed below, which are required for this project. The Contractor shall assist in obtaining certain permits, as indicated. The Contractor shall obtain and pay for all other permits required.

<u>Permits by Owner</u>	<u>Status</u>
Inland Wetlands and Watercourses Permit Application #2022-031	(Attached)
Special Permit for Filling and Grading	(Attached)
Special Permit – Expansion of Bartlem Park	(Attached)
Water Pollution Control Sewer Feasibility Approvals	(Attached)
WPCA Application for Final Design/Award of Capacity Approval for Extension of Public Sanitary Sewers	Pending
Office of the State Traffic Administration - Administrative Decision	Pending
CT DEEP Stormwater General Permit	Pending
CT DOT Encroachment Permit	*
Regional Water Authority - New Service Request Letter Application	*
Regional Water Authority Fire-Domestic Application	*
Sewer Connection Permit	*
Building Permit	*

*Contractor shall prepare permit application and obtain the permit after contract is awarded, bearing all expenses. Owner will pay for and/or waive the permit application fee, if applicable.

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS:

- A. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.

- B. Prior to commencing any construction activities, the Contractor shall demonstrate to the Owner and the Engineer, through on-site inspection and submitting copies of permits or approvals, that it is in full compliance with the terms and conditions of all permits specified herein. The Contractor shall maintain full compliance with all permits throughout the performance of the work, and upon request, grant access to permitting authorities to inspect the site for the purpose of verifying such compliance.

END OF SECTION

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September 13, 2022

Town of Cheshire
84 South Main Street
Cheshire, CT 06410

REFERENCE: Application for a special permit on behalf of the Town of Cheshire, owner; Ryan Chmielewski RLA, agent; application is for filling and grading activities associated with Bartlem Park expansion project pursuant to Section 25 of the zoning regulations. Applicant is requesting waivers pursuant to Section 25.3.2. 3 and 25.3.2.11 as part of the request for special permit. Activities are located at the property of 520 South Main Street (Assessors Map 71, Lots 89,91,170) Zone R-40

Dear Town of Cheshire,

The Cheshire Planning and Zoning Commission, at a regular meeting held on September 12, 2022, approved your application for a special permit for filling and grading located at 520 South Main St. (Assessor Map 71, Lot Nos. 89, 91, 170 Zone R-40) per plans submitted.

As Per Public Act 75-317 and Connecticut General Statute 8-3cb, the special permit is not valid until a copy of the approval is filed with the Cheshire Town Clerk. Attached to this correspondence is a notice of grant that is to be filed. Please have the property owner sign the form and file with the Town Clerk.

Please feel free to contact me if you have any questions regarding this matter. I can be reached at either (203) 271-6670 or mglidden@cheshirect.org

Very Truly Yours,

Michael Glidden CFM CZEO
Town Planner/Development Coordinator

September 13, 2022

Town of Cheshire

84 South Main Street

Cheshire, CT 06410

REFERENCE: Application for a special permit on behalf of the Town of Cheshire, owner; Ryan Chmielewski RLA, agent; application is for the expansion of Bartlem Park pursuant to Section 32,33,40,41,46 and 49 of the Cheshire Zoning Regulations located at the property of 520 South Main Street (Assessors Map 71, Lots 89,91,170) Zone R-40

Dear Town of Cheshire,

The Cheshire Planning and Zoning Commission, at a regular meeting held on September 12, 2022, approved, with conditions, your application for a special permit located at 520 South Main St. (Assessor Map 71, Lot Nos. 89, 91, 170 Zone R-40) per plans submitted.

The approval is subject to the following conditions:

1. The water main on the property will need to be extended to the parking area and walkway to the outdoor assembly and fire hydrant(s) added. Final design layout will need to be approved by the Fire Chief.
2. Access around the public assembly areas must be readily available for emergencies, any access controls will need approval from the Fire Chief/Emergency Management Director and the Police Chief.

As Per Public Act 75-317 and Connecticut General Statute 8-3cb, the special permit is not valid until a copy of the approval is filed with the Cheshire Town Clerk. Attached to this correspondence is a notice of grant that is to be filed. Please have the property owner sign the form and file with the Town Clerk.

Please feel free to contact me if you have any questions regarding this matter. I can be reached at either (203) 271-6670 or mglidden@cheshirect.org

Very Truly Yours,

Michael Glidden CFM CZEO

Town Planner/Development Coordinator

TO:	Water Pollution Control Authority	DATE:	9/16/2022
FROM:	Dennis Dievert Jr.	PROJECT NO.:	20458
SUBJECT:	Sewer Feasibility Approval Bartlem Park		

As part of an ongoing town project to upgrade Bartlem Park, this application is for the installation of a 600 square foot prefabricated bathroom building and associated gravity sewer extension to support a new turf sports field and other associated site upgrades. The bathroom facility will house 7 toilets, 2 urinals, 5 sinks and an area for prepared concessions to be sold. There will be no food preparation done on-site. The area is depicted on the Town's Map of "Unsewered Properties in C&D Conservation Areas and Sewer Recommendations" as being in a Sewered Area.

Projected increase in flows of 658 gallons per day on average are reasonable for the anticipated use. The project proposes the installation of approximately 480-feet of new 8" PVC sewer and four new sewer manholes from the bathroom facility to a sewer manhole on an existing 8-inch lateral stub from CT Route 10 to the property. The town currently owns all of the land that the proposed sewer extension will be installed and would own and maintain the new sewer main without the need for any easements.

The layout of the sewer and provided details are acceptable. The complete installation of the bathroom facility and sewer extension is part of Phase 1 anticipated to being in April 2023 with a completion date of November 2023.

Submission of the most current WPCA Final Design/Award of Capacity Application will need to be submitted and approved by the WPCA prior to any work being conducted on this project. The project would be required to pay capacity fees as outlined in the WPCA regulations and file all appropriate permits for construction with the Town of Cheshire.

Subject to the issues addressed above, the project is recommended for feasibility approval. It is also recommended that the WPCA consider waiving any capacity fees associated with this project and authorize administrative approval for the Final Design/Award of Capacity Application.

CERTIFIED MAIL
7019 1640 0000 3920 7940

August 9, 2022

Sean Kimball
Town of Cheshire
84 S. Main St. Cheshire, CT
520 S. Main St.
Cheshire, CT 06410

RE: PERMIT APPLICATION #2022-031

Dear Mr. Kimball:

At the August 2, 2022 Inland Wetlands and Watercourses Commission regular meeting, the commission approved with stipulations, the permit application of Town of Cheshire for a site plan for a park at 520 S. Main St. Cheshire, CT.

It is the responsibility of all parties involved with this application to review the enclosed approval and adhere to the stipulations. All work must be completed in the sequence, manner and timeframe detailed in the approval. Any changes or modifications made to the approved plans without the prior notification to staff and/or authorization from the Cheshire Inland Wetlands and Watercourses Commission may result in the issuance of a notice of violation, cease and desist order or permit revocation. This permit is issued to the applicant and the applicant of record is ultimately responsible for the execution of this permit. Transfer of this permit from the applicant to another individual is permissible, through application to and action by the Cheshire Inland Wetlands and Watercourses Commission.

Very truly yours,

Tim Graver

Tim Graver, Secretary
CHESHIRE INLAND WETLANDS AND
WATERCOURSES COMMISSION

cc: IWWC file

Motion:

That the Cheshire Inland Wetlands and Watercourses Commission, having considered the factors pursuant to Section 10 of the Inland Wetlands and Watercourses Regulations of the Town of Cheshire, Commissioners' knowledge of the area, previous site visitations, and after review of written information provided by the applicant on this application, finds the following:

1. That the current application is for grading, stormwater management, turf athletic field and earth removal.
2. That the total area of disturbance will be 550,600 sf with only 1550 sf of disturbance in the 50' upland review area. There will not be any disturbance in the wetland area. The disturbance in the 50' upland review area will be along the edges of the area for grading.
3. That the area was flagged for wetland soils by a licensed Soil Scientist.
4. That there is no proposed direct impact to the wetland area.
5. That the proposed site plan contained an erosion and sedimentation control plan.
6. That the proposed construction activities will not have a significant adverse effect on the adjacent wetlands and watercourses.
7. That the Commission declared this application not significant within the context of the Inland Wetlands and Watercourses Regulations of the Town of Cheshire.

Based upon the foregoing findings, the Cheshire Inland Wetland and Watercourses Commission conditionally grants CIWWC Permit Application #2022-031, the permit application of Town of Cheshire for the replacement of the existing track & field, demolition of existing tennis courts and replacing existing grass athletic field with synthetic turf.

Site Plan "Town of Cheshire"
Bartlem Park
520 South Main Street, Cheshire, CT
13 Sheets, Scale as Noted
Prepared by Weston and Sampson Engineers, Inc."

The permit is granted on the following conditions and stipulations, each of which the Commission finds to be necessary to protect the wetlands and watercourses of the State and the Town of Cheshire:

1. Any lack of compliance with any condition or stipulation of this permit shall constitute a violation of the Cheshire Inland Wetlands and Watercourses Regulations, and an enforcement order shall be both issued and recorded on the Town of Cheshire Land Records.
2. No changes or modifications may be done to work being conducted in the upland or wetland areas in the plans as presented without subsequent review and approval from the Cheshire Inland Wetlands and Watercourses Commission.

3. Prior to any clearing, grading, or other preparation or construction activities on the site, or the request for a Building Permit, the applicant shall:
 - accurately stake and/or flag all clearing limits. Work is to be completed by qualified personnel.
 - provide a professional engineer's certification, in writing to the Commission, that all required erosion and sedimentation controls are in place and functioning as represented by applicant to ensure the prevention of erosion and sedimentation into adjacent wetlands and watercourses. The cost of the professional engineer shall be borne by the applicant. The applicant shall also notify Commission Staff so that Staff may inspect the site to verify that all required controls are in place. Staff may also insist on additional controls if field conditions warrant them.
 - submit contact information with a 24-hour phone number for the individual with the responsibility and authority to receive notices of any breaches or deficiencies of sedimentation and erosion controls on-site, and to effectuate repair of any such breaches or deficiencies within six (6) hours of such notice from the sediment and erosion control inspector, or other appropriate staff of the Town of Cheshire.
4. Per Section 12 of the Cheshire Inland Wetlands and Watercourses Regulations, a bond covering the costs of the sediment and erosion controls as shown on the above-referenced plans, shall be filed with the Town Planner's Office prior to the commencement of clearing/installation activities. The amount of the bond shall be calculated by the Cheshire Planning
5. An inspection of the condition, integrity, and adequacy of the sedimentation and erosion controls shall be made by made by staff prior to any construction activities taking place.
6. Throughout the course of conducting construction activities covered by this permit grant, and per Section 11.2K of the Cheshire Inland Wetlands and Watercourses Regulations, the applicant shall be responsible for ensuring the following:
 - a) That all maintenance and refueling of equipment and vehicles is performed as far as practical from all wetlands and watercourses, at least 100' if possible. All oil, gasoline, and chemicals needed at the site shall be stored in secondary containment to prevent contamination of any wetlands or watercourses from possible leaks.
 - b) That all disturbed areas on the site not directly required for construction activities are temporarily hayed and seeded until the site is permanently stabilized.
7. This permit grant shall expire on August 2, 2027.

Moved by Mr. McPhee. Seconded by Dr. Dimmick. Motion approved unanimously by Commission members present.

CC. Weston and Sampson

SECTION 00 43 43

PREVAILING WAGE RATES

**Minimum Rates and Classifications for
Heavy/Highway Construction**

ID#: 22-42976

**Connecticut Department of Labor
Wage and Workplace Standards**

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:

Project Town: Cheshire

State#:

FAP#:

Project: Bartlem Park South - Phase 1

CLASSIFICATION	Hourly Rate	Benefits
1) Boilermaker	44.46	28.51
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	38.27	34.47
2) Carpenters, Piledrivermen	36.07	26.15
2a) Diver Tenders	36.07	26.15
3) Divers	44.53	26.15
03a) Millwrights	36.32	26.81
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	55.0	23.75
4a) Painters: Brush and Roller	37.22	23.40
4b) Painters: Spray Only	40.22	23.40

As of: December 23, 2022

4c) Painters: Steel Only	39.22	23.40
4d) Painters: Blast and Spray	40.22	23.40
4e) Painters: Tanks, Tower and Swing	39.22	23.40
4f) Elevated Tanks (60 feet and above)	46.22	23.40
5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.6	32.21+3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	39.7	38.77 + a
7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9)	47.03	34.05
----LABORERS----		
8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	32.0	24.40
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen	32.25	24.40
10) Group 3: Pipelayers	32.5	24.40
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block paver, curb setter and forklift operators	32.5	24.40

As of: December 23, 2022

12) Group 5: Toxic waste removal (non-mechanical systems)	34.0	24.40
13) Group 6: Blasters	33.75	24.40
Group 7: Asbestos/lead removal, non-mechanical systems (does not include leaded joint pipe)	33.0	24.40
Group 8: Traffic control signalmen	18.0	24.40
Group 9: Hydraulic Drills	32.75	24.40
----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----		
13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	34.23	24.40 + a
13b) Brakemen, Trackmen, Miners' Helpers and all other men	33.26	24.40 + a
----CLEANING, CONCRETE AND CAULKING TUNNEL----		
14) Concrete Workers, Form Movers, and Strippers	33.26	24.40 + a
15) Form Erectors	33.59	24.40 + a
----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----		
16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers, Miners Helpers	33.26	24.40 + a
17) Laborers Topside, Cage Tenders, Bellman	33.15	24.40 + a

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18) Miners	34.23	24.40 + a
----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----		
18a) Blaster	40.72	24.40 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	40.52	24.40 + a
20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	38.54	24.40 + a
21) Mucking Machine Operator, Grout Boss, Track Boss	41.31	24.40 + a
----TRUCK DRIVERS----(*see note below)		
Two Axle Trucks, Helpers	31.16	28.78 + a
Three Axle Trucks; Two Axle Ready Mix	31.27	28.78 + a
Three Axle Ready Mix	31.33	28.78 + a
Four Axle Trucks	31.39	28.78 + a
Four Axle Ready-Mix	31.44	28.78 + a
Heavy Duty Trailer (40 tons and over)	33.66	28.78 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	31.44	28.78 + a

As of: December 23, 2022

Heavy Duty Trailer (up to 40 tons)	32.39	28.78 + a
Snorkle Truck	31.54	28.78 + a
----POWER EQUIPMENT OPERATORS----		
Group 1: Crane Handling or Erecting Structural Steel or Stone, Hoisting Engineer (2 drums or over). (Trade License Required)	50.27	26.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and over.	46.07	26.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	49.91	26.80 + a
Group 2a: Cranes (under 100 ton rated capacity).	49.06	26.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver (\$3.00 premium when operator controls hammer).	45.71	26.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	44.86	26.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper).	44.42	26.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" mandrel)	43.73	26.80 + a

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	43.73	26.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	43.38	26.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrel)	42.99	26.80 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	42.54	26.80 + a
Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder), Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	42.04	26.80 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	39.7	26.80 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	39.7	26.80 + a
Group 12: Wellpoint Operator.	39.63	26.80 + a
Group 13: Compressor Battery Operator.	38.97	26.80 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	37.66	26.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	37.2	26.80 + a
Group 16: Maintenance Engineer.	36.46	26.80 + a

As of: December 23, 2022

Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator., Portable Grout Plant Operator, Portable Water Filtration Plant Operator.	41.39	26.80 + a
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Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	38.61	26.80 + a
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**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	48.19	6.5% + 22.00
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21) Heavy Equipment Operator	42.26	6.5% + 19.88
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22) Equipment Operator, Tractor Trailer Driver, Material Men	40.96	6.5% + 19.21
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23) Driver Groundmen	26.5	6.5% + 9.00
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23a) Truck Driver	40.96	6.5% + 17.76
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----LINE CONSTRUCTION----

24) Driver Groundmen	30.92	6.5% + 9.70
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25) Groundmen	22.67	6.5% + 6.20
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26) Heavy Equipment Operators	37.1	6.5% + 10.70
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As of: December 23, 2022

27) Linemen, Cable Splicers, Dynamite Men 41.22 6.5% + 12.20

28) Material Men, Tractor Trailer Drivers, Equipment Operators 35.04 6.5% + 10.45

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.*

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

--Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work
--

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page:

www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

As of: December 23, 2022

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

**Minimum Rates and Classifications
for Building Construction**

**Connecticut Department of Labor
Wage and Workplace Standards**

ID#: 22-42976

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: Cheshire
 State#: FAP#:
 Project: Bartlem Park South - Phase 1

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters. **See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	44.57	31.79
2) Boilermaker	44.46	28.51
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	37.75	34.62 + a
3b) Tile Setter	37.1	30.52
3c) Tile and Stone Finishers	30.0	25.30
3d) Marble & Terrazzo Finishers	31.07	24.23
3e) Plasterer	41.9	28.75

-----LABORERS-----

4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	32.0	24.40
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	32.25	24.40
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	32.5	24.40
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is \$26.80.	33.0	24.40
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	32.75	24.40
4e) Group 6: Blasters, nuclear and toxic waste removal.	35.0	24.40
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	33.0	24.40
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	30.28	24.40
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	29.74	24.40
4i) Group 10: Traffic Control Signalman	18.0	24.40
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	36.07	26.15

As of: December 23, 2022

5a) Millwrights	36.32	26.81
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.6	32.21+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	58.9	36.885+a+b
-----LINE CONSTRUCTION-----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00
8) Glazier (Trade License required: FG-1,2)	40.78	23.40 + a
9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	39.7	38.77 + a
-----OPERATORS-----		
Group 1: Crane Handling or Erecting Structural Steel or Stone; Hoisting Engineer (2 drums or over). (Trade License Required)	50.27	26.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and Over	46.07	26.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	49.91	26.80 + a
Group 2a: Cranes (under 100 ton rated capacity).	49.06	26.80 + a

As of: December 23, 2022

Group 2b: Excavator over 2 cubic yards; Pile Driver (\$3.00 premium when operator controls hammer)	45.71	26.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Finegrade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	44.86	26.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper); Goldhofer.	44.42	26.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Spreader, Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24 mandrel).	43.73	26.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	43.73	26.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	43.38	26.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under mandrel).	42.99	26.80 + a
Group 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welding; Work Boat Under 26 ft.; Transfer Machine; Rigger Foreman.	42.54	26.80 + a
Group 9: Front End Loader (under 3 cubic yards); Skid Steer Loader regardless of attachments; (Bobcat or Similar); Forklift, Power Chipper; Landscape Equipment (including Hydroseeder); Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	42.04	26.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	39.7	26.80 + a

As of: December 23, 2022

Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	39.7	26.80 + a
Group 12: Wellpoint Operator.	39.63	26.80 + a
Group 13: Compressor Battery Operator.	38.97	26.80 + a
Group 14: Elevator Operator; Tow Motor Operator (solid tire no rough terrain).	37.66	26.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	37.2	26.80 + a
Group 16: Maintenance Engineer.	36.46	26.80 + a
Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator; Portable Grout Plant Operator; Portable Water Filtration Plant Operator.	41.39	26.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL license); Rigger; Signalman.	38.61	26.80 + a
-----PAINTERS (Including Drywall Finishing)-----		
10a) Brush and Roller	37.22	23.40
10b) Taping Only/Drywall Finishing	37.97	23.40
10c) Paperhanger and Red Label	37.72	23.40
10e) Blast and Spray	40.22	23.40
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	47.03	34.05

As of: December 23, 2022

12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	40.1	23.40
14) Roofer (slate & tile)	40.6	23.40
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	40.89	41.72
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	47.03	34.05
-----TRUCK DRIVERS-----		
17a) 2 Axle, Helpers	31.16	28.78 + a
17b) 3 Axle, 2 Axle Ready Mix	31.27	28.78 + a
17c) 3 Axle Ready Mix	31.33	28.78 + a
17d) 4 Axle	31.39	28.78 + a
17e) 4 Axle Ready Mix	31.44	28.78 + a
17f) Heavy Duty Trailer (40 Tons and Over)	33.66	28.78 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	31.44	28.78 + a

As of: December 23, 2022

17h) Heavy Duty Trailer up to 40 tons	32.39	28.78 + a
17i) Snorkle Truck	31.54	28.78 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	47.55	28.96 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.*

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page:

www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: December 23, 2022

As of: December 23, 2022



Opportunity * Guidance * Support



THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

**If you have QUESTIONS regarding your wages
CALL (860) 263-6790**

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;
- (8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;
- (9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

- (10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;
- (11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
- (12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
- (13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;
- (14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and
- (15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.
- (16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice
To All Mason Contractors and Interested Parties
Regarding Construction Pursuant to Section 31-53 of the
Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.
- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions, Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the **contractor's** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

NOTICE

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached “Contracting Agency Certification Form” to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

Inquiries can be directed to 860.263.6790.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

Contracting Agency Certification Form

I, _____, acting in my official capacity as _____,
Authorized Representative Title

for _____, located at _____,
Contracting Agency Address

do hereby certify that the total dollar amount of work to be done in connection with

_____, located at _____,
Project name and number Address

shall be \$_____, which includes all work, regardless of whether such project
contains of one or more contracts.

Contractor Information

Name: _____

Address: _____

Authorized Representative: _____

Approximate Starting Date: _____

Approximate Completion Date: _____

Signature

Date

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

Subscribed and sworn to before me this _____ day of _____, _____.

Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.											PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS											Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109				
CONTRACTOR NAME AND ADDRESS:											SUBCONTRACTOR NAME & ADDRESS						WORKER'S COMPENSATION INSURANCE CARRIER									
PAYROLL NUMBER		Week-Ending Date		PROJECT NAME & ADDRESS											POLICY #											
PERSON/WORKER, ADDRESS and SECTION		APPR RATE %	MALE/FEMALE AND RACE*	WORK CLASSIFICATION	DAY AND DATE						Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY						
Trade License Type & Number - OSHA 10 Certification Number				S	M	T	W	TH	F	S	Total O/T Hours	TOTAL FRINGE BENEFIT PLAN CASH	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$	FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER				
HOURS WORKED EACH DAY												\$	Base Rate	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$							
												\$	Base Rate	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$							
											\$	Base Rate	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$								
											\$	Base Rate	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$								
											\$	Base Rate	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$								

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker’s compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care _____ 4) Disability _____
- 2) Pension or retirement _____ 5) Vacation, holiday _____
- 3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____ of _____, (hereafter known as Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such person is covered by a worker’s compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

_____ (Signature) _____ (Title) _____ Submitted on (Date)

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS											Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109											
In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.											WEEKLY PAYROLL											
CONTRACTOR NAME AND ADDRESS: Landon Corporation, 15 Connecticut Avenue, Northford, CT 06472											SUBCONTRACTOR NAME & ADDRESS XYZ Corporation 2 Main Street Yantic, CT 06389						WORKER'S COMPENSATION INSURANCE CARRIER Travelers Insurance Company POLICY # #BAC8888928 EFFECTIVE DATE: 1/1/09 EXPIRATION DATE: 12/31/09					
PAYROLL NUMBER	Week-Ending Date	PROJECT NAME & ADDRESS									Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY		
		DAY AND DATE							HOURS WORKED EACH DAY						FICA	WITH-HOLDING	WITH-HOLDING	LIST OTHER				
PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/FEMALE AND RACE*	WORK CLASSIFICATION	S	M	T	W	TH	F	S	Total O/T Hours	TOTAL FRINGE BENEFIT PLAN CASH										
Robert Craft 81 Maple Street Willimantic, CT 06226		M/C	Electrical Lineman E-1 1234567 Owner OSHA 123456		8	8	8	8	8		40	S-TIME	1. \$ 5.80	\$1,582.80				P-xxxx	\$1,582.80	#123		
										Base Rate		2. \$	\$ xxx.xx									
												3. \$ 2.01										
										O-TIME		4. \$										
										Cash Fringe		5. \$										
												6. \$										
Ronald Jones 212 Elm Street Norwich, CT 06360	65%	M/B	Electrical Apprentice OSHA 234567		8	8	8	8	8		40	S-TIME	1. \$	\$1,464.80	xx.xx	xxx.xx	xx.xx	G-xxx	\$1,464.80	#124		
										Base Rate		2. \$	\$xxx.xx									
												3. \$										
										O-TIME		4. \$										
										Cash Fringe		5. \$										
												6. \$										
Franklin T. Smith 234 Washington Rd. New London, CT 06320 SECTION B		M/H	Project Manager			8					8	S-TIME	1. \$	\$1,500.00	xx.xx	xx.xx	xx.xx	M-xx.x		xxx.xx		
										Base Rate		2. \$										
												3. \$										
										O-TIME		4. \$										
										Cash Fringe		5. \$										
												6. \$										
												S-TIME	1. \$									
										Base Rate		2. \$										
												3. \$										
										O-TIME		4. \$										
										Cash Fringe		5. \$										
												6. \$										

7/13/2009 *IF REQUIRED
WWS-CP1

*SEE REVERSE SIDE

PAGE NUMBER 1 OF 2

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care Blue Cross 4) Disability _____
- 2) Pension or retirement _____ 5) Vacation, holiday _____
- 3) Life Insurance Utopia 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of 9/26/09,

I, Robert Craft of XYZ Corporation, (hereafter known as

Employer) in my capacity as Owner (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

Robert Craft owner 10/2/09
 (Signature) (Title) Submitted on (Date)

Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

Robert Craft owner 10/2/09
 (Signature) (Title) Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

*****THIS IS A PUBLIC DOCUMENT***
DO NOT INCLUDE SOCIAL SECURITY NUMBERS**

Information Bulletin ***Occupational Classifications***

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- **ELECTRICIANS**

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ****License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.***

- **ELEVATOR CONSTRUCTORS**

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. **License required by Connecticut General Statutes: R-1,2,5,6.*

- **FORK LIFT OPERATOR**

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

- Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- **ROOFERS**

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- **SHEETMETAL WORKERS**

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- **SPRINKLER FITTERS**

Installation, alteration, maintenance and repair of fire protection sprinkler systems.

****License required per Connecticut General Statutes: F-1,2,3,4.***

- **TILE MARBLE AND TERRAZZO FINISHERS**

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are requires to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➤ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6790.

**Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES**

⇒ Please Note: If the “Benefits” listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the “Benefits” section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

- a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

- a. Paid Holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans’ Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.
- b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

- a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year’s Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

- a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

- a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

- a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

"General Decision Number: CT20230016 01/06/2023

Superseded General Decision Number: CT20220016

State: Connecticut

Construction Type: Heavy

County: New Haven County in Connecticut.

HEAVY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number Publication Date
0 01/06/2023

BRCT0001-011 01/03/2022

	Rates	Fringes
BRICKLAYER.....	\$ 38.27	34.47

BRCT0001-012 01/03/2022		

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 38.27	34.47

CARP0326-011 05/03/2022		

Beacon Falls, Bethany, Branford, Cheshire, East Haven, Guilford, Hamden, Madison, Meriden, Middlebury, Naugatuck, New Haven, North Branford, North Haven, Orange (east of Orange Center Road and north of Route 1, and north of Route 1 and east of the Oyster River), Prospect, Southbury, Wallingford, Waterbury, West Haven, Wolcott, Woodbridge

	Rates	Fringes
CARPENTER		
CARPENTERS, PILEDRIVERS.....	\$ 36.07	26.15
DIVER TENDER.....	\$ 36.07	26.15
DIVER.....	\$ 44.53	26.15

CARP0326-020 05/02/2022		

Ansonia, Derby, Milford, Orange (West of Orange Center Road and South of Route 1 and West of the Oyster River), Oxford, Seymour

	Rates	Fringes
CARPENTER		
CARPENTER, PILEDRIVER.....	\$ 36.07	26.15
DIVER TENDER.....	\$ 36.07	26.15
DIVER.....	\$ 44.53	26.15

CARP1121-006 01/03/2022		

	Rates	Fringes
MILLWRIGHT.....	\$ 36.32	26.81

ELEC0090-004 06/01/2022		

Entire County excluding Beacon Falls, Middlebury, Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott Townships

	Rates	Fringes
ELECTRICIAN.....	\$ 40.60	3%+32.21

ELEC0488-007 06/01/2022		

Beacon Falls, Middlebury, Milford, Naugatuck, Oxford, Prospect, Seymour, Southbury, Waterbury and Wolcott Townships

Rates	Fringes
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ELECTRICIAN.....\$ 41.40 3%+31.07

ENGI0478-001 04/03/2022

	Rates	Fringes
Power equipment operators:		
GROUP 1.....	\$ 50.27	26.80
GROUP 2.....	\$ 49.91	26.80
GROUP 3.....	\$ 49.06	26.80
GROUP 4.....	\$ 44.42	26.80
GROUP 5.....	\$ 43.73	26.80
GROUP 6.....	\$ 43.38	26.80
GROUP 7.....	\$ 42.99	26.80
GROUP 8.....	\$ 44.86	26.80
GROUP 9.....	\$ 42.04	26.80
GROUP 10.....	\$ 39.70	26.80
GROUP 11.....	\$ 39.70	26.80
GROUP 12.....	\$ 39.63	26.80
GROUP 13.....	\$ 41.39	26.80
GROUP 14.....	\$ 38.97	26.80
GROUP 15.....	\$ 38.61	26.80
GROUP 16.....	\$ 37.66	26.80
GROUP 17.....	\$ 37.20	26.80
GROUP 18.....	\$ 36.46	26.80
GROUP 19.....	\$ 46.07	26.80
GROUP 20.....	\$ 45.71	26.80
GROUP 21.....	\$ 44.86	26.80

Hazardous waste premium \$3.00 per hour over classified rate.

- Crane with boom, including jib, 150 feet - \$1.50 extra.
- Crane with boom, including jib, 200 feet - \$2.50 extra.
- Crane with boom, including jib, 250 feet - \$5.00 extra.
- Crane with boom, including jib, 300 feet - \$7.00 extra.
- Crane with boom, including jib, 400 feet - \$10.00 extra

- 1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
- 2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
- 3) Cranes(under 100 ton rated capacity)

a. PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

- GROUP 1: Crane handling or erecting structural steel or stone, hoisting engineer (2 drums or over)
- GROUP 2: Cranes (100 ton capacity & over) Bauer Drill/Caisson
- GROUP 3: Cranes (under 100 ton rated capacity)
- GROUP 4: Trenching machines, lighter derrick, concrete finishing machine, CMI machine or similar, Koehring Loader (skoper).
- GROUP 5: Specialty railroad equipment, asphalt spreader, asphalt reclaiming machine, line grider, concrete pumps,

drills with self contained power units, boring machine, post hole digger, auger, pounder, well digger, milling machine (over 24' mandrel), side boom, combination hoe and loader, directional driller

GROUP 6: Front end loader (3 cu. yds. up to 7 cu. yards), bulldozer (Rough grade dozer) .

GROUP 7: Asphalt roller, concrete saws and cutters (ride on types), Vermeer concrete cutter, stump grinder, scraper, snooper, skidder, milling machine (24" and under Mandrel).

GROUP 8: Mechanic, grease truck operator, hydoblaster, barrier mover, power stone spreader, welder, work boat under 26 ft. transfer machine.

GROUP 9: Front end loader (under 3 cubic yards), skid steer loader (regardless of attachments), bobcat or similar, forklift, power chipper, landscape equipment (including hydroseeder), Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).

GROUP 10: Vibratory hammer, ice machine, diesel & air, hammer, etc.

GROUP 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.

GROUP 12: Wellpoint operator.

GROUP 13: Portable asphalt plant operator, portable concrete plant operator, portable crusher plant operator, portable grout plant operator, portable water filtration plant operator.

GROUP 14: Compressor battery operator.

GROUP 15: Power Safety boat, Vacuum truck, Zim mixer, Sweeper; (Minimum for any job requiring a CDL license) .

GROUP 16: Elevator operator, tow motor operator (solid tire no rough terrain).

GROUP 17: Generator operator, compressor operator, pump operator, welding machine operator; Heater operator.

GROUP 18: Maintenance engineer.

GROUP 19: Front end loader(7 cubic yards or over); work boat 26 ft. and over.

GROUP 20: Excavator over 2 cubic yards; pile driver(\$3.00 premium when operator controls hammer).

GROUP 21: Excavator, gradall, master mechanic, hoisting engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power or operating), rubber tire excavator (drott 1085 similar), grader operator, bulldozer finegrade (slopes shaping, laser or GPS, ect.)

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Asphalt Paver.....	\$ 43.73	26.80
Asphalt Roller.....	\$ 42.99	26.80
Asphalt Spreader.....	\$ 43.73	26.80
Backhoe/Excavator 2 cubic yards and over.....	\$ 45.71	26.80
Backhoe/Excavator under 2 cubic yards.....	\$ 44.86	26.80
Crane handling or erecting structural steel or stone...	\$ 50.27	26.80
Cranes (100 ton capacity & over).....	\$ 49.91	26.80
Cranes (under 100 ton rated capacity).....	\$ 49.06	26.80
Drills with self contained power units; Directional driller.....	\$ 43.73	26.80
Earth Roller.....	\$ 39.70	26.80
Forklift.....	\$ 42.04	26.80
Front End Loader (3 cubic yards up to 7 cubic yards)..	\$ 43.38	26.80
Front End Loader (7 cubic yards or over).....	\$ 46.07	26.80
Front End Loader (under 3 cubic yards).....	\$ 42.04	26.80
Grader/Blade.....	\$ 44.86	26.80
Maintenance Engineer/Oiler..	\$ 36.46	26.80
Mechanic.....	\$ 44.86	26.80
Rubber Tire Backhoe/Excavator.....	\$ 44.86	26.80

a. PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

- b. Crane with boom, including jib, 150 feet - \$1.50 extra .
- Crane with boom, including jib, 200 feet- \$2.50 extra.
- Crane with boom, including jib, 250 feet - \$5.00 extra.
- Crane with boom, including jib, 300 feet - \$7.00 extra.
- Crane with boom, including jib, 400 feet - \$10.00 extra.

- 1) Crane handling or erecting structural steel or stone, hoisting engineer(2 drums or over)
- 2) Cranes(100 ton rated capacity and over) Bauer Drill/Caisson
- 3) Cranes(under 100 ton rated capacity)

IRON0015-005 06/06/2022

	Rates	Fringes
IRONWORKER, REINFORCING.....	\$ 39.70	38.77

a. PAID HOLIDAY: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

LAB00146-002 04/03/2022

	Rates	Fringes
Laborers: (TUNNEL CONSTRUCTION)		
CLEANING, CONCRETE AND CAULKING TUNNEL:		
Concrete Workers, Form Movers and Strippers.....	\$ 33.26	24.40
Form Erectors.....	\$ 33.59	24.40
ROCK SHAFT, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:		
Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers.....	\$ 33.26	24.40
Laborers Topside, Cage Tenders, Bellman.....	\$ 33.15	24.40
Miners.....	\$ 34.23	24.40
SHIELD DRIVE AND LINER PLATE TUNNELS IN FREE AIR:		
Brakemen and Trackmen.....	\$ 33.26	24.40
Miners, Motormen, Mucking Machine Operators, Nozzle-men, Grout Men, Shaft and Tunnel, Steel and Rodmen, Shield and Erector, Arm Operator, Cable Tenders.....	\$ 34.23	24.40
TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR:		
Blaster.....	\$ 40.72	24.40
Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders.....	\$ 40.52	24.40
Change House Attendants, Powder Watchmen, Top on Iron Bolt.....	\$ 38.54	24.40
Mucking Machine Operator...	\$ 41.31	24.40

a. PAID HOLIDAYS: On tunnel work only: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

LAB00146-003 04/03/2022

	Rates	Fringes
LABORERS		
GROUP 1.....	\$ 32.00	24.40
GROUP 2.....	\$ 32.25	24.40
GROUP 3.....	\$ 32.50	24.40
GROUP 4.....	\$ 33.00	24.40
GROUP 5.....	\$ 33.75	24.40
GROUP 6.....	\$ 34.00	24.40
GROUP 7.....	\$ 18.00	24.40

LABORERS CLASSIFICATIONS

GROUP 1: Laborers (Unskilled), acetylene burner, concrete specialist

GROUP 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators and powdermen.

GROUP 3: Pipelayers, Jackhammer/Pavement breaker (handheld), mason tenders/catch basin builders, asphalt rakers, air track operators, block paver and curb setter

GROUP 4: Asbestos/lead removal

GROUP 5: Blasters

GROUP 6: Toxic waste remover

GROUP 7: Traffic control signalman

PAIN0011-013 06/01/2021

	Rates	Fringes
PAINTER		
Brush and Roller.....	\$ 36.42	22.90
Spray Only.....	\$ 39.42	22.90
Steel Only.....	\$ 38.42	22.90

TEAM0064-001 04/03/2022

	Rates	Fringes
Truck drivers:		
2 Axle Ready Mix.....	\$ 31.27	28.78
2 Axle.....	\$ 31.16	28.78
3 Axle Ready Mix.....	\$ 31.33	28.78
3 Axle.....	\$ 31.27	28.78
4 Axle Ready Mix.....	\$ 31.44	28.78
4 Axle.....	\$ 31.39	28.78
Heavy Duty Trailer 40 tons and over.....	\$ 33.66	28.78
Heavy Duty Trailer up to 40 tons.....	\$ 32.39	28.78
Specialized (Earth moving equipment other than conventional type on-the- road trucks and semi- trailers, including Euclids).....	\$ 31.44	28.78
Snorle Truck	\$ 31.54	28.78

Hazardous waste removal work receives additional \$1.25 per hour.

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

TEAM0064-006 04/03/2022

	Rates	Fringes
TRUCK DRIVER: 4 Axle Truck.....	\$ 31.39	28.78

Hazardous waste removal work receives additional \$1.25 per hour.

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

 SUCT2002-011 12/16/2008

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 24.85	13.83
OPERATOR: Bulldozer.....	\$ 25.33	9.64

 WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can

be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

"General Decision Number: CT20230023 01/06/2023

Superseded General Decision Number: CT20220023

State: Connecticut

Construction Type: Building

County: New Haven County in Connecticut.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

ASBE0033-002 06/01/2022

	Rates	Fringes
HEAT & FROST INSULATOR (Includes Duct, Pipe and Mechanical Systems).....	\$ 44.57	31.79

BRCT0001-001 01/03/2022

	Rates	Fringes
BRICKLAYER.....	\$ 37.75	34.62

BRCT0001-005 01/03/2022

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 37.75	34.62

CARP0326-023 05/02/2022

	Rates	Fringes
CARPENTER (Includes Acoustical Ceiling Installation, Drywall Hanging, Form Work, Metal Stud Installation, Soft Floor Layer - Vinyl and Resilient).....	\$ 36.07	26.15

CARP0326-024 05/02/2022

	Rates	Fringes
FLOOR LAYER: Carpet Only.....	\$ 36.07	26.15

CARP0326-025 05/02/2022

	Rates	Fringes
FLOOR LAYER: Hardwood Floors Only.....	\$ 36.07	26.15

CARP0326-026 05/02/2022

	Rates	Fringes
METAL BUILDING ERECTOR (Metal Siding / Wall Panels).....	\$ 36.07	26.15

CARP0326-027 05/02/2022

	Rates	Fringes
CARPENTER (Scaffold Builder).....	\$ 36.07	26.15

CARP0326-036 05/02/2022

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 36.07	26.15

CARP1121-006 01/03/2022

	Rates	Fringes
MILLWRIGHT.....	\$ 36.32	26.81

ELEC0090-012 06/01/2022

	Rates	Fringes
ELECTRICIAN.....	\$ 40.60	3%+32.21

ELEC0090-013 06/01/2022

	Rates	Fringes
ELECTRICIAN (Alarm Installation Only).....	\$ 40.60	3%+32.21

ELEC0090-014 06/01/2022

	Rates	Fringes
ELECTRICIAN (Communication Technician).....	\$ 40.60	3%+32.21

ELEC0090-015 06/01/2022

	Rates	Fringes
ELECTRICIAN (Low Voltage Wiring Only).....	\$ 40.60	3%+32.21

ELEC0488-003 06/01/2022

	Rates	Fringes
ELECTRICIAN (HVAC/Temperature Controls Installation).....	\$ 41.40	3%+31.07

ELEV0091-002 01/01/2022

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 58.90	36.885+a+b

FOOTNOTE:

a. Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.

b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0478-004 04/03/2022

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Backhoe/Excavator/Trackhoe).....	\$ 44.86	26.80

PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the

holiday.

ENGI0478-005 04/03/2022

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Bulldozer) Finegrade (Slopes, Shaping, laser or GPS, etc.).....	\$ 44.86	26.80
Rough Grade Dozer.....	\$ 43.38	26.80

PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

ENGI0478-012 04/03/2022

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Crane under 100 ton rated capacity).....	\$ 49.06	26.80

PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

ENGI0478-016 04/03/2022

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Loader - 7 cubic yards or over).....	\$ 46.07	26.80

PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

IRON0424-001 06/06/2022

	Rates	Fringes
IRONWORKER (Reinforcing, Structural, Ornamental).....	\$ 39.70	38.77

LAB00455-001 04/03/2022

Rates	Fringes
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LABORER (Mason Tender- Cement/Concrete).....	\$ 32.50	24.40

PAIN0011-014 06/01/2022		
	Rates	Fringes
GLAZIER.....	\$ 40.78	23.40

PAIN0011-021 06/01/2022		
	Rates	Fringes
PAINTER (Brush and Roller).....	\$ 37.22	23.55

PAIN0011-023 06/01/2022		
	Rates	Fringes
DRYWALL FINISHER/TAPER.....	\$ 37.97	23.55

PLUM0777-001 06/01/2021		
	Rates	Fringes
PLUMBER.....	\$ 45.83	33.50

PLUM0777-008 06/01/2021		
	Rates	Fringes
PIPEFITTER (Includes HVAC Pipe Installation).....	\$ 45.83	33.50

ROOF0009-001 06/01/2021		
	Rates	Fringes
ROOFER		
Composition.....	\$ 38.90	21.85
Slate and Tile.....	\$ 39.40	21.85

SHEE0040-001 07/01/2021		
	Rates	Fringes
SHEET METAL WORKER (Including HVAC Unit Installation).....	\$ 40.08	40.53

SHEE0040-002 07/01/2021		
	Rates	Fringes
SHEET METAL WORKER (Metal Flashing and HVAC Duct Installation Only).....	\$ 40.08	40.53

SHEE0040-008 07/01/2021		
	Rates	Fringes
SHEET METAL WORKER (Metal Roofs Installation).....	\$ 40.08	40.53

TEAM0677-001 04/03/2022		

	Rates	Fringes
TRUCK DRIVER (Dump Truck).....	\$ 31.39	28.78

SUCT2016-005 09/19/2018		

	Rates	Fringes
LABORER: Common or General.....	\$ 27.85	18.04

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

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A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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END OF GENERAL DECISIO"



Weston & SampsonSM

westonandsampson.com

WESTON & SAMPSON ENGINEERS, INC.
712 Brook Street, Suite 103
Rocky Hill, CT 06067
tel: 860.513.1473

CONTRACT
DOCUMENTS

January 6, 2023

TOWN OF
Cheshire
CONNECTICUT

Bartlem Park South – Phase I
Bid Documents

LA STAMP HERE
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Signature with date here (delete this text first)

SECTION 01 11 00

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

- A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.
- B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.
- C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

3.02 EASEMENTS:

- B. Contractor shall schedule work so that it will cause minimum inconvenience and nuisance to abutting property owners, over the shortest possible time.
- C. Easements shall be kept clean; no rubbish or discarded construction materials shall be allowed to accumulate. Storage of excess construction materials, including soil, ledge, equipment, or machinery on easements will not be allowed.
- D. Restoration of fences, shrubs, trees and grass shall be completed promptly following completion of the work in an easement, to minimize disruption and inconvenience to property owners.

3.03 OPEN EXCAVATIONS:

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at its own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.
- C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.
- D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.
- E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

3.04 MAINTENANCE OF TRAFFIC:

- A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.
- B. Should the Chief of Police deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required. **Owner will pay for uniformed officers.**
- C. The Contractor shall at its own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. It shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner.
- D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning signs. Size and exact wording of signs shall be determined by the Engineer during construction.
- E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.

- F. Nothing contained herein shall be construed as relieving the Contractor of any of its responsibilities for protection of persons and property under the terms of the Contract.

3.05 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at its expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

3.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

- A. All existing buildings, utilities, pipes, poles, wires, fences, curbing, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.
- B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, gas lines, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.
- D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.
- E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.
- F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.07 MAINTENANCE OF FLOW:

- A. The Contractor shall at its own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

- B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, it shall repair the same within the same day.
- C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by its operations as described in Section 01 74 13, CLEANING UP.

3.08 REJECTED MATERIALS AND DEFECTIVE WORK:

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.
- B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.
- C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or its employees, as determined by the Engineer, occurring previous to the final payment.

3.09 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

3.10 SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Connecticut Department of Labor Division of Occupational Safety and Health (CONN-OSHA). Contractors shall be familiar with the requirements of these regulations.

3.11 SITE INVESTIGATION:

The Contractor acknowledges that it has satisfied itself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality

and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint itself with available information will not relieve it from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

3.12 HANGERS, PADS, AND SUPPORTS:

- A. Unless otherwise indicated, hangers and supports shall be by the trade providing the supported item.
- B. Except where detailed or specified, design of hangers and supports shall be the responsibility of the Contractor. All parts of such hangers or supports shall be designed in accordance with accepted engineering practice, using a factor of safety of at least 2½.
- C. When proprietary hangers, etc., are supplied, satisfactory evidence of the strength of such items shall be furnished.
- D. Hangers for items hung from steel and concrete shall be centered on the vertical center of gravity of the beam.
- E. Locations and sizes of openings, sleeves, concrete pads, steel frames, and other equipment supports are indicated on the drawings for bidding purposes only. Final sizes and locations of such items shall be obtained from the shop drawings.

3.13 SLEEVES, HOLES, HANGERS, INSERTS, ETC.:

- A. Except where holes and openings are dimensioned, and hangers, inserts, and supports are fully called for on the architectural and structural drawings (or reference is made thereon to drawings containing such information) to accommodate mechanical or electrical items, they shall be by the mechanical or electrical trade concerned.
- B. Sleeves, inserts, anchors, etc., supplied under the mechanical and electrical contracts in sufficient time to so permit, shall be set in concrete, masonry, etc., or fastened to steel deck, etc., by the respective architectural or structural trade. Where not supplied in sufficient time, installation of such items shall be the responsibility of the mechanical or electrical trade involved.
- C. Nothing shall be suspended from the steel roof deck and no fastenings made to it, except with the prior permission of the Engineer. Request for permission shall be accompanied by full details of the hanger or fastener, including the weight of the item to be suspended.

- D. Nailers and other wood members attached to steel or masonry, for which fasteners are not indicated on the design drawings or in the specification, shall be fastened with the equivalent of ½-inch diameter bolts at 3 feet o.c.
- E. Openings for mechanical and electrical items in finished areas of the building shall be closed off with near escutcheon plates or similar closures. These closures shall be by the mechanical or electrical trade involved.

3.14 ROOF PROTECTION:

Where work must be performed over completed roofing, the roofing shall be protected by 2 layers of ½-inch thick plywood, laid with joints in the second layer offset 1/2 sheet width and length from joints in the first layer. No material shall be stored or work performed on areas of roof which are not so protected.

3.15 WEATHER PROTECTION:

The Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March.

3.16 ELECTRIC SERVICE:

- A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.
- B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

3.17 HAZARDOUS WASTE:

Should the Contractor, while performing work under this contract, uncover hazardous materials, as defined in Connecticut Remediation Standard Regulations, it shall immediately notify the Engineer. The Contractor is not, and has no authority to act as, a handler, generator, operator or disposer of hazardous or toxic substances found or identified at the site, and the Owner shall undertake all such functions.

END OF SECTION

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SECTION 01 12 16

SCOPE AND SEQUENCE OF WORK

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. Park improvements including but not limited to synthetic turf field, field lighting, fencing, concrete pavement and walls, bituminous pavement, lighting, stormwater and utility improvements, restroom building, bandshell, guiderails and other site improvements.

1.02 RELATED WORK:

A. SECTION 01 11 00 – CONTROL OF WORK AND MATERIALS

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 GENERAL:

- A. The Contractor shall be responsible for scheduling its activities and the activities of any subcontractors involved, to meet the completion date, or milestones, established for the contract. Scheduling of the work shall be coordinated with the Owner and Engineer.
- B. The Construction Sequence Requirements shall be used by the Contractor to form a complete schedule for the project, which shall be coordinated with the Owner and Engineer. Prior to performing any work at the site, the Contractor shall submit a detailed plan to the Engineer for review. The plan shall describe the proposed sequence, methods, and timing of the work.

END OF SECTION

\\Wse03.local\WSE\Projects\CT\Cheshire CT\Bartlem Park Design Documents\Specifications\01 12 16 Scope and Sequence of Work.docx

SECTION 01 14 00

SPECIAL PROVISIONS

PART 1 - GENERAL

Not used

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 WATER FOR CONSTRUCTION PURPOSES:

- A. The Contractor is allowed to use water from the existing hydrants identified by town without charge for construction purposes. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

3.02 PIPE LOCATION:

Pipe shall be located substantially as indicated on drawings. The Owner reserves the right, acting through the Engineer, to make such modifications as may be deemed desirable to avoid interference with existing structures or for other reasons.

3.03 DIMENSIONS OF EXISTING STRUCTURES:

Where the dimensions and locations of existing structures are of critical importance in the installation or connections of new work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness of such information.

3.04 OCCUPYING PRIVATE PROPERTY:

The Contractor shall not enter upon nor occupy with men, equipment or materials any property outside of the public highways or Owner's easements, except with the written consent of the property owner or property owner's agent.

3.05 EXISTING UTILITY LOCATIONS – CONTRACTOR'S RESPONSIBILITY:

- A. The location of existing underground services and utilities shown on the drawings is based on available records. It is not warranted that all existing utilities and services are shown, or that shown locations are correct. The Contractor shall be responsible for having the utility companies locate their respective utilities on the ground prior to excavating.

- B. To satisfy the requirements of Connecticut law, the Contractor shall, at least 72 hours, exclusive of Saturdays, Sundays and holidays, prior to excavation in the proximity of telephone, gas, cable television and electric utilities, notify the utilities concerned by calling “CALL BEFORE YOU DIG” at telephone number: 1-800-922-4455.
- C. The Contractor shall coordinate all work involving utilities and shall satisfy itself as to the existing conditions of the areas in which it is to perform its work. It shall conduct and arrange its work so as not to impede or interfere with the work of other contractors working in the same or adjacent areas.

3.06 COORDINATION OF WORK:

The General Contractor shall be responsible for coordinating its own work as well as that of any subcontractors. He shall be responsible for notification of the Engineer when each phase of work is expected to begin and the approximate completion date.

3.07 TIME FOR COMPLETION OF CONTRACT:

The time for completion of this contract is stipulated in the Form of/for General Bid. The Bidder shall base its bid on completing the proposed work by the completion date stipulated in the contract.

3.08 MAINTENANCE OF TRENCH SURFACE:

After backfilling and compacting the trench, the Contractor shall be responsible for keeping the ground surface dry and passable at all times until the surface has been restored to original conditions.

3.09 DESIGN OF EQUIPMENT:

Attention is directed to the fact that the layout of certain equipment is based on that of one manufacturer. If other equipment is submitted for approval, the Contractor shall prepare and submit for approval at its expense, detailed structural, mechanical and electrical drawings, equipment lists, maintenance requirements, and any other data required by the Engineer, showing all necessary changes and embodying all special features of the equipment he proposes to furnish. Such changes, if approved, shall be made at the expense of the Contractor.

3.10 SERVICES OF MANUFACTURER’S REPRESENTATIVE:

- A. The Contractor shall arrange for a qualified service representative, at a time suitable to the Engineer, from the company manufacturing or supplying certain equipment as indicated on the detailed specifications, to perform the duties described herein.
- B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before others operate it the representative shall

inspect, operate, test, and adjust the equipment. The inspection shall include, but shall not be limited to, the following points as applicable:

1. Soundness (without cracks or otherwise damaged parts); completeness in all details, as specified; correctness in setting, alignment, and relative arrangement of various parts; adequacy and correctness of packing, sealing and lubricants.
2. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified. Where called for in the specifications, vibration readings shall be made and the equipment balanced accordingly.
3. On completion of its work, the Contractor shall submit in triplicate to the Engineer the manufacturer's or supplier representative's complete signed report of the results of its inspection, operation, adjustments, and test. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report shall also include a certificate that the equipment conforms to the requirements of the contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
4. After the Engineer has reviewed the reports from the manufacturer's representative, the Contractor shall make arrangements to have the manufacturer's representative present when the field acceptance tests are made.

3.12 PROJECT SIGN:

- A. The sign shall be erected within ten (10) days after the construction contract is awarded. The sign shall be fabricated, erected, and maintained by the Contractor.
- B. The Contractor shall provide adequate support for the sign as determined by the Engineer. All supports, trim, and back of sign shall be painted with at least two coats of exterior paint.
- C. The project sign shall be maintained by the Contractor in good condition at all times for the duration of construction. The Contractor shall remove the sign upon completion of construction.

3.13 COMPLIANCE WITH PERMITS:

- A. The Contractor shall perform all work in conformance with requirements of the Permits, which appear in Section 00 31 43 – PERMITS.

3.14 CUTTING, FITTING AND PATCHING:

- A. The Contractor shall do all cutting, fitting, or patching of its work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors, as shown upon or reasonably implied by the drawings and the specifications for the completed structure, including all existing work.
- B. The Contractor shall not endanger any work by cutting, digging, or otherwise and shall not cut or alter the work of any other Contractor, save with the consent of the Engineer.
- C. All holes or openings required to be made in new or existing work, particularly at pipe, conduit, or other penetrations not covered by escutcheons or plates shall be neatly patched. All such holes shall be made completely watertight as approved by the Engineer.
- D. Size and locations of holes required in steel, concrete, or other structural or finish materials for piping, wiring, ducts, etc., which have not been located and detailed on the drawings shall be approved by the Engineer prior to layout and cutting thereof. All holes shall be suitably reinforced as required by the Engineer.
- E. Workmanship and materials of patching and repair work shall match the adjacent similar work and shall conform to the applicable sections of the specification. Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

3.15 CONNECTIONS TO EXISTING WATER SYSTEMS:

- A. The Owner will, upon 72-hour notice from the Contractor, assist the Contractor by locating and opening or closing any and all valves required for draining or admitting water to the various sections of the water main as required to perform the proposed work. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed.
- B. Connections to the existing distribution system shall be made with the mains under pressure unless the lines can be temporarily taken out of service as approved by the Owner.
- C. The Contractor will be required to make test excavations to ascertain that the proposed position of the connections will be clear of joints, fittings, or other obstructions.
- D. If any failure occurs in connection to existing mains, service shall be restored in the shortest possible time, the Contractor working around the clock, if necessary. He shall cooperate with the Owner in notifying the consumers or supplying emergency water. If required by Owner, the Contractor shall make connections to water mains during night hours, on Sunday or at other times of off-peak demand for water.

3.16 PROTECTION OF AQUIFER:

The Contractor's attention is directed to the fact that the construction area is located within the watershed of the existing water supply. The Contractor shall take extra precautions to ensure that no pollutants enter the groundwater table from the construction area. The Contractor shall not store fuels or other hazardous materials or potential contaminants on the construction site. In the event of a spill, the Contractor shall immediately notify the Engineer.

3.17 CONTRACTOR'S REPRESENTATIVE:

The Contractor shall designate a representative who will be available to respond to emergency calls by the Owner at any time day and night and on weekends and holidays should such a situation arise.

3.18 VISUAL RECORDING:

Before beginning construction, the Contractor shall make a color DVD recording along the entire work length. One complete recording, for the entire project length, shall be furnished to the Engineer prior to the start of the work. The visual recording shall be identified by street name, as applicable, and station.

3.19 OPERATOR TRAINING:

A trained representative of the manufacturer of all equipment shall instruct the plant operating personnel on the operation and maintenance of the equipment. The Owner reserves the right to videotape all training sessions.

3.20 HOURS OF CONSTRUCTION ACTIVITY:

- A. The Contractor shall conduct all construction activity between 7:00 a.m. and 5:00 p.m., Monday through Friday. No construction work shall be allowed on Saturdays, Sundays or Holidays without written authorization from the Owner.
- B. The Owner will provide personnel for assistance in locating and operating valves at no cost to the Contractor during the Owner's normal working hours (Monday through Friday 7:00 a.m. to 3:00 p.m.). When this assistance is required by the Contractor outside of the Owner's normal working hours the cost will be incurred by the Contractor at the prevailing overtime rate of pay for the personnel providing the assistance. The Owner will bill the Contractor directly.

3.21 CONSTRUCTION CREWS:

The Contractor shall not increase the number of construction crews assigned to the work without providing one-week advance notice to the Engineer.

3.23 EXTENSION OF UTILITIES TO SITE:

The Owner will directly pay the cost of extending electric to the site. Contractor shall be fully responsible for coordinating the work with the individual utilities.

3.25 WINTER WORK:

Work will not be allowed within the public ways on this project during the winter months.

END OF SECTION

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SECTION 01 14 19.16

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via water, complete. The contractor shall provide all equipment, labor, materials and related work necessary for the prevention and control of dust resulting from operations in the performance of the work.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

A. (Not Applicable)

2.02 WATER:

A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali, vegetable matter or pollutants.

PART 3 - EXECUTION

3.01 APPLICATION:

A. (Not Applicable)

B. (Not Applicable)

C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

E. The contractor shall exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining the project site shall be kept broomed off and washed clean of excess material wherever and whenever directed. Water shall be applied to surface of all disturbed areas at such rates and at such times as may be directed by the Engineer to allay dust conditions.

F. Should the contractor or his employees neglect to provide proper dust control, as required in these specifications, the owner immediately, and without notice may furnish such dust control measures as are deemed necessary. The cost thereof shall be borne

by the contractor and may be deducted from any amount due or to become due to the contract under this contract.

END OF SECTION

SECTION 01 31 19.23

CONSTRUCTION MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section specifies requirements for project meetings including but not limited to Pre-Construction Conference and Progress Meetings.
- B. It shall be the responsibility of the Contractor to coordinate work between all subcontractors, sections, and trades required for the proper completion of the Work.

1.02 PRE-CONSTRUCTION CONFERENCE:

- A. After the bids have been opened but prior to the start of the construction there will be a pre-construction conference to discuss the phasing and scheduling of the Project. The specific time and place of the conference shall be arranged by the Engineer after the Contract has been awarded.
- B. This pre-construction conference is intended to establish lines of communication between the parties involved, review responsibilities and personnel assignments, establish project schedules, discuss proposed performance methods, and coordinate Work to be performed by subcontractors.
- C. Authorized representatives of the Owner, Engineer and their consultants, the Contractor, its Superintendent and Site Foreman, and all others invited by the Contractor, shall attend the pre-construction conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- D. Discuss items of significance at the pre-construction conference that could affect progress including at least the following:
 - 1. Tentative construction schedule
 - 2. Critical Work sequencing
 - 3. Designation of responsible personnel
 - 4. Procedures for processing field decisions and Change Orders
 - 5. Procedures for processing Applications for Payment
 - 6. Review of Davis Bacon and other federal requirements
 - 7. Distribution of Contract Documents

8. Submittal of Shop Drawings, Product Data and Samples
9. Preparation of record documents
10. Use of the premises
11. Office, work and storage, and laydown areas
12. Equipment deliveries
13. Construction safety procedures
14. Environmental health and safety procedures
15. First aid
16. Security
17. Housekeeping
18. Working hours
19. Traffic Control
20. Emergency Vehicle Access to and around work site
21. Environmental protection measures for construction site

1.03 PROGRESS MEETINGS:

- A. During the course of the Project, the Contractor shall attend weekly progress meetings as scheduled by the Owner. The Owner, based on work progress and activities, may adjust the progress meetings to biweekly or other. The attendance of subcontractors may be required during the progress of the Work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:
1. Progress of Work/Critical Work Sequencing in relation to Contract Schedule.
 2. Proposed Work activities for forthcoming period.
 3. Resources committed to Contract.
 4. Coordination of Work with others.
 5. Status of procurement of equipment and materials.
 6. Status of Submittals.
 7. Outstanding actions, decisions, or approvals that affect Work activities.
 8. Site access and/or security issues
 9. Hazards and risks
 10. Housekeeping
 11. Quality issues
 12. Potential Claims
 13. Change Orders
 14. Costs, budget, and payment requests
- B. The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and the revised schedule shall be submitted to the Engineer and Owner.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 01 32 16

CONSTRUCTION SCHEDULING

PART 1- GENERAL

1.01 PROGRAM DESCRIPTION:

- A. A Critical Path Method (CPM) construction schedule shall be used to control the work of this Contract and to provide a definitive basis for determining job progress. The Contractor shall prepare the construction schedule. All work shall be done in accordance with the established CPM schedule and the Contractor and his subcontractors shall be responsible for cooperating fully with the Engineer and the Owner in effectively utilizing the CPM schedule.
- B. The CPM schedule to be prepared and submitted by the Contractor shall consist of a CPM network (diagram of activities) and a computer-generated schedule (print-out) as specified herein. The format shall be the activity-on-node precedence network.
- C. The Contractor shall develop his own outline of the work and prepare his proposed CPM schedule. The computer-based schedule shall be the product of a recognized commercial computer software producer and shall meet all of the requirements defined herein.

1.02 QUALIFICATIONS:

- A. The Contractor shall have the capability of preparing and utilizing the specified CPM scheduling technique. A statement of CPM capability shall be submitted by the Contractor in writing to the Engineer within 10 days after the issuance of the Notice to Proceed to verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or his consultant has successfully applied the CPM scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of a computer-based CPM schedule. The submittal shall include the name of the individual on the Contractor's staff who will be responsible for the CPM schedule and for providing the required updating information.

1.03 SUBMITTALS:

- A. Submit under provisions of Section 013323.
- B. Within 10 days following the issuance of the Notice to Proceed, the Contractor shall submit the CPM Schedule to the Engineer for review and acceptance. The Contractor shall submit to the Engineer a preliminary network defining the planned operations during the first 60 calendar days after the issuance of the Notice to Proceed. The Contractor's general approach for the balance of the project shall be indicated. Cost of activities expected to be completed or partially completed before submission and approval of the complete network shall be included.

1.04 APPROVED CPM SCHEDULE:

- A. Following review by the Engineer, the Contractor shall incorporate the Engineer's comments into the network and submit the revised network and computer-generated schedule. This final submittal shall be delivered to the Engineer within 60 days after the issuance of the Notice to Proceed.
- B. CPM schedules, which contain activities showing negative, float or which extend beyond the contract completion date in the computer-generated schedule will not be approved.
- C. The approved network shall then be the approved CPM schedule to be used by the Contractor for planning, organizing and directing the work, and reporting progress.
- D. Approval of the CPM activity network by the Engineer is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the CPM schedule.
- E. The CPM activity network shall be submitted on sheets 24-in by 36-in and may be divided into as many separate sheets as required. An electronic file in PDF format shall be submitted concurrent with the hard copy schedule.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 NETWORK REQUIREMENTS:

- A. The network shall show the order and inter-dependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
- B. Detailed network activities shall include construction activities, the submittal and approval of shop drawings, the procurement of materials and equipment, fabrication of materials and equipment and their delivery, installation and testing, start-up and training. The Contractor shall break the work into activities with durations no longer than twenty working days each, except as to non-construction activities (such as procurement of materials and delivery of equipment) and any other activities for which

the Engineer may approve the showing of longer duration. To the extent feasible, activities related to a specific physical area of the work should be grouped on the network for ease of understanding and simplification.

- C. Separate activities shall be provided for each significant identifiable function in each trade area in each facility. Activities shall be so identified that there will be no reasonable doubt as to how much work remains on each. Specific activities which shall be included are: all subcontract work, all interface work between subcontractors and between the Contractor and subcontractors, leakage tests of pipelines, electrical connections to each item of equipment, supplier and manufacturer technical assistance, mechanical connections to each item of equipment, all tests, concrete finishing, each item of site work, (including restraints on other activities) and all utilities, fuels and chemicals.
- D. Each activity on the network shall have the following indicated on the NODE representing it.
 - 1. A single duration (i.e., the single best estimate of elapsed time considering the scope of the work involved in the activity and the resources planned for accomplishing the activity) expressed in working days.
 - 2. A five character (or less) code indicative of the party responsible for accomplishing the activity.
 - 3. A cost estimate for each activity which, when accumulated with the cost of all activities, equals the total contract cost. Estimated overhead and profit shall be prorated throughout all activities. Materials costs shall be assigned to delivery activities.
 - 4. A brief description of the activity.
- E. The selection and number of activities shall be subject to the Engineer's approval. The detailed network need not be time scaled but shall be drafted to show a continuous flow from left to right with no flow from right to left. In addition to the brief description, the Contractor shall submit a separate list of all activities containing a detailed narrative of the scope of each activity, including the trades, subcontractors involved, and number of man-hours estimated.
- F. To the extent that the network or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Engineer. Failure to include on a network any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the review of the network by the Engineer.
- G. Except where earlier completions are specified, CPM schedules, which show completion of all work prior to the contract completion date, may be approved by the Engineer but in no event shall they be acceptable as a basis for claim for delay against the Owner by the Contractor.

3.02 COMPUTER-GENERATED SCHEDULE REQUIREMENTS:

A. Each computer-generated schedule submittal from the CPM activity network shall include the following tabulations: a list of activities in numerical order, a list of activity precedence's, a schedule sequenced by Early Start Date and a schedule sequenced by Total Float. Each schedule shall include the following minimum items:

1. Activity numbers
2. Estimated duration
3. Activity description
4. Early start date (calendar dated)
5. Early finish date (calendar dated)
6. Latest allowable start date (calendar dated)
7. Latest allowable finish date (calendar dated)
8. Status (whether critical)
9. Estimated cost of the activity
10. Total float and free float

B. In addition, each schedule shall be prefaced with the following summary data:

1. Contract name and number
2. Contractor's Name
3. Contract duration
4. Contract schedule
5. The effective or starting date of the schedule.

C. The workday to calendar date correlation shall be based on an 8-hour day and 40-hour week with adequate allowance for holidays, adverse weather and all other special requirements of the work.

3.03 PROGRESS REPORTING:

A. Progress under the approved CPM schedule shall be evaluated monthly by the Contractor. Not less than seven days prior to each monthly progress meeting, The Contractor shall evaluate the status of each activity on which work has started or is due to start, based on the preceding CPM schedule; to show actual progress, to identify

those activities started and those completed during the previous period, to show the estimated time required to complete or the percent complete of each activity started but not yet completed and to reflect any changes indicated for the network. Activities shall not be considered complete until they are, in fact, 100 percent complete.

- B. At each progress meeting the Contractor shall submit a narrative report based on the CPM schedule evaluation described above, in a format agreed upon by the Contractor and the Engineer. The report shall include a description of the progress during the previous period in terms of completed activities, an explanation of each activity which is showing a delay, a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed. This report, as well as the CPM Status Report, will be discussed at each progress meeting.

3.04 RESPONSIBILITY FOR SCHEDULE COMPLIANCE:

- A. Whenever it becomes apparent from the current CPM schedule and narrative report that delays to the critical path have resulted and the contract completion date will not be met, the Contractor shall take some or all of the following actions at no additional cost to the Owner. He shall submit to the Engineer for approval, a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the approved schedule.

3.05 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME:

- A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM network. The Contractor shall adjust the CPM schedule only after prior approval of his proposed changes by the Engineer.
- B. If the completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.
- C. Shop drawings which are not approved on the first submittal or within the schedule time and equipment which do not pass the specified tests shall be immediately rescheduled.
- D. The contract time will be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any contract completion date, he shall furnish such justification and supporting evidence as the Engineer may deem necessary to determine whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Engineer will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof. If the Engineer finds that the Contractor is entitled to any extension of any contract completion date, the Engineer's determination as to the total number of day's

extension shall be based upon the currently approved CPM schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule. Actual delays in activities, which, according to the CPM schedule, do not affect any contract completion date shown by the critical path in the network, will not be the basis for a change therein.

- E. Each request for change in any contract completion date shall be submitted by the Contractor to the Engineer within 30 days after the beginning of the delay for which a time extension is requested but before the date of final payment under this Contract. No time extension will be granted for requests, which are not submitted within the foregoing time limit.

3.06 COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES:

- A. Where work is to be performed under this Contract concurrently with or contingent upon work performed on the same facilities or area under other contracts, the Contractor's CPM Schedule shall be coordinated with the schedules of the other contracts. The Contractor shall obtain the schedules of the other appropriate contracts from the Owner for the preparation and updating of his CPM schedule and shall make the required changes in his schedule when indicated by changes in corresponding schedules.
- B. In case of interference between the operations of different contractors, the Owner will determine the work priority of each Contractor and the sequence of work necessary to expedite the completion of the entire project. In all such cases, the decision of the Owner shall be accepted as final. The temporary delay of the Contractor's work due to such circumstances shall not be considered as justification for claims for additional compensation.

END OF SECTION

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SECTION 01 32 33

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers construction progress photographs to be furnished by the Contractor on the project.
- B. Construction photographs shall be provided by a commercial photographer acceptable to the Engineer.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHS AND PRINTS:

- A. Digital photographs shall be in .gif, .jpeg, .bmp or .tif format.
- B. Prints shall be 8 x 10 full color on single weight, white base, and glossy paper, mounted with binder tabs.
- C. Photographs shall be taken using a digital camera before groundbreaking, monthly throughout the Work, and on final acceptance of the project.
- D. Twenty-four views shall be taken once per month. The Engineer shall approve the selection of views. The Engineer will select eight views to be made into prints, from each disc produced at the frequency specified above.
- E. Three prints of each of the eight views shall be furnished at the frequency specified above.

PART 3 - EXECUTION

3.01 USB Flash Drive:

- A. The twenty-four views shall be delivered to the Engineer on a USB Flash Drive within six days of exposure.
- B. Drives turned over to the Engineer shall be retained by the Engineer for future reference during the project.

3.02 PRINTS:

- A. Each print shall be identified on the back with name of project, phase, orientation of view, date and time of exposure, name and address of photographer, and photographer's numbered identification of exposure.
- B. Prints shall be delivered within 15 days after the Engineer selects the views to print.

END OF SECTION

\\wse03.local\WSE\Projects\CT\Cheshire CT\Bartlem Park Design Documents\Specifications\01 32 33 Construction Photographs.docx

SECTION 01 33 23

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

- A. Divisions 1 – 48 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

- A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.
- B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (tunsky.jonathan@wseinc.com) or on USB Flash Drive (mail to Weston & Sampson Engineers, attention: Jon Tunsky), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.
- C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 HARD COPY SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to Weston & Sampson Engineers, attention: Jon Tunsky), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

3.04 SHOP AND WORKING DRAWINGS:

- A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.
- B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from its subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.
- C. Only drawings that have been prepared, checked, and corrected by the fabricator should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required in this section of the specifications and General Conditions.

- D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.
- E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating its work with that of all other trades; and performing its work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.
- F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.
- G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.
- H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when it needs more than two copies or when so requested.

3.05 SAMPLES:

- A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

- B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.
- C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

3.06 OPERATING AND MAINTENANCE MANUALS AND SPARE PARTS LISTS:

- A. Where reference is made in technical specification sections to operating and maintenance manuals and/or spare parts lists, the Contractor shall submit four copies to the Engineer for review in accordance with the instructions furnished under "Shop and Working Drawings." If the submittal is complete and does not require any changes, an acknowledgement (copy of transmittal) will be returned noting status. If the submittal is incomplete or does require changes, corrections, additions, etc., two copies of the submittal will be returned with a copy of transmittal noting status. Four copies of the final operating and maintenance manuals and/or spare parts list shall be delivered to the Engineer prior to or with the equipment when it is delivered to the job site. For systems requiring field adjustment and balancing, such as heating and ventilating, the Contractor shall submit separate test results and adjustment data on completion of the work, to be incorporated into the system manual.
- B. The information included in the manual shall be as described in the specification sections, but as a minimum shall contain clear and concise instructions for operating, adjusting, lubricating and maintaining the equipment, an exploded assembly drawing identifying each part by number and a listing of all parts of the equipment, with part numbers and descriptions required for ordering spare parts. Spare parts lists shall include recommended quantity and price.
- C. Operating and maintenance manuals shall be in durable loose-leaf binders, on 8½-inch by 11-inch paper, with diagrams and illustrations either on 8½-inch by 11 inch or multiple foldouts. The instructions shall be annotated to indicate only the specific equipment furnished. Reference to other sizes or models of similar requirement shall be deleted or neatly lined out.

END OF SECTION

EXHIBIT 1 TO SECTION 01 33 23 SUBMITTALS

SHOP DRAWING TRANSMITTAL FORM

Shop Drawing Transmittal				Weston & Sampson Engineers, Inc.					
Instruction for Preparing Transmittal No action will be taken on any item unless accompanied by this form. TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.). Each resubmittal of same item shall use same number with suffix letter (A, B, etc.). SPEC. SECT. NO: Only one spec. section no. to each transmittal. DESCRIPTION: Complete identification of document or group of documents. SOURCE: Originator of document(s) being submitted.				DRAWING NO: Identification of document(s). CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s). SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here. SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.					
THIS SECTION TO BE COMPLETED BY CONTRACTOR									
TRANSM. NO.		SPEC. SECT. NO.		DATE		CONTRACTORS JOB NO.	W&S JOB NO.		
PROJECT NAME & CONTRACT NO.				LOCATION					
T O	Weston & Sampson Engineers, Inc. 712 Brook Street, Suite 103 Rocky Hill, Connecticut 06067			F R O M					
						BY W&S			
ITEM NO.	DESCRIPTION			SOURCE	DRAWING NO. CATALOG NO. BROCHURE, ETC	NO. OF COPIES	CONTRACT DRAWING REF.	ACTION CODE	REVIEWED BY
1									
2									
3									
4									
THIS CERTIFIES THAT ALL ITEMS SUBMITTED HEREWITH HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.						SIGNATURE & TITLE			
THIS SECTION TO BE COMPLETED BY W&S									
ACTION CODE: 1. FURNISH AS SUBMITTED 2. FURNISH AS NOTED 3. REVISE AND RESUBMIT 4. REJECTED- SEE REMARKS 5. ACKNOWLEDGEMENT 6. SUBMITTAL NOT REQUIRED, RETURNED WITHOUT REVIEW						a. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 OR 2 b. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT c. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS		Weston & Sampson Engineers, Inc. 	

SECTION 01 45 23

STRUCTURAL TESTS AND INSPECTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Obtaining, coordinating, and providing notifications to the Owner and Engineer.
 - 2. Provide safe access to the work of this Contract to accommodate the indicated tests and inspections.
 - 3. Implementing corrective action and providing additional tests and/or inspections for work identified as non-conforming by the Independent Testing Agency.

1.02 GENERAL REQUIREMENTS:

- A. The Connecticut State Building Code, Latest Edition, requires the Structural Engineer of Record (SER) to provide a program of structural tests and inspections for this project.
- B. Attachment A, Program of Structural Tests and Inspections, shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the Work; their other obligations for supervising the Work; for any design work which is included in their scope of services; for full compliance with the requirements of the Contract Documents; the detection of, or failure to detect, deficiencies or defects, whether detected or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.
- C. The Program of Structural Tests and Inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, procedures, and job site safety.

1.03 CONTRACTOR RESPONSIBILITIES:

- A. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the Work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

- B. The Contractor shall give reasonable notice to the Owner and the Engineer of when the various parts of the Work will be ready for testing and/or inspection. The Contractor shall notify the Owner and the Engineer a minimum of 48 hours before such tests and/or inspections are to take place.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

ATTACHMENT A

PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS

The following is a summary of Work subject to Tests and Inspections under the Program.

1. In-situ Bearing Strata for Footings
2. Controlled Structural Fill
3. Cast-In-Place Concrete
4. Masonry
5. Structural Steel

Abbreviation Agent

SER Structural Engineer of Record
ITA Contractor – Independent Testing Agency

In-Situ Bearing Strata for Footings

Item	Agent	Scope
1. Bearing Strata QC Review	ITA	Review Contractor's field quality control procedures.
2. General Excavation	ITA	Inspect strata for conformance to the structural drawings, specifications, and/or geotechnical report.
3. General Excavation	ITA	Ensure that excavation is to proper depth or material.
4. General Excavation	ITA	Ensure that excavation is controlled and contains no unsuitable materials.
5. Bearing surfaces for footings	ITA	Inspect bearing surfaces for conformance to the requirements of the structural drawings, specifications, and/or geotechnical report.

Controlled Structural Fill

Item	Agent	Scope
1. Controlled Structural Fill QC Review	SER	Review Contractor's field quality control procedures
2. Fill Material	ITA	Test material for conformance to specifications or geotechnical report. Perform laboratory compaction tests in accordance with the specifications to determine optimum water content and maximum dry density.
3. Installation of controlled structural fill	ITA	Provide full-time inspection of the installation, in accordance with the specifications.
4. Density of Fill	ITA	Perform field density tests of the in-place fill in accordance with the specifications.

Cast-In-Place Concrete Construction

Item	Agent	Scope
1. Cast-In-Place Concrete Construction QC Review	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Mix Design	SER	Review Mix Designs
3. Materials	SER	Review material certifications for conformance to Specifications
4. Batching Plant	ITA	Review Plant quality control procedures and batching and mixing methods
5. Reinforcement Installation	ITA	Inspect reinforcing for size, quantity, condition and placement
6. Anchor Rods	ITA	Inspect anchor rods prior to and during placement of concrete.
6. Formwork	ITA	Inspect form sizes for proper sizes of concrete members.
7. Concrete Placement and Sampling fresh Concrete	ITA	Observe concrete placement operations. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Perform slump, density and air content tests at point of discharge.
8. Evaluation of Concrete	ITA	Test and evaluate in accordance with the specifications.
9. Curing and Protection	ITA	Observe procedures for conformance to the specifications.

Masonry Construction

Item	Agent	Scope
1. Masonry Construction QC Review	SER	Review Contractor's field quality control procedures
2. Materials	SER	Review material certifications for conformance to specifications.
3. Evaluation of Masonry Strength	SER	Verify strength in accordance with the specifications.
4. Proportioning, Mixing, and Consistency of Mortar and Grout	ITA	Inspect field mixing procedures for conformance to the specifications.
5. Installation of Masonry	ITA	Inspect placement for conformance to the specifications. Verify cleanout hole locations (high lift grouting). Verify the installation of bond beams and special shapes.
6. Reinforcement Installation	ITA	Inspect reinforcing steel for size, quantity, condition and placement for conformance to approved submittals and Contract Documents.
7. Grouting Operations	ITA	Inspect grouting procedures for conformance with the specifications. Inspect cells prior to grouting. Assure observation holes have been installed prior to high lift grouting.
8. Weather Protection	ITA	Inspect protection for cold and hot weather for conformance with the specifications.
9. Anchorage	ITA	Inspect anchorage of masonry to other construction for conformance to the Contract Documents.

Structural Steel

Item	Agent	Scope
1. Fabricator Certification/Quality Control Procedures	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Fabricator Certification/Quality Control Procedures	SER	Review each Fabricator's quality control procedures.
3. Fabricator Inspection	SER	Inspect in-plant fabrication, or review Fabricator's approved Independent Inspection Agency's reports.
4. Materials	SER	Review materials certifications for conformance to the specifications.
5. Anchor Rods	SER	Review Contractor's as-built survey.
6. Anchor Rods	ITA	Verify that all anchor rods have been properly torqued and have adequate fit-up.
7. Bolting	ITA	Test and inspect bolted connections in accordance with specifications. Verify bolt size and grade.
8. Welding	ITA	Check welder qualifications. Visually inspect fillet welds and test full penetration field welds in accordance with specifications
9. Shear Connectors	ITA	Inspect for size and placement. Test for proper weld attachment
10. Structural Framing, Details, and Assembly	ITA	Inspect for size, grade of steel, camber, installation and connection details. Check against Contract Documents and approved shop drawings.
11. Open Web Steel Joists	ITA	Inspect for size, placement, bridging, bearing and connection to structure. Visually inspect all welds of a minimum of 5% of the joists randomly selected.
12. Expansion and Adhesive Anchors	SER	Review installation procedures for both mechanical anchors and adhesive anchors. Verify that materials are suitable for job conditions.

13. Metal Decking	ITA	Verify gage, width, and type. Inspect placement, laps, welds, side laps attachment and screws or other mechanical fasteners. Check welder qualifications.
14. Field Correction of Fabricated Items	ITA	Review documentation of approved repairs and verify completion of repairs.

END OF SECTION

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SECTION 01 55 26.13

SIGNAGE (TRAFFIC CONTROL)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing and installing traffic control signs and other devices.

1.02 SYSTEM DESCRIPTION:

The Contractor shall furnish and install all construction signs deemed necessary by and in accordance with the latest edition of Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) as published by the U.S. Department of Transportation.

PART 2 - PRODUCTS

2.01 TRAFFIC WARNING AND REGULATING DEVICES:

Contractor shall provide warning signs, barricades and other devices in accordance with the specifications provided in the MUTCD. Size of signs, lettering, colors, method of support and other factors prescribed in the MUTCD shall be adhered to.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Contractor shall erect barricades, barrier fences, traffic signs, and other traffic control devices as required by the MUTCD, or as required by the Engineer, to protect the work area from traffic, pedestrians, and animals.
- B. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses.
- C. Unless extended protection is required for specific areas, when the work has been completed, all temporary warning and regulatory devices used by the Contractor shall be removed so that traffic can move unimpeded through the area.

END OF SECTION

SECTION 01 56 26

TEMPORARY CHAIN LINK FENCE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide all labor, materials and appurtenances necessary for the installation, maintenance and dismantling of 6-foot temporary fencing.
- B. The Contractor shall be responsible for securing the site from trespassers. Existing fencing exists on portions of the site as shown on the Contract Drawings; it will be at the discretion of the Contractor to determine whether the existing fence is suitable for site safety and security. The Contractor shall install temporary fencing across lengths of damaged/unsuitable fencing to secure the site and prevent trespassers.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature of the materials specified herein.
- B. Shop drawings of the temporary chain link fence and gates.
 - 1. Shop drawings shall indicate layout of temporary fencing, location and size of gates, existing pavement and roads, and other site-specific conditions. Prepare drawing after site observation and verification of existing conditions.

PART 2 - PRODUCTS

2.01 TEMPORARY CHAIN LINK FENCING

- A. Unless otherwise indicated, type of 6-foot temporary chain link fencing shall be Contractor's option. Following types are acceptable:
 - 1. New materials or previously used salvaged chain link fencing in good condition.
 - 2. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with base plates, or inserting in precast concrete blocks.
 - 3. Fabric: Woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.
- B. Gates: Provide gates of the quantity and size indicated as required for functional access to Site.

1. Fabricate of same material as used for fencing.
2. Vehicle gates:
 - a. Minimum width: 20 feet to allow access for emergency vehicles.
 - b. Capable of manual operation by one person.
 - c. Not less than two (2) gates

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The fence and gates shall be erected by skilled mechanics in accordance with the recommendations of the manufacturer and these specifications. These specifications shall take precedence over the recommendations of the manufacturer if any discrepancy exists between them.
- B. Posts
 1. Maximum post spacing shall be 10-feet. Post spacing shall be uniform and posts shall be plumb.
 2. Drive posts, set in holes and backfill, or anchor in precast concrete blocks.
 3. For soft and unstable ground conditions, cast concrete plug around post.
 4. Posts over pavement: Use steel post plates or precast concrete blocks.
 5. Gate posts: Use bracing or concrete footings to provide rigidity for accommodating size of gate.
 6. Temporary terminal posts shall be securely connected to existing fence posts to prevent site access/trespassing.
- C. Securely attach wire fabric to posts. Maximum area of unbraced fence fabric shall not exceed 1,500 square feet.
- D. Install with required hardware.
- E. Fabric shall be stretched taut, with the bottom edge following the existing grade, and shall be a continuous mesh between terminal posts. Each span of fabric shall be attached independently at terminal posts. Where terminal posts do not have provisions for weaving fabric to posts, stretcher bars shall be placed through the end weave of the fabric and secured to the post with bar bands spaced not more than 15-inches apart on the post. Temporary terminal posts shall be secured to existing fence posts to prevent Site access/trespassing.

- F. Fabric shall be attached with ties to line posts at intervals of not more than 14-inches (and to the top railing and braces at intervals not exceeding 24-inches).
- G. The bottom tension wire shall be interlaced in the weave of the fabric, pulled taut and fastened to terminal posts.

3.02 MAINTENANCE AND REMOVAL

- A. Maintain fencing in good condition. If damaged, immediately repair.
- B. Remove temporary fencing upon completion of Work or when no longer required for security or control. Backfill holes and compact. Holes in pavement shall be surfaced to match existing paving. Repair damage caused by installation of temporary fencing.

END OF SECTION

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SECTION 01 57 19

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.
- C. All work under this Contract shall be in accordance with the requirements of the Inland Wetlands and Water Course Commission and any conditional requirements applied, all of which are attached to Section 00 31 43, PERMITS.
- D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

- A. Section 00 31 43, PERMITS
- B. Section 01 14 19.16, DUST CONTROL
- C. Section 01 33 23, SUBMITTALS
- D. Section 31 00 00, EARTHWORK
- E. Section 31 11 00, CLEARING AND GRUBBING
- F. Section 31 23 19, DEWATERING
- G. Section 31 50 00, SUPPORT OF EXCAVATION

1.03 SUBMITTALS:

- A. The Contractor shall submit details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 SILT FENCE:

- A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a mesh backing, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1-1/2-inches by 1-1/2-inches (Minimum Dimension) by 48-inches and shall be tapered. The bottom edge of the silt fence shall be buried as shown on the drawings.
- B. The silt fence shall be DOT Silt Fence CT36112130, as manufactured by U.S. Silt & Site Supply/Getsco, Concord, NH, or approved equal.
- C. Silt fence properties:

<u>Physical Properties</u>	<u>Test Method</u>	<u>Minimum Value</u>
Grab Strength, lbs.	ASTM-D-4632	124
Grab Elongation, %	ASTM-D-4632	15
Mullen burst, psi	ASTM-D-3786	300
Puncture, lbs.	ASTM-D-4833	65
Trapezoidal Tear, lbs.	ASTM-D-4533	65
UV Resistance ² , % ³	ASTM-D-4355	80@500 hrs.
AOS, US Sieve No.	ASTM-D-4751	30
Flow Rate, gal/min/sq ft	ASTM-D-4491	10
Permittivity, (1/sec) gal/min/sq ft	ASTM-D-4491	0.05 sec ⁻¹

2.02 STRAW BALES:

- A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18-inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

2.03 STRAW WATTLES:

- A. (Not Applicable)

2.04 SILT CURTAIN:

- A. (Not Applicable)

2.05 COMPOST FILTER TUBE:

- B. Material for the filter tubes shall be compost, except that no manure or bio- solids shall be used. In addition, no kiln-dried wood or construction debris shall be allowed. Particle size analysis: 98% shall pass through a 3-inch (75mm) sieve; 30-50% shall pass 3/8 inches (10mm) sieve.
- C. Tubes for compost filters shall be a minimum of 12 inches, a maximum of 18" in diameter. Tube material shall be a knitted mesh with 1/8" - 3/8" (3-10 mm) openings and made of biodegradable (cotton or jute) materials. Photodegradable (HDPE or polypropylene) fabric may be used; however, photodegradable fabric must be removed and disposed of by the contractor, at his expense, at the end of the contract. Additional tubes shall be used at the direction of the Engineer.
- D. As shown in the detail, the 1 foot wide by 2-inch-deep wedge of compost spread along the top of the filter tube shall be incidental to this item.
- E. Stakes for anchors, if required, shall be nominal 2 x 2 stakes.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

The Engineer will notify the Contractor in writing of any non-compliance with the requirements of the Inland Wetlands and Water Course Commission. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

- A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to

comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

- B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 CONSTRUCTION IN AREAS DESIGNATED AS WETLANDS ON THE DRAWINGS:

(Not Applicable)

3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

- A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.
- B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to ensure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

- A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.
- B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled straw around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.
- C. There shall be no storage of equipment or materials in areas designated as wetlands.
- D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.
- E. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

3.07 PROTECTION OF LANDSCAPE:

- A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by

the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.

- B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.
- C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 31 11 00, CLEARING AND GRUBBING.
- D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.08 CLEARING AND GRUBBING:

- A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the Engineer. Removal of mature trees (4 inches or greater DBH) will not be allowed on temporary easements.
- B. The Contractor shall not remove trees in the Owner's temporary easements without permission of the Engineer.

3.09 DISCHARGE OF DEWATERING OPERATIONS:

- A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water

from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.

- C. The pumped water shall be filtered through filter fabric and baled straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.10 DUST CONTROL:

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01 14 19.16, DUST CONTROL.
- B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.11 SEPARATION AND REPLACEMENT OF TOPSOIL:

- A. Topsoil shall be carefully removed from cross-country areas where excavations are to be made, and separately stored to be used again as required. The topsoil shall be stored in an area acceptable to the Engineer and adequate measures shall be employed to prevent erosion of said material.

3.12 BALED STRAW:

- A. To trap sediment and to prevent sediment from clogging drainage systems, baled straw shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically. Straw bales shall not be placed within a waterway during construction of the pipeline crossing.

3.13 ERECTION AND MAINTENANCE OF SILT FENCE:

- A. Where indicated on the drawings or where required by the Engineer, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with a silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

3.14 SURFACE RESTORATION OF CROSS COUNTRY AREAS:

(Not Applicable)

3.15 CATCH BASIN PROTECTION:

- A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation fabric shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation fabric from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The Contractor shall properly dispose of all debris at no additional cost to the Owner.

3.16 STRAW WATTLES:

(Not Applicable)

END OF SECTION

SECTION 01 74 13

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

- A. Section 00 72 00 GENERAL CONDITIONS
- B. Section 01 11 00 CONTROL OF WORK AND MATERIALS
- C. Section 01 14 00 SPECIAL PROVISIONS
- D. Section 01 57 19 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

- A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.
- B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.
- C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

- A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

- A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

- A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

- A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.
- B. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the building to a "like new" condition. This cleanup shall include removing all trash and debris from the premises; sweeping and mopping of all floors; washing of all walls, windows and doors; cleaning and polishing of all finish metal surfaces; cleaning of all equipment, utilizing proper solvents for removal of oil and grease; cleaning of dirt and debris out of all mechanical and electrical cabinets; and all other related work required to render the building suitable for use. Before acceptance, the Engineer shall approve the condition of the building.

END OF SECTION

SECTION 01 78 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers administrative and procedural requirements for closing out the project, including, but not limited to:
 - 1. Project as-built documents
 - 2. Checkout and Certification
 - 3. Startup and Testing
 - 4. Final Cleaning
 - 5. Substantial Completion
 - 6. Closeout Procedures
 - 7. Final Completion
 - 8. Correction/Warranty Period
- B. Closeout checklist to be completed by the Engineer.

1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Section 01 74 13, CLEANING UP
- C. Section 01 75 13, EQUIPMENT CHECKOUT AND TESTING
- D. Division 2 through Division 16.

1.03 AS-BUILT DOCUMENTS:

- A. Contractor shall maintain on site, separate from the documents used for construction, one set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.
 - 1. Contract Drawings.

2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Written interpretations and clarifications.
7. Field Orders.
8. Field test reports properly verified.

- B. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.
- B. The draft and completed set of as-built documents shall be submitted to the Engineer and Owner in conformance with the requirements of Section 01 78 39.

1.04 CHECKOUT AND CERTIFICATIONS:

- A. Prior to checkout and certifications, the following tasks shall be completed:
 1. Construction shall be complete. For this purpose, completion of construction is defined as follows:
 - a. The Contractor has completed construction and erection of the work in conformance with the Contract Drawings and Specifications.
 - b. The Contractor has installed and adjusted operating equipment, systems, or facilities, as applicable, as defined by the manufacturers' erection, installation, operation and maintenance instructions.
 2. All shop drawings shall have final approval.
 3. All shop tests shall be complete and approved test results submitted to the Engineer.

1.05 START-UP AND TESTING:

- A. Prior to start-up the following tasks shall be complete:
 1. All checkout and certifications shall be satisfactorily completed,
 2. All operations and maintenance manuals shall be approved,

3. All preliminary training by the manufacturer's representative shall be completed,
4. An approved start-up procedure shall be in place.

1.06 FINAL CLEANING:

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 1. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to smooth, even textured surfaces.
 2. Remove waste and surplus materials, rubbish, fencing equipment, temporary utilities and construction facilities from the site, unless otherwise required by the Engineer.
 3. Comply with requirements of Section 01 74 13 CLEANING UP.

1.07 SUBSTANTIAL COMPLETION:

- A. Substantial Completion is officially defined in the General and Supplementary Conditions. The date of substantial completion will be certified by the Engineer. This date will not be certified until the following requirements have been satisfied by the Contractor:
 1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance shall meet acceptable standards for the particular unit.
 2. All field tests have been satisfactorily completed and reports forwarded to the Engineer.
 3. All final training has been completed by the manufacturers' representatives.
 4. All spare parts and lubricants have been satisfactorily delivered to the Owner. Spare parts are for the exclusive use of the Owner when the facility has been turned over. Contractor is responsible for all maintenance and repair materials required until the facility is accepted by the Owner.

1.08 CLOSEOUT PROCEDURES:

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's and Owner's inspection.
- B. Accompany Engineer and Owner on inspection to verify conformance with the Contract Documents. Prepare a punch list of work items that have been determined by inspection to not conform to Contract Documents. Punch list items shall include work items that are missing, incomplete, damaged, incorrect items, or improperly installed or constructed. The Contractor shall correct the punch list deficiencies by re-work, modifications, or replacement, as appropriate, until the items conform to the Contract Documents. The initial punch list shall be produced by the Contractor, with copies to the Engineer and Owner. When the Contractor has reduced the number of deficient items to a reasonable level, the Engineer will develop a definitive punch list for the use of the Contractor.
- C. Provide submittals to Engineer that are required by governing or other authorities.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The Contractor shall submit the following documents with or prior to Final Application for Payment: Set of as-built documents, Contract Completion and Acceptance Certificate, Consent of Surety to Final Payment, Release and Waiver of Liens and Claims (SECTION 01 78 00 – ATT. A), Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

1.09 FINAL COMPLETION:

- A. Prior to final completion, the following tasks shall be completed:
 - 1. All items in the punch list shall be completed.
 - 2. All Contract closeout documentation shall be submitted to and accepted by the Engineer.

1.10 CORRECTION/WARRANTY PERIOD:

- A. During the correction period, the Contractor shall correct all deficiencies in equipment and materials.
- B. During the warranty period, the Contractor shall perform all corrective work on warranty deficiencies.
- C. Corrective work will be identified by the Engineer or Owner, as appropriate. The Contractor will be notified of the item(s) requiring corrective work.

- D. The Contractor shall begin work on all corrective work within ten days of being notified of the deficiency by the Engineer and shall then work continuously until the deficiency is corrected. Upon completion of the corrective work, the Contractor shall submit a letter report to the Engineer describing the deficiency and the corrective action that was taken.
- E. The Contractor shall coordinate all corrective work with the Engineer and/or the Owner.

1.11 COMPLETION CHECKLIST:

- A. The Project Completion Checklist shall be completed as the project nears completion. When the project has been fully completed, Final Payment can be approved.

PROJECT COMPLETION CHECKLIST

Owner _____ Job No.

Project _____

As part of the project closeout, all items listed below must be checked off as being complete or otherwise accounted for. The person verifying completion of the item shall list the completion date and his/her initials.

Project Closeout Checklist		
	Date Completion Verified	Verified by
AS-BUILT DOCUMENTS HANDED OVER		
1. Contract Drawings		
2. Specifications		
3. Addenda		
4. Change Orders/Contract Modifications		
5. Reviewed Shop Drawings, Product Data and Samples		
6. Written Interpretations/Clarifications		
7. Field Orders		
8. Field Test Reports		
EQUIPMENT CHECKOUT AND CERTIFICATIONS		
1. Construction Complete per Drawings/Specifications		
2. Equipment Installed and Adjusted		
3. All Shop Drawings have Final Approval		
4. All Shop Tests Complete and Results Submitted		

Project Closeout Checklist		
	Date Completion Verified	Verified By
START-UP AND TESTING		
1. All Checkout and Certifications Complete		
2. All O&M Manuals Approved		
3. All Preliminary Training by Manufacturers Rep. Completed		
FINAL CLEANING		
1. All Construction Facilities Removed		
2. All Construction Debris Removed		
3. All Areas Swept/Cleared		
SUBSTANTIAL COMPLETION		
1. All Items Coordinated Into a Fully Operational System		
2. All Equipment Units Operational at Specified Efficiencies		
3. All Field Tests Completed and Reports Submitted		
4. All Final Training by Manufacturer's Rep. Completed		
5. All Spare Parts and Lubricants Provided		
CLOSEOUT PROCEDURES		
1. Written Certification Submitted that Work is Ready for Owner & Engineer Inspector		
2. Inspection by Owner, Engineer, Contractor completed		
3. Punch List of Nonconforming Items Prepared		
4. Documents Required by Governing or Other Authorities Submitted (List Them)		
5. Final Application for Payment Received		
6. Contract Completion and Acceptance Certificate Submittal		
7. Consent of Surety to Final Payment Submittal		
8. Release and Waiver of Liens and Claims Submitted		
9. Affidavit of Payment of Debts and Claims Submitted		

Project Closeout Checklist

	Date Completion Verified	Verified By
10. Warranties/Guarantees Submitted		
11. Other Required Releases and Waivers Submitted (List Them)		
12. Permits Submitted (List Them)		
13. Weekly Payrolls Submitted as Required by Law		
FINAL COMPLETION		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
CORRECTION/WARRANTY PERIOD		
1. Correction Period Start Date: _____ End Date: _____		
2. Specific Warranties Provided <u>Item</u> <u>Warranty Duration</u>		

Full name of persons signing their initials on this checklist:

END OF SECTION

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SECTION 01 78 39

PROJECT AS-BUILT RECORD DRAWINGS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the Contractors As-Built Record drawings for the project. The As-Built Record drawings for the project shall include, but are not limited to:

A. The Contractors construction coordination drawings for all the project disciplines. The Contractors construction coordination drawings for the project disciplines shall be submitted to the Engineer prior to Construction of the said discipline. The Contractors construction coordination drawings for the project disciplines shall include but are not limited to the following:

1. Architectural
2. Civil
3. Structural
4. Electrical
5. Mechanical
6. Plumbing
7. Process
8. Instrumentation

B. Draft Record Documents Review

Upon completion of the project construction the Contractor shall submit a complete copy of 24- by 36-inch Record Drawings to the Owner and the Engineer for review. The Owner and the Engineer shall jointly review the Record Drawings and provide comments to the Contractor. The Contractor shall modify the Record Drawings as necessary based on the comments provided by the Owner and the Engineer.

C. Final Record Documents

Upon incorporation and acceptance of the Draft Record Drawings comments from the Owner and the Engineer, the Contractor shall submit the Final Record Drawings and documentation. The Contractor shall submit two sets of 24- by 36-inch Record Drawings to the Owner and an additional two sets of 24- by 36-inch Record Drawings to the Engineer for their records. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic Record Drawing files. The electronic Record Drawing files shall be obtained from the Owner (the Engineer shall provide on behalf of the Owner if the Engineer was the project designer) and developed in AutoCAD 2010/Revit 2017 (or later) and

the submittal shall include the Final AutoCAD DWG/Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD/Revit shall be coordinated with the Engineer.

D. Post-Construction Survey

The Contractor shall perform a post-construction survey of the entire project area to horizontal and vertical accuracy levels of A-2 & T-2. The topographic survey shall be performed by or under the supervision of and certified, signed and sealed by a Registered Land Surveyor in the State of Connecticut. Survey to include percentage of driveway slopes, building and impervious coverage calculations, wetlands and watercourse boundaries. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic post-construction survey files. The Contractor shall send the electronic post-construction survey files to the Engineer which shall be developed in AutoCAD 2010/ Revit 2017 (or later) and the submittal shall include the Final AutoCAD DWG / Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD / Revit shall be coordinated with the Engineer. The Contractor shall notify the Owner and Engineer at least 48-hours in advance of each survey.

1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Division 02 through Division 34.

1.03 AS-BUILT DOCUMENTS:

- A. Contractor shall maintain on site, separate from the documents used for construction, one complete set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Written interpretations and clarifications.
 - 7. Field Orders.
 - 8. Field test reports properly verified.
- B. The completed set of documents shall include but are not limited to:
 - 1. Significant deviations of any nature made during construction.

- C. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

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SECTION 01 92 13

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

- A. This section includes procedural requirements for compiling and submitting operation and maintenance data required to complete the project.

1.02 RELATED WORK:

- A. General Requirements in their entirety (Section 00 72 00 through Section 01 78 00)
- B. Individual Technical Specification Sections Specific for Operation and Maintenance Data.
- C. Section 01 33 23, SUBMITTALS

1.03 FORMAT:

- A. Prepare data in form of an instructional manual.
- B. Binders: Commercial quality, 8 ½- x 11-inch three-ring binders with hardback, washable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings. Provide a table of contents in each binder.
- C. Cover: Identify each binder cover and spine with typed or printed title OPERATION AND MAINTENANCE INSTRUCTION; list title of Project facility; identify subject matter of contents.
- D. Arrange contents by systems under section numbers and sequence of Table of Contents.
- E. Provide tabbed flyleaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data - on 20-pound paper.
- G. Drawings: Provide with reinforced punched, binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Submit certification that the data and drawings provided pertain exactly to the model, size, and series product and equipment installed in the work.
- I. All documents will be electronically scannable.

J. All products, systems, and drawings must be cross-referenced with tag ID numbers.

K. The manual for each piece of equipment shall be a separate document with the following specific requirement:

1. Contents:

Table of Contents and Index

Brief description of each system and components

Starting and stopping procedures

Special operating instructions

Routine maintenance procedures

Manufacturer's printed operating and maintenance instructions, parts list, illustrations, and diagrams

One copy of each wiring diagram

One copy of each approved shop drawing and each Contractor's coordination and layout drawing

List of spare parts, manufacturer's price, and recommended quantity

Name, address and telephone number of local service representatives.

2. Material

Loose leaf on 60 pound, punched paper

Holes reinforced with plastic cloth or metal

Page size, 8 ½- x 11-inches

Diagrams, illustrations and attached foldouts as required, of original quality, reproduced by dry copy method

Covers: oil, moisture and wear resistant 9 x 12 size

1.04 QUALITY ASSURANCE:

- A. Prepare instructions and data by personnel experienced in maintenance and operations of described products.

1.05 CONTENTS, EACH VOLUME (BINDER):

- A. Table of Contents: Provide title of Contract, schedule of products and systems, indexed to content of the volume. A listing of all relevant tag ID numbers for each volume shall be placed immediately after the Table of Contents.
- B. For each product or systems: List names, addresses, and telephone numbers of subcontractors and suppliers, including local source of suppliers and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- E. Text: As required to supplement product data, provide logical sequence of instructions for each procedure incorporating manufacturer's instructions.
- F. Warranties, Guarantees, and Bonds: Bind copy of each
- G. See O&M Manual Review Checklist at end of this specification section.

1.06 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Include product data with catalog number, size composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual product specification sections.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS:

- A. Each Item of Equipment and Each System: Include description of unit or system and component parts. Identify function, normal operating characteristics and

limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

- B. Data submitted on all equipment shall include complete maintenance instructions (including preventive and corrective maintenance) and parts lists in sufficient detail to facilitate ordering replacements.
- C. All products, systems, equipment, electrical wiring, instrumentation wiring, personnel protection systems wiring, presented in this manual will have tag numbers corresponding to contract drawings and specifications. In the event, numbers do not exist; the Engineer will specify a series of numbers.
- D. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.
- E. Include color-coded wiring diagrams as installed.
- F. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequence. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter and any special operating instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required. Cross-reference lubricants to products offered by at least three major lubricant suppliers.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color-coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports, calibration data, alignment records, and other information.
- P. Additional Requirements: as specified in individual product specification sections.

- Q. Provide a listing in table of Contents for design data with tabbed flysheet and space for insertion of data.
- R. Incorporation of all Physical Checkout information obtained through the field-testing and correction phases of the Work. Input must be specific to the actions and information obtained during those phases.

1.08 SUBMITTALS:

- A. Submit draft and final copies of operation and maintenance manuals as described in Section 01 33 23 SUBMITTALS.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

Note to Specifier: Review the attached Checklist and add items that are required or delete items not relative to this project.

**OPERATION AND MAINTENANCE MANUAL
REVIEW CHECKLIST**

1. Name, address, telephone/fax number of the manufacturer
2. Name, address, contact name, telephone/fax of local representative
3. Name, address, telephone/fax number of the contractor
4. Exploded view/general arrangement of materials of construction
5. Description of operation/operating principal
6. Project specific Operating parameters
7. Wiring Diagrams (If Applicable)
8. Troubleshooting checklist
9. Recommended spare parts list with prices, and ordering instructions
10. Model number and the serial number of the model provided
11. Performance curves or tabulated data
12. Routine Maintenance instructions/service instructions with recommended Intervals
13. Assembly and disassembly instructions
14. Recommended lubricates and lubrication schedule.
15. Approved copies of Shop Drawings are to be included in the manual
16. Startup/break-in and adjustment instructions
17. Warranty information

Reviewed By: _____
Weston & Sampson Engineers

Date: _____

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END OF SECTION

Division 02-33
Technical Specifications

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 SCOPE OF WORK:

- A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all structures and site features encountered or noted to be removed or abandoned to a minimum of three feet below finished grade, and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and Engineer's requirements. Provide all labor, equipment, materials and transportation necessary to complete the work.
- B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as indicated by the Engineer.
- C. Items plan referenced, or as indicated by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.
- D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items required to be removed by the Engineer, shall be transported to a municipal storage facility, located within the town confines, and unloaded and stacked as required by the Engineer.
- E. Items indicated on the contract drawings or in the specification to be removed and reset shall be carefully removed and reset in the same location as existing according to the specification and details.
- F. The following scope describes the general work/demolition requirements of this Section.
 - 1. Cement concrete, bituminous concrete and gravel pavements.
 - 2. Curbing
 - 3. Concrete footings and foundations complete.
 - 4. Chain link fencing and footings complete.
 - 5. Wood guide rail

6. Other features as indicated on the drawings.

1.02 PROTECTION:

- A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition.
- B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.
- C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

1.03 SPECIAL REQUIREMENTS:

- A. The Contractor shall salvage items labeled to be demolished and transport these items to the Owner's Yard unless the items are called for to be reused or required by the Engineer to be disposed of.
- B. Install erosion controls to protect adjacent areas from eroded materials likely to enter wetlands, resource areas, or drainage ways/systems, downstream of areas disturbed by work activities.
- C. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

1.04 REFERENCES:

- A. State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities and Incidental Construction – latest edition.

PART 2 - PRODUCTS

2.01 BACKFILL:

- A. The Contractor shall provide suitable backfill as specified under Section 31 00 00 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.
- B. Suitable materials shall be used as base course fill and topsoil to the depth as

specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

2.02 TEMPORARY FENCE:

- A. The work shall include temporary installation of chain link fence around the perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.
- B. Temporary fence shall consist of 6-foot-high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the Engineer. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.

2.03 TREE PROTECTION FENCE:

- A. Standard 4-foot-high orange snow fence with 2 inch by 4 inch posts. Attach fence to post with wire. See detail sheet.

PART 3 - EXECUTION

3.01 SALVAGEABLE MATERIAL:

- A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

3.02 ABANDONED STRUCTURES:

- A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.
- B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

3.03 ABANDONED PIPES OR CONDUITS:

- A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.
- B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with Owner requirements.

- C. Electrical conduits encountered and previously abandoned shall be capped or plugged.

END OF SECTION

SECTION 03 11 00
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specifications covers the furnishing and installation of forms for cast-in-place concrete.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- B. Section 03 21 00, CONCRETE REINFORCEMENT
- C. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.03 REFERENCES:

The following standards form a part of this specification:

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301 Standard Specifications for Structural Concrete

ACI 347 Recommended Practices for Concrete Formwork

U.S. ARMY CORPS OF ENGINEERS (CE)

CE 03300 Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Forms for exterior and interior surfaces which will be exposed to view after the work is completed, whether such surfaces are painted or unpainted, shall be new plywood stock, steel, tempered masonite, or other materials which will provide smooth concrete surfaces without subsequent surface plastering. Plastic or plastic-faced forms shall not be used, except with the prior approval of the Engineer.
- B. Form ties shall be cone type or equal, with waterstop, which leaves no metal closer than 2-inches to finished face of concrete.

- C. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic Kote" by Symons Corp., Des Plaines, IL or approved equal.
- D. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete.

PART 3 - EXECUTION

3.01 PREPARATION:

Surfaces of forms to be in contact with concrete shall be greased with nonstaining form release compound. Wetting will not be accepted as a substitute. Approval of the Engineer shall be obtained before use of coated materials or liners in lieu of form release compound, except as modified herein.

3.02 CONSTRUCTION:

- A. For concrete surfaces which will be visible after completion of the structure, painted or unpainted, the type and the precise location of form ties, nails joints between form members, and any other features which will leave a visible trace in the finished concrete, will be subject to the approval of the Engineer.
- B. Formwork shall be so constructed, braced, or tied that the formed surfaces of the concrete will be perfectly true, smooth, and to the dimensions shown on the drawings. All forms used for circular sections shall be true arcs as indicated on the drawings. Short chords will not be acceptable. Form line shall present an uninterrupted surface conforming to radii indicated on the drawings.
- C. Forms shall be sufficiently tight to prevent leakage of mortar, and when necessary shall have temporary openings as required for thorough cleaning, and as required for introduction of concrete to avoid excessive free fall. Panels damaged in stripping or otherwise shall not be reused.
- D. Unless otherwise noted on the design drawings, forms shall be filleted and chamfered at all sharp corners, and exposed edges with a 3/4-inch chamfer. Chamfer shall not be used where masonry or other material will subsequently be installed flush with one of the adjacent surfaces of the concrete. Where a wash or slope is indicated on the drawings no additional chamfer is required.

3.03 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 30 percent of the ultimate strength prescribed by the design and not before reaching the following number of day-degrees [whichever is the longer]:

<u>Forms for</u>	<u>Day-Degree*</u>
Beams and Slabs	500
Walls and vertical surfaces	200

* Day-Degree: Total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily weighted average temperature of 60 deg F equals 300 day-degrees. Temperatures below 50 deg F are not to be considered in determining Day-Degree.

- B. Where beams, girder, columns, walls and similar vertical forms are adequately supported on shores, the side forms may be removed after 24 hours of cumulative curing time provided the side forms support no loads other than the lateral pressure of the plastic concrete. Cumulative curing time represents the sum of time intervals, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 deg. F in accordance with American Concrete Institute standards.
- C. Shoring shall not be removed until the concrete has attained at least 70 percent of the specified strength and sufficient strength to support safely its own weight and the construction live loads upon it.
- D. Forms shall be removed in such a manner as not to impair safety and serviceability of the structure. Concrete exposed by form removal shall have sufficient strength not to be damaged by the removal operation.

END OF SECTION

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SECTION 03 21 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specification covers the furnishing and installation of reinforcement for cast-in-place concrete.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- B. Section 03 11 00, CONCRETE FORMWORK
- C. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.03 SYSTEM DESCRIPTION:

Materials and construction shall conform to ACI 318 and ACI 350 unless otherwise noted on the design drawings or modified herein.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall furnish the Engineer with complete checked, reinforcing steel shop drawings and bar lists. Shop drawing shall include grade of steel used as well as splice lengths.
- B. Mill test reports shall accompany drawings. Fabrication shall not commence until the drawings and mill test reports have been released by the Engineer.
- C. When fiber reinforcement is used, contractor shall submit manufacturer's data confirming that material meets the specification.

1.05 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

ACI 318 Building Code Requirements for Concrete

ACI 347 Recommended Practice for Concrete Formwork

ACI 350 Environmental Engineering Concrete Structures

ACI SP-66 ACI Detailing Manual

American Society for Testing and Materials (ASTM)

- | | | |
|------|------|--|
| ASTM | A185 | Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement |
| ASTM | A497 | Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement |
| ASTM | A615 | Deformed Billet-Steel Bars for Concrete Reinforcement |
| ASTM | A775 | Epoxy-coated Reinforcing Steel Bars |
| ASTM | A884 | Epoxy-coated Welded Wire Fabric |

American Welding Society (AWS)

- | | | |
|-----|------|--|
| AWS | 12.1 | Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction |
|-----|------|--|

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, and A775 if epoxy-coated bars are specified.
- B. Welded steel wire fabric shall conform to ASTM A185 or ASTM A497 and ASTM A884 if epoxy-coated fabric is specified. Gauge and spacing of wires shall be as indicated on the drawings.
- C. Reinforcing steel shall be detailed in accordance with ACI SP-66 modified as applicable to conform to ACI 350.
- D. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Bars shall be shipped to the site with bars of the same size and shape, fastened in bundles with securely wired-on metal identification tags listing both size and mark.
- E. Any bar showing cracks after bending shall be discarded.
- F. Steel failing to meet the requirements of this specification or the drawings will be rejected and shall be removed from the site immediately.

2.02 FIBER REINFORCEMENT

When called for on the drawings, concrete engineered reinforcing fibers shall be polypropylene, collated, fibrillated fibers from Fibermesh Co., 4019 Industry Drive, Chattanooga, TN; Forta Corporation, One Hundred Forta Drive, Grove City, PA; or approved equal. Only fibers designed and manufactured specifically for use in concrete from virgin polypropylene and so certified by the manufacturer shall be acceptable.

PART 3 - EXECUTION

3.01 STEEL INSTALLATION:

- A. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings (including ice), that reduce or destroy bond. When there is a delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned as necessary.
- B. After forms have been oiled, but before concrete is placed, all steel shall be securely wired in the exact position called for, and shall be maintained in that position until all concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Engineer.
- C. Concrete blocks having a minimum bearing area of 2-inches by 2-inches and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Wood blocks, stones, brick chips, etc., shall not be used to support reinforcement.
- D. Metal supports shall be of types that will not penetrate the surface of formwork or slab and which will not show through or stain surfaces that are to be exposed to view, painted or unpainted.
- E. Welding of reinforcing bars will be permitted only where permission of the Engineer has been obtained in advance. Such welding shall be performed only under conditions established by the Engineer, and in accordance with AWS 12.1.
- F. Reinforcement, which is to be exposed for a considerable length of time after having been placed, shall be painted with a heavy coat of cement grout, if required by the Engineer.

3.02 FIBER INSTALLATION:

- A. Fibermesh fibers shall be used in concrete as indicated on the drawings or as specified and in strict accordance with the manufacturer's recommendations as to type and amount. The fiber manufacturer or approved distributor shall provide the services of a qualified employee for pre-job meeting and initial job start up.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all concrete and all related items necessary to place and finish the concrete work for walls and foundations.

1.02 RELATED WORK:

- A. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
- B. Section 03 11 00, CONCRETE FORMWORK
- C. Section 03 21 00, CONCRETE REINFORCEMENT
- H. D. Section 31 00 00, EARTHWORK
- I. Items furnished under other Sections and installed under this Section include, but are not limited to:

Items embedded in concrete, including anchors, sleeves, floor drains, castings, frames for hatches, angles, nosings, and other miscellaneous metals.

1.03 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

- ACI 301 Structural Concrete for Buildings
- ACI 302 Recommended Practice for Concrete Floor and Slab Construction
- ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Replacing Concrete
- ACI 305 Recommended Practice for Hot Weather Concreting
- ACI 306 Recommended Practice for Cold Weather Concreting
- ACI 318 Building Code Requirements for Reinforced Concrete

- ACI 347 Recommended Practice for Concrete Formwork
- ACI 350 Code Requirements for Environmental Engineering Concrete Structures
- American Society for Testing and Materials (ASTM)
- ASTM C33 Concrete Aggregates
- ASTM C39 Compressive Strength of Cylindrical Concrete Specimens
- ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- ASTM C87 Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
- ASTM C94 Ready-Mixed Concrete
- ASTM C143 Standard Method for Slumps of Portland Cement Concrete
- ASTM C150 Portland Cement
- ASTM C171 Sheet Materials for Curing Concrete
- ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C260 Air-Entraining Admixtures for Concrete
- ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C494 Chemical Admixtures for Concrete
- ASTM D1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- ASTM D1752 Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23
SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Shop drawings of the materials specified herein.
- B. Statement of materials constituting the design of mixes which satisfy the specified strength for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the contract.

- C. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. Concrete shall conform with Class PCC04462 Concrete and shall conform to the requirements of Section M.03.01.
- B. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C94 shall be delivered to the Engineer immediately upon arrival of each load of concrete at the site. The Contractor shall be responsible for the design of the concrete mixtures.
- C. Standard compression tests of all proposed mixes shall be made by the testing laboratory or other satisfactory evidence shall be presented that the design mixes will attain the minimum strengths listed on the design drawings or called for herein, within the limitations of the ACI Code. No concrete shall be delivered to the job site until the Engineer has approved the design mixes.
- D. All concrete (unless otherwise directed) shall contain an air-entraining agent. Air entrained concrete shall have an air content by volume of 3 to 6 percent for 1-1/2-inch aggregate and 4 to 8 percent for 3/4-inch aggregate. The air content shall be the responsibility of the testing laboratory and in accordance with ASTM C231.
- E. All concrete shall contain a mid-range water reducer to minimize cement and water content of the mix, at the specified slump, in accordance with ASTM C494.
- F. Slump for all concrete shall be from 3-inch to 4-inch, except for concrete using a superplasticizer, when the maximum slump shall be 8-inches. Any concrete having a slump greater than 4-inches (8-inches with superplasticizer) shall be promptly removed from the site.
- G. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixture other than those specified shall be used in concrete without the specific written permission of the Engineer in each case.
- H. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 CEMENT:

- A. The cement shall be an approved brand of American manufactured Portland Cement, Type IIA conforming to ASTM C150. The brand name and type of cement proposed for use shall be submitted to the Engineer for approval immediately following award of contract. Only one color of cement, all of the same manufacture, shall be used for the work.

- B. When the use of high-early-strength Portland cement (Type IIIA) is permitted by the Engineer the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

2.03 ADMIXTURES:

- A. Air entraining agent shall be in accordance with ASTM C260.
- B. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A.
- C. Water reducing agent-retarder shall be in accordance with ASTM C494, Type D.
- D. Superplasticizer agent shall be in accordance with ASTM C494, Type F or Type G and contain no more than 0.1% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time.

2.04 AGGREGATES:

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.
- B. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33.
- C. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33.
- D. The following designated sizes of aggregate shall be the maximum employed in concrete.

2-inch for mass concrete

1½-inch for reinforced sections 18-inch and over in thickness

¾-inch for reinforced and unreinforced sections less than 18-inch thickness.

2.05 WATER:

Water for concrete shall be potable, free from injurious amounts of oil, acid, alkali, organic matter and other deleterious substances.

2.06 GROUT:

Grout shall be mixed in the proportions of one part Portland Cement to 2 parts sand, by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Aggregate for grout shall conform to the requirements of the reference specification for concrete. Prior approval of the Engineer shall be obtained for the use of proprietary grouts, and the instructions of the Engineer shall be followed in their use.

2.07 CURING MATERIALS:

- A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal.
- B. Curing paper shall be a fiber-reinforced laminated Kraft bituminous product conforming to the requirements of ASTM C171.

2.08 JOINT FILLER:

- 1. Prefomed joint filler strip shall conform to ASTM D1751 or D1752, having a thickness as indicated on the drawings.
- 2. Fillers shall be provided in pieces of the full thickness required. Use of multiple layers of thin pieces to make-up the full thickness will not be permitted.
- 3. Backer rod.

2.09 JOINT SEALANT:

Joint sealant for construction and control joints shall be a two-part polysulfide base sealant conforming to Thiokol's Building Trade Performance Specification, Class A (self-leveling), Type II (hardness: 35-45 Shore A).

PART 3 - EXECUTION

3.01 GENERAL:

Under no circumstances shall concrete that has set or partially set before placing be used; and no retempering of concrete or grout will be permitted.

3.02 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.
- B. Unless otherwise indicated, a moisture barrier shall be used under all slabs placed on the ground in accordance with ACI 302.1R. The moisture barrier shall be fungi-resistant and shall have a vapor permeance rating not exceeding 0.01 perms (Perms [grains/ft²*hr*in. Hg]) per ASTM F1249 or ASTM E96) and 10 mils thickness (49 lbs/MSF). The moisture barrier shall be a high-performance underslab vapor retarder made from polyethylene resins that exceed ASTM E1745, Class A. Sheets shall be lapped 6-inches at joints and sealed with 2-inch wide tape or as recommended by the manufacturer. The vapor barrier should have all laps, seams, penetrations and terminations sealed and should carry across footings.

- C. When no moisture barrier is used, the earth, concrete, masonry, or other water-permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.
- D. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping and washing off all dirt and scum and laitance. It then shall be moistened prior to placing new concrete.
- E. Concrete surfaces that act as a seat for structural members (other than those resting on grout) shall be troweled to an extremely flat and level surface. If necessary, such surfaces shall be ground off to achieve the required flatness and level.
- F. Fill concrete on top of concrete shall be placed in the locations indicated on the drawings or designated by the Engineer. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set. Fill concrete shall be brought to the lines and grades shown on the drawings or approved by the Engineer.
- G. Concrete for thrust and anchor blocks shall be placed against undisturbed earth and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints. Minimum bearing areas and dimensions shall be as shown on the drawings.

3.03 MIXING:

- A. Concrete shall be ready-mixed, or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and in the presence of the Engineer.
- B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the nameplate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.

- C. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.
- D. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

3.04 INSTALLATION/APPLICATION/ERECTION:

A. Placing

1. No concrete shall be placed by pumping methods without the prior written approval of the Engineer. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304.2R and as approved by the Engineer.
2. Concrete shall be placed in alternate areas, as defined by the construction and control joints indicated on the design drawings. A minimum of 3 days shall elapse between placement of adjacent sections.
3. Segregation of the concrete shall be prevented during handling; should any segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet, the Contractor shall obtain the approval of the Engineer for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet in any direction in the forms or on the ground, unless otherwise permitted by the Engineer.
4. Unless otherwise noted, the work begun on any day shall be completed in daylight of the same day.
5. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.
6. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined, and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees and shall be such as to prevent segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris

and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally more than 5 feet.

7. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.
8. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.
9. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.
10. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each run, and the water and debris shall not be discharged inside the form.

B. Concrete Placing During Cold Weather

1. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F, or is expected to fall to below 40°F, within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.
2. The temperature of concrete surfaces shall not be permitted to drop below 50°F. for at least 7 days after placement of the concrete.
3. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

C. Concrete Placing During Hot Weather

1. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays that will result in excessive mixing of the concrete after arrival on the job.
2. During periods of excessively hot weather (90°F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement will not be acceptable, and will be rejected.
3. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

D. Pipes And Embedded Metals

1. Special care shall be taken to bring the concrete into solid contact with pipes and iron work embedded in the walls and floors, particularly underneath and around all pipes where a head of water exists, making watertight joints.
2. In general, such embedded items are not shown on the structural design drawings. Design drawings of the other trades shall be consulted for their location and details.
3. Anchor bolt location, size and details shall be verified with the equipment manufacturer's certified drawings before installation.
4. Anchor bolts, reglets, sleeves, edge angles and similar embedded items will be provided, delivered to the site under other Sections of the specification, for installation under this Section.
5. Where edge angles, etc., have nuts welded on to receive machine screws, the threads of the nuts shall be protected from concrete, and the concrete shall be excluded from the space to be occupied by the screw, by the use of wood plugs or other effective means.
6. Inserts required for hanging mechanical and electrical items shall be provided and installed in the forms under the mechanical and electrical sections of the specification.
7. Should the Contractor be allowed to leave openings in the concrete for pipes or ironwork, to await the arrival of items that would delay the prosecution of the work, the openings shall be subject to the approval of the Engineer. Appropriate construction joints shall be provided. In filling any such openings with concrete, a

mixture of 1: 1-1/2 : 3 shall be used and a watertight bond shall be secured between the old and new concrete.

8. In bolting miscellaneous items to concrete after the concrete has set, expansion bolts of an approved pattern and type shall be used. The Contractor shall submit to the Engineer, for approval, the types of expansion bolts. Expansion bolts shall not be used until they are approved.

E. Curing

1. Concrete curing shall be performed as specified in ACI 301 and as stated herein. All curing procedures shall have prior approval of the Engineer.
2. Concrete Floors

Concrete floors which are to receive paint, concrete fill, mortar setting beds, grout fill, or any other subsequent finish shall be cured by one of the following procedures immediately after completion of placement and finishing:

- a. Ponding or continuous sprinkling.
 - b. Application of absorptive mats or fabric kept continuously wet.
 - c. Application of sand kept continuously wet.
 - d. Application of waterproof sheet materials conforming to ASTM C171.
 - e. Application of curing compounds conforming to ASTM C309, if it can be demonstrated to the Engineer's satisfaction that the compound is applicable and that it will not prevent bonding of the subsequent finish to be received. Compound shall be placed at a rate of 200 square feet per gallon, in two applications perpendicular to each other.
3. Curing procedure shall be continued for at least 7 days.
 - a. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.
 - b. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.
 - c. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

F. Bracing And Supports

1. All concrete members shall be adequately and safely supported and braced until the permanent supports and braces are installed.
2. Backfilling against exterior walls shall not be done until supporting slabs are in place and have attained 70 percent of design strength, otherwise walls shall be braced against earth lateral pressure, using a system approved by the Engineer.
3. Backfilling against retaining walls shall not commence until the wall concrete has reached its 28-day strength.

G. Removing Forms And Supports

1. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees or attained 50 percent strength. (Day-degrees equals the total of number of days times the average daily air temperature at the surface of concrete. For example, 5 days at a daily average temperature of 60°F. equals 300 day-degrees.)

<u>Location</u>	<u>Day-Degrees</u>
Beams and Slabs	500
Walls and Vertical Surfaces	200

2. Shores under beams and slabs shall not be removed until the concrete has attained at least 70 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the construction loads upon it.

H. Patching

1. Defective concrete and honeycombed areas as determined by the Engineer shall be chipped down reasonably square and at least one-inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly imbedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 1-inch wide all around the steel. For areas less than 1-1/2 inches deep, the patch may be made following the procedure for filling form tie holes, described in the subsection below, using adequately dry (non-trowelable) mixtures to avoid sagging. Thicker repairs will require build-up in 1-inch layers on successive days. Unless otherwise indicated, thicker repairs shall be made with Vertipatch mortar mixture blended with Acryl-Set, both by Master Builders, Inc., Cleveland, Ohio, or approved equal.
2. For concrete areas exposed to serious abrasion and/or impact forces, the Engineer may order the use of grout with a non-shrink metallic aggregate (Embeco by Master

Builders, Inc.; Ironite by Fox Industries, Madison, IL; or approved equal) as an additive in the proportions listed below:

Material	Small Patches		Large Formed Patches	
	Volumes	Weights	Volumes	Weights
Cement	1.0	1.0	1.0	1.0
Metal Aggregate	0.15	0.25	0.2	0.33
Sand	1.5	1.5	1.5	1.0
Pea Gravel	--	--	1.5	1.5

I. Finishing Of Formed Surfaces

1. All concrete that is to be left exposed to view shall be scraped to remove projecting imperfections left by voids in the forms.
2. In addition to scraping, exterior exposed concrete shall be covered with a cement-base plaster mix. The mix shall consist of Thoroseal Plastic Mix and Acryl 60, as manufactured by Standard Drywall Products, Miami, FL, or approved equal. It shall be mixed and applied in accordance with the manufacturer's recommendations.
3. In addition to scraping, interior concrete surfaces which will be exposed to view and concrete surfaces which are to be prepared and painted as specified in Section 09 90 00, PAINTING, shall receive a smooth rubbed finish, in accordance with ACI 301 and as described below.
4. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete as early as is possible without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms shall be chipped off, and the surfaces rubbed smooth.
5. Form tie holes and other voids and faults shall be patched. Voids shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.
6. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.
7. Where finishing is performed before the end of the curing period, concrete shall under no circumstances be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

J. Concrete Floor Finishing Requirements

Unless designated otherwise, concrete floors shall have a troweled finish as specified in Section 11.7 of ACI 301. Troweled finishes shall conform to the requirements of "Class A Tolerances," Section 11.9 as specified in ACI 301.

L. Testing

1. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. The laboratory shall supply testing equipment, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.
 - a. The Testing Laboratory shall conform to the requirements of ASTM E-329. The State Board of Building Regulations and Standards shall license them.
2. At least one slump test shall be performed from each truckload of concrete. The sample for slump shall be taken from the middle third of a truckload. Air content tests shall be made at the discretion of the Engineer. If the measured slump or air content falls outside the specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and shall be immediately removed from the jobsite to be discarded.
3. The Contractor shall advise the Engineer of his readiness to proceed with concrete placement at least one working day prior to each placement. The Engineer will inspect the preparations for concrete, including the preparation of previously placed concrete, the reinforcing, and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.
4. A minimum of four standard compression test cylinders shall be made and tested for each 100 cubic yards or fraction thereof for each type and design strength of concrete from each day's placement of concrete. One cylinder shall be tested at 7 days and two cylinders at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. The Engineer reserves the right to require test cylinders to be made for each truckload of concrete if the nature of the project or project experience indicates such additional tests are required for proper control of concrete quality; such tests will be at the Owner's expense.
5. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength f'_c , and no individual strength test (average of two cylinders) result falls below the specified strength f'_c by more than 500 psi.

6. In the event the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days.

M. Failure To Meet Requirements

1. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense. All costs associated with removing rejected concrete, placing new concrete, and conducting tests on new concrete shall be at the Contractor's expense.
2. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan to the Engineer, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.
3. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.
4. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes to the satisfaction of the Engineer.
5. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, engineering, repair of the holes, or removal and replacement of the concrete in question, and all associated costs therefor, shall be at the expense of the Contractor.
6. If load testing of the concrete is permitted, and if not otherwise indicated, slabs or beams under load test shall be loaded with their own weights plus a superimposed load of 2 times the design live load. The load shall be applied uniformly over the portion being tested in the approved manner and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period, does not exceed the following value:

$$D \text{ equals } 0.001 (L \times L)/t$$

in which "L" is span in feet, "t" is depth of slab, or beam in inches. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, the slab, or beam under test recovers at least 75 percent of the observed deflection.

7. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review by the Engineer.

N. Test For Watertightness

1. All concrete shall be watertight against leakage or groundwater infiltration. Special care shall be taken in the construction joints and any noticeable leakage or seepage causing wet spots on the concrete walls or slabs shall be repaired by and at the expense of the Contractor and by methods approved by the Engineer. See Section 03 15 13, WATERSTOPS.
2. All liquid holding concrete structures shall be tested for leakage before backfilling and after the concrete has attained the specified minimum 28-day design strength, as indicated by test cylinders.
3. The structure shall be filled with water to the overflow level, allowed to stand for at least 24-hours, and refilled to overflow to begin the test. After 72 hours, the liquid loss per 24 hour period shall be determined, either by measuring the amount required to refill the tank to overflow, by measuring the drop in water level, or by an equivalent procedure approved by the Engineer. Evaporative losses shall be calculated and deducted from the measured loss to determine net liquid loss (leakage). If the leakage per 24-hour period exceeds the allowable, the structure shall be repaired and retested until the leakage falls within the allowable limit.
4. For structures designed to hold water, one twentieth of one percent leakage will be allowed during a 24-hour period. No leakage (zero leakage) will be permitted for structures designed to hold liquid chemicals or fuels.
5. The Contractor shall pay all costs (including water) incurred in the testing for watertightness.
6. The Engineer shall be given a minimum notice of 48 hours prior to commencement of the leakage test.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking, cants, and nailers.
 - 3. Engineered Lumber / LVL's

1.03 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. Timber: Lumber of 5 inches nominal size or greater in least dimension.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.05 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, Furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-

test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.[For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Framing for non-load-bearing partitions.

2.04 ENGINEERED WOOD PRODUCTS

- A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

1. Extreme Fiber Stress in Bending, Edgewise: **2600 psi** for 12-inch nominal- depth members.
2. Modulus of Elasticity, Edgewise: **1,800,000 psi**

2.05 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Cants.
 4. Furring.
 5. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 in any of the following species:
1. Hem-fir (north); NLGA.
 2. Mixed southern pine or southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 6. Western woods; WCLIB or WWPA.
 7. Northern species; NLGA.
 8. Eastern softwoods; NeLMA.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods; No. 2 Common grade; NeLMA.
 5. Northern species; No. 2 Common grade; NLGA.
 6. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.06 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.07 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. Simpson Strong-Tie Co., Inc.
 - 3. USP Structural Connectors.
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 316.
 - 1. Use for exterior locations and where indicated.

2.08 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 2. ICC-ES evaluation report for fastener.
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Comply with approved fastener patterns where applicable.
 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.02 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

3.04 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Underlayment.
3. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry"
2. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.
- C. Field quality-control reports.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.03 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing

2.04 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified.[For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

2.05 WALL SHEATHING (HIDDEN)

- A. Plywood Sheathing: Exposure 1, Structural I.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than 1/2 inch.

2.06 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.
- G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.07 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:

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SHEATHING

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 2. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

END OF SECTION

SECTION 06 20 13

EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

- 1. Exterior cellular PVC trim.

- B. Related Requirements:

- 1. Section 06 10 00 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.

1.03 DEFINITIONS

- A. MDO: Plywood with a medium-density overlay on the face.

- B. PVC: Polyvinyl chloride.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

- B. Samples: For each exposed product and for each color and texture specified.

- C. Samples for Verification:

- 1. For cellular PVC trim, with half of exposed surface finished; 50 sq. in..

1.05 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Cellular PVC trim.

B. Sample Warranties: For manufacturer's warranties.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

1.08 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 EXTERIOR TRIM

A. Cellular PVC Trim: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for exterior use, made from UV- and heat-stabilized rigid material.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. AZEK Building Products, Inc.
- b. Kleer Lumber, LLC.
- c. Versatex Trimboard; a Wolfpac Technologies, Inc. company.

2. Density: Not less than 31 lb/cu. ft..
3. Heat Deflection Temperature: Not less than 130 deg F, according to ASTM D648.
4. Coefficient of Thermal Expansion: Not more than 4.5 x 10⁻⁵ inches/inch x deg F.
5. Water Absorption: Not more than 1 percent, according to ASTM D570.
6. Flame-Spread Index: 75 or less, according to ASTM E84.

2.02 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry (PVC Trim): Provide concealed fasteners in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 1. Provide coated, concealed fastener self-tapping screws with plugs to match selected PVC manufacturer PVC board color and texture.
Basis of Design to be "*Cortex Hidden Fastening Systems for PVC Trim*"
Tel: 1-800-518-3569, Web: <https://www.fastenmaster.com/products/cortex-loose-plug-for-pvc-trim-board>
- B. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.
- C. Flashing: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
 1. Horizontal Joint Flashing for Panel Siding: Preformed stainless steel, Z-shaped flashing.
- D. Sealants: Latex, complying with ASTM C834 Type OP, Grade NF and applicable requirements in Section 07 92 00 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation.
 - b. Permathane®/Acryl-R®; ITW Polymers Sealants North America.
 - c. Tremco, Inc.

2.03 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.
 - 1. Cut to required lengths and prime ends.
 - 2. Comply with requirements in Section 09 90 00 "Painting."

3.03 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
 - 6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.04 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install cellular PVC trim to comply with manufacturer's written instructions.
- B. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.

1. Use scarf joints for end-to-end joints.
 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water.
1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
 2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.05 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements.
1. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.06 CLEANING

- A. Clean exterior finish carpentry on exposed and semiexposed surfaces.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

3.07 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY:

- A. Section Includes:

- 1. Building wrap.
- 2. Flexible flashing.

1.03 ACTION SUBMITTALS:

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

- 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

- B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.04 INFORMATIONAL SUBMITTALS:

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.01 WATER-RESISTIVE BARRIER:

- A. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. DuPont de Nemours, Inc.
 - b. Raven Industries, Inc.
 - c. TYPAR.
2. Water-Vapor Permeance: Not more than 30 perms per ASTM E96/E96M, Desiccant Method (Procedure A).
 3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E2178.
 4. Allowable UV Exposure Time: Not less than three months.
 5. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.02 FLEXIBLE FLASHING:

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030-inch.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. DuPont de Nemours, Inc.
 - b. Protecto Wrap Company.
 - c. Raven Industries, Inc.
 2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.
- C. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F1667.

PART 3 - EXECUTION

3.01 WATER-RESISTIVE BARRIER INSTALLATION:

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier ½-inch on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.02 FLEXIBLE FLASHING INSTALLATION:

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.
5. Mildew-resistant joint sealants.
6. Latex joint sealants.

B. Related Requirements:

1. Section 08 36 13.11 BI-FOLDING SECTIONAL DOORS: Exterior Bi-Folding Sectional Doors.

1.02 PREINSTALLATION MEETINGS:

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

1.03 ACTION SUBMITTALS:

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.04 INFORMATIONAL SUBMITTALS:

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.

D. Field-adhesion-test reports.

E. Sample warranties.

1.05 QUALITY ASSURANCE:

A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.06 PRECONSTRUCTION TESTING:

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with masonry substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

1.07 WARRANTY:

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

PART 2 - PRODUCTS

2.01 JOINT SEALANTS, GENERAL:

A. Colors of Exposed Joint Sealant As selected by Architect from manufacturer's full range.

2.02 SILICONE JOINT SEALANTS:

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
- B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.
- C. Silicone, S, NS, 35, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability. nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 35, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. The Dow Chemical Company.
- D. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Pecora Corporation.
 - c. The Dow Chemical Company.
- E. Silicone, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.

- b. Sika Corporation; Joint Sealants.
 - c. The Dow Chemical Company.

- F. Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Soudal USA.
 - b. The Dow Chemical Company.

- G. Silicone, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.

- H. Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade P, Class 100/50, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.

- I. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. May National Associates, Inc.; a subsidiary of Sika Corporation.

- J. Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type M, Grade P, Class 100/50, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. May National Associates, Inc.; a subsidiary of Sika Corporation.
- b. Sika Corporation; Joint Sealants.

2.03 NONSTAINING SILICONE JOINT SEALANTS:

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Sika Corporation; Joint Sealants.
 - c. Tremco Incorporated.
- C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Sika Corporation; Joint Sealants.
 - c. The Dow Chemical Company.
- D. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. The Dow Chemical Company.
- E. Silicone, Nonstaining, M, NS, 50, NT: Nonstaining, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Tremco Incorporated.

2.04 URETHANE JOINT SEALANTS:

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Sika Corporation; Joint Sealants.
 - c. Tremco Incorporated.
- B. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Sika Corporation; Joint Sealants.
- C. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. LymTal International Inc.
- D. Urethane, S, P, 35, T, NT: Single-component, pourable, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 35, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Bostik, Inc.
- E. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Pecora Corporation.
 - c. Permathane®/Acryl-R®; ITW Polymers Sealants North America.

- F. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Pecora Corporation.
- G. Urethane, M, NS, 25, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Sherwin-Williams Company (The).
- H. Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Tremco Incorporated.
- I. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.
- J. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 50, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. LymTal International Inc.
- K. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement

capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.

2.05 IMMERSIBLE JOINT SEALANTS:

- A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C1247, Class 1, tested in deionized water unless otherwise indicated
- B. Urethane, Immersible, S, NS, 100/50, NT, I: Immersible, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses NT, and I.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Tremco Incorporated.
- C. Urethane, Immersible, S, NS, 35, NT, I: Immersible, single-component, nonsag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 35, Use NT and I.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. BASF Corporation.
- D. Urethane, Immersible, S, NS, 50, T, NT, I: Immersible, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 50, Uses T, NT, and I.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Tremco Incorporated.
- E. Urethane, Immersible, S, NS, 35, T, NT, I: Immersible, single-component, nonsag, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 35, Uses T, NT, and I.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Sika Corporation; Joint Sealants.

- F. Urethane, Immersible, S, NS, 25, T, NT, I: Immersible, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Uses T, NT, and I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
- G. Urethane, Immersible, S, P, 50, T, NT, I: Immersible, single-component, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 50, Uses T, NT, and I.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Tremco Incorporated.
- H. Urethane, Immersible, S, P, 25, T, NT, I: Immersible, single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T, NT, and I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Sika Corporation; Joint Sealants.
 - b. Tremco Incorporated.
 - c. W.R. Meadows, Inc.
- I. Urethane, Immersible, M, NS, 50, T, NT, I: Immersible, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Uses T, NT, and I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LymTal International Inc.
 - b. Tremco Incorporated.
- J. Urethane, Immersible, M, NS, 25, T, NT, I: Immersible, multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Uses T, NT, and I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Sika Corporation; Joint Sealants.

K. Urethane, Immersible, M, P, 25, T, NT, I: Immersible, multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T, NT, and I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Corporation.
- b. LymTal International Inc.
- c. Sika Corporation; Joint Sealants.

2.06 MILDEW-RESISTANT JOINT SEALANTS:

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Pecora Corporation.
- b. The Dow Chemical Company.
- c. Tremco Incorporated.

C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Pecora Corporation.
- b. Sherwin-Williams Company (The).
- c. Tremco Incorporated.

2.07 JOINT-SEALANT BACKING:

A. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Alcot Plastics Ltd.
- b. BASF Corporation.
- c. Construction Foam Products; a division of Nomaco, Inc.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.08 MISCELLANEOUS MATERIALS:

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.02 INSTALLATION OF JOINT SEALANTS:

- A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

- 1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.03 FIELD QUALITY CONTROL:

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

- 1. Extent of Testing: Test completed and cured sealant joints as follows:

- a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

- 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.04 JOINT-SEALANT SCHEDULE:

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces: JS-A.

- 1. Joint Locations:

- a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between plant-precaster architectural concrete paving units.
 - c. Tile control and expansion joints.
 - d. Joints between different materials listed above.
 - e. Other joints as indicated on Drawings.

- 2. Joint Sealant: Urethane, M, P, 50, T, NT

- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion: JS-B

- 1. Joint Locations:

- a. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, immersible, S, P, 25, T, NT, I
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces: JS- C
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precaster architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces: JS-D
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, P, 25, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces: JS-E.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry, concrete walls and partitions.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors
- F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement: JS-F.
1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

- G. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces: JS-G.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors
- H. Joint-Sealant Application: Concealed mastics: JS-H.
1. Joint Locations:
 - a. Aluminum thresholds.
 - b. Sill plates.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Butyl-rubber based.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 08 36 13.11

BI-FOLDING SECTIONAL DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes manually operated bi-folding sectional doors.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for Engineered Wood / LVL lumber headers.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. Include rated capacities, operating characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details. Shop drawings must be 1/4" scale and specific to project.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
- C. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
 - 1. Flat door sections with sensor edge on bottom section.
 - 2. Frame for paneled door sections; of each width of stile and rail required.

3. Panel for raised-panel door sections; not smaller than required to show raised-panel profile.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For special warranties.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Failure of components or operators before reaching required number of operation cycles.
 - c. Faulty operation of hardware.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - e. Delamination of exterior or interior facing materials.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward
 2. Testing: According to ASTM E330 or DASMA 108 for garage doors and complying with the acceptance criteria of DASMA 108
 3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
 - a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of the door width.
 - b. Deflection of horizontal track assembly shall not exceed 1/240 of the door height.
 4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20 lbf/sq. ft. wind load, acting inward and outward.
- C. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. Component Importance Factor: 1.50.

2.03 DOOR ASSEMBLY

- A. Bi-Folding Sectional Doors: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Overhead Door Corporation.
 - b. Raynor Garage Doors.
 - c. Wayne Dalton; a division of Overhead Door Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E283

- D. Installed R-Value: 17.4 deg F x h x sq. ft./Btu.
- E. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 zinc coating.
 - 1. Section Thickness: 2 inches
 - 2. Exterior-Face, Steel Sheet Thickness: 20 GA nominal coated thickness.
 - a. Surface: Flat.
 - b. Surface: Manufacturer's standard. Flush.
 - 3. Insulation: CFC Free Polyurethan, fully encapsulated.
 - 4. Interior Facing Material: Same as exterior face steel thickness and coating.
- F. Track Configuration: Attached to wood framing and LVL Header.
- G. Weatherseals: Fitted to bottom and top and around entire perimeter of door.
- H. Roller-Tire Material: Manufacturer's standard
- I. Locking Devices: Equip door with slide bolt for padlock, locking device assembly, and chain lock keeper
 - 1. Locking Device Assembly: Locking bars, operable from inside and outside, with cylinders.
- J. Door Finish:
 - 1. Baked-Enamel or Powder-Coat Finish: Color and gloss as selected by Architect from manufacturer's full range.
 - 2. Finish of Interior Facing Material: Match Exterior material, color and finish type.

2.04 STEEL DOOR SECTIONS

- A. Exterior Section Faces and Frames: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A653/A653M, with indicated zinc coating and thickness.
 - 1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weather-resistant seal, with a reinforcing flange return.
 - 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.

- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.
- E. Provide reinforcement for hardware attachment.
- F. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within steel sections and the interior facing material, with no exposed insulation.
- G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.05 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances indicated on Drawings, Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides for required door type, size, weight, and loading.
 - 1. Galvanized Steel: ASTM A653/A653M, minimum G60 zinc coating.
 - 2. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors.
 - a. For Horizontal Track: Continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.
- B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

2.06 HARDWARE

- A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.

- C. Push/Pull Handles: Equip each push-up operated or emergency-operated door with galvanized-steel lifting handles on each side of door, finished to match door.

2.07 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: Cylinders standard with manufacturer and keyed to building keying system.
 - 2. Keys: Three for each cylinder. Match all cylinders with all doors so keying is alike.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Provide eye hook and clasp to be able to keep door locked in open position against wall.

2.08 MANUAL DOOR OPERATORS

- A. General: Equip door with handles and locks with keys for manual operation.

2.09 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. 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.

2.010 FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks:
 - 1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
 - 2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.03 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.04 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 11 68 33

SPORTS FIELDS SITE FURNISHINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

- A. Provide site improvements in the locations shown or as described herein, complete with anchorages and associated site work.

1.03 RELATED SECTIONS:

Division 31 Section "Earthwork" for excavation and grading related to site improvements.

Division 03 Section "Cast-In-Place Concrete" for anchorages.

1.04 SUBMITTALS:

- A. In accordance with the requirements of Section 01 33 23 SUBMITTALS, Contractor shall submit catalog information on site improvements for review by **Landscape Architect/Engineer**.

PART 2 - PRODUCTS

2.01 SPORTS EQUIPMENT:

- A. Portable Football/ Soccer Combo Goal Post (Qty. 2)
 - 1. Model #M88W-RD4-C-SG/FB-HS-10 Combination Wheeled 4" Round Football/Soccer Goals as manufactured by KEEPER GOALS, a Division of Demand & Precision Parts, 12400 W Silver Spring Dr, Butler, WI 53007 PHONE: 262-781-7800 OR 800-594-5126
 - Constructed from combination aluminum and steel
 - Verticals and up rights 4" round
 - Goals powder coated YELLOW except for weighted caster wheel backbar is BLACK
 - Soccer goal is 8'H x 24'W x 4'T x 10'B
 - Football crossbar is 10'H and upright is 10'H above crossbar
 - Distance between uprights is 23'4" for High School

2. Model # NP2-30-824-410-HP 8'H x 24'W x 4'T x 10'B 3mm HTPP 2" Mesh Soccer Nets as manufactured by KEEPER GOALS, a Division of Demand & Precision Parts, 12400 W Silver Spring Dr, Butler, WI 53007 PHONE: 262-781-7800 OR 800-594-5126
 - Soccer Nets color: WHITE
 3. ACW- Steel Anchor Weight (2 weighs per goal) as manufactured by KEEPER GOALS, a Division of Demand & Precision Parts, 12400 W Silver Spring Dr, Butler, WI 53007 PHONE: 262-781-7800 OR 800-594-5126
 4. An approved equivalent.
- B. 20' Ht. Ball Safety Netting System
1. Model #TFBSS420P-SG, 4-inch O.D., 3-½-inch schedule 80 aluminum straight pole ball stopper system with standard coated black pole finish. Model TFBSS-NET-ULTRACROSS, 4 ply ultra-cross dyneema knotless UHMWPE netting, 1-¾-inch square mesh with sewn rope binding on perimeter edges as manufactured by Sportsfield Specialties, Inc., or
 2. An approved equivalent.

PART 3 - EXECUTION

- 3.01 Sports Equipment shall be permanently installed in concrete anchorages unless otherwise indicated by manufacturer specifications. See Division 3-Concrete.
- 3.02 Sports Equipment shall be installed in accordance with **National Federation of State High School Associations (NFHS)**, manufacturer's installation instructions, and as shown on the plans.
- 3.03 Any site improvement materials which are constructed of steel and not galvanized, or factory coated with a finish system shall be painted in the field in accordance with Division 9 Finishes. Colors by **Landscape Architect/Engineer**.
- 3.04 All Sports Equipment shall be installed ready for use. All nets, cables, uprights, etc., shall be in place. Bleachers and benches shall be placed as required by the **Landscape Architect/Engineer**.
- 3.05 The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, subgrades, previous work, and conditions.

- 3.06 The Contractor shall be responsible for timing the delivery of all site improvement elements so as to minimize on-site storage time prior to installation. All stored materials must be protected from weather, careless handling and vandalism.
- 3.07 Contractor shall anchor all site element stanchions to cement concrete pad using approved bolts and/or anchoring devices.
- 3.08 Fasten wood members to stanchions or supports before or after stanchions are secured to footings; pre-drill all fastener holes. Take necessary precautions not to over tighten fasteners.

END OF SECTION

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SECTION 12 40 00

SITE FURNISHINGS

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.02 WORK INCLUDED:
- A. Provide site improvements in the locations shown or as described herein, complete with anchorages and associated site work.
- 1.03 RELATED SECTIONS:
- Section 03 30 00, Cast-In-Place Concrete
Section 31 00 00, Earthwork
- 1.04 SUBMITTALS:
- A. Contractor shall submit catalog information on site improvements for review by Owner's Representative.

PART 2 - PRODUCTS

- 2.01 SITE FURNISHINGS:
- A. PRECAST CONCRETE WHEEL STOP
1. The wheel stops shall be precast concrete double face, model number B-BBDF WT 270# as manufactured by Shea Concrete, Inc., Wilmington, MA, or approved equal. Refer to contract drawings for quantities and locations. All final locations are to be approved in the field by the Engineer.
- B. ADA DETECTABLE WARNING MAT
1. The ADA detectable warning mat shall be Model # 2436REP as manufactured by ADA Solutions, Inc., Chelmsford, MA or an approved equal. Color: Brick Red, No. 20109.

PART 3 - EXECUTION

- 3.01 Equipment shall be permanently installed in concrete anchorages unless otherwise indicated by manufacturer specifications. See Section 03 30 00, Cast in Place Concrete.

END OF SECTION

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SECTION 13 34 10.01

FABRICATED ENGINEERED AMPHITHEATER

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. Structural-steel framing.
 - 2. Tounge & Groove wood roof deck
 - 3. Metal roof panels.
 - 4. Accessories.

1.3 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."
- B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site
 - 1. Review methods and procedures related to metal building systems including, but not limited to, the following:
 - a. Condition of foundations and other preparatory work performed by other trades.
 - b. Structural load limitations.
 - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Required tests, inspections, and certifications.
 - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
 - 2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

- a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
- b. Structural limitations of frames and deck during and after roofing.
- c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
- d. Temporary protection requirements for metal roof panel assembly during and after installation.
- e. Roof observation and repair after metal roof panel installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Metal roof panels.
- B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
 - 1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
 - 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - a. Show provisions for attaching lighting and sound accessories.
 - 3. Metal Roof Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
- C. Samples for Initial Selection: For units with factory-applied finishes.
- D. Samples for Verification: For the following products:
 - 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 - 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: Nominal 12-inch-long Samples for each type of accessory.
- E. Delegated-Design Submittal: For fabricated engineered amphitheater

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation in the State of Connecticut.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For erector and manufacturer
- B. Welding certificates.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 1. Name and location of Project.
 2. Order number.
 3. Name of manufacturer.
 4. Name of Contractor.
 5. Building dimensions including width, length, height, and roof slope.
 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 7. Governing building code and year of edition.
 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- D. Erector Certificates: For qualified erector, from manufacturer.
- E. Material Test Reports: For each of the following products:
 1. Structural steel including chemical and physical properties.
 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shop primers.
 5. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.
- I. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.

- b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 25 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Poligon Park Structures
 - 1) Holland, MI
- B. Source Limitations: Obtain building system components, including primary and secondary framing and metal roof panel assemblies, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

- A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
- B. Primary-Frame Type:
 - 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
- C. Eave Height: As indicated by nominal height on Drawings
- D. Roof Slope: Curved, refer to drawings for intent.
- E. Roof System: Manufacturer's standard standing-seam, vertical-rib, metal roof panels.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design fabricated amphitheater.

- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
1. Design Loads: *CT State Building Code – 2022 (ICC 2021 Series with CT Amendments)*
 2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
 3. Deflection and Drift Limits: No greater than the following:
 - a. Purlins and Rafters: Vertical deflection of 1/360 of the span.
 - b. Metal Roof Panels: Vertical deflection of 1/240 of the span.
 - c. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
 - d. Lateral Drift: Maximum of 1/400 of the building height.
- C. Seismic Performance: Amphitheater shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces
- E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.
- G. Structural Performance for Metal Roof Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated in building code.
- H. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90

2.4 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing, second framing; rafters, rake, and columns; and wind bracing.
 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
 2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 3. Exterior Column: Uniform depth
 4. Rafter: Uniform depth
- D. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.
- E. Materials:
 1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
 5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
 7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
 8. Metallic-Coated Steel Sheet Preprinted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, SS, Grade 50 or 80; with Class AZ50 coating.
9. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
- a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50
10. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
11. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1 hardened carbon-steel washers.
- a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50, baked-epoxy coated
12. Unheaded Anchor Rods: ASTM A572/A572M, Grade 50
- a. Configuration: Straight.
 - b. Nuts: ASTM A563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.
 - d. Washers: ASTM F436 hardened carbon steel.
 - e. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50
13. Headed Anchor Rods: ASTM A307, Grade A
- a. Configuration: Straight.
 - b. Nuts: ASTM A563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.
 - d. Washers: ASTM F436 hardened carbon steel.
 - e. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50
14. Threaded Rods: ASTM A307, Grade A
- a. Nuts: ASTM A563, heavy-hex carbon steel.
 - b. Washers: ASTM A36/A36M carbon steel.
 - c. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50
- F. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.
 - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

2.5 TOUNGE & GROOVE SOLID-SAWN WOOD ROOF DECKING

- A. Standard for Solid-Sawn Wood Roof Decking: Comply with AITC 112.
- B. Roof Decking Species: Balsam fir, Douglas fir-larch, Douglas fir-larch (North), hem-fir, hem-fir (North), southern pine, spruce pine-fir (North), western hemlock, or western hemlock (North).
- C. Roof Decking Species: Alaska cedar
- D. Roof Decking Nominal Size: Required for performance.
- E. Roof Decking Grade: Select(ed) Decking.
- F. Grade Stamps: Factory mark each item with grade stamp of grading agency. Apply grade stamp to surfaces that are not exposed to view.
- G. Moisture Content: Provide wood roof decking with 15 percent maximum moisture content at time of dressing.
- H. Face Surface: Rough sanded or wire brushed
- I. Edge Pattern: Channel grooved

2.6 METAL ROOF PANELS

- A. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: Two-coat fluoropolymer
 - b. Color: As selected by Architect from manufacturer's full range
 2. Clips: One-piece fixed to accommodate thermal movement.
 3. Joint Type: Mechanically seamed
 4. Panel Coverage: 16 inches
 5. Panel Height: 2 inches

B. Finishes:

1. Exposed Coil-Coated Finish:

- a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.7 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.030-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

2.8 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
 - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 - 1. Make shop connections by welding or by using high-strength bolts.
 - 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
 - 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - 4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
 - 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

2.9 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
 - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
 - a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
 - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Pre-drill panels for fasteners.
6. Provide metal closures at entire perimeter of roof,

C. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying

rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
 - 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- D. Metal Roof Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 13 34 70

MODULAR RESTROOM BUILDING

PART I - GENERAL

1.01 GENERAL PROVISIONS:

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION I – GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK:

- A. Offerors shall furnish all labor, materials, equipment, subcontracting and transportation required to fabricate, deliver and install a pre-manufactured, modular Restroom Building in the location indicated on the Contract Drawings, and as specified herein:
- B. Related Divisions
 - 1. Division 26- ELECTRICAL
 - 2. Division 33- UTILITIES

1.03 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies as made in the contract documents.
 - 1. ANSI - American National Standards Institute.
 - 2. ASTM - American Society for Testing and Materials.
 - 3. AISI - American Iron and Steel Institute
 - 4. AISC - American Institute of Steel Construction
 - 5. AWS – American Welding Society
- B. Requirements not specifically set forth herein but required by the agencies listed above shall apply to this contract since these are established as the industry standards for quality and safety. Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Engineer, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

1.04 SHOP DRAWINGS:

- A. Shop drawings and Offeror's specifications or its subcontractor in the case of entities certified in General Building Construction shall be submitted in accordance with the provisions of the GENERAL CONDITIONS. The specifications provide for "or equal" provision by other Offerors than the basis of design specified. However, the equipment shall be equal to, or better than, the specified material, with equal dimensions in order to be considered.
- B. Drawings and calculations submitted for review shall be stamped and signed by a registered professional engineer licensed in the state of Connecticut.** If the Offeror submits drawings that are different than those included in the contract drawings, structural calculations will be required for review as well as the CT PE Stamp.

1.05 SAMPLES:

- A. Submit the following samples in accordance with the provisions of the GENERAL CONDITIONS.
1. Submit samples and/or descriptive literature of all items specified in this Section, including treatments, finishes, colors, and test information.

1.06 REGULATIONS, FEES, AND PERMITS:

- A. All materials and the installation thereof shall conform to the requirements of all current Federal, State and local laws, rules and regulations and codes including, but not limited to:

1. ***2022 Connecticut State Building Code***
2. 2017 ICC ANSI A117.1 Accessible and Usable Building & Facilities
3. 2021 ICC Series with CT Amendments
 - 2021 IBC
 - 2021 IECC
 - 2021 IPC
 - 2021 IMC
4. 2023 National Electric Code (NFPA 70)
5. MRA Water Codes and Standards

Where Provisions of the Contract drawings conflict with any codes, laws and regulations, the codes, laws, and regulations shall govern.

- B. All legally imposed charges made by local authorities for the work of this Section involving the connection, inspection and approval services of all bureaus

administering all applicable codes and regulations shall be provided hereunder at no additional expense.

1.07 SPECIFICATIONS AND CLARIFICATION OF MANUFACTURED BUILDING AND SITE INSTALLATION:

- A. The installation of the pre-fabricated modular building on-site must be coordinated between the Offeror and the contractor responsible for the installation of the building foundation/pad shall be provided herein as part of the Work of this Contract. Due to the responsibility of the Offeror for design and engineering and the requirement to provide a five (5) year warranty, the site pad/foundation must comply with the Offeror's design so the pad and building can be considered as being from a single source for warranty purposes. The Offeror must accept the pad and compactions tests in writing before taking responsibility for the entire system under the specified warranty requirements.

1.08 INSURANCE:

- A. INSURANCE FOR THE BUILDING OFF-SITE, WHILE IN TRANSIT, AND/OR ON SITE UNTIL TURN OVER AND FINAL OWNER ACCEPTANCE

The Offeror may request invoicing for a percentage of building completion in-plant, monthly. Under UCC law, this means that the Offeror is turning over responsibility for the portion invoiced to the owner yet the building will not be on the owner's property and may not be covered by the owner's insurance. Therefore, the building Offeror must provide a separate insurance policy insuring the owner and Offeror as additionally insured for liability, damage and/or vandalism to the building while in the manufacturing facility, while in transit, and/or while in storage at a certified bonded storage facility or at the final project site for up to \$200,000 for each prefabricated building module, until the building is final accepted by owner.

PART II - PRODUCTS

2.01 MANUFACTURED BUILDING OFFEROR:

- A. Bid Standard for the Manufactured Building:

The client understands that there are several firms who design and build various types of public restroom buildings in varying quality and architectural styles, using similar or different construction methods and materials. For this bid, the owner has selected as a basis of design:

Public Restroom Company, 2587 Business Parkway Minden, NV 89423 and specifies herein that this firm is the standard for architectural design. PRC contact information is (888-888-2060).

The proposed building shall be to the size and dimensions shown on the plans and

attached drawings. Please note drawings are attached to this specification to illustrate the Basis of Design only and that “or equal Offerors or their subcontractor in the case of entities certified in General Building Construction who meet the specification requirements will be considered.

B. “Or Equal Restroom Design/Build Offerors”

1. In order to provide full and open competition, other modular manufacturers or in the case of entities certified in General Building Construction their subcontractors may request approval as “or equal.” The following items must be provided to the Town as submittals. Failure to supply these items will result in rejection of the submittal.
 - a. Or Equal applicant shall provide scaled floor plans and elevations to show general architectural design criteria is met.
 - b. Or Equal applicant shall provide a written list of each deviation from the published bid specifications/plans.
 - c. Or Equal applicant shall provide, manufacturers cut sheets for each deviation from the bid specifications.
 - d. Or Equal applicant shall provide manufacturer’s certification of test compliance from a national independent testing laboratory to support the claim for absorption resistance of the slab type that will be used in their proposed restroom. The written report must state the concrete compressive strength and absorption resistance per ASTM standard #C39 and #C642 respectively.
 - e. Or Equal applicant must provide a list of at least 5 buildings they designed and built over the last 3 years. Provide date of building bid, date of completion, and most knowledgeable owner contact.
 - f. Or Equal applicant shall provide certification of the special insurance required in this bid.
 - g. Or Equal applicant shall be responsible for and bear all cost for architecture, plan checks, design and structural engineering and all fees in obtaining approvals and permits from applicable agencies.

C. Certificate of off-site inspection and construction compliance, provision for maintenance manuals, and warranty

- a. The off-site restroom construction requires that a licensed third-party inspection firm provide the owner and the local building official with certification and compliance for the building with the approved plans and specifications. A certificate of compliance shall be issued by this inspector to the local building official to provide certification that the building meets and/or exceeds the approve plans and applicable codes.
- b. At the project conclusion, the building Offeror shall furnish two sets of complete maintenance manuals including a troubleshooting guide, location of manufacturers of key components for replacement parts together with final as-built plans, and a five (5) year warranty to the Owner.

D. Site Scope of Work by Selected Bidder and Offeror

1. The Selected Bidder shall prepare the manufactured building pad to receive the prefabricated building in accordance with the Offeror's "pad preparation drawings."
2. The building pad shall be excavated to 14" deep from the final building concrete slab elevation, the Selected Bidder shall provide 4' deep footings and bearing beams as shown on the Design plans and required by code.
3. The building pad shall meet a 90% compaction in lifts using class 2 base for the first four inches and coarse sand for the last two inches of the pad, leaving the finished sub grade pad elevation at finished floor, minus 8".
4. The Selected Bidder shall provide water point of service at 30" below finished building slab; sewer at 24" below the finished building slab; and electrical at 36" below the finished building slab or other per bid plans.
5. The Offeror shall coordinate to provide full site delivery access for a 70' tractor- trailer and hydro crane to the final building site.
6. If the final site access is over existing sidewalks, utilities, or landscaping, the Offeror shall be responsible for plating and or tree trimming, utility line removal, or other to protect any existing conditions.
7. The hydro crane must be able to locate no greater than 35' from the center point of the building to the center point of the crane.
8. The utilities shall be furnished per bid site plans at specified points of connection (POC) nominally 6' from the building line.

E. Connection to Utilities

1. The Selected bidder will furnish and install traffic rated lockable concrete Christy curb boxes for Electrical, Water, and Sewer at the proper POINT OF CONNECTION AND AT THE PROPER ELEVATION BELOW GRADE, for this project. Restroom subcontractor shall provide final hook up of the water from building to POC; sewer hookup to POC; and electrical sleeve from building panel to POC only. Final utility connections shall be by Offeror or others. Offeror shall flush the water lines thoroughly before making final water connection and contaminating the fresh water supply to the building.

F. Concrete Slab, Required Independent Testing Laboratory Certification:

1. The manufactured building slab special concrete technology claims to be water and urine resistant for life due to special additive technology. The building subcontractor must furnish a test certification of compliance from a national independent testing laboratory to support the claim for

absorption resistance. The written report must state the concrete compressive strength and absorption resistance per ASTM standard #C642 and #C39 respectively.

2.02 MATERIALS:

A. Mat Engineered Concrete Building Slab/Foundation:

1. The mat engineered 8" thick slab/foundation shall be engineered and constructed to withstand the transportation weight of the building without cracking and to resist absorption from any liquids deposited on the surface. The concrete slab shall be constructed inside a steel angle curb, reinforced with dual mats (tension and compression,) and poured with a custom concrete formula with special admixtures to create a finished slab that is waterproof for life.
2. Perimeter Steel Curb: 5/16" 50,000-kip steel 6" X 6" welded continuous angle.
3. Rebar Steel Mat: Two layers of 40,000 tensile steel rebar in varying sizes per engineer's requirements, including a perimeter structural continuous grade beam design inside the exterior steel angle and at any other location deemed by the engineer of record as required for the use intended. In coastal locations or when required for corrosion resistance rebar shall be epoxy coated or fiberglass to resist permanent corrosion. Rebar mats shall be wire tied to code with a minimum of three turns of the wire and overlaps shall be minimum of 15 diameters for any connection.
4. All slab openings shall be surrounded with two layers of steel collars as required by the engineer of record to stop corner cracking and to reinforce the openings for lifting.
5. 1" thick by 3" minimum length threaded nuts shall be welded to the steel perimeter frame with continuous 1/4" fillet welds. Nuts shall be welded to common steel plates per the engineer of records design and attached to the interior steel rebar structural mats.
6. The engineer of record shall provide lifting locations with sufficient reinforcement to allow the safe lifting of the entire designed weight of the structure with dual 1" steel bolts and washers at each lifting location. The number of lifting locations with each location fitted with removable 3/4" 8" X 8" 50,000 tensile strength steel angles shall be determined by the engineer of record.
7. All floors shall slope to any floor drains within each room and if no floor drain is present the floor should not slope. The surface shall be a very light broom that should meet a coefficient of friction on the surface of .06. Birdbaths shall be cause for rejection.
8. After the site concrete sidewalks are poured, the joint shall be full flow sealed with self-leveling grey urethane caulk to prevent penetration of

water into the joint.

9. The building system shall be designed for placement on a site prepared class 2 building pad/and or footings as required by code, per the bid drawings, suitable for 1500 pounds' soil bearing capacity minimum. Any soils survey (if necessary) shall be by owner or engineer of record.

B. Exterior & Interior Masonry Block Walls

1. The exterior walls shall be 8" thick CMU per Connecticut codes or engineering for wind and seismic to the height shown on the plans. The interior CMU walls shall be min. 4" CMU but shall be sized as required to conceal plumbing piping where required.
2. The 8" mat engineered concrete slab shall be cured a minimum of 7 days. Holes for vertical dowels shall be drilled into the mat engineered slab avoiding any grade beams or other structural reinforcement. Once the holes are drilled, blow out the remaining material and using two part structural epoxy, wet set the #3 or #4 vertical rebar (as specified on the engineering calculations into holes drilled to the depth per the engineer of record requirements. Each rebar shall be held vertical to allow equal epoxy support to each dowel during the drying period. Engineering calculations require that rebar shall be installed in each concrete block center void or every block hole. The engineered uplift on each rebar shall be sufficient to restrain any load imposed on the masonry block wall for vertical rebar pull out from the concrete mat engineered slab.
3. The block walls shall be nominal 8" x 16" CMU. The building corners shall have special corner return block that matches the exterior finish and creates a uniform appearance. All 4" CMU shall be custom fabricated with an enlarged interior hole for placement of the grout and vertical rebar.

C. Roof System

1. The roof structure shall be 2" x 6" wood rafters at 24" on center with 5/8" OSB sheathing and ice and water shield membrane with 26 gauge standing seam metal roof panels, color selected by owner. The rake and fascia shall be 14 gauge formed steel painted in a color selected by owner. The rake and fascia shall be 14 gauge formed steel painted in a color selected by Owner.
2. Roof overhang to be 2'-0" around entire perimeter of building. Refer to plan for additional overhang at front entrance to mens and womens restrooms where columns are located.
3. Roof shall be designed per plans to reduce vandals climbing on roof and to obtain proper ventilation size openings for the gables to provide fan-free ventilation.

4. Provide perimeter gutters with continuous hinged leaf guard system. Downspouts and gutter, k-style, are to be .032" aluminum minimum. Refer to drawings for downspout locations.
5. The restroom ventilation screens (described in a following section) shall be attached to the truss frames and non-removable by vandals. Roof color shall be determined by owner.

D. Interior Wall Finish:

1. Interior precision CMU block masonry walls shall be smoothed to a pebble grain finish with two (2) 4 mil layers of 7-day curing block fillers and painted with two (2) additional 4 mil layers of industrial high solids (white) industrial grade enamel.

E. Natural Ventilation System

1. Shall be woven ¼" X 1" X 1", 316T, stainless steel woven crimp-stop wire mesh set into stainless steel welded frames and fastened to the steel frame with vandal-resistant screws.
2. Removable Lexan winter panels shall be provided at each screened opening.

F. Personnel Doors, Coiling Doors, and Gates

1. All entry doors shall be 7'-0" high, custom fabricated, fiberglass, reinforced with a welded plate for door closer mounting. Doors shall be hung on a single continuous, 1 million cycle, aluminum gear hinge with stainless steel vandal resistant screws at nominal 4" on center. Custom fabricated fiberglass door jambs with 4" heads shall be solid filled with 3000 psi masonry grout mix. Stainless steel vandal resistant fasteners shall be used on all hardware. Doors shall be come pre-finished, color to be selected by Owner.
2. All entry doors shall have a 1/8" thick plate stainless steel "Z-shaped" anti-microbial pull handles with integral latch guard and Schlage B-600 series commercial series dead bolts.
3. The door closer (restroom entry doors only) shall be "LCN" heavy duty #4211 Series, fastened to a structural reinforced door plate per door manufacturer design. Stainless steel vandal resistant fasteners shall be used on all hardware.
4. Door Sweeps, Thresholds and Weather stripping shall be included on all exterior doors.
5. MAGNETIC DOOR LOCKING SYSTEM: Securitron Magnalock SAM System magnetic time clock-controlled lock system shall be furnished for each public entry door. A touch to exit button shall be installed adjacent to each door for emergency egress in the event that the system magnetic lock

engages. System shall also remain operating for a minimum two-hour power out cycle by a self-charging battery backup.

6. Coiling Doors to be aluminum slat door with chain hoist and electric motor. Motor is to be 1/3 HP minimum with vandal controller to keep public out of building. Basis of Design is "Coil Away", Model 600, by Overhead Door Inc. Color selected from full range of manufactured standard color selection.

2.03 PLUMBING:

All manufactured building plumbing shall be installed in accordance with the CT state building code & IPC 2021 and all other applicable codes.

A. MATERIALS:

1. WATER PIPING: shall be type L copper soldered per code above grade and type K with silver solder below grade. All water piping shall be designed and constructed with high and low point drain fittings. All piping shall be mounted on Uni-strut wall brackets with neoprene isolators, to code.
2. WATER PRESSURE GAUGE: install one commercial grade Industrial water pressure gauge, isolation ball valve, and check valve.
3. CHECK VALVE: a single backflow in line check valve shall be placed on the incoming water service before the isolation valve.
4. Plumbing Faucets, Isolation Valves and Actuators: All fixtures except those with flush valves shall be isolated with ball valves for each fixture, concealed antimicrobial impregnated flush handle valves, and metered push-button lavatory faucets.
5. DWV PIPING: DWV piping shall be concealed behind the wall. DWV piping shall be PVC DWV, solvent welded, for all concealed piping. A cast iron no hub DWV vent pipe with a cast iron roof mounted vandal cap vent shall be required, through the roof.
6. REMOVABLE PIPE TRAPS: All floor drain, sink drain, and waste traps shall be removable for maintenance. Floor drains shall be trapped behind the wall in the utility chase using a combination waste and vent system. Floor drains shall be increased two pipe sizes over standard to allow code use. Trap primers for restroom floor drains shall be installed in the utility chase. All surface mounted utility chase piping shall be mounted on Uni-strut with plastic isolators to code. Sink drain traps shall be concealed behind the utility chase walls where maintenance staff can access all plumbing.
7. PRESSURE REDUCING VALVE: Provide all valves and requirements per MRA Water Requirements.

- B. **PLUMBING FIXTURES:** Plumbing fixtures shall be stainless steel manufactured by Acorn. Toilets and urinal shall be wall hung, rear discharge, with concealed anti-microbial, lever-type, flush valves. Toilet seats shall be black solid core plastic, non-flammable construction with continuous stainless steel concealed self-checking hinges. Lavatories shall have concealed remote traps behind the mechanical wall.

Schedule of fixtures:

1. Water Closets: Acorn Penal-Ware, 1675-W-1-HET-FVBO-9-ada-PFS
2. Water Closet Flush Valve: Zurn ZH6152AV-HET-7L-BG
3. Lavatories: Acorn Penal-ware 1652LRB-1-DMS-03-M-H1

C. **Other Materials**

1. **FLOOR GRATES:** Removable 350 lbs per square foot pultruded fiberglass non-skid floor grates shall be installed over every opening in the utility chase for OSHA protection/compliance.
2. **HOSE BIB:** There shall be one freeze resistant hose bib provided in the utility chase in the restroom building and one for each of the following restrooms. Provide one on the exterior of the building as indicated in the drawings.
3. **HOSE REEL:** One commercial grade hose reel with capacity for 75' X 3/4" commercial heavy-duty hose and nozzle shall be hung in mechanical room for cleaning of restrooms. One 3/4" X 75' commercial hose shall be furnished.
4. **TEMPERING VALVE:** Watts MMV-US-M1

2.04 **BATHROOM ACCESSORIES:**

1. All specialty washroom equipment shall be commercial grade stainless steel fastened securely to walls with vandal resistant stainless-steel screws to avoid removal by vandals as follows:
2. Toilet paper holder shall be a Royce Rolls TP-3, covered, three-roll, 18-gauge stainless steel with lock. Toilet paper holders shall be attached to block walls with 4 epoxy bedded vandal resistant stainless-steel fasteners.
3. Stainless steel grab bars to code shall be 1 1/4" minimum exposed fastener vandal resistant design and installed at each accessible water closet.
4. Mirrors to be B-290 series by Bobrick, 18" wide x 36" tall.

5. Soap Dispensers to be B-2111 by Bobrick, 40 fl oz with soap refill window. Vandal resistant with special key to open for refilling.
6. Cast Aluminum T-24 compliant door signs shall be recessed into block surface flush with masonry exterior. Signs shall have raised pointed Braille tips and shall be blind secured with epoxy adhesive and stainless-steel fasteners.
7. Hand dryers shall be Dyson Airblade V, nickel finish, mounted adjacent to lavatories.
8. Toilet Partitions (overhead braced), and urinal screens to be Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material. Hinges and brackets to full height / continuous. Basis of design is Hiny Hiders by Scranton Products.
9. Fold-down baby changing stations to be Koala Kare, Model KB200-01SS.

2.05 ELECTRICAL:

1. GENERAL: Electrical system and components shall be commercial grade or better and piping conduits shall be installed on commercial Uni-strut wall hangers. Interior electrical lighting fixtures in public areas shall provide lifetime manufacturer's warranty.
2. PANEL/WIRING: One 200-amp panel, Square "D" QO series, shall be mounted in the utility chase in the restroom building. All breakers shall be snap-in type, minimum 10,000 A.I.C. RMS (Sym) at 120/240 vac. Wiring shall be stranded copper wire #12 min in EMT piping with screw fittings.
3. PIPING: All piping in the utility chase shall be surface mounted to the masonry block walls with minimum of 2" fastener penetration. EMT conduit shall be compression type. Main panel shall maintain a 30" X 36" safety code required clear space, floor to 6' above finished floor.
4. EXTERIOR LIGHTING: Luminaire AEL12, Dark Sky Compliant LED, vandal resistant, high-impact polycarbonate lens fixtures shall be installed per plans. (one on each elevation of the building).
5. INTERIOR LIGHTING: Luminaire SWP1212, 15-watt LED vandal resistant high-impact polycarbonate lens fixtures shall be installed in the restrooms per plans (3 in each restroom). The utility chase shall have one (3), 4' double-tube LED fixture, suitable for wet locations, with a single switch at door entry.
6. LIGHTING CONTROL: All interior restroom lighting shall be controlled by integral occupancy sensors and 2 bypass switches (one for interior

lighting and one for exterior lighting), so maintenance staff can check operation during daylight hours. A single photocell, roof mounted, and shall control all exterior lighting.

7. ELECTRICAL OUTLETS: One (1) commercial spec grade duplex outlet shall be provided in the utility chase adjacent to the panel. Provide (1) outlet for the coiling door motor in the storage room. Also provide exterior vandal proof outlet near the coiling door for town employees to utilize.
8. HAND DRYER: Shall be Dyson Airblade V, nickel finish, mounted adjacent to lavatories. Coordinate exact requirements once submittal has been reviewed and approved.
9. WATER HEATER (Restroom Lavatories): Shall be a Stiebel tankless located in the utility chase.

2.06 CASTS IN PLACE CONCRETE FOR FOOTINGS:

- A. Concrete for footings will be cast in place cement concrete as set forth in Section 03 30 00 of these Specifications. The G.C. is to coordinate footings with the requirements of the selected Modular Bathroom Facility Offeror.

PART III – BASIS OF PAYMENT FOR MODULAR BATHROOM

Payment for “Manufactured Buildings” shall be paid for under the contract lump sum item price, which shall include all labor, tools, materials, equipment, transportation, and all other incidental work as necessary to provide a complete, functional, and proper installation.

END OF SECTION

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

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. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 3. Sealing Elements: EPDM and/or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 4. Pressure Plates: Plastic, Carbon steel, Stainless steel. Include two for each sealing element.
 - 5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating, Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMISSIONING OF SYSTEMS AND EQUIPMENT

- A. Engage a factory-authorized service representative or technician who is familiar with this project to participate and assist, if necessary, in the functional performance testing of the equipment include in this Division with the Commissioning Agent.

3.2 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.
- F. Devices on wall shall be installed on a common vertical center line wherever possible.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.

- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/2-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.
- N. Exterior-Wall Penetrations: Seal all penetrations once the demo/remediation is complete.

SLEEVE-SEAL INSTALLATION

- O. Install to seal exterior wall penetrations.
- P. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.5 COMMISSIONING OF EQUIPMENT

- A. Engage a factory authorized service representative, who is familiar with this project, to participate and assist, if necessary, in the functional performance testing of the equipment include in this Division with the Commissioning Agent.

END OF SECTION 260500

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.
- D. Product Schedule: Indicate type, use, location, and termination locations.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- C. Aluminum and Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- E. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC, metal-clad cable, Type MC, mineral-insulated, and metal-sheathed cable, Type MI with ground wire.
- F. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 and ASTM B 496 for stranded conductors.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.4 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Plastic, Carbon steel, Stainless steel. Include two (2) for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one (1) for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: All feeders and service entrance cables shall be Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- F. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- J. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- K. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- M. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- N. Class 2 Control Circuits: Type THHN-THWN, in raceway Power-limited cable, concealed in building finishes, Power-limited tray cable, in cable tray.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 - 2. For sleeve rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both wall surfaces.
- G. Extend sleeves installed in floors 2 inches above finished floor level.

- H. Size pipe sleeves to provide ¼-inch annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- M. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations
- B. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- C. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.8 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than sixty (60) days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice eleven (11) months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Foundation steel electrodes.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Ground rings.
 - 4. Grounding arrangements and connections for separately derived systems.
 - 5. Grounding for sensitive electronic equipment.
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Field quality-control reports.
- E. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at test wells, ground rings, and grounding connections for separately derived systems based on NETA MTS and NFPA 70B.

- a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
- b. Include recommended testing intervals.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 1. No. 4 AWG minimum, soft-drawn copper.
 2. Conductor Protector: Half-round PVC or wood molding; if wood, use pressure-treated fir, cypress, or cedar.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression and exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt or socket set screw.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- J. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- K. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- L. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- M. Straps: Solid copper, copper lugs. Rated for 600 A.
- N. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal [one] [two]-piece clamp.
- O. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- P. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with zinc-plated or stainless-steel bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad, sectional type; 3/4 inch by 10 feet (19 mm by 3 m) and 5/8 by 96 inches (16 by 2400 mm) in diameter.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
 2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
 1. Bury at least 24 inches (600 mm) below grade.
 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- E. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.

4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
 9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters,

dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- G. Metal and Wood Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- H. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column and/or indicated item, extending around the perimeter of building, area, and/or item indicated.
1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
 2. Bury ground ring not less than 24 inches (600 mm) from building's foundation.
- I. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet (6.0 m) long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

3.6 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order,

and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

- E. Grounding system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
 - 5. Substations and Pad-Mounted Equipment: 5 ohms.
 - 6. Manhole Grounds: 10 ohms.
- H. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five (5) times the applied force.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA 4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.

- f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
- 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch-diameter holes at a maximum of 8 inches o.c., in at least one (1) surface.
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 - 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 - 3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 - 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
- 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated and stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be ¼ inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least twenty-five percent (25%) in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps single-bolt conduit clamps single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1½-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1, with lock washers and nuts, Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69, Spring-tension clamps.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, twenty-eight (28) day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

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. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
 - 2. For handholes and boxes for underground wiring, including the following:
 - a. Duct entry provisions, including locations and duct sizes.
 - b. Frame and cover design.
 - c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 - e. Joint details.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Structural members in the paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
- D. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Qualification Data: For professional engineer and testing agency.
- F. Source quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.
- C. Rigid Steel Conduit: ANSI C80.1.
- D. Aluminum Rigid Conduit: ANSI C80.5.
- E. IMC: ANSI C80.6.
- F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit and IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- G. EMT: ANSI C80.3.
- H. FMC: Zinc-coated steel or aluminum.
- I. LFMC: Flexible steel conduit with PVC jacket.
- J. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel or die-cast and set-screw or compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- K. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Aruco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.; Pipe & Plastics Group.
 - 6. Condux International, Inc.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; a Hubbell Company.
 - 12. Thomas & Betts Corporation.
- C. ENT: NEMA TC 13.
- D. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- E. LFNC: UL 1660.
- F. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- G. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.
- D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- E. Wireway Covers: Hinged type, Screw-cover type, Flanged-and-gasketed type, or as indicated.
- F. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- C. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- D. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- E. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Thomas & Betts Corporation.
 - b. Walker Systems, Inc.; Wiremold Company (The).
 - c. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard or custom colors.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Butler Manufacturing Company; Walker Division.
 - b. Enduro Systems, Inc.; Composite Products Division.
 - c. Hubbell Incorporated; Wiring Device-Kellems Division.
 - d. Lamson & Sessions; Carlon Electrical Products.
 - e. Panduit Corp.
 - f. Walker Systems, Inc.; Wiremold Company (The).
 - g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 2. EGS/Appleton Electric.
 3. Erickson Electrical Equipment Company.
 4. Hoffman.
 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 6. O-Z/Gedney; a unit of General Signal.
 7. RACO; a Hubbell Company.
 8. Robroy Industries, Inc.; Enclosure Division.
 9. Scott Fetzer Co.; Adalet Division.
 10. Spring City Electrical Manufacturing Company.
 11. Thomas & Betts Corporation.
 12. Walker Systems, Inc.; Wiremold Company (The).
 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- C. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, cast ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- F. Metal Floor Boxes: Cast iron or sheet metal, fully adjustable, rectangular.
- G. Nonmetallic Floor Boxes: Nonadjustable, round.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized cast iron with gasketed cover.

- J. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

- K. Cabinets:
 - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 - 1. Color of Frame and Cover: Gray.
 - 2. Configuration: Units shall be designed for flush burial and have integral closed bottom, unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, "ELECTRIC." And "TELEPHONE.", or as indicated for each service.
 - 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - 7. Handholes 2 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. NewBasis.

- C. **Fiberglass Handholes and Boxes with Polymer-Concrete Frame and Cover:** Sheet-molded, fiberglass-reinforced, polyester-resin enclosure joined to polymer-concrete top ring or frame.
1. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 3. **Basis-of-Design Product:** Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. Christy Concrete Products.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
- D. **Fiberglass Handholes and Boxes:** Molded of fiberglass-reinforced polyester resin, with covers of polymer concrete.
1. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 3. **Basis-of-Design Product:** Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Carson Industries LLC.
 - b. Christy Concrete Products.
 - c. Nordic Fiberglass, Inc.

2.8 SLEEVES FOR RACEWAYS

- A. **Steel Pipe Sleeves:** ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. **Cast-Iron Pipe Sleeves:** Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. **Sleeves for Rectangular Openings:** Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.
- D. **Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."**

2.9 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.10 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by a independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit, IMC, RNC, Type EPC-40-PVC, RNC, Type EPC-80-PVC.
 - 2. Concealed Conduit, Aboveground: Rigid steel conduit, IMC, RNC, Type EPC-40-PVC, RNC, Type EPC-80-PVC.

3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC and/or LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
6. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete and Fiberglass enclosures with polymer-concrete frame and cover, SCTE 77, Tier 15 structural load rating.
 - b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Heavy-duty fiberglass units with polymer-concrete frame and cover, SCTE 77, Tier 8 structural load rating.
 - c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf (13 345-N) vertical loading.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT, ENT, or RNC. Exposed, Not Subject to Severe Physical Damage: EMT, RNC identified for such use.
2. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT, ENT, or RNC, Type EPC-40-PVC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: Rigid steel conduit.
6. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway, EMT.
7. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway, EMT.
8. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: General-use, optical fiber/communications cable raceway, Riser-type, optical fiber/communications cable raceway, Plenum-type, optical fiber/communications cable raceway, EMT.
9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel nonmetallic in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
 2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).
1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 - d. Attics: 135 deg F (75 deg C) temperature change.
 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- O. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

P. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

Q. Set metal floor boxes level and flush with finished floor surface.

R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits, placing them 24 inches (600 mm) o.c. Align planks along the width and along the centerline of conduit.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below the frost line, below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.8 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

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. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct bank, and in single duct runs.
2. Handholes and pull boxes.
3. Manholes.

1.3 DEFINITION

- A. RNC: Rigid nonmetallic conduit.
- B. GRC: Galvanized rigid (steel) conduit.
- C. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- D. Duct Bank:
 1. Two or more ducts installed in parallel, with or without additional casing materials.
 2. Multiple duct banks.
- E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Duct-bank materials, including separators and miscellaneous components.
2. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Accessories for handholes, pull boxes, and other utility structures.
4. Warning tape.
5. Warning planks.

- B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
 - 1. Duct entry provisions, including locations and duct sizes.
 - 2. Reinforcement details.
 - 3. Frame and cover design and manhole frame support rings.
 - 4. Grounding details.
 - 5. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
 - 6. Joint details.

 - C. Shop Drawings for Factory-Fabricated Handholes and Pull Boxes Other Than Precast Concrete: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:
 - 1. Duct entry provisions, including locations and duct sizes.
 - 2. Cover design.
 - 3. Grounding details.
 - 4. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

 - D. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
 - 1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
 - 2. Drawings shall be signed and sealed by a qualified professional engineer.

 - E. Product Certificates: For concrete and steel used in precast concrete manholes, pull boxes, and handholes, comply with ASTM C 858.

 - F. Qualification Data: For qualified professional engineer and testing agency.

 - G. Source quality-control reports.

 - H. Field quality-control reports.
- 1.5 QUALITY ASSURANCE
- A. Comply with IEEE C2.
 - B. Comply with NFPA 70.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

- B. Store precast concrete and other factory-fabricated underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
- C. Lift and support precast concrete units only at designated lifting or supporting points.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Architect and Construction Manager no fewer than two (2) days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Architect's and Construction Manager's written permission.

1.8 COORDINATION

- A. Coordinate layout and installation of ducts, handholes, and pull boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.
- B. Coordinate elevations of ducts and duct-bank entrances into handholes, and pull boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Furnish cable-support stanchions, arms, insulators, and associated fasteners in quantities equal to five percent (5%) of quantity of each item installed.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AFC Cable Systems.
 2. ARNCO Corporation.
 3. Beck Manufacturing.
 4. Cantex, Inc.
 5. CertainTeed Corp.
 6. Condux International, Inc.
 7. DCX-CHOL Enterprises, Inc.; ELECSYS Division.
 8. Electri-Flex Company.
 9. IPEX Inc.
 10. Lamson & Sessions; Carlon Electrical Products.
 11. Manhattan Wire Products; a Belden company.
- B. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
- C. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type DB-60-PVC and Type DB-120-PVC, ASTM F 512, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
- D. Duct Accessories:
1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and retained to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
 2. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification for Electrical Systems."
 3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches in size, manufactured from 6000-psi concrete.
 - a. Color: Red dye added to concrete during batching.
 - b. Mark each plank with "ELECTRIC" in 2-inch-high, 3/8-inch-deep letters.

2.3 PRECAST CONCRETE HANDHOLES AND PULL BOXES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Christy Concrete Products.
 2. Cretex Concrete Products West, Inc.; Riverton Division.
 3. Elmhurst-Chicago Stone Co.
 4. Oldcastle Precast Group.
 5. Oldcastle Precast Inc.; Utility Vault Division.
 6. Utility Concrete Products, LLC.

7. Wausau Tile Inc.
- B. Comply with ASTM C 858 for design and manufacturing processes.
- C. Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153 and ASTM A 123.
- D. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or pull box.
 1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing stainless-steel bolts.
 2. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing stainless-steel bolts.
 3. Frame and Cover: Weatherproof steel frame, with hinged steel access door assembly with tamper-resistant, captive, cover-securing stainless-steel bolts.
 - a. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - b. Cover Handle: Recessed.
 4. Frame and Cover: Weatherproof aluminum frame with hinged aluminum access door assembly with tamper-resistant, captive, cover-securing stainless-steel bolts.
 - a. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - b. Cover Handle: Recessed.
 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 6. Cover Legend: Molded lettering, "ELECTRIC.", "TELEPHONE.", and as indicated for each service.
 7. Configuration: Units shall be designed for flush burial and have integral closed bottom unless otherwise indicated.
 8. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - a. Extension shall provide increased depth of 12 inches.
 - b. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
 9. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
 - a. Windows shall be located no less than 6 inches from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
 - b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
 - c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.

10. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - a. Type and size shall match fittings to duct or conduit to be terminated.
 - b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
11. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.4 HANDHOLES AND PULL BOXES OTHER THAN PRECAST CONCRETE

A. Description: Comply with SCTE 77.

1. Color: Gray.
2. Configuration: Units shall be designed for flush burial and have integral closed bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering,
 - a. "ELECTRIC.", "TELEPHONE.", and as indicated for each service.
 - b. Tier level number, indicating that the unit complies with the structural load test for that tier according to SCTE 77.
6. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, retained to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
7. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

B. Polymer Concrete Handholes and Pull Boxes with Polymer Concrete Cover: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two (2). Handholes and pull boxes shall comply with the requirements of SCTE 77 Tier 8 and Tier 15 loading.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. Hubbell Power Systems; Lenoir City Division.
 - e. NewBasis.

- C. **Fiberglass Handholes and Pull Boxes with Polymer Concrete Frame and Cover:** Complying with SCTE 77 Tier 8 and Tier 15 loading. Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. Christy Concrete Products.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
- D. **Fiberglass Handholes and Pull Boxes:** Molded of fiberglass-reinforced polyester resin, with covers of polymer concrete, complying with SCTE 77 Tier 8 and Tier 5 loading.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carson Industries LLC.
 - b. Christy Concrete Products.
 - c. Nordic Fiberglass, Inc.
- E. **High-Density Plastic Pull Boxes:** Injection molded of high-density polyethylene or copolymer-polypropylene, complying with SCTE 77 Light Duty loading. Cover shall be polymer concrete.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carson Industries LLC.
 - b. Nordic Fiberglass, Inc.
 - c. Pencil Plastics.

2.5 UTILITY STRUCTURE ACCESSORIES

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bilco Company (The).
 2. Campbell Foundry Company.
 3. Christy Concrete Products.
 4. Cretex Concrete Products West, Inc.; Riverton Division.
 5. East Jordan Iron Works.
 6. Elmhurst-Chicago Stone Co.
 7. Hubbell Power Systems; Lenoir City Division.
 8. McKinley Iron Works.
 9. Neenah Foundry Company.
 10. NewBasis.

11. Oldcastle Precast Group.
 12. Oldcastle Precast Inc.; Utility Vault Division.
 13. Osburn Associates, Inc.
 14. Pennsylvania Insert Corporation.
 15. Underground Devices, Inc.
 16. Utility Concrete Products, LLC.
 17. Wausau Tile Inc.
- B. Ferrous metal hardware, where indicated, shall be hot-dip galvanized complying with ASTM A 153 and A 123.
- C. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch-diameter eye, and 1-by-4-inch bolt.
1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
- D. Pulling Eyes in Nonconcrete Walls: Eyebolt with reinforced fastening, 1¼-inch-diameter eye, rated 2500-lbf minimum tension.
- E. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch-diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
- F. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; ½-inch ID by 2¾ inches deep, flared to 1¼ inches minimum at base.
1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- G. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with ½-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
- H. Cable Rack Assembly: Steel, hot-dip galvanized except insulators.
1. Stanchions: T-section or channel; 2¼-inch nominal size; punched with 14 holes on 1½-inch centers for cable-arm attachment.
 2. Arms: 1½ inches wide, lengths ranging from 3 inches with 450-lb minimum capacity to 18 inches with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
 3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
- I. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.
1. Stanchions: Nominal 36 inches high by 4 inches wide, with minimum of nine (9) holes for arm attachment.

2. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches with 450-lb minimum capacity to 20 inches with 250-lb minimum capacity. Top of arm shall be nominally 4 inches wide, and arm shall have slots along full length for cable ties.
- J. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- K. Fixed Manhole Ladders: Arranged for attachment to wall of manhole. Ladder and mounting brackets and braces shall be fabricated from nonconductive, structural-grade, fiberglass-reinforced resin.
- L. Cover Hooks: Heavy duty, designed for lifts 60 lbf and greater. Two (2) required.

2.6 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.
- B. Nonconcrete Handhole and Pull Box Prototype Test: Test prototypes of manholes and pull boxes for compliance with SCTE 77. Strength tests shall be for specified Tier ratings of products supplied.
 1. Testing Agency: Owner will engage a qualified testing agency to evaluate nonconcrete handholes and pull boxes.
 2. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 CORROSION PROTECTION

- A. Aluminum shall not be installed in contact with earth or concrete.

3.2 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Cables over 600 V: RNC, NEMA Type EPC-40-PVC, in concrete-encased duct bank unless otherwise indicated.
- B. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40 PVC, in direct-buried duct bank unless otherwise indicated.
- C. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.

- D. Underground Ducts for Telephone, Communications, or Data Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.
- E. Underground Ducts Crossing Driveways, Roadways, and Railroads: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Pull Boxes for 600 V and Less, Including Telephone, Communications, and Data Wiring:
 - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.
 - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 or Tier 22 structural load rating.
 - 3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: structural load rating.
 - 4. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf "Light-Duty" vertical loading.
 - 5. .

3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Cut and patch existing pavement in the path of underground ducts and utility structures.

3.5 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 25 ft. both horizontally and vertically, at other locations unless otherwise indicated.

- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inch ducts, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to end-bell spacing 10 ft. from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.
 - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 ft. outside the building wall without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Division 26 Section "Common Work Results for Electrical."
- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf-test nylon cord in ducts, including spares.
- H. Concrete-Encased Ducts: Support ducts on duct separators.
 - 1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than five (5) spacers per 20 ft. of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
 - 2. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
 - a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
 - b. If more than one (1) pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.
 - 3. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
6. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and signal ducts.
7. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
8. Stub-Ups: Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.
9. Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
10. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

I. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
2. Space separators close enough to prevent sagging and deforming of ducts, with not less than five (5) spacers per 20 ft. of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Division 31 Section "Earth Moving."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.

7. Depth: Install top of duct bank at least 36 inches below finished grade unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
10. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
11. Warning Planks: Bury warning planks approximately 12 inches above direct-buried ducts and duct banks, placing them 24 inches o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each 12-inch increment of duct bank width over a nominal 18 inches. Space additional planks 12 inches apart, horizontally.

3.6 INSTALLATION OF CONCRETE, HANDHOLES, AND PULL BOXES

A. Precast Concrete Handhole Installation:

1. Comply with ASTM C 891 unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

B. Elevations:

1. Set other manhole frames 1 inch above finished grade.
2. Install handholes with bottom below the frost line, below grade.
3. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
4. Where indicated, cast handhole cover frame integrally with handhole structure.

C. Drainage: Install drains in bottom where indicated. Coordinate with drainage provisions indicated.

D. Waterproofing: Apply waterproofing to exterior surfaces of manholes and handholes after concrete has cured at least three (3) days. Waterproofing materials and installation are specified in Division 07. After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three (3) days.

- E. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
- F. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
- G. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two (2) anchors for each cable stanchion.
- H. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.

3.7 INSTALLATION OF HANDHOLES AND PULL BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and pull boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use pull box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
- B. Unless otherwise indicated, support units on a level 6-inch-thick bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: Set so cover surface will be flush with finished grade.
- D. Install handholes and pull boxes with bottom below the frost line, below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Retain arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
- G. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.
 - 1. Concrete: 3000 psi, twenty-eight (28) day strength, complying with Division 03 Section "Cast-in-Place Concrete," with a troweled finish.
 - 2. Dimensions: 10 inches wide by 12 inches deep.

3.8 GROUNDING

- A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to eighty percent (80%) fill of duct. If obstructions are indicated, remove obstructions and retest.
 - 3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.
- C. Prepare test and inspection reports.

3.10 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 260543

SECTION 26 05 44

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

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. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
- 2. Sleeve-seal systems.
- 3. Sleeve-seal fittings.
- 4. Grout.
- 5. Silicone sealants.

- B. Related Requirements:

- 1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:

- 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
- 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

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- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Sealing Elements: EPDM or Nitrile (Buna N)] rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Carbon steel, Plastic or Stainless steel].
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide [1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 26 05 48

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

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. This Section includes the following:

- 1. Isolation pads.
- 2. Spring isolators.
- 3. Restrained spring isolators.
- 4. Channel support systems.
- 5. Restraint cables.
- 6. Hanger rod stiffeners.
- 7. Anchorage bushings and washers.

- B. Related Sections include the following:

- 1. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:

- 1. Site Class as Defined in the IBC: E.
- 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 5.5.

- c. Component Amplification Factor: 1.0.
3. Design Spectral Response Acceleration at Short Periods (0.2 Second).

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.
2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.

9. Vibration Mountings & Controls, Inc.
 - B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 1. Resilient Material: Oil- and water-resistant neoprene.
 - C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
 - D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti Inc.
 5. Loos & Co.; Seismic Earthquake Division.
 6. Mason Industries.
 7. TOLCO Incorporated; a brand of NIBCO INC.

8. Unistrut; Tyco International, Ltd.
 - B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
 - C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
 - D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
 - E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.
 - F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
 - G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
 - H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
 - I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
 - J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 1. Install restrained isolators on electrical equipment.
 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator restraint clearance.
 7. Measure isolator deflection.

8. Verify snubber minimum clearances.
9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high letters on 20-inch (500-mm) centers.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- I. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high letters on 20-inch (500-mm) centers.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- D. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
- B. Furnish and install tape at location in accordance with NEC 110.26 for all electrical distribution equipment.

2.6 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- C. Tag: Type I:
 - 1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 2. Thickness: 4 mils (0.1 mm).
 - 3. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
 - 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 30 lbf (133.4 N), and 2500 psi (17.2 MPa).
- D. Tag: Type II:
 - 1. Multilayer laminate consisting of high-density polyethylene scrim coated with pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 2. Thickness: 12 mils (0.3 mm).
 - 3. Weight: 36.1 lb/1000 sq. ft. (17.6 kg/100 sq. m).
 - 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 400 lbf (1780 N), and 11,500 psi (79.2 MPa).
- E. Tag: Type ID:
 - 1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of

the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.

2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

F. Tag: Type IID:

1. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 8 mils (0.2 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 34 lb/1000 sq. ft. (16.6 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 300 lbf (1334 N), and 12,500 psi (86.1 MPa).

2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.9 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.10 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).

3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

2.12 POWER RECEPTACLES

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm)

2.13 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- J. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at 30-foot (10-m) maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot (10-m) maximum intervals.
- D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Power.
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

- F. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags, nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- G. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- H. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- J. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- N. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual.

Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:
 - a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label [Stenciled legend 4 inches (100 mm) high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive and engraved laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Enclosed controllers.
 - d. Contactors.

END OF SECTION 260553

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

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. This Section includes computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.
 - 1. Coordination of series-rated devices is permitted where indicated on Drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals may be in digital form.
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and Equipment Evaluation Reports.
 - 3. Coordination-Study Report.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For coordination-study specialist.
- B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

1.5 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

- B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.
- C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.
- D. Comply with IEEE 399 for general study procedures.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide [the product indicated on Drawings] or a comparable product by one of the following:
 - 1. CGI CYME.
 - 2. EDSA Micro Corporation.
 - 3. ESA Inc.
 - 4. Operation Technology, Inc.
 - 5. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.
 - 1. Optional Features:
 - a. Arcing faults.
 - b. Simultaneous faults.
 - c. Explicit negative sequence.
 - d. Mutual coupling in zero sequence.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

- A. Gather and tabulate the following input data to support coordination study:
1. Product Data for overcurrent protective devices specified in other electrical Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Impedance of utility service entrance.
 3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
 - a. Circuit-breaker and fuse-current ratings and types.
 - b. Relays and associated power and current transformer ratings and ratios.
 - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
 - d. Generator kilovolt amperes, size, voltage, and source impedance.
 - e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
 - f. Busway ampacity and impedance.
 - g. Motor horsepower and code letter designation according to NEMA MG 1.
 4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Generator thermal-damage curve.
 - e. Ratings, types, and settings of utility company's overcurrent protective devices.
 - f. Special overcurrent protective device settings or types stipulated by utility company.

- g. Time-current-characteristic curves of devices indicated to be coordinated.
- h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
- i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
- j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.3 FAULT-CURRENT STUDY

- A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:
 - 1. Switchgear and switchboard bus.
 - 2. Medium-voltage controller.
 - 3. Motor-control center.
 - 4. Distribution panelboard.
 - 5. Branch circuit panelboard.
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
- D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 141, IEEE 241 and IEEE 242.
 - 1. Transformers:
 - a. ANSI C57.12.10.
 - b. ANSI C57.12.22.
 - c. ANSI C57.12.40.
 - d. IEEE C57.12.00.
 - e. IEEE C57.96.
 - 2. Medium-Voltage Circuit Breakers: IEEE C37.010.
 - 3. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
 - 4. Low-Voltage Fuses: IEEE C37.46.
- E. Study Report:
 - 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.

2. Show interrupting (5-cycle) and time-delayed currents (6 cycles and above) on medium-voltage breakers as needed to set relays and assess the sensitivity of overcurrent relays.

F. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.4 COORDINATION STUDY

- A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.
 1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
 2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
 3. Calculate the maximum and minimum ground-fault currents.
- B. Comply with IEEE 141, IEEE 241 and IEEE 242 recommendations for fault currents and time intervals.
 1. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.
- C. Motors served by voltages more than 600 V shall be protected according to IEEE 620.
- D. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.
- E. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:
 1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
 - a. Device tag.
 - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
 - c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.

- d. Fuse-current rating and type.
 - e. Ground-fault relay-pickup and time-delay settings.
2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
- a. Device tag.
 - b. Voltage and current ratio for curves.
 - c. Three-phase and single-phase damage points for each transformer.
 - d. No damage, melting, and clearing curves for fuses.
 - e. Cable damage curves.
 - f. Transformer inrush points.
 - g. Maximum fault-current cutoff point.
- F. Completed data sheets for setting of overcurrent protective devices.

END OF SECTION 260573

SECTION 26 05 74

OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY

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 a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.3 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- D. SCCR: Short-circuit current rating.
- E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.
 - 1. Arc-flash study input data, including completed computer program input data sheets.
 - 2. Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.

- a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Arc-Flash Study Software Developer Retain "Product Certificates" Paragraph below to require submittal of product certificates from manufacturers.
- B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 1. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.
 2. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.7 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing

laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Comply with IEEE 1584 and NFPA 70E.
- B. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Cable size and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output: As specified in "Short Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
- F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."
- G. Arc-Flash Study Output:
 - 1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.

- d. No AC Decrement (NACD) ratio.
- e. Equivalent impedance.
- f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
- g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

2.3 ARC-FLASH WARNING LABELS

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis.
- B. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
 1. Location designation.
 2. Nominal voltage.
 3. Flash protection boundary.
 4. Hazard risk category.
 5. Incident energy.
 6. Working distance.
 7. Engineering report number, revision number, and issue date.
- C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. Preparatory Studies:
 - 1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
 - 2. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."
- C. Calculate maximum and minimum contributions of fault-current size.
 - 1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
 - 2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
- D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.
- E. Include medium- and low-voltage equipment locations, except equipment rated 240-V ac or less fed from transformers less than 125 kVA.
- F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.
- G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
 - 1. Fault contribution from induction motors should not be considered beyond three to five cycles.
 - 2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g., contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).
- H. Arc-flash computation shall include both line and load side of a circuit breaker as follows:
 - 1. When the circuit breaker is in a separate enclosure.
 - 2. When the line terminals of the circuit breaker are separate from the work location.
- I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

- A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.
1. Verify completeness of data supplied on the one-line diagram on Drawings[and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article]. Call discrepancies to the attention of Architect.
 2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
 3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers.
- B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Obtain electrical power utility impedance at the service.
 3. Power sources and ties.
 4. Short-circuit current at each system bus, three phase and line-to-ground.
 5. Full-load current of all loads.
 6. Voltage level at each bus.
 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in per cent, and phase shift.
 8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
 9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
 11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
 12. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
 13. Motor horsepower and NEMA MG 1 code letter designation.
 14. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
 15. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.

3.4 LABELING

- A. Apply one arc-flash label for 600-V ac, 480-V ac, and applicable 208-V ac panelboards and disconnects and for each of the following locations:
 - 1. Motor-control center.
 - 2. Low-voltage switchboard.
 - 3. Switchgear.
 - 4. Medium-voltage switch.
 - 5. Control panel.

3.5 APPLICATION OF WARNING LABELS

- A. Install the arc-fault warning labels under the direct supervision and control of the Arc-Flash Study Specialist.

3.6 DEMONSTRATION

- A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 260574

SECTION 260923
LIGHTING CONTROL DEVICES

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. This Section includes the following lighting control devices:
 - 1. Time switches.
 - 2. Outdoor and indoor photoelectric switches.
 - 3. Lighting contactors.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
 - a. Refer to specifications 017823 Operation and Maintenance Data for additional O&M requirements

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Area Lighting Research, Inc.; Tyco Electronics.
 - 2. Grasslin Controls Corporation; a GE Industrial Systems Company.
 - 3. Intermatic, Inc.
 - 4. Leviton Mfg. Company Inc.
 - 5. Lightolier Controls; a Genlyte Company.
 - 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 - 7. Paragon Electric Co.; Invensys Climate Controls.
 - 8. Square D; Schneider Electric.
 - 9. TORK.
 - 10. Touch-Plate, Inc.
 - 11. Watt Stopper (The).
- B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
 - 1. Contact Configuration: SPST, DPST, and DPDT.
 - 2. Contact Rating: 30-A inductive or resistive, 240-V ac, and 20-A ballast load, 120/240-V ac.
 - 3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
 - 4. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
 - 5. Programs: channels; each channel shall be individually programmable with 8 on-off set points on a 24-hour schedule.
 - 6. Programs: channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule with skip-a-day weekly schedule.

7. Programs: channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week.
8. Programs: channels; each channel shall be individually programmable with 40 on-off operations per week and an annual holiday schedule that overrides the weekly operation on holidays.
9. Programs: channels; each channel shall be individually programmable with 40 on-off operations per week, plus 4 seasonal schedules that modify the basic program, and an annual holiday schedule that overrides the weekly operation on holidays.
10. Program: an annual holiday schedule that overrides the weekly operation on holidays.
11. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
12. Astronomic Time: All channels.
13. Battery Backup: For schedules and time clock.

C. Electromechanical-Dial Time Switches: Type complying with UL 917.

1. Contact Configuration: SPST, DPST, SPDT, and DPDT.
2. Contact Rating: 30-A inductive or resistive, 240-V ac, 20-A ballast load, 120/240-V ac.
3. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
4. Astronomic time dial.
5. Eight-Day Program: Uniquely programmable for each weekday and holidays.
6. Skip-a-day mode.
7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings:

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Grasslin Controls Corporation; a GE Industrial Systems Company.
3. Intermatic, Inc.
4. Lithonia Lighting; Acuity Lighting Group, Inc.
5. Novitas, Inc.
6. Paragon Electric Co.; Invensys Climate Controls.
7. Square D; Schneider Electric.
8. TORK.
9. Touch-Plate, Inc.
10. Watt Stopper (The).

B. Description: Solid state, with SPST and DPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.

2. Time Delay: 15-second minimum, to prevent false operation.
 3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
 4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
- C. Description: Solid state, with SPST and DPST dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773.
1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
 2. Time Delay: 30-second minimum, to prevent false operation.
 3. Lightning Arrester: Air-gap type.
 4. Mounting: Twist lock complying with IEEE C136.10, with base.

2.3 INDOOR PHOTOELECTRIC SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Allen-Bradley/Rockwell Automation.
 2. Area Lighting Research, Inc.; Tyco Electronics.
 3. Eaton Electrical Inc; Cutler-Hammer Products.
 4. Grasslin Controls Corporation; a GE Industrial Systems Company.
 5. Intermatic, Inc.
 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 7. MicroLite Lighting Control Systems.
 8. Novitas, Inc.
 9. Paragon Electric Co.; Invensys Climate Controls.
 10. Square D; Schneider Electric.
 11. TORK.
 12. Touch-Plate, Inc.
 13. Watt Stopper (The).
 - 14.

2.4 LIGHTING CONTACTORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Allen-Bradley/Rockwell Automation.
 2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 3. Eaton Electrical Inc.; Cutler-Hammer Products.
 4. GE Industrial Systems; Total Lighting Control.

5. Grasslin Controls Corporation; a GE Industrial Systems Company.
 6. Hubbell Lighting.
 7. Lithonia Lighting; Acuity Lighting Group, Inc.
 8. MicroLite Lighting Control Systems.
 9. Square D; Schneider Electric.
 10. TORK.
 11. Touch-Plate, Inc.
 12. Watt Stopper (The).
- B. Description: Electrically operated and electrically held, combination type with nonfused disconnect, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as indicated on Drawings and schedule, matching the NEMA type specified for the enclosure.
- C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
1. Monitoring: On-off status.
 2. Control: On-off operation.

2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 260923

SECTION 26 24 16

PANELBOARDS

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. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.

8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graph paper; include selectable ranges for each type of overcurrent protective device.
- C. Qualification Data: For qualified testing agency.
 - D. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - E. Field Quality-Control Reports:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
 - F. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
 - G. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.
- 1.5 QUALITY ASSURANCE
- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
 - B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
 - C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 1.
- F. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407 and NEMA PB 1.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 6600 feet (2000 m).
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Architect and Construction Manager Owner no fewer than two days in advance of proposed interruption of electric service.
 - 2. Do not proceed with interruption of electric service without Architect's and Construction Manager's written permission.
 - 3. Comply with NFPA 70E.

1.8 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.
 - 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250

- b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Kitchen and Wash-Down Areas: NEMA 250, Type 4X.
 - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5 or Type 12.
 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
 6. Finishes:
 - a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Same finish as panels and trim.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
 7. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- C. Incoming Mains Location: Top and bottom.
- D. Phase, Neutral, and Ground Buses:
 1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
 5. Split Bus: Vertical buses divided into individual vertical sections.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Main and Neutral Lugs: Compression type.
 3. Ground Lugs and Bus-Configured Terminators: Compression type.
 4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 6. Gutter-Tap Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.
- I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- C. Panelboards: NEMA PB 1, power and feeder distribution type.
- 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. Mains: Circuit breaker, Fused switch, and Lugs only.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in Bolt-on circuit breakers.
- G. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- H. Branch Overcurrent Protective Devices: Fused switches.

- I. Contactors in Main Bus: NEMA ICS 2, Class A, electrically and/or mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120-V branch circuit.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- C. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- D. Mains: Circuit breaker or lugs only.
- E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- F. Contactors in Main Bus: NEMA ICS 2, Class A, electrically and/or mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120-V branch circuit.
- G. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- H. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Compression and Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - e. Communication Capability: Universal-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
 - f. Shunt Trip: 120 and/or 24 V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 - g. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
 - h. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
 - i. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.

- j. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 - k. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
 - l. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
 - m. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - n. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
- 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section "Fuses."
 - 2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
 - 3. Auxiliary Contacts: One normally open and normally closed contact(s) that operate with switch handle operation.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407 and/or NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NECA 407 and/or NEMA PB 1.1.

- B. Equipment Mounting: Install panelboards on concrete bases, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
 - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to panelboards.
 - 5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- D. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- E. Mount top of trim [90 inches (2286 mm) above finished floor unless otherwise indicated.
- F. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- G. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- H. Install filler plates in unused spaces.
- I. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- J. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- K. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. The CxA must be provided with a least two weeks notice of any scheduled field quality control testing.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- E. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- F. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- G. Panelboards will be considered defective if they do not pass tests and inspections.

- H. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study."
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 26 27 13
ELECTRICITY METERING

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 equipment for electricity metering by utility company and electricity metering by Owner.

1.3 DEFINITIONS

- A. KY Pulse: Term used by the metering industry to describe a method of measuring consumption of electricity that is based on a relay opening and closing in response to the rotation of the disk in the meter.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Dimensioned plans and sections or elevation layouts.
 - 2. Wiring Diagrams: For power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.
- C. Field quality-control reports.
- D. Operation and Maintenance Data. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - 1. Application and operating software documentation.
 - 2. Software licenses.
 - 3. Software service agreement.
 - 4. Hard copies of manufacturer's operating specifications, design user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy Submittal.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

1.7 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 - 1. Comply with requirements of utilities providing electrical power services.
 - 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.
- C. Meter Sockets: Comply with requirements of electrical-power utility company.
- D. Meter Sockets: Steady-state and short-circuit current ratings shall meet indicated circuit ratings.
- E. Modular Meter Center: Factory-coordinated assembly of a main service terminal box with lugs only and/or disconnect device, wireways, tenant meter socket modules, and tenant feeder circuit breakers arranged in adjacent vertical sections. Assembly shall be complete with interconnecting buses and other features as specified below.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one (1) of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 - c. Siemens Energy & Automation, Inc.
 - d. Square D; a brand of Schneider Electric
 - 2. Comply with requirements of utility company for meter center.
 - 3. Housing: NEMA 250, Type 3R enclosure.
 - 4. 100,000 A symmetrical at rated voltage.

5. Main Disconnect Device: Circuit breaker, series-combination rated for use with downstream feeder and branch circuit breakers.
6. Main Disconnect Device: Fusible switch, series-combination rated by circuit-breaker manufacturer to protect downstream feeder and branch circuit breakers.
7. Tenant Feeder Circuit Breakers: Series-combination-rated molded-case units, rated to protect circuit breakers in downstream tenant and to house loadcenters and panelboards that have 22,000-A interrupting capacity.
 - a. Identification: Complying with requirements in Section 260553 "Identification for Electrical Systems" with legend identifying tenant's address.
 - b. Physical Protection: Tamper resistant, with hasp for padlock.
8. Meter Socket: Rating coordinated with indicated tenant feeder circuit rating.
9. Surge Protection: For main disconnect device, comply with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
- C. Install modular meter center according to NECA 400 switchboard installation requirements.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.
 2. Equipment Identification Labels: Adhesive film labels with clear protective overlay. For residential meters, provide an additional card holder suitable for printed, weather-resistant card with occupant's name.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. Connect a load of known kilowatt rating, 1.5 kW minimum, to a circuit supplied by metered feeder.
 2. Turn off circuits supplied by metered feeder and secure them in off condition.
 3. Run test load continuously for 8 hours minimum, or longer, to obtain a measurable meter indication. Use test-load placement and setting that ensures continuous, safe operation.
 4. Check and record meter reading at end of test period and compare with actual electricity used, based on test-load rating, duration of test, and sample measurements of supply voltage at test-load connection. Record test results.
- C. Electricity metering will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262713

SECTION 26 27 26

WIRING DEVICES

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. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Digital timer light switches

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5351 (single), 5352 (duplex).
 - b. Hubbell; HBL5351 (single), CR5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5381 (single), 5352 (duplex).
- B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; TR8300.
 - b. Hubbell; HBL8300SG.
 - c. Leviton; 8300-SGG.
 - d. Pass & Seymour; 63H.
3. Description: Labeled to comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; GF20.
 - b. Pass & Seymour; 2084.

2.4 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; L520R.
 - b. Hubbell; HBL2310.
 - c. Leviton; 2310.
 - d. Pass & Seymour; L520-R.

2.5 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 1. Plate-Securing Screws: Stainless, tamper resistant with trident pan head matching current building standard.

2. Material for Finished Spaces: Brushed stainless.
 3. Material for Unfinished Spaces: Brushed stainless for flush box installations, raised galvanized for surface box installations.
 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet locations while in use.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, thermoplastic with lockable cover.

2.6 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
1. Wiring Devices Connected to Normal Power System: Ivory and/or as selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Power System: Red.
 3. TVSS Devices: Blue.
 4. Isolated-Ground Receptacles: Orange and/or as specified above, with orange triangle on face.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

4. Existing Conductors:

- a. Cut back and pigtail, or replace all damaged conductors.
- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailling existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
10. Install GFCI devices in all wet locations.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles and Switches: Identify panelboard and circuit number from which served. Use self-adhesive labels with black lettering on white field mounted on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

- C. Test straight blade convenience outlets in patient-care areas and hospital-grade convenience outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

END OF SECTION 262726

SECTION 26 56 13

LIGHTING POLES AND STANDARDS

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. Poles and accessories for support of luminaires.
 - 2. Luminaire-lowering devices.

1.3 DEFINITIONS

- A. EPA: Equivalent projected area.
- B. Luminaire: Complete lighting fixture.
- C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.
- D. Standard: See "Pole."

1.4 ACTION SUBMITTALS

- A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device, arranged as indicated.
 - 1. Include data on construction details, profiles, EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
 - 2. Include finishes for lighting poles and luminaire-supporting devices.
 - 3. Anchor bolts.
 - 4. Manufactured pole foundations.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

3. Detail fabrication and assembly of poles and pole accessories.
 4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
 5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
 6. Method and procedure of pole installation. Include manufacturer's written installations.
- C. Samples: For each exposed lighting pole, standard, and luminaire-supporting device and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements according to AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations signed and sealed by a professional engineer.
- B. Qualification Data: For Installer and testing agency.
- C. Seismic Qualification Certificates: For accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Material Test Reports:
1. For each foundation component, by a qualified testing agency.
 2. For each pole, by a qualified testing agency.
- E. Source quality-control reports.
- F. Field quality-control reports.
- G. Sample Warranty: Manufacturer's standard warranty.
- H. Soil test reports

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For poles and luminaire-lowering devices to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include pole inspection and repair procedures.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Pole repair materials.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for foundation testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole to be installed below finished grade.
- D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.
- E. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) and luminaire-lowering device(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
 - 2. Warranty Period for Corrosion Resistance: Five years from date of Substantial Completion.
 - 3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design pole foundation and pole power system.

- B. Seismic Performance: Foundation and pole shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event.
 - 2. Component Importance Factor: 1.5 or 1.0.
- C. Structural Characteristics: Comply with AASHTO LTS-6-M.
- D. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.
- E. Live Load: Single load of 500 lbf distributed according to AASHTO LTS-6-M.
- F. Ice Load: Load of 3 lbf/sq. ft., applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.
- G. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M.
 - 1. Basic wind speed for calculating wind load for poles exceeding 50 feet in height is 100 mph, 90 mph.
 - a. Wind Importance Factor: 1.0.
 - b. Minimum Design Life: 50 years.
 - c. Velocity Conversion Factor: 1.0.
 - 2. Basic wind speed for calculating wind load for poles 50 feet high or less is 100 mph, 90 mph.
 - a. Wind Importance Factor: 1.0.
 - b. Minimum Design Life: 25 years.
 - c. Velocity Conversion Factor: 1.0.
- H. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.
- I. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

2.2 STEEL POLES

- A. Source Limitations: Obtain poles from single manufacturer or producer.
- B. Source Limitations: For poles, obtain each color, grade, finish, type, and variety of pole from single source with resources to provide products of consistent quality in appearance and physical properties.

- C. Poles: Comply with ASTM A 500/A 500M, Grade B carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in height with access handhole in pole wall.
 - 1. Shape: Square, straight.
 - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- D. Poles: Comply with ASTM A 240/A 240M or ASTM A 666, stainless steel with a minimum yield of 55,000 psig ; one-piece construction up to 40 feet in height with access handhole in pole wall.
 - 1. Shape: Square, straight.
 - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- E. Steel Mast Arms: Single-arm type, continuously welded to pole attachment plate. Material and finish same as plate.
- F. Brackets for Luminaires: Detachable, cantilever, without underbrace.
 - 1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with galvanized-steel bolts.
 - 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire. Match pole material and finish.
- G. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- H. Fasteners: Galvanized steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
 - 1. Materials: Compatible with poles and standards as well as the substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
 - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- I. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size indicated, and accessible through handhole.
- J. Steps: Fixed steel, with nonslip treads.
 - 1. For climbing positions, install at 15-inch vertical spacing, alternating on opposite sides of pole, oriented 180 degrees from each other; first step shall be at an elevation 10 feet above finished grade.
 - 2. For working positions, install steps on opposite side of pole, oriented 180 degrees from each other at the same elevation.
- K. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.

- L. Intermediate Handhole and Cable Support: Weatherproof, 3-by-5-inch handhole located at midpoint of pole, with cover for access to internal welded attachment lug for electric cable support grip.
- M. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported load multiplied by a 5.0 safety factor.
- N. Platform for Lamp and Ballast Servicing: Factory fabricated of steel, with finish matching that of pole.
- O. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- P. Galvanized Finish: After fabrication, hot-dip galvanize according to ASTM A 123/A 123M.
- Q. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
 - 3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high gloss, high-build polyurethane enamel.
 - a. Color: As selected by Architect.
- R. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Powder Coat: Comply with AAMA 2604.
 - a. Electrostatic-applied powder coating; single application and cured to a minimum 2.5- to 3.5-mils dry film thickness. Coat interior and exterior of pole for equal corrosion protection.
 - b. Color: As selected by Architect.

2.3 POLE ACCESSORIES

- A. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.

2.4 MOUNTING HARDWARE

- A. Anchor Bolts: Manufactured to ASTM F 1554, Grade 55, with a minimum yield strength of 55,000 psi.
 - 1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C Mechanically deposited galvanization according to ASTM B 695, Class 50.
 - 2. Headed rods
 - 3. Threading: Uniform National Coarse or Uniform National 8, Class 2A.
- B. Nuts: ASTM A 563, Grade A, Heavy-Hex
 - 1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C Mechanically deposited galvanization according to ASTM B 695, Class 50.
 - 2. Four nuts provided per anchor bolt, shipped with nuts pre-assembled to the anchor bolts.
- C. Washers: ASTM F 436, Type 1.
 - 1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C Mechanically deposited galvanization according to ASTM B 695, Class 50.
 - 2. Two washers provided per anchor bolt.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine poles, luminaire-mounting devices, lowering devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.
- C. Examine roughing-in for foundation and conduit to verify actual locations of installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 POLE FOUNDATION

- A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123 M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Pre-Cast Foundations: Factory fabricated, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- C. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories.
 - 1. Baseplate: Stamped with manufacturer's name, date of production, and cable entry.
- D. Direct-Buried Foundations: Install to depth indicated on Drawings, but not less than as indicated. Add backfill in 6-inch to 9-inch layers, tamping each layer before adding the next, To ensure a plumb installation, continuously check pole orientation with plumb bob while tamping.
- E. Direct-Buried Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height as indicated. To ensure a plumb installation, continuously check pole orientation with plumb bob while tamping.
 - 1. Make holes 6 inches in diameter larger than pole diameter.
 - 2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days and finish in a dome above finished grade.
 - 3. Use a short piece of 1/2-inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
 - 4. Cure concrete a minimum of 72 hours before performing work on pole.
- F. Anchor Bolts: Install plumb using manufacturer-supplied template, uniformly spaced.

3.3 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on drawing.
 - 1. Fire Hydrants and Water Piping: 60 inches.
 - 2. Water, Gas, Electric, Communications, and Sewer Lines: 10 feet.
 - 3. Trees: 15 feet from tree trunk.

- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."
- D. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.
 - 1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 - 2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
 - 3. Install base covers unless otherwise indicated.
 - 4. Use a short piece of 1/2 -inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6-inch wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch below top of concrete slab.
- F. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

3.4 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.
- B. Steel Conduits: Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

3.5 GROUNDING

- A. Ground Metal Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground Nonmetallic Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole.
 - 2. Install grounding conductor and conductor protector.
 - 3. Ground metallic components of pole accessories and foundation.

3.6 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Inspect poles for nicks, mars, dents, scratches, and other damage.
 - 2. System function tests.

END OF SECTION 265613

SECTION 26 56 19

LED EXTERIOR LIGHTING

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. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.
3. Luminaire-mounted photoelectric relays.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 OR IES LM-80.
 - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
6. Wiring diagrams for power, control, and signal wiring.
7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each luminaire and for each color and texture indicated with factory-applied finish.

D. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For luminaire supports.

1. Include design calculations for luminaire supports and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Structural members to which luminaires will be attached.
3. Underground utilities and structures.
4. Existing underground utilities and structures.
5. Above-grade utilities and structures.
6. Existing above-grade utilities and structures.

7. Building features.
 8. Vertical and horizontal information.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of the following:
1. Luminaire.
 2. Photoelectric relay.
- E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency
- F. Source quality-control reports.
- G. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
 2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
 4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- E. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- F. Mockups: For exterior luminaires, complete with power and control connections.
 - 1. Obtain Architect's approval of luminaires in mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- F. Bulb shape complying with ANSI C79.1.
- G. CRI of minimum 65 70 80 CCT of 2700 K, 3000 K, 4100 K
- H. L70 lamp life of 50,000 hours.
- I. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- J. Internal driver.
- K. Nominal Operating Voltage: 120 V ac.

- L. In-line Fusing: On the primary for each luminaire.
- M. Lamp Rating: Lamp marked for outdoor use and in enclosed locations.
- N. Source Limitations: Obtain luminaires from single source from a single manufacturer.
- O. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
 - 1. Relay with locking-type receptacle shall comply with ANSI C136.10.
 - 2. Adjustable window slide for adjusting on-off set points.

2.4 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Stainless steel. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
 - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
 - 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage and coating.
 - c. CCT and CRI for all luminaires.

2.5 FINISHES

A. Variations in Finishes: 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.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected from manufacturer's standard catalog of colors.

2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
 1. Sized and rated for luminaire weight.

2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:

1. Attached using through bolts and backing plates on either side of wall] <Insert means of attachment.

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

A. Aim as indicated on Drawings.

B. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.5 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
 - a. IES LM-5.
 - b. IES LM-50.
 - c. IES LM-52.
 - d. IES LM-64.
 - e. IES LM-72.
 - 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.
- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.9 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Architect.

Bartlem Park
Cheshire, CT

Weston & Sampson, Inc.
Construction Documents
November 18, 2022

END OF SECTION 265619

SECTION 26 56 68

EXTERIOR ATHLETIC LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. The purpose of these specifications is to define the performance and design standards for Cheshire Bartlem Part. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the Football Field.
- D. The primary goals of this sports lighting project are:
 - 1. **Guaranteed Light Levels:** Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated.
 - 2. **Control and Monitoring:** To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system including all costs to monitor for 25 years. Fields should be proactively monitored to detect fixture outages over a 25-year life cycle. All communication costs shall be included in the bid.

Environmental Light Control: It is a primary goal of this project to minimize spill light and glare to the players, spectators and adjoining properties.

1.2 LIGHTING PERFORMANCE

- A. **Performance Requirements:** Playing surfaces shall be lit to an average target light level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Average illumination level shall be measured in accordance with the IESNA LM-5-04. Light levels shall be guaranteed not to drop below desired target values from the first 100 hours of operation for the maximum warranty period of 25 years or 10,000 hours.
- B. **Mounting Heights:** To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be 60', 70', 75' and 80'. Higher mounting heights may be required based on photometric report and ability to ensure the top of the beam angle is a minimum of 10 degrees below horizontal.
- C. **Lighting Methodology:** The approved Lighting Method, automated timed power utilizes methodology that adjusts light levels through a series of programmed adjustments. This method must be at or above target light values throughout the 25 years of the contract/warranty provided by the manufacturer. Scans shall reflect initial design lumens,

end of life design lumens, recoverable light loss factor (RLLF), and the Coefficient Utilization (CU) for the design. A +/- 10% design/testing allowance is not acceptable.

1. Lighting Method: Automated Timed Power Adjustments:

- a. The lighting system shall use automated timed power adjustments to achieve a lumen maintenance control strategy as described in the IESNA Lighting Handbook 10th Edition, Lighting Controls Section page 16-8: "Lumen maintenance involves adjusting lamp output over time to maintain constant light output as lamps age and dirt accumulation reduces luminaire output. With lumen maintenance control, either lamps are dimmed when new, or the lamp's current is increased as the system ages."
- b. Independent Test Report: If lamp replacement interval is greater than 3,000 hours, manufacturer shall supply an independent test report with applicable recoverable light loss factors. Manufacturers bidding an automated timed power adjustment system must provide an independent test report certifying the system meets the lumen maintenance control strategy above and verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer with outdoor lighting experience. If report is not provided prior to bid opening, the manufacturer shall provide the initial and maintained designs called for in this specification under Lighting Method #2: Alternate Manufacturers, section 1.2.C.2.
- c. Project References: Manufacturers bidding any form of Automated Timed Power Adjustment light system must provide a minimum of 10 project references within the state of Connecticut that have been completed within the last 12 months utilizing this exact technology. Manufacturer will include project name, project city, and if requested, contact name and contact phone number for each reference.

Football Field Calculations

Area of Lighting	Average Target Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Football	40 footcandles	2.5:1.66	72	30' x 30'
Practice Area	40 footcandles	2.5:1.57	60	30' x 30'

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast and other enclosures shall be factory assembled, aimed, wired and tested.
- B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized

per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.

- C. System Description: Lighting system shall consist of the following:
1. Galvanized steel poles and crossarm assembly.
 2. Non-approved pole technology. Concrete poles will not be accepted. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
 3. Pre-stressed concrete base embedded in concrete backfill allowed to cure for 12-24 hours before pole stress is applied. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel portion of the foundation is located a minimum of 18 inches above final grade. The concrete for anchor bolt foundations shall be allowed to cure for a minimum of 28 days before the pole stress is applied.
 4. All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.
 5. Provide specified quantity of LED fixtures at specified heights to achieve specified performance levels.
 6. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall be touch-safe and include ballast, capacitor and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure. Integral ballast fixtures will not be accepted.
 7. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
 8. Controls and Monitoring Cabinet to provide on-off control and monitoring of the lighting system constructed of NEMA Type 4 aluminum. Communication method shall be provided by manufacturer. Cabinet shall contain custom configured contactor modules for 60 amps, labeled to match field diagrams and electrical design. Manual Off-On-Auto selector switches shall be provided.
 9. Lightning Protection: Manufacturer shall provide integrated lightning grounding via concrete encased electrode grounding system as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A. If grounding is not integrated into the structure, the

Manufacturer shall supply grounding electrodes, copper down conductors and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be not less than 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

- D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:

1. Electric power: 208 Volt, 1 Phase
2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

2.3 STRUCTURAL PARAMETERS

- A. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, the minimum pole mounting heights from the playing field surface shall be as noted in Section 1.2.B & as depicted on the drawings. Higher mounting heights may be required based on photometric performance of manufacturer's luminaires to meet spill and glare requirements.
- B. Support Structure Wind Load Strength: Poles and other support structures, brackets, arms, bases, anchorages and foundations shall be determined based on the 2012 IBC Building Code, wind speed of 120 mph, exposure category C. Luminaire, visor, and crossarm shall withstand 150mph winds and maintain luminaire aiming alignment.
- C. Structural Design: The stress analysis and safety factor of the poles shall conform to AASHTO, Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
- D. Soil Conditions: The design criteria for these specifications are based on soil design parameters as outlined in the geotechnical report.

It shall be the contractor's responsibility to notify the owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the owner's approval / payment for additional costs associated with:

1. Providing engineered foundation embedment design by a CT registered engineer.
 2. Additional materials required to achieve alternate foundation
 3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.
- E. Foundation Drawings: Project specific foundation drawings stamped by a CT registered engineer are required. The foundation drawings must list the moment, shear (horizontal)

force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROLS AND MONITORING

- A. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The manufacturer shall notify the owner of outages within 24 hours, or the next business day. The controller shall determine switch position (Manual or Auto) and contactor status (open or closed)
- B. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields, to only having permission to execute "early off" commands by phone.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- C. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of lamp outages, control operation and service scheduling including relamping operations completed and scheduled.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility
 2. Current lamp hours: shall be tracked separately to reflect the amount of hours on the current set of lamps being used, so relamping can be scheduled accurately.
- D. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Delivery Timing Equipment On-Site: The equipment must be on-site 4-6 weeks from receipt of approved submittals and receipt of complete order information.
- B. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04. For Lighting

Method, Timed Power Adjustment systems, light levels must be measured and exceed the specified target levels.

- C. Field Light Level Accountability
1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warrantee period of 25 Years.
 2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
 3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities.
Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.
- D. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including foot-candles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the manufacturer shall be liable to any or all of the following:
1. Manufacturer shall at his expense provide and install any necessary additional fixtures to meet the minimum lighting standards. The Manufacturer shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional wind load.
 2. Manufacturer shall minimize the Owner's additional long-term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of \$1,000.00 (one thousand dollars) for each additional fixture required.
 3. Manufacturer shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications

3.2 25 YEAR WARRANTY

- A. Each manufacturer shall supply a signed warranty covering the entire system for 25 years or for the maximum hours of coverage based on the estimated annual usage, whichever occurs first. Warranty shall guarantee that the average light levels will not fall below target levels; lamp replacements; system energy consumption; monitoring, maintenance and control services, spill light control, and structural integrity. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.
- B. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual lamp outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

3.3 PRE-BID SUBMITTAL REQUIREMENTS

- A. Approved Product: Musco's TLC® sports lighting system is the approved "Lighting Method" product. All submittal information at the end of this section must be submitted

prior to bid for any alternates using the approved Lighting Method. An addendum will be issued prior to bid, listing any approved alternate lighting manufacturers and the design method to be used.

- B. Design Approval: The owner / engineer will review pre-bid submittals per section 3.3.A from all the manufacturers to ensure compliance to the specification. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- C. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner’s representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION ANY ALTERNATE MANUFACTURERS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements

Tab	Item	Description
A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer’s local representative and his/her phone number. Signed submittal checklist to be included.
B	Equipment Layout	Drawing showing field layout with pole locations
C	On Field Lighting Design	Lighting design drawing(s) showing: <ul style="list-style-type: none"> a. Field Name, date, file number, prepared by b. Outline of field being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
E	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Connecticut. (May be supplied upon award).
F	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring. They will also provide ten (10) references currently using proposed system in the state of Connecticut.
G	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Connecticut.
H	Independent Testing Report	a. Lighting Method is to provide an independent test report certifying the system meets the lumen maintenance control strategy defined in Section 1.2.C.1.a, verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer with outdoor lighting experience.

I	Project References	Manufacturer to provide a list of 10 projects where the technology and specific fixture proposed for this project has been installed in the state of Connecticut. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
J	Product Information	Complete bill of material for all product being provided.
K	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.

The information supplied herein shall be used for the purpose of complying with the specifications for Cheshire Bartlem Park. By signing below, I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 SUBSURFACE DATA

- A. Refer to Section 00 31 32 SUBSURFACE DATA for information on site and subsurface conditions.
- B. Subsurface conditions at the site indicated the presence of shallow refusals encountered at nine of the thirteen boring locations and a prevalence of cobbles and boulders encountered in the test pits at depths as shallow as 0.3 feet.
- C. A majority of the southern portion of the site was historically occupied by barn and shed structures and remnants of these buried concrete foundations were encountered during the subsurface exploration program. The Contractor shall be aware that remnants of old foundations and other buried structures may exist within the work area and may be encountered.
- D. Difficult excavation conditions through cobbles, boulders, and buried structures should be anticipated during construction.
- E. Screening of on-site materials to remove cobbles and boulders will be required if re-used.

1.03 RELATED WORK:

- A. Section 00 31 32, SUBSURFACE DATA
- B. Section 01 11 00, CONTROL OF WORK AND MATERIALS
- C. Section 01 57 19, ENVIRONMENTAL PROTECTION
- D. Section 31 05 19.13, GEOTEXTILE FABRICS
- E. Section 31 11 00, CLEARING AND GRUBBING
- F. Section 31 23 19, DEWATERING

G. Section 31 50 00, SUPPORT OF EXCAVATION

H. Section 32 12 00, PAVING

I. Section 32 91 19, LOAMING AND SEEDING

1.04 SUBMITTALS AND TESTING

A. Samples of all materials proposed for the project shall be submitted to the project site for the Engineer's review. Size of the samples shall be as approved by the Engineer.

B. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil and/or fill material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 1557 for each onsite and borrow soil and/or fill material proposed for fill and backfill.

C. Prior to commencing earthwork activities, submit a work plan describing the earthwork operations including:

1. Frequency and locations of tests and inspections;
2. Equipment list, including excavation, material processing, grading, compaction and moisture control equipment;
3. Locations and methods of excavating;
4. Handling, and stockpiling (if applicable) of excavated material, including methods to keep materials from various sources separated; and
5. Drainage and dewatering (if required).

No work shall be performed until this plan has been approved by the Owner's Engineer.

D. Supply and Quality Control Inspection Results: Submit the results of all sources of supply and quality control inspections and tests. Submittals reviewed beyond the second rejection (or required submittal) shall be provided at no cost to the Owner and shall be reviewed by the Engineer at the Contractor's expense. No work shall be performed until the Owner's Engineer has reviewed the source of supply. It is the Contractor's responsibility to submit the Supply and Quality Control Inspection Results in a timely manner to ensure the project's workflow.

1. Backfill Materials: Submit 20-pound samples for each backfill material from each proposed source including on-site materials to the project site. Samples of off-site soil borrow for submission shall be collected in the presence of the Owner's Engineer so that the Owner's Engineer has the opportunity to see each borrow material at the source.
2. In addition, a certification statement and analytical results shall accompany each

physical sample of earth materials to be imported onto the site, including but not limited to, materials described herein. At a minimum the certification shall state the point of origin and that the material is free of contaminants. The certification shall include representative sample analysis from each point of origin of backfill to be used on the site. The sample(s) shall be analyzed by a certified laboratory for total metals (EPA priority pollutant metals), volatile organic compounds (EPA Method 8260), semi-volatile organic compounds (EPA Method 8270), petroleum hydrocarbons (EPA Method 8100), and Total PCBs and pesticides (EPA Method 8081 and 8082).

3. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and shall be either: 1) a Licensed Environmental Professional registered in the State of Connecticut; 2) a Professional Engineer registered in the State of Connecticut; or 3) an authorized representative of the one of the persons listed above. Samples of each material shall be submitted to a chemical analytical laboratory, certified by the Connecticut Department of Environmental Protection (CTDEEP).
4. Material shall not contain asbestos or other deleterious material.
5. Submit additional samples and geotechnical and analytical test data and certifications for every 1,000 cubic yards (every 500 cubic yards for moisture density curves) of material imported or reused on-site or anytime consistency of material changes in the opinion of the Owner's Engineer. Submit associated chemical laboratory data on the imported materials throughout the course of the Work, if requested by the Owner's Engineer, to evaluate the consistency of the source or process, at no additional cost to the Owner.
6. Information identifying the name of the accredited field and laboratory soil testing subcontractor proposed for documenting conformance of earthwork activities. Include examples of typical field and laboratory test result documentation from the subcontractor that are proposed for use the project. In addition to test results, the report documentation shall include the location and elevation of all tests, materials tested, a description of methods and equipment used, compaction requirements, and conformance or non-conformance. All measuring and testing equipment (MTE) used at the site shall have documentation certifying the MTE has been calibrated within the last year (or sooner if required by subcontractor quality procedures). Calibration certificates shall be provided to the Engineer at least one week prior to MTE use on site.

E. During Construction, submit written confirmation of fill lift thickness, in-place soil moisture content, percentage of compaction, and test depth to the Owner's Engineer before placing the next lift or constructing foundations or structures.

1.05 QUALITY CONTROL

- A. Contractor shall assume full responsibility for quality control inspection and testing, give sufficient notice to the Owner's Engineer to permit the witnessing of the inspections or tests, and provide test results to Owner's Engineer within one day of

completion.

- B. The contractor shall engage a qualified, independent testing agency to perform quality control testing and inspections. Compaction testing shall be performed at the minimum frequency specified.
- C. Source of supply. No earthwork materials will be accepted on the jobsite without written approval of submittals from the Owner's Engineer, as stated in Section 1.4.
- D. The Owner's Engineer reserves the right to perform inspections and tests at any time during the execution of the work.
- E. Notification Point: The Contractor shall give the Owner's Engineer two days' notice in advance of quality control tests and inspections.

1.06 REFERENCE STANDARD:

- A. The following standards are applicable to the work of this section to the extent referenced herein.

1. American Society for Testing and Materials (ASTM)

ASTM C117	Standard Test Method for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
ASTM C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM D1140	Standard Test Method Particle Size Analysis of Soils Standard Test Methods for Determining the Material Finer than No. 200 Sieve in Soils by Washing.
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,00 ft-lbf/ft ³) (2700 kN-m/m ³)
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soils and Rock by Mass ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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| ASTM D2488 | Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) |
| ASTM D4318 | Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils |
| ASTM D4643 | Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating |
| ASTM D6913 | Standard Test Method Particle Size Analysis of Soils |
| ASTM D6938 | Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth). |
2. Connecticut Department of Transportation Standard Specification for Highways and Bridges (Form 818).

1.07 EXAMINATION OF SITE AND DOCUMENTS

- A. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of a lack of knowledge of existing conditions as indicated in the Contract Documents, or obvious from observation of the site.
- B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct, but the Contractor shall have examined them for himself during the bidding period and formed his own conclusions as to the full requirements of the work involved
- C. Refer to Section 00 31 32 SUBSURFACE DATA for information on site and subsurface conditions.

1.08 EXCAVATION CONSIDERATIONS

- A. Earth Excavation or "Excavation" consists of removing materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.
- B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Owner's Engineer. Unauthorized excavation, as well as remedial work required by the Owner's Engineer, shall be at the Contractor's expense.
 - 1. Under footings, foundations, concrete slabs, or other structures, fill unauthorized excavations to the proper elevations with Gravel Borrow as defined herein.

2. Elsewhere, backfill and compact unauthorized excavations as specified for excavations of the same class, unless otherwise required.

C. Additional Excavation:

1. When excavation has reached required subgrade elevations, notify the Owner's Engineer, who will observe subgrade conditions.
2. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and to the lateral extent as required on the drawings and as required by the Owner's Engineer. Replace excavated material as required by the Owner's Engineer.
3. Removal of unsuitable material and its replacement as specified is included in the base Scope of Work and shall be included in the lump sum price. Contractor shall promptly notify the Owner and the Engineer if unsuitable material quantities represent, in the Contractor's opinion, a differing subsurface or physical condition. Any corresponding adjustment to the Contract Price and/or Contract Times shall be made in accordance with the Contract Documents.

D. Rock Excavation:

1. Rock excavation in trenches and footing excavations includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on medium-size track-mounted hydraulic excavator equivalent to Caterpillar Model 215, rated at not less than 90HP flywheel power and 30,000 lb. drawbar pull. Trenches and footing excavations in excess of 10-feet in width are classified as open excavation.
2. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty hydraulic excavating equipment without drilling or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170 HP flywheel power and developing 40,000-lb. breakout force (measured in accordance with SAE J732C).
3. Determination of rock excavation classification will be made by the Owner's Engineer. Typical of materials classified as rock are boulders 3.0 cubic yards or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by the Owner's Engineer. Visual observation of the completed excavation may be made by the Owner's Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Owner's Engineer shall be considered as earth excavation unless accepted by the Owner's

Engineer in writing. Such excavation will be paid on the basis of contract unit rates for this classification.

4. Rock payment lines (if applicable) are limited to the following:

- a. Two feet outside of concrete work for which forms are required.
- b. In footing excavations, one foot below bottom-of-footing elevation.
- c. One foot below bottom-of-slab elevation.
- d. One foot outside of the vertical walls of utility structures.
- e. In pipe trenches, depth limits shall be 6 inches below the bottom of the pipe:

Depth from Ground Surface to Invert of Pipe	Pay Width (Pipe ID)	
		0-24"
0-12'	5'-0"	Pipe I.D. +3'-0"
12-20'	7'-0"	Pipe I.D. +7'-0"
Over 20'	9'-0"	Pipe I.D. +7'-0"

- f. Rock sloping across the width of trench shall have the top of rock established at the rock elevation over the centerline of the pipe.
- g. For all other site improvements not listed above, including but not limited to landscape plantings, and roadways, the payment line for rock removal shall be the subgrade for installation of the earthen components of the particular site improvement.

1.09 EXCAVATION

- A. Perform all excavations and of whatever materials encountered, in a manner as required to allow for placing of temporary earth support, dewatering, forms, installation of pipe and other work, and to permit access for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work. Work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.
- B. All excavations made in open cut will be controlled by the conditions existing at that location. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and utilities as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth bladed bucket or by hand. Subgrades shall be observed by the Owner's Engineer prior to placement of overlying materials including fill, concrete forms, and rebar.

- C. The Contractor shall segregate and stockpile separately materials that are considered suitable for on-site re-use by the Owner's Engineer from unsuitable materials and materials requiring off-site disposal. Costs associated with off-site disposal of materials that are considered suitable for re-use by the Owner's Engineer, whether mixed with unsuitable materials or not, shall be borne by the Contractor.
- D. Temporary excavation support shall be provided in accordance with Section 31 50 00, TEMPORARY SUPPORT OF EXCAVATION.
- E. Dewatering shall be provided in accordance with Section 31 2319, DEWATERING.

1.10 PERMITS, CODES, AND SAFETY REQUIREMENTS

- A. Comply with all rules, regulations, laws and ordinances of the municipality, the State of Connecticut, and other authorities having jurisdiction over the project site or work. All labor, materials, equipment and services necessary to make the work comply with these requirements shall be provided by the Contractor without additional cost to the Owner.
- B. Comply with the provisions of the Manual for Accident Prevention in Construction of the Associated General Contractors of America, Inc., and the requirements of the Occupational Safety and Health Administration, United States Department of Labor.
- C. The Contractor shall obtain and pay for all permits and licenses required to the complete work specified herein and shown on the Contract Drawings.
- D. The Contractor shall not close or obstruct any street, sidewalk, or passageway without written permission from authorities having jurisdiction unless otherwise indicated on the Contract Drawings. The Contractor shall conduct their operations as to minimize interference with the use of roads, driveways, or other facilities near enough to the work to be affected by the work.
- E. The Contractor shall notify Call Before You Dig (CBYD) prior to commencing any excavation work.
- F. The Contractor shall coordinate and provide police details when working in roadways as required by local jurisdictional authorities. Police details will be paid for directly by the Town.

1.11 PROTECTION OF EXISTING CONDITIONS:

- A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

- B. Locate and mark underground utilities to remain in service before beginning the work. All costs associated with protecting, maintaining, relocating, supporting, locating, digging test pits, etc. for all utilities shall be included in the bid price. Protect and support all existing utilities to remain in service during operations. Do not interrupt existing utilities except when authorized in writing by authorities have jurisdiction unless otherwise indicated on the Contract Drawings.
- C. When an active utility line is exposed during construction its location and elevation shall be recorded on the Record Drawings by the Contractor and both the Owner's Engineer and the Utility Owner shall be notified in writing. Active utilities existing on the site shall be carefully protected from damage or relocated as required by the work.
- D. Inactive or abandoned utilities encountered during construction operations shall be removed or abandoned in place by completely filling with grout or Controlled Density Fill in a manner to prevent voids. The location of such utilities shall be recorded on the Record Drawings.
- E. Buried drainage structures and pipes and observation wells, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project
- F. Provide barricades, fences, lights, signs, and all other safety devices required to protect the public against injury.
- G. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points which are disturbed or destroyed.
- H. Acceptance of any of the Contractor's plans, design calculations and methods of construction shall not relieve the Contractor of the responsibility for the adequacy of the excavation lateral support system; preventing damage to existing or new structures, utilities and streets adjacent to excavations; the safety of persons working within excavated areas and the public at large; and excavation dewatering.

1.12 DRAINAGE:

- A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures nor cause excessive disturbance of underlying natural ground or abutting properties.

1.13 FROST PROTECTION AND SNOW REMOVAL:

- A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.
- B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.
- C. Silty soils are highly susceptible to softening and disturbance by construction activity during wet or freezing weather. Subgrade protection is the responsibility of the contractor and special precautions and protective measures appropriate for the weather conditions during construction shall be used during earthwork and foundation construction to preserve the integrity of subgrades. Disturbed subgrades shall be repaired at the sole expense of the Contractor.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. CRUSHED STONE: Crushed stone shall satisfy the requirements listed in CTDOT Article M.01.01 #3.

B. BACKFILL MATERIALS:

- 1. Class B Backfill: Class B backfill shall be granular, well graded, friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.
- 2. Select Backfill: Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
3"	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

C. SPECIAL PIPE BEDDING MATERIAL

- 1. The special pipe bedding material shall consist of a filter fabric installed on the trench bottom before backfilling with crushed stone as specified and as shown on the contract drawings. Filter fabric shall be as specified in Section 31 05 19.13, FILTER FABRIC.

- D. PROCESSED AGGREGATE BASE: Processed Aggregate Base shall satisfy the requirements listed in CTDOT Article M.05.01.
- E. GRAVEL BORROW: Gravel Borrow shall satisfy the requirements listed in CTDOT Article M.02.01-2 for uncrushed bank gravel.
- F. MODIFIED RIPRAP: Modified Riprap shall satisfy the requirements listed in CTDOT Article M.12.02 and the gradation provided in CTDOT Article M.12.02-3.
- G. SAND: Sand shall satisfy the requirements listed in CTDOT Article M.01.01 for fine sand.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The Contract Drawings indicate the proposed finish alignments, elevations, and grades of the work. Establish the line and grade in close conformity with the Contract Drawings. The Owner's Engineer, however, may make minor adjustments in the field as necessary due to conditions encountered.
- B. The Contractor is responsible for establishing construction phasing, means, and methods and interim grading and temporary conditions required to attain the finish product required by the Contract Documents. The Contractor is responsible for all construction, protection, movement, and maintenance of stockpiles. Establish and maintain suitable benchmarks and grade control to accurately perform the work.

3.02 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

- A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.
- B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.
- C. The Contractor shall place a minimum of 12-inch layer of special bedding materials and crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.03 EXCAVATION:

A. GENERAL REQUIREMENTS:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.
2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.
3. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.
4. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.02 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils. All excavated materials shall be stockpiled separately from each other within the limits of work.
5. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.
6. Temporary ditches shall be made as needed to drain off surface water to avoid damage to areas of cut or fill. Such ditches shall be maintained as required for efficient operations, at no additional cost to the Owner.
7. No excavation is permitted below a line drawn downwards at 2 horizontal to 1 vertical from the underside of the closest edge of any in-place footing or utility at a higher elevation without providing adequate sheeting and bracing (designed by a Professional Engineer in Connecticut and retained by the Contractor) to prevent movement of the in-place footing or utility.
8. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as required by the Engineer.

Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

9. Cobbles and boulders within dense well-bonded soils or other competent, naturally deposited soils and/or any other features man-made, man-placed, or natural may be encountered during construction. The Contractor shall implement appropriate means and methods to advance the excavation through these materials and be prepared (equipment readily available) to remove these materials should they be encountered. No separate measurement or payment will be made for removal of these materials.
10. Provide shoring, sheeting, and/or bracing at excavations, as required, to assure complete safety against collapse of earth at the side of excavations. Provide shoring of public utility lines where exposed in the excavations in accordance with rules and regulations of the local authorities, as no additional cost to the Owner.

B. TRENCHES:

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.
2. The Contractor shall satisfy all dewatering requirements specified in Section 31 23 19 DEWATERING, before performing trench excavations.
3. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.
4. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.
5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.
6. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.
7. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures,

the Contractor shall remove such disturbed subgrade to a minimum of 12 inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

C. BUILDING AND FOUNDATION EXCAVATION:

1. Excavations shall not be wider than required to set, brace, and remove forms for concrete, or perform other necessary work.
2. After the excavation has been made, and before forms are set for footings, mats, slabs, or other structures, and before reinforcing is placed, all loose or disturbed material shall be removed from the subgrade. The bearing surface shall then be compacted to meet the requirements of this specification.
3. If, in the opinion of the Engineer, the existing material at subgrade elevation is unsuitable for structural support, the Contractor shall excavate and dispose of the unsuitable material to the required width and depth as required by the Engineer. If, in the opinion of the Engineer, filter fabric is required; the Contractor shall place filter fabric, approved by the Engineer, as per manufacturer's recommendations. Crushed stone shall then be placed in lifts and compacted to required densities. Backfill shall be placed to the bottom of the proposed excavation.

D. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are existing pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.
2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.
3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.04 FILLING AND BACKFILLING:

A. SUBGRADE PREPARATION: The subgrade for site improvements shall be shaped to lines, grades, and cross-sections shown on the Contract Drawings and observed by the Owner's Engineer:

1. These operations shall include any required reshaping and moisture conditioning to obtain proper re-compaction of loose granular materials. All soft or otherwise

unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted according to the requirements of this specification. Any portion, which is not accessible to a roller, shall be thoroughly compacted by other mechanical or manual methods.

2. All subgrades must be observed and accepted by the Owner's Engineer prior to placement of Crushed Stone, Gravel Borrow, or any structure over the subgrade. Observations will include proof-rolling with at least 4 passes of fully loaded, ten cubic yard dump truck over the subgrade or other acceptable compaction equipment subject to the approval of the Owner's Engineer. Where inaccessible, the Owner's Engineer may use steel rod probe, compaction test results or other means to evaluate the suitability of the subgrade.
3. Unsuitable soils or materials present at the subgrade level shall be over-excavated and backfilled with Gravel Borrow or other materials approved by Owner's Engineer.

B. BACKFILL MATERIAL: Unless otherwise specified or directed, the following backfill material shall be placed and compacted to lines, grades, and cross-sections shown on the Contract Drawings and observed by the Owner's Engineer:

1. Common Fill for all unpaved areas around the site.
2. Backfill in trenches above pipe bedding shall consist of Class B Backfill.
3. Gravel Backfill around light pole bases shall consist of Processed Aggregate Base.
4. Granular Backfill below pavement shall consist of Gravel Borrow.
5. In areas where the bottom of the excavation is in fine sand and silt, and is below the groundwater table, crushed stone wrapped in filter fabric may be placed and compacted in maximum 12-inch layers to provide a working mat and drainage layer.
6. All crushed stone shall be separated on the top and all sides from adjacent material by geotextile fabric as specified herein.

C. FILL PLACEMENT:

1. Backfill shall be placed and compacted to lines, grades, and cross-sections shown on the Contract Drawings and observed by the Owner's Engineer. Backfill shall be compacted to the minimum requirements specified in Section 3.5-A, Compaction testing shall be performed by the Contractor's Independent Testing Subcontractor at the minimum testing frequency specified in Section 3.5-E.

2. Prior to placing backfill, the areas shall be cleaned of all excess construction material and debris and the bottom of excavations shall be in a thoroughly compacted condition.
3. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 3 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as uniform as possible in lift thickness, moisture content, and effort required to compact soil mass. Backfill which is too wet for use shall be stockpiled, allowed to dry sufficiently, and reused by the Contractor at no additional cost to the Owner.
4. Unless larger lifts are approved by the Owner's Engineer based on the mass and vibratory capabilities of specific compaction equipment and observed performance by the Owner's Engineer of test pad during construction, the fill thickness for each lift shall not exceed in 12 inches loose thickness.
5. The vertical and lateral limits of Gravel Borrow below proposed footings and slabs-on-grade (the "zone of influence") shall be defined by a horizontal plane extending away from the outside bottom edge of the footings for two feet, then by a plane that slopes down and away from the foundation at a maximum 1H:1V slope to the subgrade shown on drawings. Gravel Borrow shall be placed within the zone described above
6. All fills shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill shall be benched into the existing slope in order to avoid the formation of a shear plane.
7. Use of uncontaminated, processed and recycled demolition materials as Class B Backfill is limited to areas outside structures, and outside the 'zone of influence' below foundations and slabs (as defined above). Each lift shall be thoroughly compacted to at least the minimum compaction requirements stated in Section 3.5-A.

D. TRENCH BACKFILL

1. After the utility pipe installation has been inspected and approved, trenches shall be backfilled as soon as practicable with specified material. All trench backfilling shall be done with care.
2. Backfill material for pipe bedding shall be deposited in the trench, uniformly on both sides of the pipe, for the entire width of the trench to the spring line of the pipe. The backfill material shall be placed by hand shovels, in layers not more than 6-inches thick in loose depth, and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe, free from voids.

3. The balance of backfill shall be spread in layers not exceeding 9-inches in loose depth. Each layer shall be thoroughly compacted by mechanical methods and shall contain no rock, stones or boulders larger than 4 inches in their greatest dimension.
4. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time; if necessary, a timber grillage or other suitable method shall be used to break the fall of the material. The moisture content of the backfill material shall be such that proper compaction will be obtained. Puddling of backfill with water will not be permitted. Backfill within areas to receive topsoil or pavement construction shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.
5. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density as specified herein.
6. Any trenches or excavations improperly backfilled or where settlement occurs shall be reopened, to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.
7. During filling and backfilling operations, pipelines will be checked by the Owner's Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied in a manner satisfactory to the Engineer at no additional cost to the Owner.
8. Class B backfill shall be placed from the top of the select backfill to the specified material at grade (loam, pavement subbase, etc.). Fill compaction shall meet the density requirements of this specification.

E. BACKFILLING UNDER BUILDINGS AND FOUNDATIONS:

1. Gravel Borrow shall be used as backfill under structures, including by not limited to foundations and building slabs, as shown on the Drawings or as required by the Engineer. Fill placement and compaction shall meet the requirements of this specification.

F. BACKFILLING ADJACENT TO STRUCTURES:

1. Backfilling against masonry or concrete shall not be done until permitted by the Owner's Engineer. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage.

2. In general, use Gravel Borrow for backfilling against structures where the finished ground surface will be pavement or sidewalks; use Class B Backfill where the finished ground surface will be lawn or landscaped areas.
 3. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures. During backfilling operations, care shall be exercised that the equipment used will not overload the structures in passing over and compacting these fills. Backfill shall be placed in 9 inches in loose depth and each layer of backfill shall be compacted thoroughly and evenly using approved types of mechanical equipment. Each pass of the equipment shall cover the entire area of each layer of backfill.
 4. In compacting and other operations, the Contractor shall conduct their operations in a manner to prevent damage to structures due to passage of heavy equipment over, or adjacent to, structures, and any damage thereto shall be made good by the Contractor at no additional expense to the Owner.
- G. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a smooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- H. The completed and approved subgrades upon which topsoil is to be placed, concrete slabs are to be constructed, or pavements are to be installed, shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the base and finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- I. Uniformly shape the surfaces of all areas to be graded, to the lines and grades indicated on the Contract Drawings, and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.
- J. The Contractor is responsible to provide the finish grades as shown on the Contract Drawings. The Contractor shall provide temporary erosion control throughout the construction period to maintain all constructed lawns, and to protect all existing drains, catch basins, swales, from any debris or soil entering from excavation, backfill, or erosion. Contractor shall take whatever precautions necessary to accomplish temporary erosion control such as straw bales, silt fence, erosion control fabric, or pumping, at no additional cost to the Owner.

3.05 COMPACTION

- A. Compaction Requirements: The degree of compaction is expressed as a percentage of the maximum dry density of the material at optimum moisture content as determined by ASTM

Test D 1557. The compaction requirements are as follows:

Area	ASTM D1557 Density Degree of Compaction
In the zone of influence below foundations, exterior slabs, and other structural features, including all Gravel Borrow	95%
Pavement, foundation and slab-on-grade base course, including all Dense Graded Crushed Stone and Gravel Borrow	95%
Pavement, foundation and slab-on-grade subgrade	95%
Trench backfill <ul style="list-style-type: none"> ▪ Below pipe springline ▪ Above Pipe springline ▪ below pavements ((upper 3 ft.)) ▪ below landscaped areas ▪ below structures 	95% 92% 95% 92% 95%
All other areas	92%

B. Crushed stone used for backfill should be placed and compacted to a firm and stable condition as observed by the Owner's Engineer.

C. Moisture Control:

1. Fill that is too wet for proper compaction shall be disked, harrowed, or otherwise mixed and dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.
2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

D. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. In no case shall frozen soil or soil material containing frost, snow or ice be placed as backfill. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the

close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

E. Compaction Control

1. In-place density tests shall be made in accordance with ASTM D6938 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. Additional in-place density testing shall be made at the Contractor's expense by the geotechnical testing laboratory. Testing locations shall be selected by the Engineer unless otherwise noted.
2. In-place density tests shall be performed at a minimum according to the following:
 - a. Under all Foundations – At subgrade, each compacted lift and base course layer, one for each independent foundation or one every 200 square feet of each lift (whichever results in more tests);
 - b. Slabs-on-Grade – At subgrade, each compacted lift and base course layer, one every 1,000 square feet of each lift;
 - c. Pavements – At subgrade, each compacted lift and base course layer, one every 2,000 square feet of each lift;
 - d. Backfill of Trenches – one test for every 100 linear feet of each lift.
 - e. General Fill – one every 5,000 square feet of each lift.
3. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.06 DISPOSAL OF SURPLUS MATERIALS:

- A. Surplus excavated materials, which are acceptable to the Owner's Engineer and meeting the requirements herein, shall be used to backfill normal excavations or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.
- B. Surplus excavated material not needed as specified above shall be hauled away and

disposed of by the Contractor at no additional cost to the Owner, at appropriate locations and in accordance with project arrangements. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

- C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Owner's Engineer.
- D. The Contractor shall comply with applicable local, state, and federal regulations that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

3.07 WASTE MANAGEMENT

- A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION

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SECTION 31 05 19.13

FILTER FABRIC

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials and equipment and install the filter fabric in locations shown on the plans, in the specifications or as required by the Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/MATERIALS:

The filter fabric shall be Tencate Mirafi 140N as manufactured by Tencate Geosynthetics Americas, Pendergrass, GA; Foss-65, as manufactured by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

The filter fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding. The filter fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of filter fabric shall be overlapped by the subsequent width in accordance with manufacturer's recommendations, but not less than two feet, to ensure no intrusion of soil fines into the bedding.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall do all required clearing and grubbing as indicated on the drawings or herein specified in the area required for construction operations on the Owner's land or in the Owner's permanent or temporary easements and shall remove all debris resulting therefrom.
- B. Unless otherwise noted, all areas to be cleared shall also be grubbed.
- C. The Contractor shall not clear and grub outside of the area required for construction operations.

1.02 RELATED WORK:

Any trees and shrubs specifically designated by the Owner not to be cut, removed, destroyed, or trimmed shall be saved from harm and injury in accordance with Section 01 57 19, ENVIRONMENTAL PROTECTION.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 RIGHT TO WOOD AND LOGS:

The Owner shall have the right to cut and remove logs and other wood of value in advance of the Contractor's operations. All remaining logs and other wood to be removed in the course of clearing shall become the property of the Contractor.

3.02 CLEARING:

- A. Unless otherwise indicated, the Contractor shall cut or otherwise remove all trees, saplings, brush and vines, windfalls, logs and trees lying on the ground, dead trees and stubs more than 1-foot high above the ground surface (but not their stumps), trees which have been partially uprooted by natural or other causes (including their stumps), and other vegetable matter such as shags, sawdust, bark, refuse, and similar materials.
- B. The Contractor shall not remove mature trees (4-inches or greater DBH) in the Owner's temporary easements.
- C. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and stubs to be cleared

shall be cut as close to the ground as practicable but not more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of large trees. Saplings, brush and vines shall be cut close to the ground.

3.03 GRUBBING:

- A. Unless otherwise indicated, the Contractor shall completely remove all stumps and roots to a depth of 18-inches, or if the Contractor elects to grind the stumps, they shall be ground to a minimum depth of 6-inches.
- B. Any depression remaining from the removal of a stump and not filled in by backfilling shall be filled with gravel borrow and/or loam, whichever is appropriate to the proposed ground surface.

3.04 DISPOSAL:

All material collected in the course of the clearing and grubbing, which is not to remain, shall be disposed of in a satisfactory manner away from the site or as otherwise approved. Such disposal shall be carried on as promptly as possible and shall not be left until the final clean-up period.

END OF SECTION

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SECTION 31 23 16.26

ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall excavate rock, if encountered, to the lines and grades indicated on the drawings or as required, shall dispose of the excavated material, and shall furnish the required material as specified in Section 31 00 00 EARTHWORK for backfill in place of the excavated rock.

1.02 RELATED WORK:

- A. Section 31 50 00, SUPPORT OF EXCAVATION
- B. Section 31 00 00, EARTHWORK

1.03 DEFINITIONS:

- A. The word "rock," wherever used as the name of the excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding one cubic yard in volume, or solid ledge rock which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed by normal earth excavation methods, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."
- B. The word "earth," wherever used as the name of an excavated material, or material to be excavated shall mean all kinds of material other than rock as above defined.

1.04 QUALITY ASSURANCE:

- A. The Contractor shall conform to all municipal ordinances and state and federal laws relating to the transportation, storage, handling, and use of explosives. In the event that any of the above mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work site and shall permit examination thereof by the Engineer or other officials having jurisdiction.
- B. The Contractor shall procure all permits required for blasting.

1.05 SUBMITTALS:

- A. At least two weeks before beginning blasting operations, the Contractor shall submit to the Engineer for record the following data:
 - 1. Name of Contractor or Subcontractor responsible for blasting and monitoring operations and license number.
 - 2. Name, affiliation, and license number of the person or persons who will be directly responsible for designing each blast, supervising the loading of the shot, and firing it.
- B. Copies of all permits required for blasting.
- C. Results of pre-blast survey.
- D. When blasting is in progress, daily reports on blasting operations and blast monitoring results.

1.06 DELIVERY/STORAGE AND HANDLING:

Delivery, storage and handling of explosives shall conform to all federal, state and local regulations and permits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION/PRE-BLAST SURVEY

If required, the pre-blast survey shall be conducted in accordance with state regulations and/or local permit requirements.

3.02 EXCAVATION:

- A. The Contractor shall excavate rock to the lines and grades indicated on the drawings or as required by the Engineer. The excavated rock shall be removed and disposed of by the Contractor as specified for surplus excavated materials under Section 31 00 00, EARTHWORK.
- B. Work damaged by blasting shall be repaired or replaced at the Contractor's expense.
- C. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below:

1. In pipe trenches, excess excavation shall be filled with the required material and compacted in the same manner as specified for the material in the zone around the pipe under Section 31 00 00 EARTHWORK.
 2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi. Other excess excavation shall be filled with Class B backfill compacted to a minimum of 92 percent density (ASTM D1557 Method C) as specified under Section 31 00 00, EARTHWORK.
 3. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches crushed stone may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.
- D. When required by the Engineer, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.
- E. When concrete is to be placed on rock, the rock shall be free of all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, water, ice, snow, and other objectionable substances.

3.03 VIBRATION AND AIR BLAST MONITORING:

- A. The Contractor shall measure air blast and vibration levels of blasting operations to assure compliance with all applicable regulations and local permits.
- B. Records of each day's air blast and vibration measurements shall be submitted to the Engineer in writing no later than the start of the next day's work. Records shall include, as a minimum:
- Identification of instrument
 - Name of observer
 - Name of interpreter
 - Distance and direction of recording station from the area of detonation
 - Date and exact time of reading
 - Type of ground at recording station

- Peak particle velocity for all components as well as resultant for all frequencies of vibrations
- Duration of motion with a velocity in excess of one thousandth of an inch per second
- A copy of the photographic record of seismograph readings
- Peak air blast level.

3.04 BLASTING RECORDS:

The Contractor shall prepare and submit to the Engineer daily blast reports, including logs of each blast. Reports shall be submitted to the Engineer no later than the start of the next day's work. However, during each day of blasting, the Contractor shall review and shall provide access for the Engineer to review the data from that day's blasting. Reports after each blast shall include at least the following information for each blast:

- Date, time, and location of blast
- Permit number and expiration date
- Amount and type of explosives used by weight and number of cartridges
- Total number of delays used and number of holes used for each delay
- On a diagram of the blast pattern, indicate total number and depth of holes, maximum charge per delay, maximum charge per hole, and corresponding delay number
- An evaluation of the blast indicating areas of significant overbreak, unusual results, and any recommended adjustments for the next blast.

3.05 POST BLASTING INSPECTIONS:

The Contractor shall examine any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed. Advance notice shall be given to all interested parties so that the parties may be present during the final examination. Records of the final examination shall be signed and distributed to the owner of the property, the head of the local fire department, and the Engineer.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

- A. Section 01 57 19, ENVIRONMENTAL PROTECTION
- B. Section 31 00 00, EARTHWORK
- C. Section 31 50 00, SUPPORT OF EXCAVATION

1.03 SUBSURFACE DATA

- A. Refer to Section 00 31 32 SUBSURFACE DATA for information on site and subsurface conditions.

1.04 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

1.05 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems.
- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.

- C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.
- D. The dewatering system and excavation support (see Section 31 50 00, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.06 SUBMITTALS:

- A. In accordance with Section 01 33 23, Contractor shall submit a plan indicating how it intends to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01 57 19 ENVIRONMENTAL PROTECTION and Section 00 31 43 PERMITS.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
 - 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
 - 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into straw bale sedimentation traps lined with filter fabric. Water is to be filtered through the straw bales and filter fabric prior to being allowed to seep out into its natural watercourse.
 - 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.
 - 4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags shall be utilized in catch basins.

- D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers riprap for slope protection, drainage swales and pipe ends, complete.
- B. Grading and compaction of earth slopes and other slope preparation for the riprap are included under other sections of the specification.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK.
- B. Section 31 05 19.13, GEOTEXTILE FABRICS.

1.03 REFERENCES:

- A. The following standard forms a part of these specifications and indicates minimum standards required:

Connecticut Department of Transportation Standard Specifications for Highways and Bridges Form 818.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. SLOPE PROTECTION:

(Not Applicable)

- B. PIPE ENDS:

Stone for pipe ends shall be angular and shall be in accordance with CONN DOT Specification Article M12.02, Intermediate Riprap or Specification Article M12.02, Modified Riprap, where indicated on plans and details.

C. DRAINAGE SWALES:

Stone for drainage swales shall conform to CONN DOT Specification Article M12.02, Modified Riprap and shall be not weigh less than 50 pounds or more than 125 pounds and least 75% of the volume shall consist of stones not less than 75 pounds each. The stones shall be so graded that when placed with larger stones, the entire mass will be compact.

D. GEOTEXTILE FABRIC:

Geotextile fabric shall be from CTDOT Qualified Product List for geotextiles: Subsurface Drainage (Class A)

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Geotextile fabric shall be installed where shown on the drawings, prior to placing the riprap.
- B. Riprap for slope protection and pipe ends shall be placed on the prepared slope or area in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids and a maximum void of 12-inches.
- C. Riprap shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing the underlying material. Placing of riprap in layers or by dumping into chutes or by other similar methods likely to cause segregation will not be permitted.
- D. Riprap stones shall be placed and distributed such that there will be no large accumulation of either the larger or smaller stones in any given area.
- E. It is the intent of these specifications to produce compact riprap protection in which all required sizes of stone are placed in the proper proportions. Hand placing or rearranging of individual stones by mechanical equipment shall be utilized to the extent necessary to secure the desired results.

END OF SECTION

SECTION 31 50 00

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.
- B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

- A. Section 00 31 32, SUBSURFACE DATA
- B. Section 31 00 00, EARTHWORK
- C. Section 31 23 19, DEWATERING

1.03 QUALITY ASSURANCE:

- A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Connecticut Occupational Safety and Health Act (Chapter 571 of the Connecticut General Statutes). Contractors shall be familiar with the requirements of these regulations.
- B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

1.04 SUBSURFACE DATA

- A. Refer to Section 00 31 32 SUBSURFACE DATA for information on site and subsurface conditions.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.
- B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.
- B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 31 23 19, DEWATERING.
- C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.
- D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.
- E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.
- F. All cut-off will become the property of the Contractor and shall be removed by him from the site.
- G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.
- H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

SECTION 32 11 00

SIDEWALK CONSTRUCTION AND REPLACEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials, equipment and incidentals required to restore gravel sidewalks and/or construct new or replacement bituminous or cement concrete sidewalks where directed or where existing sidewalks are disturbed by the Contractor, as shown on the drawings and described herein. The Contractor shall also furnish all materials and install wheelchair ramps where shown on the drawings or as required by the Engineer.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 32 16 00, CURBING

1.03 REFERENCES

The following standards form a part of these specifications, as referenced:

State of Connecticut Department of Transportation (CT DOT)
Standard Specifications for Roads, Bridges and Incidental Construction (latest edition)

1.04 SUBMITTALS, IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Shop drawings and/or materials specifications for each component of the work to be performed under this section of the Specifications.

1.05 SYSTEM DESCRIPTION:

A. GRAVEL SIDEWALKS:

Gravel sidewalks shall be restored to a condition at least equal to that existing immediately before the work was started.

B. BITUMINOUS CONCRETE AND CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

- 1. Except as otherwise indicated, bituminous concrete and concrete sidewalks shall be constructed in accordance with the requirements of Sections 9.21 Concrete

Sidewalks and 9.22 Bituminous Concrete Sidewalk, of the latest edition of the State of Connecticut Department of Transportation (CT DOT) Standard Specifications for Roads, Bridges and Incidental Construction, and all amendments thereto.

2. Wheel chair ramps shall be installed in new sidewalks at intersections in accordance with the contract documents and requirements of the Owner, as applicable. When curbs or sidewalks are constructed or reconstructed on one side of the street, curb cuts shall also be installed on the opposite sides of the street, where there is a pedestrian path of travel. Curb cuts shall be located within the crosswalk and/or the pedestrian path of travel.
- C. Water boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grade.
- D. Sidewalks shall not be less than 48-inches in width, excluding curbing. An unobstructed path of travel shall be provided which is at least 36-inches clear, excluding curbing.

PART 2 - PRODUCTS

2.01 BITUMINOUS CONCRETE SIDEWALKS:

- A. Bituminous concrete sidewalks shall consist of Bituminous Concrete meeting the requirements of Table M.04.02-2.
- B. Bituminous concrete shall conform to the requirements of Section M.04.
- C. Processed aggregate for the base course shall conform to the requirements specified in Article M.05.01 Processed Aggregate Base and Pavement Surface Treatment.

2.02 CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

- A. Concrete sidewalks and wheelchair ramps shall be constructed with Class PCC04462 Concrete and shall conform to the requirements of Section M.03.01.
- B. Air-entraining Portland cement concrete shall conform to the requirements of Article M.03.01.
- C. Processed aggregate for the base course shall conform to the requirements specified in Article M.05.01 Processed Aggregate Base and Pavement Surface Treatment.
- D. Concrete sidewalk construction adjacent to a traffic control foundation shall conform to the requirements of Article M.03.01 for Class PCC03342 concrete.

PART 3 - EXECUTION:

3.01 BITUMINOUS CONCRETE SIDEWALKS:

- A. The subgrade for the bituminous concrete sidewalks shall be shaped parallel to the proposed surface of the sidewalks and shall be thoroughly compacted with a roller weighing not less than 500 pounds. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard in order for a gravel foundation to be placed upon it.
- B. When the bituminous concrete is spread by hand, metal or wooden forms shall be used. Forms shall be of a depth equal to or greater than the depth of sidewalks or driveways and shall be securely braced, staked, and held firmly to the required line and grade.
- C. The bituminous concrete sidewalk shall be a minimum of 3 compacted inches thick, laid in two equal courses. The sidewalk pitch shall be 3/16-inch per foot of width or shall match the existing sidewalk. Construction shall conform to Section 4.06, except that material may be spread by hand and thoroughly compacted by multiple passes of a roller weighing not less than 500 pounds.

3.02. CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

- A. Concrete for sidewalks and wheelchair ramps shall be a minimum of 5-inches thick. At driveways, the sidewalks shall be 8-inches thick. Concrete shall be proportioned, mixed placed, etc. in accordance with the provisions of Section 6.01 for Class "C" concrete, except as modified herein.
- B. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.
- C. After the subgrade has been prepared as hereinbefore specified, a subbase of gravel borrow at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel borrow shall be a minimum of 8-inches in thickness.
- D. The forms for sidewalks shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked, thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk. The finished walk shall have sufficient pitch from the outside to the edge of the walk to provide for surface drainage. This pitch shall be 1/4-of an inch per foot unless otherwise required by the Engineer. Before the concrete is placed, the subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.
- E. Concrete shall be conveyed from the place of mixing to the place of deposit in such a manner that no mortar will be lost, and the composition of the mix shall be uniform, showing neither excess nor lack of mortar in any one place. The consistency shall be such that water will float to the surface under heavy tamping. The concrete shall be placed as

close to its final position as practicable and thoroughly consolidated, with precautions taken not to overwork it while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeds to eliminate voids and honeycombs at the edges. Retempering of concrete will not be permitted.

- F. Concrete shall not contain less than 5 nor more than 7 percent entrained air at the time the concrete is deposited in the forms.
- G. Concrete shall be placed in alternate slabs not exceeding 25 feet in length. Slabs shall be separated by transverse preformed expansion joint filler ½-inch thick, backer rod and joint sealant. The surface of all concrete sidewalks shall be uniformly scored into block units of not more than 40 square feet. The depth of the scoring shall be at least one quarter of the thickness of the sidewalk.
- H. When concrete sidewalks are constructed adjacent to curbing, building foundations, retaining walls, light pole bases or fixed structures, ½-inch thick premolded joint filler, backer rod and joint sealant shall be used between the newly constructed sidewalk and the structure. Concrete sidewalks adjacent to building foundations shall include #6 smooth dowels, one foot long at eighteen inches on center.
- I. Finishing of the concrete surface shall be done by experienced and competent cement finishers as soon as is practicable. Finishing shall be delayed until all bleed water and water sheen has left the surface and the concrete has begun to stiffen. The concrete surface shall be finished as directed with a steel trowel or wood float to give a smooth, uniform and attractive surface finish and uniformly scored into block units or areas of not more than 36 square feet. Following this, the Contractor shall draw a nylon push broom lightly over the surface to produce a non-slip surface. Application of neat cement to the surface to hasten hardening is prohibited.
- J. The Contractor shall protect the newly placed concrete surface against vandalism and marking or defacing and must stand ready to replace any blocks which, in the opinion of the Engineer, are excessively marked or defaced, at no additional cost to the Owner. When completed the walks shall be kept moist and protected from traffic and weather for at least 3 days.
- K. Adequate protection shall be provided where temperatures of 40°F or lower occur during placing of concrete and during the early curing period. The minimum temperature of fresh concrete after placing and for the first 3 days shall be maintained above 55°F. In addition to the above requirements, an additional 3 days of protection from freezing shall be maintained.

END OF SECTION

SECTION 32 12 00

PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials and equipment and shall replace the pavements as indicated on the drawings and as herein specified.

Due to the significant variations in asphalt prices this contract includes a price adjustment as described in Appendix D ASPHALT ADJUSTMENT COST.

1.02 RELATED WORK:

- A. Section 00 31 43, PERMITS
- B. Section 01 14 19.16, DUST CONTROL
- C. Section 31 00 00, EARTHWORK
- D. Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS

1.03 SYSTEM DESCRIPTION:

A. GENERAL

The types of pavement systems to be utilized on this project are as follows:

- TYPE 1. PERMANENT TRENCH PAVEMENT
- TYPE 2. TEMPORARY TRENCH PAVEMENT
- TYPE 3. VEHICULAR BITUMINOUS CONCRETE PAVEMENT

PAVEMENT SCHEDULE

B. TYPE 1. PERMANENT TRENCH PAVEMENT

Areas shall be paved with binder course pavement, 6 inches thick and wearing course pavement, 3-inches thick. Permanent trench binder course and trench wearing course pavement shall be installed only with the approval of the Engineer. Permanent trench pavement on State Road shall comply with CTDOT standards for thickness, material type, base, and construction.

C. TYPE 2. TEMPORARY TRENCH PAVEMENT

Areas shall be paved with temporary trench binder course pavement, 4-inches thick, as soon as practicable after installation of individual pipeline segments. Temporary pavement shall be maintained a minimum of 90 days prior to installation of permanent pavement. This may require that the temporary pavement be maintained until the following year, at which time the permanent pavement shall be installed. Temporary trench pavement on State Road shall comply with CTDOT standards for thickness, material type, base, and construction.

D. TYPE 3. VEHICULAR BITUMINOUS CONCRETE PAVEMENT

Driveways and parking areas shall be paved with permanent curb to curb binder course pavement, HMA S0.5, 2-inches thick, and permanent curb to curb wearing course pavement, HMA S0.375, 1.5-inches thick as shown on to the Drawings and as specified herein. Pavement on State Road shall comply with CTDOT standards for thickness, material type, base, and construction.

1.04 REFERENCES

The following standards form a part of these specifications and indicate the minimum standards required:

American Society for Testing and Materials (ASTM)

ASTM D1557 Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18-Inch Drop

State of Connecticut Department of Transportation (CT DOT)

Form 818 Standard Specifications for Roads, Bridges and Incidental Construction

4.06 Bituminous Concrete (Recycle or Crushed Glass Option)

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of complete job mix formula shall be submitted to the Engineer at least two weeks before any of the work of this section is to begin.

PART 2 - PRODUCTS

2.01 GRAVEL BASE:

- A. Gravel base shall consist of inert material that is hard durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.
- B. Gradation requirements for gravel base shall be as specified in Article M.05.01 Processed Aggregate Base and Pavement Surface Treatment.

2.02 BITUMINOUS CONCRETE PAVEMENT:

- A. Bituminous concrete pavements shall consist of HMA S0.5 and HMA S.0.375.
- B. Bituminous concrete mixtures shall be within the composition limits of base courses, binder courses, wearing courses and surface treatment, in accordance with Article M.04.02 Mix Design and Job Mix Formula.
- C. The joint sealant shall be a hot poured rubberized emulsified asphalt sealant, meeting the requirements of Article M.04.01 Joint Seal Material.
- D. The tack coat shall be an asphalt emulsion, RS-1, conforming to Article M.04.01 Bituminous Concrete Materials.

2.03 PAVEMENT MARKINGS:

- A. Pavement markings shall conform to the requirements of Section 12.09 Painted Pavement Markings.
- B. The mixture of the marking material shall be within the composition limits for reflectorized pavement markings as described in the DOT Specifications as follows:
 - 1. Fifteen-minute dry paint – M.07.20.
 - 2. Hot applied fast-drying paint – M.07.21.
- C. Application of the glass beads to be used as reflector material on the striping shall conform to Section 12.09 Painted Pavement Markings and Article M.07.30 Glass Beads.

2.04 GRAVEL BORROW (SUBBASE):

- A. Gravel borrow subbase shall consist of inert material that is hard durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.

- B. Gradation requirements for gravel borrow subbase shall be as specified in Earthwork Specification 31 00 00, Section 2.01(E).

PART 3 - EXECUTION

3.01 GENERAL:

Paving courses required for the project shall be as shown on the drawings and as specified herein. Pavement thicknesses specified are measured in compacted inches. If a pavement course thickness exceeds 2-1/2 compacted inches, the course shall be installed in multiple lifts with each lift not exceeding 2-1/2 compacted inches in thickness.

3.02 GRAVEL BASE / GRAVEL BORROW SUBBASE:

- A. The gravel base and gravel borrow subbase to be placed under pavement shall consist of gravel evenly spread and thoroughly compacted. Depths of the gravel base and gravel borrow subbase shall be as shown on the drawings. Gravel base on State Road shall comply with CTDOT standards for thickness, material type, and construction.
- B. The gravel base and gravel borrow subbase shall be spread in layers not more than 4-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

3.03 TEMPORARY BITUMINOUS PAVEMENT:

- A. Where specified and required by the Engineer and after placement of the gravel base, the Contractor shall place temporary bituminous pavement above the trench, between the edges of the existing pavement. It shall consist of HMA S0.5 or HMA S.0.375 Bituminous Concrete Pavement, 4-inches thick, as shown on the drawings and described herein. Temporary trench pavement on State Road shall comply with CTDOT standards for thickness, material type, base, and construction.
- B. The temporary pavement shall be repaired as necessary to maintain the surface of the pavement until replaced by permanent pavement. When so required by the Engineer, the Contractor shall remove the temporary pavement and install or regrade the base for installation of permanent pavement.

3.04 PERMANENT BITUMINOUS PAVEMENT:

- A. The bituminous paving mixture, equipment, methods of mixing and placing, and the precautions to be observed as to weather, condition of base, etc., shall be in accordance with Section 4.06 Bituminous Concrete.

B. BINDER COURSE (HMA S0.5) PAVEMENT:

1. Immediately prior to installing the binder course, the trimmed edges shall be made stable and unyielding, free of loose or broken pieces and all edges shall be thoroughly broomed clean. Contact surfaces of trench sides, curbing, manholes, catch basins, or other appurtenant structures in the pavement shall be painted thoroughly with a uniform coating of asphalt emulsion (tack coat), just before any mixture is placed against them.
2. The binder course shall be repaired as necessary to maintain the surface of the pavement until placement of the permanent overlay. If required, the Contractor shall place a leveling course before placing the permanent overlay.

C. WEARING COURSE (HMA S0.375) PAVEMENT:

1. The wearing course shall be placed over the trench or full width as shown on the drawings or as specified.
2. Prior to placement of the wearing course, the entire surface over which the wearing course is to be placed, including against curbs, gutters and castings, shall be broom cleaned and tack coated.
3. Wearing course pavement placed over trenches may be feathered to meet existing paved surfaces, if approved by the Engineer.
4. Prior to placing full width wearing course, keyways shall be cut in all intersecting streets.

3.07 PAVEMENT PLACEMENT:

- A. Unless otherwise permitted by the Engineer for particular conditions, only machine methods of placing the pavement shall be used. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture true to line, grade, width and crown. The mixtures shall be placed and compacted only at such times as to permit proper inspection and checking by the Engineer.
- B. After the paving mixtures have been properly spread, initial and intermediate compaction shall be obtained by the use of steel wheel rollers having a weight of not less than 10 tons. Vibratory roller, if used, shall be of a self-propelled type specifically designed for the compaction of bituminous concrete. It shall be equipped with a spread control device and set to prevent the roller from traveling in excess of 2 1/2 mph (220 fpm) while operating in vibratory mode, and 5 mph (440 fpm) while operating in the static mode.
- C. Final rolling of the wearing course or surface treatment pavement shall be performed by a steel wheel roller weighing not less than 10 tons at a mix temperature and time sufficient to allow for final smoothing of the surface and thorough compaction.

- D. Immediately after placement of wearing course or surface treatment pavement, all joints between the existing and new wearing course or surface treatment pavements shall be sealed with joint sealant.
- E. Where there is no backing for the edges of the curb-to-curb pavement, the Contractor shall provide a gravel transition. The gravel transition shall be installed immediately after the pavement is placed, shall be feathered and extend a minimum of 18-inches, and shall be compacted using the same equipment as for pavement compaction. The gravel shall be uniformly graded material meeting the requirements of Article M.02.04 Gravel Shoulders.
- F. When required by the Engineer, the Contractor shall furnish and install additional paving to provide satisfactory transition for driveways and walkways impacted by a new curb-to-curb pavement installation. The transition installation will be considered incidental to the curb-to-curb pavement installation.

3.08 ADDITIONAL PAVING:

- A. If the Engineer determines that the existing bituminous concrete pavement on (local or state) streets is thicker than the permanent pavement specified herein, the Contractor may be required to install additional HMA S0.5 bituminous concrete to obtain the depth of the existing pavement.
- B. If for the installation of full width paving, the Engineer determines that the existing road surface requires additional leveling pavement, then the Contractor shall install additional HMA S0.375) bituminous concrete to bring the section to proper line and cross section. Additional paving required to restore the proper line and cross section of binder course installed by the Contractor which has become rough and uneven shall be furnished and installed at the expense of the Contractor.

3.09 PARKING LOTS AND DRIVEWAYS:

- A. Pavement shall consist of a 2-inch binder course and a 1-1/2-inch wearing course on a 6-inch processed aggregate base on 8-inch compacted gravel borrow. All thicknesses are compacted thicknesses. Pavement on State Road shall comply with CTDOT standards for thickness, material type, base, and construction.
- B. Adjacent concrete work, slate work, sidewalks, structures, etc., shall be protected from stain and damage during the entire operation. Damaged or stained areas shall be replaced or repaired to equal their original condition.
- C. All joints between binder and wearing course shall be staggered a minimum of 6-inches.
- D. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened sufficiently to prevent distortion and loss of fines, and in no case in less than 6 hours.

- E. Smoothness of all areas of the finished surface shall not vary more than 1/4-inch when tested with a 10 foot straight-edge, applied both parallel to and at right angles to the centerline of the paved area. At building entrances, curbs, and other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed plus or minus 1/8-inch. Irregularities exceeding these amounts, or which retain water on the surface, shall be corrected by removing the defective work and replacing or repairing it to the satisfaction of the Engineer.
- F. Parking lot line painting shall be in accordance with CTDOT Section 12.09.

3.10 RAISING AND ADJUSTING CASTINGS:

- A. In areas of permanent wearing course paving, existing municipally-owned catch basin and manhole castings and valve boxes shall be raised to the proper grade where required by the Engineer.
- B. Castings owned by private utilities shall be raised by their own forces. The Contractor shall be responsible for coordinating this work.
- C. The method of adjusting these castings shall be as follows: Cut around catch basin or manhole castings a minimum of 8-inches from casting. Excavate and if required rebuild up to 12-inches of masonry below the bottom of the casting. Backfill with suitable material and compact to bottom of casting. Place high, early strength cement or bituminous concrete collar, as required by the Engineer, to approximately 1½-inches below the raised casting grade. Masonry work shall conform to Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS.
- D. In some areas, raising of castings may not be required. Where required by the Engineer, castings not to be raised shall have at least 12-inches of bituminous concrete pavement chipped and removed around the casting. New bituminous concrete pavement shall be placed and compacted around such castings to approximately 1-1/2-inches below the top of the casting. The overlay course shall then be sloped down to the level of the casting.
- E. The method of raising valve boxes shall be as follows: Cut around valve box a minimum of 8-inches from valve box. Excavate as required and raise the valve box. Pour high early strength cement or bituminous concrete collar, as required by the Engineer, to approximately 1-1/2-inches below the top of the valve box.
- F. Castings, which need to be raised or adjusted to complete permanent curb to curb paving, shall be done immediately prior to paving.

3.11 PAVEMENT MARKINGS:

- A. The Contractor shall replace all pavement markings removed or covered-over in carrying out the work, and as required by the Engineer, no sooner than 48 hours after completion

of permanent pavement. The markings shall be 4-inches wide, white or yellow, single or double lines as required.

- B. When required by the Engineer, the Contractor shall provide painted or plastic temporary markings on temporary pavement at no additional cost to the Owner.

3.12 PAVEMENT REPAIR:

- A. If required in the contract or if permanent pavement becomes rough or uneven, permanent pavement patches and trenches shall be repaired and brought to grade utilizing "infrared" paving methods following completion of the construction.
- B. The Contractor performing the work shall use care to avoid overheating the pavement being repaired.
- C. Pavement repair shall extend a minimum of 6-inches beyond all edges of the pavement patch to assure adequate bonding at the pavement joints.

END OF SECTION

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SECTION 32 16 00

CURBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers furnishing and installation of curbing, where required, as shown on the Drawings and herein specified.

1.02 RELATED WORK:

- A. Required earthwork is specified under Section 31 00 00 EARTHWORK.
- B. Section 32 11 00, SIDEWALK REPLACEMENT
- C. Section 32 12 00, PAVING

1.03 REFERENCES:

The following standards form a part of these specifications, as referenced:

State of Connecticut Department of Transportation (CT DOT)

Form 818 Standard Specifications for Roads, Bridges and Incidental Construction

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of shop drawings, showing dimensions of typical curb sections, shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 BITUMINOUS CONCRETE LIP CURBING

Bituminous concrete lip curbing shall be machine-formed, Curb Mix installed per Section 8.15.03. Materials shall be Curb Mix conforming to Article M.04.

2.02 CONCRETE CURBING:

- A. Cast-in-place or slip formed curbing shall be Class PCC04462 concrete conforming to the requirements of Article M.03.01. Joint filler shall conform to the requirements of Article M.03.08. The concrete for precast concrete curbing shall have a minimum 28-day compressive strength of 4,400 psi and shall contain 5 to 7% entrained air unless otherwise approved by the Engineer.

PART 3 - EXECUTION

3.01 BITUMINOUS CONCRETE LIP CURBING:

- A. The curbing shall have a 6-inch reveal unless otherwise required by the Engineer.
- A. Unless modified herein, installation shall conform to Section 4.06 of the latest edition of CT DOT Form 818 and all amendments thereto.
- B. Prior to the arrival of the mixture at the site, the surface of the pavement where the curbing is to be constructed shall be cleaned of all loose and foreign material. The surface, which shall be perfectly dry and clean at the time the mix is placed, shall be coated with an approved tack coat just prior to placing the mixture.
- C. On arrival at the site, the mixture shall be transferred from the truck to the hopper of the curbing machine, and the mixture shall be kept clean and free from dirt and foreign materials at all times.
- D. The surface of the curbing shall be tested with a 10-foot straightedge, and any variation from a true line extending ¼-inch shall be satisfactorily corrected. The only compaction required shall be that obtained by the approved mechanical curbing machine.
- E. Where machine work is impractical, the Engineer may permit hand-laid curbing to be constructed.
- F. After completion of the curbing, traffic shall be kept at a safe distance for a period of not less than 24 hours and until the curbing has set sufficiently to prevent injury to the work.
- H. When indicated on the plans, or as directed, drainage openings shall be made through the curb at the elevations and of the size required.

3.04 CONCRETE CURBING:

- A. Construction methods for concrete curbing shall conform to the requirements of Article 6.01.03 for concrete for structures. In addition, the following paragraphs apply.
- B. Excavation shall be made to the required depth, and the base upon which the curbing is to be set shall be compacted to a firm, even surface.
- B. The concrete shall contain not less than 5 or more than 7 percent entrained air at the time the concrete is deposited within the forms. Concrete shall be placed only on a moist base. Concrete shall not be placed on a soft, muddy, or frozen base.
- C. Slip form equipment may be used if the resulting product conforms to the plans. Precast concrete curbing may be used if the resulting product conforms to the plans except for the length of each curb unit. Precast concrete curbing units may be constructed in six foot or longer lengths for straight sections.

- D. Where slip form equipment or precast concrete curbing is not used, the concrete shall be placed in forms, struck off with a template, compacted by approved means, and finished to a smooth, even surface. Vibration will not be required.
- E. The concrete curbing shall be constructed in sections having a uniform length of approximately 10 feet, unless otherwise required, so arranged that a joint in the curbing shall come opposite a joint in the adjoining concrete pavement slab and be similar to it. The length of these sections may be varied slightly where necessary for closures, but no section less than 6 feet in length will be permitted. These sections shall be separated by an approved method at the time of placing the concrete.
- F. Where forms are used, they shall be so constructed that the form for exposed faces may be removed before the concrete has taken final set in order to permit correction of surface irregularities.
- G. Concrete curbing, except precast curbing, shall be cured and protected in conformity with the requirements of Article 4.01.03 for concrete pavement. Precast curbing shall not be shipped to the project until the 28-day compressive strength is acquired. Precast curbing that has been damaged shall be removed for the project at the Contractor's expense.
- H. After the concrete has set sufficiently, the grading shall be completed to the lines shown on the plans, or as ordered, by refilling to the required elevation with approved material which shall be placed in layers not over 6-inches in depth and compacted until firm and solid.

END OF SECTION

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SECTION 32 18 13

SYNTHETIC GRASS INFILL SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide all labor, materials, equipment and tools necessary for the complete installation of Synthetic Grass Infill System over a graded stone base as outlined in these specifications and in strict accordance with the manufacturer's written specifications with a specially formulated resilient infill of rounded sand and SBR (Crumb) rubber.

1. Drainage stone base course
2. Perimeter Edge Concrete Turf Anchor
3. A drainage system consisting of flat drains, collector piping, yard drains, turf box covers shall be installed.
4. Legion 2.25+ Sports Turf System- A synthetic grass system with an average pile height of 2.25" long 100% polyethylene fibers, tufted on a 1/2" tufting machine. A minimum of 5000 denier slit film and a minimum 7200 denier monofilament in single needle stitching, with a fiber weight of not less than 46 ounces per square yard. The turf shall be of dual fiber construction with multi-structured monofilament and slit-film fibers tufted together in same needle stitching if 1/2" gauge. The system shall include a single, dimensionally stable, three-component backing, and have a minimum of 20 ounces of urethane secondary backing per square yard and a total weight of 74 ounces per square yard. The finished product shall also include perforations (1/4" holes on 4" centers) to ensure maximum drainage. Systems that are tufted on larger than 1/2" gauge tufting machines, are not perforated or include any type of nylon fiber "thatch zone" shall not be acceptable.
5. A resilient infill system, consisting of a course, rounded, uniformly sized silica sand and graded SBR rubber. (Minimum total weight of 5.51lbs. per square foot with a 60/40 rubber/ sand ratio 3.3lbs rubber per sqft. 2.21lbs sand per sqft. – no exceptions). Infill shall be installed to a minimum height of 2 inches providing no more than 1/4-inch exposed fiber.

B. Approved Manufacturers

- | | |
|---------------------|-------------------|
| 1. Sprinturf | 5. Greenfield USA |
| 2. Fieldturf | 6. AstroTurf |
| 3. ACT Global | 7. Approved Equal |
| 4. Shaw Sports Turf | |

1.02 QUALIFICATIONS AND SUBMITTALS

- A. Prospective Bidders and / or installers of the turf shall be required to comply with the following:
1. The successful turf contractor must be a member of the Synthetic Turf Council (STC), Sports Field Management Association (SFMA), American Sports Builders Association (ASBA).
 2. The turf contractor and / or the turf manufacturer must be experienced in the manufacture and installation of this specific type of sand and SBR rubber infill synthetic grass system, for at least five (5) years and provide references of ten (10) specific installations in the last five (5) years.
 3. The turf manufacturer shall have a minimum of ten (10) installations in the State of Connecticut
 4. The turf manufacturer shall have a minimum of Ten (10) NCAA Division 1 game and/or practice fields installed for football or soccer.
 5. The turf contractor and/or turf manufacturer must provide in-house competent workmen skilled in this specific type of synthetic grass installation with a minimum of 10 fields installed. The designated supervisory personnel on the project must be certified in writing by the turf manufacturer as competent in the installation of this material, including the gluing of seams and the proper installation of the infill mixture. The manufacturer shall have a representative on site to certify the installation and warranty compliance.
 6. All designs, marking, layouts, materials shall conform to current NFHS and CIAC rules and other standards that may be applicable to this type of synthetic grass installation unless there is a specific exception identified.
 7. Submit a full color rendering/drawing indicating all field markings for final approval prior to placing turf order. Failure to do so shall be at the contractor's risk and cost.
- B. All bidders of the turf contract must submit to the Engineer the following information:
1. All Contractors shall submit to the Engineer, after the bid, prior to award, a 1' x 1' minimum sample of the exact synthetic turf and infill system that is specified for this project. A sample of the Resilient Performance Base material shall also be submitted.
 2. The turf contractor / manufacturer shall submit, with the bid, a sample copy of the material warranty demonstrating compliance with the warranty requirements.

3. The turf contractor shall provide evidence - direct from the turf manufacturer corporate headquarters- that the installer is certified by the manufacturer to install this type of synthetic grass installation.
4. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a. Pile Height, Face or Pile Weight & Total Fabric Weight, ASTM D418 or D5848
 - b. Primary & Secondary Backing Weights, ASTM D418 and D5848
 - c. Tuft Bind, ASTM D1335
 - d. Grab Tear Strength, ASTM D1682 or D5034
 - e. Infill Materials, ASTM F3188-16
5. List of Ten (10) similar existing installations that have been installed in Connecticut including, Owner representative and telephone number(s).
6. The Turf Contractor and Turf Manufacturer (if different from the company) shall provide evidence that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending. Evidence shall be in the form of a written document stating such and signed by the Turf Manufacturers Corporate Headquarters.
7. The Turf Contractor and Turf Manufacturer (if different from the company) shall provide a sample copy of insured, non-pro-rated warranty and NON-CANCELABLE third-party warranty insurance policy with a policy minimum claim limits of at least \$350,000 and annual aggregate limit of at least \$10,000,000 in order to fully cover the full replacement of the turf system in the event of total failure.
8. Letter stating the products anticipated lifespan.
9. A certified letter and specifications sheet certifying that the products in this section meet or exceed specified requirements including certification from the turf manufacturer that lead or lead chromate, or PFAS/PFOS are not used in the manufacturing of the specified system. Including test results from the time the material leaves the plant indicating such.
10. Contractor shall submit certified copies of independent (third party) laboratory reports on the actual turf system and its components manufactured for this specific project as follows:
 - a. Lead Contact – ASTM F2765-09
 - b. Drainage capability of 10” minimum / hour
 - c. EPA Method 533 Modified, EPA Method 537 Modified laboratory analysis with isotope dilution, DoD QSM 5.4 Table B-15, or Engineer approved equivalent showing non-detectable concentrations of all PFAS quantified by the analysis method utilized.

11. Warranty must cover full 100% of replacement value of total square footage installed. Minimum \$10.00 per square foot.
- C. The General Contractor / Site Contractor shall be defined as the contractor who is responsible for the construction of the site components related to and located beneath the turf product, inclusive of but not limited to all cuts and fills as needed to establish an approved subgrade, the dynamic stone drainage system, the flat drains, yard drains, turf box covers, the perimeter collection system. The turf supplier / installer is a subcontractor to the general contractor. The General Contractor / Site Contractor shall have installed a minimum of five (5) Turf Fields in the last three (3) years and shall provide documentation and contact information for such.

1.03 SHOCK ATTENUATION EVALUATION:

- A. Near the completion of the turf, hire an independent testing laboratory to perform ten (10) in place G max tests in compliance with ASTM F1936 and F355. If any test results exceed 125, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Owner's Representative.
- B. Guarantee: During the eight (8) year guarantee period, the G max rating shall remain less than 165. The Contractor shall contract with an independent testing laboratory to perform three (3) in place G max tests each on site during the first, third, fifth, seventh and eighth years. If any test results meet or exceed 165, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Owner's Representative. If the G max rating exceeds 165 after three attempts to repair the high rating, replace the field within 90 calendar days at no cost to the Owner.

1.04 QUALITY CONTROL

- A. Upon delivery of the turf material to the project site, the Contractor shall deliver to the Engineer three (3) copies of notarized letter addressed to the Owner certifying that all products provided by them for incorporation into the system do not contain PFAS as specified by EPA Method 533 Modified, EPA Method 537 Modified laboratory analysis with isotope dilution, DoD QSM 5.4 Table B-15 or Engineer approved equivalent showing non-detectable concentrations of all PFAS quantified by the analysis method utilized in samples of the turf components and do not contain any other hazardous materials exceeding current EPA and CPSC requirements. The testing method utilized must report at least 29 PFAS compounds including the 5 PFAS regulated by the CTDEEP, and on the most current European Union REACH and California Proposition 65 compound lists:

Compound	CAS #	Reference
PFBS	375-73-5	REACH
PFHxS	355-46-4	REACH, CTDEEP
PFHpA	375-85-9	CTDEEP
PFOA	335-67-1	REACH, CTDEEP, Prop 65
PFOS	1763-23-1	CTDEEP, Prop 65
PFOS precursors	various	Prop 65
PFNA	375-95-1	REACH, CTDEEP, Prop 65
PFTTrDA	72629-94-8	REACH

As of 9/9/22

Separate samples of the turf can also be completed by a certified laboratory of the City's choice

1.05 PRE-INSTALLATION MEETING:

A. Convene One (1) Week After Bid Opening:

1. An interview shall take place at a time and date to be determined by the Engineer at the district office or other location determined by the Engineer and Owner. Present at this meeting shall be the Engineer, Owner's Representative(s), the Project Manager and Site Superintendent for the Prime Contractor and the Project Manager and Project Foreman for the Turf Installer. The purpose of this meeting will be to review turf product and installation means and methods, to interview and ascertain the experience and competence of the Turf Installer, as well as, the onsite Project Foreman for this project and to review the project schedule. The basis of choosing this particular product shall be in part due to the results of this interview process. Contractor shall submit all required submittals before this meeting.

B. Convene One (1) Week Prior to Stone Blanket Completion:

1. A second meeting shall take place at a location, time and date to be determined by the Engineer. Present at this meeting shall be the Engineer, Owner's Representative(s), and the Project Manager for the Site Contractor. The purpose of this meeting shall be to review and confirm schedule. (with particular attention on the turf installation) and to confirm that the turf product has been ordered by way of notarized copies of the original confirmed Purchase Order and guaranteed delivery date.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.
- C. Protect all products and installation area from vandalism, theft, other construction, etc.

1.07 WARRANTIES

- A. The Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight (8) years from the date of Substantial Completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements. The turf fabric shall not lose more than an average 2% per year. The manufacturer shall guarantee the availability of replacement material for the synthetic turf system installed for the life of the warranty.
- B. The Manufacturer's Warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer.
- C. The Turf Manufacturer's Warranty must be supported by an insurance policy of the full eight (8) year period.
- D. The Turf Contractor shall provide a Warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the Manufactures' recommendations and any written directives of the Manufacturer's onsite representative.
- E. The synthetic grass turf must maintain an ASTM F355 and ASTM F1936 G-max between 125-165 for the life of the Warranty.
- F. Any repairs or service to the field requested by the Owner or Owner's representative shall be addressed within 14 days from the date of written notification.
- G. The Turf Manufacturer shall be 100% responsible for and warranty all products installed as part of his system inclusive of the fibers whether the fibers are manufactured by the turf company or by others.

1.08 MAINTENANCE SERVICE

- A. The Turf Contractor will train the Owner's facility maintenance staff in the use of the specified maintenance attachments and equipment to routinely groom and sweep the field. Equipment shall be in good working condition.

1.09 ADA HANDICAP ACCESSIBLE

- A. Synthetic turf system shall be approved as ADA compliant as determined by Test-Method ASTM 1951-99.
- B. Proof of passing must be submitted for approval.

PART 2 - PRODUCTS

2.01 BASE STONE AND DRAINAGE SYSTEM

Sieves	Base Stone-Type 1	Base Stone-Type 2	Finishing Stone
3"			
2"	100		
1 ½"	90-100		
1"	75-100	100	
¾"	65-95	90-100	
½"	55-85	80-100	100
⅜"	40-75	70-100	85-100
¼"	25-65	60-90	75-100
US#4	15-60	50-85	60-90
US#8	0-40	30-65	35-75
US#16	0-20	10-50	10-55
US#30	0-10	0-35	0-40
US#60	0-8	0-15	0-15
US#100	0-6	0-8	0-8
US#200	0-5	0-2	0-2

Please note that the Base Stone and Drainage Stone system is a special manufactured product and any deviation from this material shall require written approval from the turf manufacturer's corporate headquarters. The base stone and finishing stone product is a 100% cleaned washed quarry stone mixture. gravel and sand mix material shall not be allowed (no exceptions)

RESTRICTIONS:

- A. To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < D_{30}^2 < 3$
 $D_{10} D_{60}$ Fragmentation must be 100%.
- B. To ensure separation of both stones: D_{85} of finishing stone > 2
 D_{15} of base stone and $3 < D_{50}$ of base stone < 6
 D_{50} of finishing stone

- C. To ensure proper drainage:
- Permeability of base stone > 50 in/hr (3.5×10^{-2} cm/sec)
 - Permeability of finishing stone > 10 in/hr (7.0×10^{-3} cm/sec)
 - Porosity of both stones > 25%
 - (When stone is saturated and compacted to 95% Proctor.)

2.02 PERIMETER EDGE: CONCRETE TURF ANCHOR – REFER TO DETAILS

2.03 UNDERDRAIN SYSTEM

- A. J-Drain MVP (Maximum Velocity & Performance)
- J-Drain-12 (1 inch by 12 inch flat drain)
 - J-Drain 6” end cap cut and fit for 12” drain
 - J-Drain 12” end outlet fitting with 4” outlet
 - J-Tape to connect fittings
- B. ADS- Advanced Drainage Systems, Inc.
- 18” diameter perforated collector drain pipe.
 - 24” diameter solid wall Nyloplast area drains- (with synthetic turf cover, see specs)
 - 4” Inserta Tee Lateral Connection
 - 4” Type C single wall pipe- (For J-Drain 12” end outlet to Inserta Tee)
- C. Mirafi 140N drainage filter fabric
- D. Approved equivalent

2.04 SYNTHETIC GRASS INFILL SYSTEM MATERIALS

- A. Manufacturer: Subject to compliance with all specified requirements,
1. The contractor shall provide with his bid, in the bid form, the synthetic grass system manufacturer and system his/her bid is based on.
- B. The Synthetic Grass Material and SBR rubber infill shall be in strict accordance with the following:
1. The fiber shall be a 7,200 denier 300 micron minimum thickness monofilament, and 5,000 denier 100 micron minimum thickness parallel slit film 100% polyethylene, low-friction fiber, measuring 2.25 inches high, as manufactured by Shaw Sports Turf. The low friction fiber shall be specifically designed to virtually eliminate abrasion. The fiber shall be a hybrid fiber combo with multi-structured monofilament and slit-film fibers tufted together in same needle construction per General specification part 1-1.01-A-3.
 2. The tufted fiber weight shall not be less than 46 ounces per square yard. The fiber shall be tufted on a ½” tufting machine. The overall product weight must not be less than 74 ounces per square yard. The low friction

non-abrasive fiber shall be 100% polyethylene, treated with a UV inhibitor. Systems that use polyethylene/ polypropylene blended fibers and systems that include any type of nylon fibers are unacceptable.

3. The carpet shall be delivered in 15' wide rolls. The rolls shall be of sufficient length to go from edge of track to edge of track. Head seams will not be acceptable.
4. All field lines, numbers and markings indicated on the plans shall be permanently installed or painted as indicated in the plans.
5. The fiber shall be Field Green/Lime Green/Olive Green in color to simulate natural grass as closely as possible and treated with UV inhibitor, guaranteed a minimum of eight (8) years.
6. The infill system shall consist of a non-compacting mixture of specifically graded, coarse, rounded, uniformly sized silica sand and coarse SBR rubber. SBR rubber shall conform to all STC regulation standards for safety. The contractor shall submit to the engineer for approval all SBR product data inclusive of material size and content. Failure to do so shall be at the contractor's risk and cost.

<u>SAND</u>		<u>RUBBER</u>	
Typ. Part. Size	Distr.	Typ. Part. Size	Distr.
*Mesh (ASTM E-11)		*Mesh (ASTM E-11)	
8	-----	8	-----
12	0.3%	10	Trace
16	57.8%	12	20%
20	32.6%	16	80%
30	5.1%	20	100%
40	-----	PAN	0%
50	-----		
PAN	0.4%		

Minimum total weight of infill to be 7 lbs./square foot with a 60/40 rubber and sand ratio (NO EXCEPTIONS)

*Represents the typical mean percentage (%) retained on individual sieves

7. Infill shall have no detection of pesticides, heavy metals, and all PFAS compounds quantified by EPA 533 Modified, EPA Method 537 Modified laboratory analysis with isotope dilution, DoD QSM 5.4 Table B-15 or ENGINEER approved equivalent.

2.05 TURF DATA

- A. Turf Fabric: Turf fabric with multicolored fiber and UV resistance, complying with the following:

Pile Weight:	Min. 46 oz/sy for 2.25"
Face Yarn Type:	100% Polyethylene
Yarn Size:	

Monofilament	7,200 Denier (300 micron minimum thickness)
Slit Film	5,000 Denier (100 micron minimum thickness)
Pile Height (Finished)	2.25"
Color:	Field Green/Lime Green/Olive Green
Construction:	Broadloom Tufted
Stitch Rate:	10/3"
Tufting Gauge:	1/2"
Primary Backing:	Woven and non-woven, fiber reinforced backing (three component system)
Secondary Backing:	20 oz/sy Urethane
Total Product Weight:	74 oz/sy
Finished Roll Width:	15'
Finished Roll Length:	Up to 220'
Perforation (Outdoors):	3/16" Holes on Staggered 4" (approximate)
Center Permeability:	20" ± Per Hour
Turf contractor shall provide independent study data on permeability requirements	
Infill Composition:	Rounded, Uniformly-Sized Silica Sand and SBR Rubber Mixture (60% rubber / 40% sand by weight)
Field Lines & Markings:	Tufted, Inlaid

Shall have no detectable concentrations of all PFAS compounds quantified EPA Method 533 Modified, Method 537 Modified laboratory analysis with isotope dilution, DoD QSM 5.4 Table B-15 or Engineer approved equal.

2.06 SYNTHETIC TURF BOXES

- A. Manhole access frame kit with infill retainer system for synthetic turf applications. Model number MHAFIT36 as produced by Sportsfield Specialties, Inc. www.sportsfield.com. or approved equal.
- B. TurfCool Water Hose Reel Enclosure Box for synthetic turf applications. Model number TCITHRSR (TC-3800-DGM) as produced by Sportsfield Specialties, Inc. www.sportsfield.com. or approved equal.
 - a. With retractable water hose reel model number REELCRAFT (DGM83075 OLP) as produced by Sportsfield Specialties, Inc. www.sportsfield.com. or approved equal.
- C. Half ComBox with infill retainer system for synthetic turf applications. Model number CBIT1815 as produced by Sportsfield Specialties, Inc. www.sportsfield.com. or approved equal.
- D. All synthetic turf boxes installed complete per manufacturer recommendations.,

2.07 FIELD GROOMER

- A. Supply a manufacturer recommended field groomer, which shall include a towing mechanism compatible with a field utility vehicle.

- B. The field groomer shall be a Greens Groomer Synthetic Turf Groomer, FieldTurf Groomright, Redexim Verti-Groom, SMG TurfCare TCA1400 or approved equal.

2.08 TURF SWEEPER

- A. Supply a manufacturer recommended field sweeper, 46" minimum width, suitable for removing leaves, loose paper and other debris, which shall include a towing mechanism compatible with a field utility vehicle.

PART 3 - INSTALLATION

3.01 SUBGRADE / SUBBASE APPROVALS

- A. Prior to the installation of the Synthetic Grass Infill System, the General/Site Contractor shall provide written certification that all subgrade, subbase, leveling course and slopes and elevations are in compliance with the Contract Documents and meets or exceeds all manufacturer's requirements. This certification shall be prepared by an approved Installer. The finished grade of the subbase shall not vary more than 3/16" in ten (10) feet. A laser grader must be used to meet the requirements.
- B. The General/Site Contractor shall also provide an as-built survey of the finished subgrade and also finished leveling course with spot grades every 25 feet on center each way for approval.
- C. The General/Site Contractor shall prepare a minimum 25'x25' (twenty five foot by twenty five foot) mock-up of the approved materials for the subbase and leveling course system in order to evaluate porosity and stability prior to installing material over the entire field. If acceptable the mock-up may become part of the finished field.

3.02 SYNTHETIC GRASS INFILL SYSTEM

- A. Verification of Conditions (by Installer): Examine conditions under which synthetic grass surfacing is to be installed in coordination with Installer of materials and components specified in this Section and notify affected Prime Contractors and Engineer in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
 - 1. When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Architect written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.
 - 2. Synthetic Grass Infill System: Provide manufacturer's inspection and certification that surface to receive synthetic turf is ready for installation of

synthetic turf system, is perfectly clean in accordance with manufacturer's standards, and will be maintained in acceptable clean condition throughout installation.

3. Infill shall have no detectable pesticides, heavy metals, and all PFAS compounds quantified by EPA Method 533 Modified, EPA Method 537 Modified analysis with isotope dilution, DoD QSM 5.4 Table B-15 or Engineer approved equal.

B. Installation: Install in strict accordance with manufacturer's written specifications and recommendations.

1. Unless otherwise recommended by turf and base manufacturer, lay turf loosely across field, stretched, and attached to perimeter edge detail with sufficient length to permit full cross-field installation without head or cross-seams. (Head and cross-seams shall not be permitted)
2. Per the manufacturer's recommendation, the installation of field lines shall be sewn in or cut and glued. All field line installation shall be covered under the warranty.
3. Provide Infill material properly mixed on site and applied/spread evenly with a large fertilizer type spreader (minimum six (6) foot wide) in strict accordance with manufacturer recommendations. Between each application of infill, the field area shall be brushed with a motorized rotary nylon broom. Minimum infill depth shall be 2.0 inches. Comply with manufacturer's recommendations regarding environmental requirements for installation such as dryness and absence of moisture. Please note that prior to final approval of the field the Engineer shall perform field infill height measurements and also infill weight tests throughout the field to ensure the proper infill height and weight have been met. The infill weight tests shall include removing a square foot of material and weighing accordingly, in the presence of the turf manufacturer / turf installer, at 8 chosen areas throughout the field of play. Upon completion of the test, the turf manufacturer shall replace the extracted material accordingly. If it is deemed the proper infill weight is not in compliance with the contract documents, the turf manufacturer, at his/her cost, shall import and install added infill material (in the presence of the Engineer) throughout the field until it has been deemed the infill weight is acceptable.
4. Field markings: Apply and install fixed markings as indicated herein and in accordance with the Contract Drawings.
 - a. Football: All lines/markings shall be inlaid White. (360'x160')
 - b. Soccer: All lines/markings shall be inlaid Yellow. (360'x195')
 - c. Boys Lacrosse: All lines/markings shall be inlaid Blue. (330'x180')
 - d. Girls Lacrosse: All lines/markings shall be inlaid Red. (360'x195')

- e. Field Hockey: All lines/markings shall be inlaid Black. (300'x180')
- f. Practice Lacrosse: All lines/markings shall be inlaid Gray. (300'x165')
- g. Town logo as indicated on the plans.

All markings can be sheared/shaved or cut and glued.

- 5. Provide final cleaning of synthetic grass surfacing installations and maintain area clean and free from debris during installation. Clean surfaces, recesses, enclosures, and similar areas as required, leaving area of installation in clean, immaculate condition ready for immediate occupancy and use by Owner.
- 6. Protect installed synthetic grass from subsequent construction operations. Do not permit traffic over unprotected surfacing.
- 7. The turf manufacturer shall provide up to 8 hours of training for the Owner's facility maintenance staff in use of grooming equipment recommended and supplied by the manufacturer.

3.03 MAINTENANCE AND WARRANTY

A. The turf installer and/or the turf manufacturer must provide the following:

- 1. The turf manufacturer shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight years from the date of Substantial Completion. The turf manufacturer must verify that their on-site representative has inspected the installation and that the work conforms to the manufacturer's requirements. The polyethylene yarn manufacturer shall provide an eight (8) year "UV stabilization" warranty.
- 2. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, acts of War and acts of God beyond the control of the Owner of the manufacturer.
- 3. The turf contractor shall provide a warranty to the owner that covers defects in the installation workmanship, and further warrant the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's on-site representative.
- 4. All turf warranties shall be limited to repair or replacement of the affected areas and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs. All warranties are contingent on the full payment by the Owner of all pertinent invoices.

END OF SECTION

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SECTION 32 31 13

CHAIN LINK FENCE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide all labor, materials and appurtenances necessary for the installation of a complete chain link fence systems and shall meet or exceed the standards of the Chain Link Fence Manufacturer's Institute, New York, NY except as otherwise indicated on the Drawings and as herein specified.
- B. The manufacturer shall supply a total vinyl PVC coated chain link fence system of the height, fabric type, fabric gauge, framework strength, color and coating specifications contained herein. All fence materials unless specifically stated otherwise, shall be fused and adhered polyvinyl chloride (PVC) coated, color black.

1.02 RELATED WORK:

- A. Section 01 33 23, SUBMITTALS
- B. Section 03 30 00, CAST IN PLACE CONCRETE

1.03 REFERENCES:

- A. The following standards form a part of this specification as referenced.

American Society for Testing and Materials (ASTM)

ASTM	A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM	A392	Zinc Coated Steel Chain Link Fence Fabric
ASTM	A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM	A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM	F567	Installation of Chain Link Fence
ASTM	F626	Fence Fittings
ASTM	F668	Specification for Poly Vinyl Chloride (PVC) - Coated Steel Chain-Link Fence Fabric.

ASTM F1043 Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.

Federal Specifications (FS)

FS RR-F-191 Fencing Wire and Post, Metal (and Gates, Chain-Link Fabric, and Accessories)

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature of the materials specified herein.
- B. Shop drawings of the fence and the proposed color.

1.05 WARRANTY:

- A. Prior to installation, the fence contractor shall provide the fence manufacturer's notarized certification that all vinyl components are fully warranted by the manufacturer for 15 years against rust and corrosion.

PART 2 - PRODUCTS - PVC COATED

2.01 STEEL FRAMEWORK (GENERAL):

- A. All posts, gate frames, braces and horizontal rails shall be Type I round post, hot dipped galvanized with a minimum average coating of 1.8 oz/ft², meeting ASTM F 1083 for Standard Weight Galvanized Pipe and shall be of the sizes and weights given below or other approved equivalent sections of steel having a minimum tensile strength of 50,000 pounds per square inch and a minimum yield strength of 25,000 pounds per square inch.
- B. Minimum cross-section dimensions for line posts of specified shape shall be: either 2-3/8-inch (2.375-inch) outside diameter steel pipe weighing not less than 3.65 pounds per linear foot.
- C. Minimum cross-section dimensions for end, corner, and pull posts of specified shape shall be: 2-7/8-in. (2.875-in.) outside diameter steel pipe weighing not less than 5.79 pounds per linear foot.
- D. All tubular and pipe posts shall be capped to prevent precipitation from entering the post.
- E. Posts, other fence framework, accessories, fittings, and miscellaneous items shall be galvanized and have a fused and adhered polyvinyl chloride (PVC) coating Class 2b. The PVC coating on posts shall be a minimum of 10 mils thick. Framework color coating shall match fabric. Galvanized finish shall have not less than the following weight of zinc per square foot:

1. Pipe: 1.8 oz, complying with ASTM A53.
 2. H-sections and square tubing: 2.0 oz, complying with ASTM A123.
 3. Hardware and accessories: Comply with Table I of ASTM A153.
- F. For top railings and top, middle and bottom braces between terminal posts and adjacent line posts, the minimum cross-section dimensions for the specified shall be 1-5/8-inch outside diameter steel pipe weighing not less than 2.26 pounds per linear foot.
- G. Diagonal truss braces between terminal and adjacent line posts and for gauge framework shall not be less than either 3/8-inch diameter steel rod or double No. 9 AWG steel wire stranded together.
- H. Fittings shall be galvanized fused and adhered vinyl coated press steel, malleable or cast steel as specified in ASTM F626 and Federal Specification RR-F-191.
- I. Where posts do not have provisions for weaving fence fabric to posts, tension or stretcher bars for attaching fabric to terminal posts such as end, corner, gauge and pull posts, shall be flat bar with nominal dimensions no less than 3/16 by 3/4-inch for use with fence fabric having mesh larger than 1-inch, of a length equal to full height of the fence fabric, and used with bar bands, bolts and nuts. Bar bands shall be no thinner than No. 11 gauge coated sheet steel. Bolt diameters shall be not less than 3/8-inch for use with bar bands.
- J. Ties for fastening fence fabric to line posts and rails shall be not less than No. 9 AWG steel wire with the same coating as the fence fabric or other approved bands.

2.02 CHAIN LINK FENCE FABRIC – PVC COATED:

- A. Vinyl coated fabric shall be supplied with Class 2B (fused and adhered) vinyl coating. The coating shall be applied over a galvanized steel core wire and be manufactured in accordance with Federal Specifications RR-F-191 and ASTM F668. The PVC coating shall have a final coating thickness of 0.015-0.025-inch and a core wire size diameter of 0.148-inch.
- B. Wire size: The finished wire size shall be 6 gauge.
- C. Height and Mesh Size: The fabric height shall be 4 feet high with a mesh size of 2-inches.
- D. Selvage: Top edge and bottom edge of the fabric shall be knuckled.
- E. The tension wires shall either be No. 7 gauge steel-core wire. PVC coating shall conform to ASTM F668 Class 2b. Also, a 7-strand galvanized steel 1/2-inch guy wire with PVC coating may be supplied.
- F. The polyvinyl chloride (PVC) coating shall be free of voids, shall be dense and impervious, shall be of a plasticized or epoxy modified, high specific gravity polyvinyl chloride with high resistance to tear and suitable hardness. The PVC coating shall not support combustion and shall withstand an accelerated aging and weathering test a

minimum of 2,000 hours at 145 degrees F with ultraviolet and salt spray without cracking or peeling the PVC coating and without corrosion of the base metal. The PVC coating shall withstand a mandrel bending test of ten times the thickness of the base metal at minus 25 degrees F without cracking. The PVC coating shall not separate from the metal or shrink. Color used in PVC coating shall be stabilized so that it will not fade under long exposure to sunlight. Color shall be approved by the Engineer as selected from the manufacturer's standard colors.

2.03 SWING GATES – PVC COATED:

- A. Gate leaf frames shall be amply braced and trussed for rigidity. Truss rods shall be adjustable. Gate leaf framework shall be pipe or other approved suitable cross-section of the size recommended by the fencing manufacturer for the size of gate leaf, but shall be no smaller than 2-inch outside diameter steel pipe weighing not less than 3.65 pounds per linear foot. If bolted or riveted corner fittings are not used, the gate frame shall have the corrosion-resistant finish applied after welding.
- B. Gates, gate posts, fabric and associated hardware shall be thermally coated with PVC, 10 mils thick, to match the fence.
- C. Gate hinges shall be 180 degree, heavy pattern, of adequate strength for the gate size, with large bearing surfaces for clamping or bolting in position, and with hinge action such that the gates may be opened and closed easily.
- D. Gates shall be provided with accessible, suitable latches and provisions for padlocking.
- E. Double leaf gates shall have center bolts and center stops. Unless indicated otherwise on the drawings, the gates shall have automatic backstops to hold the leaves in open position.
- F. For gate openings, up to and including 12-feet, with double leaf gates, minimum cross-section dimensions for the gate posts of specified shape shall be the same as specified above for end posts.
- G. For gate openings larger than 12 feet, the minimum outside diameter for the gate posts shall be 6-5/8-inches, weighing not less than 18.97 pounds per linear foot.

PART 3 - EXECUTION

3.01 ERECTION:

- A. The fence and gates shall be erected by skilled mechanics in accordance with the recommendations of the manufacturer and these specifications. These specifications shall take precedence over the recommendations of the manufacturer if any discrepancy exists between them.

- B. Maximum post spacing shall be 10-feet. Post spacing shall be uniform and posts shall be plumb. All end, corner, pull and gate posts must be set in concrete. Line posts may be secured by driven blades.
- C. Concrete post foundations in earth shall be concrete cylinders with a minimum diameter of 12-inches, crowned at below grade to shed water, and shall extend not less than 3-1/2 feet into the ground. Posts shall be set in the full depth of the foundations except for 3-inches of concrete under the posts. If foundation holes are excavated in unsuitable material, the Engineer shall be notified for determination of suitable construction precautions.
- D. If solid rock is encountered without an overburden of soil, poles shall be set into the rock a minimum depth of 12-inches for line posts and 18-inches for terminal posts, such as end, corner, gate and pull posts, and grouted into solid rock with the post hole diameter a minimum of one inch larger than that of the post.
- E. Where solid rock is covered by an overburden of soil or loose rock, the posts shall be set into the rock as specified above. The total pole setting depth shall not exceed the depths required for setting in earth.
- F. Any change in direction of fence line of 30 degrees or more shall be considered as a corner. Pull posts shall be used at all abrupt changes in grade. Maximum area of unbraced fence shall not exceed 1,500 square feet.
- G. Terminal posts such as end, corner, gate and pull posts shall be braced to the adjacent post(s) with horizontal rail braces used as compression members and diagonal truss braces with truss tighteners for tension members, with the lower ends at the terminal post in each panel of fence framework as indicated in detail on drawings.
- H. The top railing shall pass through intermediate or line post tops, form a continuous brace with all splices made by approved couplings, and shall be fastened to terminal posts.
- I. Fabric shall be stretched taut, with the bottom edge following the finished grade, and shall be a continuous mesh between terminal posts. Each span of fabric shall be attached independently at terminal posts. Where terminal posts do not have provisions for weaving fabric to posts, stretcher bars shall be placed through the end weave of the fabric and secured to the post with bar bands spaced not more than 15-inches apart on the post.
- J. Fabric shall be attached with ties to line posts at intervals of not more than 12-inches (and to the top railing and braces at intervals not exceeding 12-inches).

END OF SECTION

SECTION 32 84 00

IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

- A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.
- B. Coordinate work of this Section with other underground utilities and with trades responsible for their installation. Refer to respective Drawings pertaining to other work.

1.02 WORK INCLUDED:

- A. The irrigation system shown on the Drawings and described within these Specifications represents a single controller, irrigation system supplied from town water. The system is designed for 133 gallons per minute. Minimum 90-psi dynamic pressure at full system flow is required from the irrigation contractor's point of connection.
- B. Work to be done includes furnishing all labor, materials, equipment and services required to provide a complete and functional irrigation system as indicated on the Drawings, as specified herein, or both.
- C. The mechanical point of connection for the irrigation system shall be a new town water tap provided and installed by others.
- D. The electrical point of connection for the irrigation system shall be to a 120-volt, 20-amp building electrical circuit provided and installed by others.
- E. The Drawings and Specifications must be interpreted and are intended to complement each other. The Contractor shall furnish and install all parts, which may be required by the Drawings and omitted by the Specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the Contractor shall refer the matter to the Owner's Representative for decision, and its interpretation shall be final, conclusive and binding.
- F. All necessary changes to the Drawings to avoid any obstacles shall be made by the Contractor with the approval of the Owner's Representative.

- G. Trench excavation, back filling and bedding materials, together with the testing of the completed installation shall be included in this work.
- H. The work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the Drawings and Specifications. All parts necessary for the proper and complete execution of the work, whether the same may have been specifically mentioned or not, or indicated on the Drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.
- I. Record Drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

1.03 RELATED WORK:

- A. Electrical power supply: Division 26
- B. Earthwork: Division 31

1.04 REFERENCES:

- A. The following standards, latest revision thereof, form a part of this specification as referenced:

American Society for Testing & Materials (ASTM)

ASTM	A536	Ductile Iron Castings
ASTM	D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM	D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and C1200.
ASTM	D2464	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
ASTM	D2466	Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
ASTM	D2564	Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
ASTM	F477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
ASTM	D2737	Polyethylene (PE) Pressure rated tube.

National Plumbing Code (NPC)

National Electric Code (NEC)

National Sanitary Foundation (NSF)

American Society of Agricultural Engineers (ASAE)

Underwriters Laboratories, Inc. (UL)

Occupational Safety and Health Regulations (OSHA)

1.05 ORDINANCES, PERMITS AND FEES:

- A. The Work under this Section shall comply with all ordinances and regulations of authorities having jurisdiction.
- B. The Contractor shall obtain and pay for any and all permits, tests and certifications required for the execution of Work under this Section.
- C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.
- D. The Contractor shall include in its bid any charges by the Owner, Utility Company, or other authorities for work done by them and charged to the Contractor.

1.06 EXAMINATION OF CONDITIONS:

- A. The Contractor shall fully inform itself of existing conditions on the site before submitting its bid, and shall be fully responsible for carrying out all work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.07 CONTRACTOR'S QUALIFICATIONS:

- A. Installer: A firm which has at least five (5) years' experience in work of the type and size required by this Section and which is acceptable to the Owner's Representative.
- B. References: The Contractor must supply three references for work of this type and size with their bid including names and phone numbers of contact person(s).

1.08 TESTS:

- A. Observation: The Owner's Representative will be on site at various times to ensure the system is being installed according to the Specifications and Drawings.
 - B. Coverage Test: After completion of the system, test the operation of entire system and adjust sprinklers as required by the Owner's Representative. Demonstrate to the Owner's Representative that all irrigated areas are being adequately covered. Furnish and install materials required to correct inadequacies of coverage due to deviations from the Drawings or where the system has been willfully installed when it is obviously inadequate or inappropriate without bringing it to the attention of the Owner. See Part 3 - Execution).
 - C. The Owner's Representative shall be notified 48 hours in advance for observations.
 - D. During final observation, the Contractor shall be responsible for having two-way communication and sufficient personnel to provide instantaneous communication between the observation area and the controller for the system.
- 1.09 SUBMITTALS: IN ACCORDANCE WITH SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:
- A. Product specification sheets on all proposed equipment to be installed. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included:
 - 1. Sprinkler Heads
 - 2. Valves: Manual and Automatic
 - 3. Controllers
 - 4. Valve Boxes
 - 5. Pipe and Fittings
 - 6. Wire and Connectors
 - 7. Quick Coupling Valves
 - 8. Rain Sensor
 - 9. Grounding Equipment
 - 10. Miscellaneous Materials

- B. Operation and maintenance manuals: See paragraph 1.13 of this Section of the specifications.
- C. Project Record Documents:
1. The Contractor shall provide and keep up to date a complete redlined Record Set of Drawings of the system as the project proceeds. Drawings shall be corrected daily, showing every change from the original Drawings and Specifications. Record Drawings shall specify and exactly locate sprinkler type; pop up height and nozzle for each sprinkler installed. Each valve box location to be referenced by distance from a minimum of two permanent locations. Controller(s), rain sensor(s), quick coupling valves and all other equipment shall be indicated on the drawings. All wire routing, wire size and splices shall be indicated. Main line pipe and wire route shall have two (2) distinctly different graphic symbols (line types). Prints for this purpose may be obtained from Owner's Representative at cost. This redlined record set of drawings shall be kept at job site and shall be used only as a record set.
 2. The redlined set of documents shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. This record set of drawings shall be available at all times for observation and shall be kept in a location designated by Owner's Representative. Should this record set of drawings not be available for review or not be up to date at the time of the observation, it will be assumed no work has been completed. Provide copies of the redlined record set of drawings for Owner's Representative review on a monthly basis.
 3. Make neat and legible notations on this record set of drawings daily as the work proceeds, showing the work as actually installed. For example, should a piece of equipment be installed in a location that does not match the plan, indicate that equipment in a graphic manner in the location of installation and so as to match the original symbols as indicated in the irrigation legend. Should the equipment be different from that specified, indicate with a new graphic symbol both on the drawings and the irrigation legend. The relocated equipment dimensions and northing and easting coordinates should then be transferred to the appropriate drawing in this record set of drawings at the proper time.
 4. On or before the date of final field observation, deliver corrected and completed AutoCAD computer plots of "record drawings" on vellum and AutoCAD electronic files on disk to Owner's Representative as part of contract closeout. Delivery of plots will not relieve Contractor of the

responsibility of furnishing required information that may have been omitted from the prints.

- D. At the end of each segment of the project the Contractor shall submit the following to the Owner's Representative.
1. Plumbing permits: If none required, so state.
 2. Material approvals.
 3. Pressure line tests: By whom approved and date.
 4. Materials furnished: Recipient and date.

1.10 DELIVERY, STORAGE AND HANDLING:

- A. Store and handle all materials in compliance with manufacturer instructions and recommendations. Protect from all possible damage. Minimize on-site storage. The Contractor shall be responsible for protection of all materials and replacement of damaged materials.

1.11 WARRANTY:

- A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.
- B. In addition to the manufacturers guarantees the Contractor shall warrant the entire irrigation system, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.
- C. As part of the one-year warranty the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system.
- D. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner's Representative at no additional expense to the Owner.
- E. A written warranty showing date of completion and period of warranty shall be supplied upon completion of each segment of the project.

1.12 COORDINATION:

- A. The Contractor shall at all times coordinate his work closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. The Owner's Representative shall be notified as to the start of work, progression and completion, as well as any changes to the drawings before the change is made. The Contractor shall also coordinate his work with that of his sub-contractors.
- B. The Contractor shall be held responsible for and shall pay for all damage to other work caused by his work, workmen or sub-contractors. Repairing of such damage shall be done by the Contractor who installed the work, as required by the Owner's Representative.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS:

- A. Contractor shall include in its Bid an allowance for four (4) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator (The Owner's Representative office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).
- B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3) three ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE BARTLEM PARK IRRIGATION SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binders shall be:
 - 1. Table of Contents
 - 2. Written description of Irrigation System.
 - 3. System drawings:
 - a. One (1) copy of the original irrigation plan;
 - b. One (1) copy of the Record Drawing;
 - c. One (1) reproducible of the Record Drawing;
 - d. One (1) copy of the controller valve system wiring diagram
 - 4. Listing of Manufacturers.
 - 5. Manufacturers' data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.

- a. "APPROVED" submittals of all irrigation equipment;
 - b. Operation:
 - c. Maintenance: including complete troubleshooting charts.
 - d. Parts list.
 - e. Names, addresses and telephone numbers of recommended repair and service companies. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
6. Winterization and spring start-up procedures.
 7. Guarantee data.

1.14 COORDINATION WITH OWNER AND UTILITIES:

- A. Notify all **town** departments and/or public utility owners concerned, of the time and location of any work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of any utilities.
- B. Provide and install temporary support, adequate protection and maintenance of all structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as required by the Architect.

PART 2 - PRODUCTS

1.01 GENERAL:

- A. All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation are the property of the Contractor and shall be removed from the site.
- B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative.

2.02 PVC IRRIGATION PIPE:

- A. All pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.
- B. All pipe in sizes 2-1/2-inches and smaller shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 as manufactured by CertainTeed, Cresline, JM or equal.
- C. All pipe in sizes 3-inches and larger shall be PVC, Class 200, Type 1120, SDR 21, Gasket-Joint PVC, conforming to ASTM No. D2241 as manufactured by CertainTeed, Cresline, JM or equal.
- D. The pipe insertion mark shall be visible to show the proper depth into spigot.

2.03 PVC PIPE SLEEVES:

- A. All pipe sleeves beneath non-soil areas shall be PVC, Class 160, Schedule 40 water pipe as manufactured by CertainTeed, Cresline, JM or equal. Minimum sleeve size to be 3-inch.

2.04 WIRE CONDUIT:

- A. Conduit for wiring beneath non-soil areas shall be PVC, Schedule 40 conduit with solvent-weld joints, as manufactured by CertainTeed, Cresline, JM or equal.
- B. Sweep ells shall be standard electrical type PVC Schedule 40 long sweep elbows. Cap sweep ell with tri-plug with the ring for securing nylon pull rope.
- C. Conduit for above ground wiring to rain sensors or controllers shall be galvanized, rigid metallic conduit.

2.05 PVC IRRIGATION FITTINGS:

- A. Fittings for solvent weld PVC pipe, 2-1/2-inches and smaller in size, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears or equal.
- B. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule.
- C. All PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 threads will not be approved for installation.
- D. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement is to meet ASTM D2564 and FF493 for

potable water pipes. PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Heavy Duty Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-68 Clear, Oatey Clear Primer for PVC and CPVC, or equal.

- E. Fittings for PVC main line pipe, for all directional changes, pipe reductions and plugs 3- inch and larger in size shall be deep bell push-on gasket joint ductile iron fittings for PVC pipe. Fittings shall be manufactured of ductile iron, grade 70-55-05 in accord with ASTM A536 and gaskets shall meet ASTM F477. Fittings shall be as manufactured by Harrington Corporation, Harco, or equal. For main line pipe to zone valve / lateral pipe connections, Harco or equal push-on gasket joint ductile iron service tees shall be used. Saddles, (strap, bolt down or snap) will not be approved for installation.
- F. All nipples to be schedule 80 PVC.

2.06 ROTARY SPRINKLERS:

- A. Rotary sprinklers shall be gear-driven, rotary type heads, designed for in-ground installation with integral check valves and in-riser flow shut-off capability. Sprinkler shall be capable of covering a 70-104-foot radius and flow range of 19.5-83.8 gpm at 80-120 pounds per square inch of pressure. Sprinklers shall have a one hundred percent warranty for two years minimum against defects in workmanship.
- B. The nozzle assembly shall elevate minimum three inches when in operation and retraction shall be achieved by a stainless-steel spring. Riser assembly shall be plastic. A nozzle wiper seal shall be included in the sprinkler for continuous operation under the presence of sand and other foreign material.
- C. All sprinkler parts shall be removable through the top of the unit through the removal of a heavy-duty threaded cap. The sprinkler shall have a one and one-half inch (1 1/2") IPS water connection on the bottom of the sprinkler.
- D. Sprinklers shall be manufactured by Rain Bird model EAGLE-900/950, Hunter Industries model I90-36V 38 or approved equal.
- E. Approved Performance Chart (90' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird EAGLE 900	90psi	360 Deg.	64	133	97'

Rain Bird EAGLE 950	90psi	40 - 360 Deg.	64	133	92'
Hunter I-90-36V 38	90psi	360 Deg.	38	133	90'
Hunter I-90-ADV	90psi	40 - 360 Deg.	43	133	90'

2.07 ELECTRIC CONTROL VALVES:

- A. Electric control valves shall be one, one and one half and two-inch remote control, diaphragm type, fiberglass or reinforced nylon body plastic valves with manual flow control, manual bleed screw and 200 psi pressure rating.
- B. Valves shall be manufactured by Rain Bird model PEB, Hunter Industries model ICV or approved equal.

2.08 VALVE BOXES:

- A. All valve boxes shall be manufactured from unformed resin with a tensile strength of 3,100-5,500 psi conforming to ASTM D638. All boxes shall be green in color. Covers shall be green in color unless otherwise specified.
- B. Valve boxes for single electric valves, isolation valves and quick coupling valves shall be 10-inch round valve boxes with metal detection and bolt down covers.
- C. Valve boxes for dual electric valves shall be 12-inch standard valve boxes with metal detection and bolt down covers.
- D. Valve boxes for wire splices shall be 10-inch round valve boxes with detectable disks as manufactured by Armor, Part 181104 or 181112. All splices shall be in separate valve boxes and not included with isolation valves.
- E. Valve box extensions shall be provided and installed as required for proper box depth. Valve box extensions shall be made by the same manufacturer.
- F. Valve boxes shall be manufactured by Armor or approved equal.

2.09 AUTOMATIC CONTROLLER:

- A. Controller shall be electronic in construction with capability of up to 10 hour run times per zone in increments of 1 or 10 minutes. Controllers to have minimum four

independent programs, auto/off switch and be capable of manual, semi-automatic and automatic operation. Controller shall have water budgeting feature, cycle and soak feature, sensor input terminal, locking, weather resistant plastic cabinet and internal transformer. Terminal strip connection shall be easily accessible. The controller shall be U.L. listed, 120-volt, 60 Hertz, A.C. type.

- B. Controller shall be as manufactured by Rain Bird model ESP-32LXM, Hunter Industries model HCC-1600PL or approved equal.
- C. Station quantity shall be minimum of 54.

2.10 QUICK COUPLING VALVES:

- A. The valve body shall be of cast brass construction with a working pressure of 125 psi. The valve seat disc plunger body shall be spring loaded so that the valve is normally closed under all conditions when the key is not inserted.
- B. The top of the valve body receiving the key shall be equipped with ACME threads and smooth face to allow the key to open and close the valve slowly. The quick coupling valve shall be equipped with a vinyl cover.
- C. The valve body construction shall be such that the coupler seal washer may be removed from the top for cleaning or replacement without disassembling any other parts of the valve.
- D. Keys shall be ACME with 1-inch male thread and 3/4-inch female thread at the top.
- E. Contractor shall provide two (2) keys for quick couplers and two (2) 1-inch x 3/4-inch swivel hose ells.
- F. Quick coupling valves, keys and swivels shall be manufactured by Hunter Industries, model HQ-44RC, or approved equal.

2.11 WIRE:

- A. All valve control wire shall be minimum #14-awg, common #12-awg, single strand, solid copper, UL- approved direct burial AWG-U.F. 600V and shall meet all state and local codes for this service. Individual wires must be used for each zone valve. Common wire shall be white in color, control wire shall be red in color and spare wires, installed where indicated on the drawings shall be blue. White color shall be used for common wire only.
- B. In ground wire connections shall be UL listed, manufactured by 3M, model DBY-6 splice kits. All wire splices shall be made in valve boxes, at controller, or at valves.

- C. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

2.12 ISOLATION VALVES:

- A. Isolation valves 2-1/2-inches and smaller in size shall be gate type, of bronze construction, US Manufacture, 200 WOG with steel cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco, model T-113-K, or approved equal.
- B. Isolation valves 3-inches and larger in size shall be cast iron epoxy coated inside and outside, long bell length ring-tite valves, 200 psi rated, ductile iron gland flange, bronze stem-seal box, o-ring stem seal replaceable under pressure, stainless steel stem, 2-inch operating nut and replaceable disc conforming to AWWA C-509 as manufactured by Nibco, Model P-619-RW or approved equal.

2.13 BACKFLOW PREVENTER:

- A. Backflow preventer shall comply with Regional Water Authority (RWA) requirements. Material shall cast iron, epoxy coated, 3" female-threaded inlet model LF909 as manufactured by Watts, model 375XL as manufactured by Wilkins, or approved equal.

2.14 SWING JOINTS:

- A. Small rotary sprinklers shall be installed on swing pipe assemblies, minimum length 6-inches, maximum 18-inches.
- B. Large rotary sprinklers shall be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double o-ring seals, minimum 315 psi rating and minimum length of 12-inches.
- C. Quick coupling valves to be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double o-ring seals, minimum 315 psi rating and minimum length of 12-inches with brass insert and stabilizer (unless stabilizer is an integral part of the quick coupling valve).

2.15 AUTOMATIC RAIN SENSOR:

- A. Rain sensor shall be plastic in construction with adjustable interruption point, 1/2-inch IPS threads and stainless-steel vandal resistant guard. Rain sensor shall be manufactured by Hunter Industries, model Rain-Clik or approved equal with sensor guard.

2.16 CRUSHED STONE:

- A. Crushed stone shall be as specified in Section 31 00 00 EARTHWORK. Crushed stone shall be used under valve boxes.

2.17 SAND:

- A. Sand used for backfilling of trenches; under, around and over PVC lines shall be as specified in SECTION 31 00 00 EARTHWORK.

2.18 THRUST BLOCKS:

- A. Standard concrete mix shall be in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,000 psi.
- B. All bell and gasket mainline pipe and fittings shall have thrust blocks sized and placed in accordance with pipe manufacturer's recommendations for standard concrete mix. Thrust blocks shall be installed at all tees, elbows, crosses, reducers, plugs, caps and valves. Contractor shall be responsible to insure the stability of all thrust blocks.

2.19 GROUNDING EQUIPMENT:

- A. Each exterior field controller installed outside of a building shall include factory-installed and factory-recommended lightning protection and shall be connected to 5/8-inch diameter x 10-foot long copper clad grounding rods with minimum #6 AWG, solid, bare copper wire and 4-inch x 96-inch x 0.0625-inch copper grounding plates as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between controller and ground rod. All connections to rods shall be with Cadweld connectors as specified. All connections to plates shall be performed by the plate manufacturer (Paige #182199L) with 25-feet of bare copper wire already attached. Each grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch ADS drainage pipe. Plates shall be installed in ground enhancement material. Plates shall be covered with 4-inch plastic grated cover with detection and minimum 36-inches of 4-inch dia. ADS drainage pipe. Ground rods and plates shall be UL listed.
- B. Each controller shall be grounded to one rod and one plate. The 10-foot rod shall be installed penetrating into the soil to its full length. Plate shall be installed at a 36-inch depth with 50 lbs. of Power Set ground enhancement material spread evenly below the plate and 50 lbs. spread evenly above the plate in accordance with manufacturer's requirements. The grounding electrodes shall be installed at least 10 feet from wires connected to the field controllers. Each field controller shall have a separate grounding system.

2.20 SPARE PARTS:

- A. Contractor shall supply the following tools and equipment to the Owner's Representative before final observation:
 - 1. Two (2) wrenches for disassembling and adjusting each type of sprinkler head provided.
 - 2. One (1) quick coupler key assembly for every five or fraction thereof of each type of quick coupling valve provided.
 - 3. One (1) of each type of gate valve used in the project.
 - 4. Two (2) of each type sprinkler head and pattern (PC & FC) used in the project.
 - 5. Two (2) of each type nozzle used in the project.
- B. Before final observation can occur, written evidence that the Owner's Representative has received the tools and equipment must be shown to the Owner.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the work.
- B. Examine all contract documents applying to this Section noting any discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.
- C. All work indicated on Drawings shall be provided whether or not specifically mentioned in the Specifications.
- D. If there are ambiguities between Drawings and Specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by Owner's Representative, and Contractor shall comply with the decisions. In the event the installation contradicts the directions given, the installation shall be corrected by Contractor at no additional cost to Owner.
- E. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the landscape irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, drawing legend or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.

- F. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out essentially as indicated on the Irrigation Plans, making minor adjustments for variations in the planting arrangement. Major changes shall be reviewed with the Owner's Representative prior to proceeding.
- G. Layout of sprinkler lines indicated on Drawings is diagrammatic only. Location of sprinkler equipment is contingent upon and subject to integration with all other underground utilities. Contractor shall employ all data contained in the Contract Documents and shall verify this information at the construction site to confirm the manner by which it relates to the installation.
- H. Coordinate installation of all sprinkler materials, including pipe, to avoid conflict with the trees, shrubs, or other plantings.
- I. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. The superintendent shall represent the Contractor in his absence and all directions given to the superintendent shall be as binding as if given to the Contractor.
- J. At all times, protect existing irrigation, landscaping, paving, structures, walls, footings, etc. from damage. Any inadvertent damage to the work of another trade shall be reported at once.
- K. Replace, or repair to the satisfaction of the Owner, all existing paving disturbed during course of work. New paving shall be the same type, strength, texture, finish, and be equal in every way to removed paving.

3.02 PIPE AND FITTINGS INSTALLATION:

- A. Using proper width trencher chain, excavate a straight (vertical) and true trench to a depth of 2-inches below pipe invert elevation.
- B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the Drawings and stockpiled for subsequent replacement in the upper 6-inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

- C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock larger than 1-inch or sharp edges; if not, excavate to 2-inches below pipe invert and provide and install sand base or crushed stone upon which to lay pipe.
- D. Back filling shall be accomplished as follows: the first 10-inches of backfill material shall contain no foreign matter and no rock larger than 1-inch in diameter. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.
- E. Do backfilling when pipe is cool. During hot weather cool pipe by operating the system for a short period, or by backfilling in the early part of the morning before the heat of the day.
- F. Do not, under any circumstances, use truck wheels for compacting soil.
- G. Where feasible, Owner's Representative may authorize the use of flooding in lieu of tamping.
- H. Restore grades and repair damage where settling occurs.
- I. Clean bell and spigot ends and make all gasketed joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of lubricant, and wiping off any excess lubricant from each connection. Maximum deflection per joint shall not exceed manufacturer's recommendations.
- J. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow welded joints at least 15 minutes set-up/curing time before moving or handling. When the temperature is above 80° F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80° F, follow manufacturer's recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).
- K. Mainline pipe shall have minimum 22-inches of cover (excavate to invert as required by pipe size). Lateral pipe shall have minimum 16-inches of cover for PVC and 12-inches of cover for Polyethylene (excavate to invert as required by pipe size).

- L. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.
- M. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or back filled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40° F or below. Pipe installed at temperatures below 40° F shall be removed and replaced at no cost to the Owner. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.
- N. In installing irrigation pipe the Contractor shall route the pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees, the Contractor shall provide proper root pruning and sealing methods to all roots 1-inch and larger.
- O. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.
- P. Maintain 1-inch minimum between lines which cross at angles of 45 to 90 degrees.
- Q. Exercise care when excavating, trenching and working near existing utilities.
- R. Throughout the guarantee period it will be the responsibility of the Contractor to refill any trenches that have settled due to incomplete compaction.
- S. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.03 THRUST BLOCK INSTALLATION:

- A. All ringtite bell-end fittings shall be blocked with an adequately sized thrust block as per ASAE Standard S376.1 and as depicted in the details. Blocking shall be in accordance with pipe and fitting manufacturer's recommendations. Thrust blocks shall be required at all changes in size and direction of bends, reducers, plugs and tees. Thrust blocks shall be installed against undisturbed soil in all cases. Concrete thrust blocks shall utilize 3,000-psi standard concrete mixture. Bricks, stones, boulders, etc. will not be accepted as thrust blocks or thrust block material. Sakrete

will not be permitted as a thrust blocking material. Contractor to supply all material needed for thrust blocking.

- B. Size of thrust block shall be determined by working pressure, size and type of fitting, and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to fittings manufacturer's thrust block sizing table to determine size of thrust block for each condition.
- C. Ensure stability of thrust blocks.
- D. Under no circumstances will concrete block be approved for thrust blocks including for 2-inch fittings.

3.04 ELECTRICAL WIRE CONDUIT INSTALLATION:

- A. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring where wire passes under or through walls, walks and paving to controllers and rain sensor.
- B. Conduit shall extend 18-inches beyond edges of walls and pavement.

3.05 PIPE SLEEVING INSTALLATION:

- A. Sleeving shall be installed wherever piping is going under a non-soil area, generally where indicated on the Drawings. Minimum cover over all sleeving pipe shall be 24-inches as shown on the drawings.
- B. Sleeving shall extend 18-inches beyond edges of walls and pavement.

3.06 ISOLATION VALVE INSTALLATION :

- A. Install isolation valves per detail where indicated on the Drawings. Install all isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.
- B. Check and tighten valve bonnet packing before valve box and backfill installation.
- C. Provide and install thrust blocks for ring-tite valves as per detail.

3.07 VALVE BOX INSTALLATION:

- A. Furnish and install a valve access box for each electric valve, quick coupling valve, isolation valve and wire splice.

- B. All valve access boxes shall be installed on a minimum 4-inch crushed stone base. Finish elevation of all boxes shall be at grade. All crushed stone to be supplied by the Contractor and installed before valve box. Crushed stone shall not be poured into previously installed valve boxes.

3.08 24 VOLT CONTROL VALVE INSTALLATION:

- A. Control valves shall be installed on a level crushed stone base. Grade of bases shall be consistent throughout the project so that finish grades fall within the limits of work. Valves shall be set plumb with adjusting handle and all bolts, screws and wiring accessible through the valve box opening. Valves shall be set in a plumb position with 24-inch minimum maintenance clearance from other equipment.
- B. Install at sufficient depth to provide no more than 6-inches, nor less than 4-inches cover from top of valve to finish grade.
- C. Adjust zone valve operation after installation using flow control device on valve.

3.09 WIRING INSTALLATION:

- A. Wiring shall be installed along with the main line. Multiple wire bundles shall be cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid beside, and at the same invert as, the irrigation lines. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8- to 12-inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box. Each valve shall have a separate wire back to the controller.
- B. All wire shall be laid in trenches and shall be carefully backfilled to avoid any damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2-inch layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 12-inches of cover. Wire not to be installed that day shall not be laid out.
- C. An expansion curl shall be provided and installed within 6-inches of each wire connection to a solenoid and at least every 100 feet of wire length on runs more than 100 feet in length. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.
- D. Provide and install a common ground wire of white color. No white color shall be used for power wire. Control wire shall be red and spare wiring shall be blue in color.

- E. Service wiring in connection with Drawings and local codes for 24-volt service. All in-ground wire connections shall be waterproofed with 3M DBY-6 splice kits. All splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the Record Drawings.
- F. Contractor shall provide a complete wiring diagram showing wire routing for the connections between the controller and valves. Include wiring diagram in operation and maintenance manuals per this section of the specifications.

3.10 CONTROLLER INSTALLATION:

- A. Contractor to install controller wall-mounted in the mechanical room generally where shown on the drawings. Contractor to wire valves and rain sensor into controller and set proper program. Coordinate final location of Controller with Owner's Representative.
- B. Wire controller to 120-volt electrical supply provided and installed to the controller locations.
- C. Keys shall be turned over to Owner's Representative.

3.11 GROUNDING INSTALLATION:

- A. Each grounding rod shall be driven into the ground its full length within 8-feet of the controller and connected via a Cadweld connection to #6 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8-inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and Cadweld connection for periodic maintenance. Cover shall be installed on a minimum of 6-inches of 4-inch dia. ADS corrugated polyethylene, perforated drainage pipe. Plates shall be installed 36-inches below grade with 50 lbs. of Power Set ground enhancement material spread evenly below the plate and 50 lbs. of Power Set ground enhancement material spread evenly above the plate in accordance with the manufacturer's requirements. Plates shall also be covered with a 4-inch grated cover as specified, set a minimum of 1-inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36-inches of 4-inch ADS corrugated polyethylene, perforated drainage pipe.
- B. When tested, grounding grid shall have an earth resistance no greater than 5 ohms. If earth resistance is greater than 5 ohms, additional grounding plates and

enhancement material shall be added to system until desired test results have been meet.

3.12 RAIN SENSOR INSTALLATION:

- A. Install rain sensor on pole with well control panel, generally where indicated on the drawings. Coordinate final location of rain sensor with Owner's Representative. Rain sensor shall be in direct contact with the weather and not in contact with the irrigation spray.
- B. Install rain sensor wiring within 1/2-inch conduit where exposed. All above ground wires shall be installed in conduits.

3.13 SPRINKLER INSTALLATION:

- A. Small rotary sprinklers shall be installed flush (perpendicular) to grade on swing pipe assemblies, minimum length 6-inches, maximum 18-inches.
- B. Large rotary sprinklers shall be installed flush to grade on 1-inch prefabricated PVC unitized swing joint assemblies with integral o-rings, minimum length 12-inches.
- C. Sprinklers shall not exceed maximum spacing indicated.
- D. Adjust sprinkler zone after installation using flow control device on valve.

3.14 QUICK COUPLING VALVE INSTALLATION:

- A. Provide and install quick coupling valves where indicated on the Drawings.
- B. Quick coupling valves to be mounted on 1-inch prefabricated PVC unitized swing joint assemblies with integral o-rings, minimum length 12-inches with brass insert and stabilizer as per details.

3.15 CHECK/TEST/START-UP/ADJUST:

- A. Flushing:
 - 1. After all piping, valves, sprinkler bodies, pipe lines and risers are in place and connected, but prior to installation of sprinkler internals, open the control valves and flush out the system under a full head of water.
 - 2. Sprinkler internals, flush caps and riser nozzles shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner's Representative.

3. Contractor shall be responsible for flushing the entire system after installation is complete and will be responsible for any clogged nozzles for thirty (30) days after substantial completion of this portion of the landscape irrigation system.

B. Testing:

1. Leakage test: test all lines for leaks under operating pressure. Repair all leaks and re-test.
2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Architect at least seven (7) days in advance of scheduled coverage test). Representative will determine if the water coverage is complete and adequate. Readjust heads and/or head locations as necessary or required to achieve proper coverage.
3. All testing shall be at the expense of the Contractor.

3.16 CLEANING AND ADJUSTING:

- A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.
- B. Adjust sprinkler heads, valve boxes, and quick coupling valves to grade as required, so that they will not be damaged by mowing operations.
- C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.
- D. Each control zone shall be operated for a minimum of 5 minutes and all heads checked for consistency of delivering water. Adjustments shall be made to sprinklers that are not consistent to the point that they match the manufacturer's standards. All sprinklers, valves, timing devices or other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

3.17 ACCEPTANCE AND OPERATION BY OWNER:

- A. Upon completion of the work and acceptance by the Owner, the Contractor shall be responsible for the training of the Owner's personnel the operation of the system (provide minimum 48 hours written notice in advance of test). The Contractor shall furnish, in addition to the Record Drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel

responsible for the operation of the irrigation system. The Contractor shall guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

- B. Conditions for acceptability of work for start of maintenance by Owner issued by Owner or Owner's Representative shall include but not be limited to:
 - 1. Punch list items complete and approved by Owner or Owner's Representative.
 - 2. Landscape irrigation system complete and in place.
 - 3. Record drawings complete.
 - 4. Maintain installation and watering schedules until all conditions noted above have been completed.

3.18 CLEAN UP:

- A. Upon completion of all installation work, Contractor shall remove all leftover materials and equipment from the site in a safe and legal manner.
- B. Contractor shall remove all debris resulting from work of this section.
- C. Contractor shall regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.
- D. Contractor shall fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accordance with Drawings requirements.

END OF SECTION

SECTION 32 91 19

LOAMING AND SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers all labor, materials, and equipment necessary to do all loaming, seeding and related work as indicated on the drawings and as herein specified. All lawns disturbed by the Contractor's operations shall be repaired as herein specified.

1.02 RELATED WORK:

- A. Section 32 93 00, TREES, SHRUBS, GROWDCOVERS, AND LANDSCAPING

1.03 QUALITY ASSURANCE:

- A. For a particular source of loam, the Engineer may require the Contractor to send approximately 10 pounds of loam to an approved testing laboratory and have the following tests conducted:
 - 1. Organic concentration
 - 2. pH
 - 3. Nitrogen concentration
 - 4. Phosphorous concentration
 - 5. Potash concentration
- B. These tests shall be at the Contractor's expense. Test results, with soil conditioning and fertilizing recommendations, shall be forwarded to the Engineer.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Information detailing the seed mixes, fertilizers, mulch material, slope protection material (if required) and origin of loam.
- B. Test results.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM:

- 1. Loam shall be a natural, fertile, friable soil, typical of productive soils in the vicinity, obtained from naturally well-drained areas, neither excessively acid nor alkaline, and

containing no substances harmful to grass growth. Loam shall not be delivered to the site in frozen or muddy condition and shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1/2-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.

2. The loam shall contain not less than 4 percent or more than 20 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.

B. LIME:

Lime shall be standard commercial ground limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide), and 50 percent of the material must pass through a No. 100 mesh sieve with 98 percent passing a No. 2 mesh sieve.

C. FERTILIZER:

Fertilizer shall be commercial fertilizer, 10-10-10 fertilizer mixture containing at least 40 percent of organic nitrogen. It shall be delivered to the site in the original sealed containers, each showing the manufacturer's guaranteed analysis. Fertilizer shall be stored so that when used it will be dry and free flowing. No fertilizer shall be used which has not been marketed in accordance with State and Federal Laws, relating to fertilizers.

D. MULCH:

1. Materials to be used in mulching shall conform to the following requirements:
2. Straw Mulch - Straw Mulch shall consist of stalks or stems of grain after threshing.
3. Wood Fiber Mulch - Wood Fiber Mulch shall consist of wood fiber produced from clean, whole uncooked wood, formed into resilient bundles having a high degree of internal friction and shall be dry when delivered to the project.

E. SEED:

1. Seed shall be of an approved mixture, the previous year's crop, clean, high in germinating value, a perennial variety, and low in weed seed. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates relative to mixture purity and germinating value.
2. Grass seed for lawn areas shall conform to the following requirements:

	Proportion by Weight	Germination Purity	Purity Minimum
Chewing's Fescue	30%	70%	97%
Kentucky 31 Fescue	30%	90%	98%

Kentucky Blue Grass	20%	80%	85%
Perennial Rye Grass	20%	90%	98%

3. Detention Basin Seeding:

New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites:
 New England Wetland Plants, Inc. 14 Pearl Lane South Hadley, MA 01075, or equal.
 Rate shall be 1 pound PLS per 1250 sq. ft.

F. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

	% Weight	Germination Minimum
Winter Rye	80 min.	85%
Red Fescue (creeping)	4 min.	80%
Perennial Rye Grass	3 min.	90%
Red Clover	3 min.	90%
Other Crop Grass	0.5 max.	
Noxious Weed Seed	0.5 max.	
Inert Matter	1.0 max.	

G. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100% degradable plastic mesh with 100% degradable straw or straw/coconut fill. Fill shall be held together by degradable fastening. Weight shall be 0.50 lb./sq. yd. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 2:1 or greater, Model SC150 shall be used. For slopes less than 2:1, Model S150 shall be used.
2. Six-inch wire staples shall be placed according to manufacturer's recommendations to anchor the mesh material. Staples shall be designed to decompose.

PART 3 - EXECUTION

3.01 SUBGRADE

- A. After rough subgrade has been established, loosen subgrade by ripping or discing to a depth of at least 16 inches to promote subsurface infiltration. Establish subgrade and remove and dispose of all stones/boulders greater than 2 1/2" in size encountered within the top 3" of the subgrade prior to spreading the topsoil layer. Continue with formation of subgrade operations.

- B. Confirm with the owner's representative that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Subgrade elevations shall slope parallel to the finished grade and or toward any subsurface drain lines as shown on the Contract Documents. Provide an As-Built survey of the great lawn area to the Owner to confirm that the subgrade has been placed to within the required elevations of ½" in 10ft. The As-Built survey shall consist of elevations taken based upon a 25ft grid across the entire field area. Perform no work of placing and spreading subsurface drainage layer until elevations have been confirmed and the As-Built survey has been accepted by the Owner/Engineer.
- C. All backfill to subgrade, shall be compacted to not less than eighty-five percent (85%) and not more than ninety percent (90%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test.
- D. Low Ground Pressure (LGP) Equipment must be used for final grading of subgrade and installation of the loam in order to minimize the compaction of the backfill and subgrade.

3.02 SURFACE PREPARATION:

- A. After approval of subgrade, loam shall be placed on areas affected by the Contractor's operations. Loam shall be at least 6-inches compacted thickness.
- B. Lime shall be applied to bring the pH to 6.5.
- C. Fertilizer shall be applied according to the soil test.
- D. Loam shall be worked a minimum of 3-inches deep, thoroughly incorporating the lime and fertilizer into the soil. The loam shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing not over 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines and grades. Minimum depth shall be 6-inches after completion.
- E. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

3.03 SEEDING:

- A. Seeding shall be done when weather conditions are approved as suitable, in the periods between April 1 and May 30 or August 15 to October 1, unless otherwise approved.
- B. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

- C. Seed shall be sown at the approved rate, on a calm day by machine.
- D. One half the seed shall be sown in one direction and the other half at right angles. Seed shall be raked lightly into the soil to a depth of 1/4-inch and rolled with a roller weighing not more than 100 pounds per linear foot of tread.
- E. The surface shall be kept moist by a fine spray until the grass shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 sq. ft., the Contractor shall reseed, roll, and water as necessary to obtain proper germination.
- F. The Contractor shall water, weed, cut and otherwise maintain and protect seeded areas as necessary to produce a dense, healthy growth of perennial lawn grass.
- G. If there is insufficient time in the planting season to complete the fertilizing and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor or as required by the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.
- H. Great lawn seeding shall be sown by slice seeding, Brillion Seeder or other mechanical means at a rate of 6 pounds per 1000 square feet or as directed by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of 1/4-inch.
- I. In the great lawn if mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.

3.04 PLACING MULCH:

- A. Straw Mulch shall be loosely spread to a uniform depth over all areas designated on the plans, at the rate of 4-1/2 tons per acre, or as otherwise required.
- B. Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.
- C. Wood Fiber Mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise required. It shall be placed by spraying from an approved spraying machine having pressure sufficient to cover the entire area in one operation.

3.05 SEEDING AND MULCHING BY SPRAY MACHINE:

- A. The application of lime, fertilizer, grass seed and mulch may be accomplished in one operation by the use of an approved spraying machine. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed and mulch shall be equal to the specified quantities.
- B. A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of limestone, fertilizer, grass seed and mulch per 100 gallons of water.
- C. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other methods.

3.06 INSPECTION AND ACCEPTANCE:

- A. At the beginning of the planting season following that in which the permanent grass crop is sown, the seeded areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor until the end of that planting season, when they will be accepted if the sections show dense, vigorous growth.

3.07 MAINTENANCE:

- A. The Contractor shall maintain and protect the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project, or for 60 days, whichever is longer. If lawns are planted in late summer or during the fall, maintenance shall continue through the following spring for at least 30 days beyond active growing. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.
- B. The first cutting of lawn areas shall be done when the grass is between 2½ - to 3-inches in height. The lawn shall be cut no shorter than 2-inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site.
- C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.

- D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer according to the soil test, at one half the rate recommended by the initial soils laboratory tests, or as required by the Engineer.
- E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All temporary barriers shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.
- F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

END OF SECTION

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SECTION 32 93 00

TREES, SHRUBS, GROUNDCOVERS, AND LANDSCAPING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section includes furnishing all labor, materials, equipment, plants, and incidental materials necessary to perform all operations related to the planting of all trees, shrubs, vines, herbaceous plants, ground covers, and for all appurtenant work, complete in place, maintained, and accepted, in accordance with the Contract Drawings and Specifications.
- B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of plant materials, as part of the work of this contract.

1.02 RELATED WORK:

- A. Section 31 05 13.13, LOAM BORROW
- B. Section 32 92 19, SEEDING

1.03 SUBMITTALS:

In accordance with requirements of Section 01 33 23 SUBMITTALS, the Contractor shall submit the following:

- A. Prior to planting, State nursery inspection certificates for all plant materials.
- B. Samples of the manufacturer's product data, as applicable, for the following materials:
 - 1. Limestone.
 - 2. Fertilizer.
 - 3. Sphagnum Peat Moss.
 - 4. Humus.
 - 5. Organic Compost.
 - 6. Manure.
 - 7. Mulch.
 - 8. Guying and Staking Apparatus.

9. Crepe Wrapping for tree trunks.
10. Anti-transpirant/Anti-desiccant.
11. Insecticides.
12. Herbicides.
13. Fungicides.

PART 2 - PRODUCTS

2.01 PLANT MATERIALS:

- A. The Contractor shall furnish and plant all plant materials as shown on the plans and in the quantities and sizes listed thereon. No substitutions shall be permitted without the written approval of the Engineer.
- B. Plants larger than those specified in the Plant List may be used if approved by the Engineer. However, use of such oversized plants shall not be considered grounds for any increase in the contract price. If the use of larger plants is approved, the required spread of roots or ball of earth shall be increased in proportion to the size of the plant and plant pits shall be increased as necessary.
- C. All plants shall be certified to have passed all required Federal and State inspection laws requiring ensuring freedom from plant diseases and insect infestations. The Contractor shall obtain clearance from applicable governing agencies, as required by law, before planting any plants delivered from outside the state in which they are to be planted.
- D. All plants shall be nursery-grown under climatic conditions and environmental stresses similar to those in the locality of the project. All plants shall originate from nurseries that are no more than one Hardiness Zone higher (as established by the Arnold Arboretum, Jamaica Plain, MA) than where the plant is to be installed. Plants also shall conform to the botanical names and standards of size, culture, and quality for the highest grades and standards as adopted by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock, ANSI-Z60.1, latest edition. All plants shall be legibly tagged with their proper botanical name.
- E. No heeled-in plants or plants from cold storage shall be used. All plants shall be typical of their species or variety and shall have a normal habit of growth. Plants shall be sound, healthy, and vigorous, well branched and densely foliated when in leaf; shall be free of disease, insects, eggs or larvae; and shall have healthy, well-developed root systems. All parts of the plant shall be moist and shall show active green cambium when cut.
- F. All nursery plants shall be balled and burlapped or container-grown and shall have been acclimatized for at least one growing season. Container-grown stock shall have been

grown in a container long enough for the root system to have developed sufficiently to hold its soil together, firm and whole, after removal from the container. No plants shall be loose in the container. Container-grown plants shall have no girdling roots and shall not be in a root-bound condition. Plants shall remain in their container until planted.

- G. Care shall be exercised in digging and preparing field-grown plants for shipment and planting. Balled and burlapped materials shall have solid unbroken balls of earth of sufficient size to encompass all fibrous feeding roots necessary to ensure successful recovery and development of the plants. Balls shall be firmly wrapped in untreated biodegradable burlap and tied securely with wire cages and/or jute twine. Roots or balls of plants shall be adequately protected at all times from sun and drying winds. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during planting, or after the burlap, staves, wire cage, rope, or platform in connection with its transplanting have been removed. Soil characteristics (i.e., composition, texture, pH, etc.) of all field-grown plants shall closely match those of the soil where plant materials are to be planted.
- H. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the Plant List in the Drawings. The branching height for deciduous trees installed adjacent to or within walks shall be 7 feet minimum, having been pruned to this height at least 1 year prior to transplanting. Except when a clump is designated, the trunk of each tree shall be a single trunk growing from a single, unmutated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. All pruning cuts shall comply with acceptable horticultural practices. No pruning wounds having a diameter of more than 1½-inches shall be present. Any such wounds must show vigorous bark growth on all edges. Evergreen trees shall be branched to within 1 foot of the ground. No tree that has had its leader cut or die shall be accepted.
- I. Caliper measurements for tree trunks shall be taken 6-inches above ground for trees up to and including 4-inch caliper size and at 12-inches above ground for larger sizes.
- J. Shrubs shall meet the requirements for spread and/or height stated in the Plant List on the Drawings. The measures for height are to be taken from the crown or root flare to the average height of the top of the shrub mass (not the longest branch). The fullness of each shrub shall correspond to the trade classification "No. 1". Single stemmed or thin plants will not be accepted. The side branches must be generous, well-twigged and the plant as a whole must be well-bushed to the ground. The plants must be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.
- K. Herbaceous plants, vines and groundcovers shall be of the size, age and/or condition designated in the Plant List on the Drawings.
- L. Plants shall be delivered only after preparations for planting have been completed. Plants shall be handled and packed in a horticulturally approved manner and all necessary precautions shall be taken to ensure that plants arrive on-site in a healthy vigorous

condition. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn, desiccation, and overheating during transport. Plants that have not been thoroughly watered shall not be accepted at the planting site. Any plants delivered to the site in a dry or wilted condition shall be rejected and replaced at no expense to the Owner. All plant materials shall be protected, watered and otherwise maintained prior to, during, and upon delivery to the site.

- M. Plants shall be subject to inspection and approval by the Engineer at the place of growth, or upon delivery, for conformity to specification requirements as to quality, size, variety, and condition. Inspection and selection of plants before digging shall be at the option of the Engineer. The Contractor, or his representative, shall be present, if requested by the Engineer, for inspection of plants at the Nursery. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work, for size and condition of balls and roots, disease, insects and latent defects or injuries. Rejected plants shall be removed immediately from the site. Certificates of inspection of plant materials shall be furnished as may be required by Federal, State and other authorities to accompany shipments.

2.03 SOIL ADDITIVES AND AMENDMENTS:

A. LIMESTONE:

Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

B. FERTILIZER:

- 1. Fertilizer shall be a complete, standard commercial fertilizer, homogeneous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.
- 2. Fertilizer for tree, shrub and groundcover plantings shall contain all major plant nutrients and minor trace elements essential to sustain plant growth and shall have the following analysis:

Nitrogen (N)	Phosphorous (P)	Potassium (K)
10%	10%	10%

3. As approved by the Engineer, a slow release root contact fertilizer installed at the time of planting, may be used in place of the above, at the discretion of the Contractor.

C. Organic Compost shall be a standard commercial product comprised of fully decomposed, 100 percent plant-derived, natural organic matter. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Compost shall be free of sticks, stones, weed seeds, roots, mineral or other foreign matter and delivered air dry. It shall be free from excessive soluble salts, heavy metals, phytotoxic compounds, and/or substances harmful to plant growth and viability. Organic compost shall have an acidity range of 4.5 to 7.0 pH.

D. Sphagnum Peat Moss shall be a standard commercial product. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Peat moss shall be free of sticks, stones, weeds or weed seeds, roots, mineral or other foreign matter. It shall be free from toxic substances and/or compounds harmful to plant growth and viability. It shall be delivered air dry in standard bales and shall have an acidity range of 3.5 to 5.5 pH.

E. Humus shall be natural humus, reed peat, or sedge peat. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Humus shall be free of sticks, stones, weeds, roots, mineral or other foreign matter and/or toxic substances harmful to plant growth and viability. It shall be low in wood content, free from hard lumps and excessive amounts of zinc and delivered air dry in a shredded or granular form. The acidity range for humus shall be 5.5 to 7.5 pH, and the organic matter content shall be not less than 85 percent, as determined by loss on ignition. The minimum water holding capacity shall be 200 percent by weight on an oven-dry basis.

F. Manure shall be well-rotted, leached, cow manure not less than 8 months or more than 2 years old. It shall be free of sawdust, shavings, or refuse of any kind and shall not contain more than 25 percent straw. It shall contain no substances harmful to plant growth. The Contractor shall furnish information regarding chemical disinfectants, if any, that may have been used in storage of the manure.

2.04 PLANTING MIXTURE:

Planting mix shall consist of 7 parts loam borrow and 1 part organic compost, humus, sphagnum peat moss, or manure, thoroughly blended.

2.05 WATER:

Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be furnished by the Contractor, at no additional cost to the Owner.

2.06 MULCH:

Mulch shall be fibrous pliable shredded softbark mulch, not exceeding ½-inch in width. It shall be 98 percent organic matter with a pH range between 3.5 and 4.5 and a moisture content not to exceed 35 percent. It shall be free of weeds, weed seeds, debris, and other materials harmful to plant growth and viability. Organic mulch shall be aged no longer than 2 years.

2.07 MATERIALS FOR STAKING, GUYING, AND WRAPPING:

- A. Tree stakes shall be sound, untreated 2 x 3 (nominal) x 8-foot length Douglas Fir reasonably free of knots. No paint or stain shall be used in conjunction with tree stakes. Tying material shall be flexible braided nylon webbing, ¾-inch wide and have a tensile strength of 900 pounds. Webbing shall be ‘ArborTie’, or approved equal.
- B. Drive anchors and guy wire assemblies shall be suitable for protecting trees and shall be sized in accordance with the manufacturer’s recommendations. No materials shall be used for guying that will girdle, chafe, or otherwise injure trees.
- C. Tree wrap shall be duplex, waterproof kraft paper crinkled to 33-1/3 percent stretch, 4 to 6-inch wide strips. Tying materials shall be jute twine, 2-ply for shrubs and trees less than 3-inch caliper; 3-ply for larger plants.

2.08 TREE PAINT:

Tree paint shall not be used.

2.09 ANTI-TRANSPIRANT/ANTI-DESICCANT:

Anti-transpirant or anti-desiccant shall be ‘Wilt-Pruf’, as manufactured by Nursery Specialty Products, Inc., Groton Falls, NY, or approved equal. It shall be delivered in original sealed manufacturer's containers and used in accordance with the manufacturer's instructions.

2.10 INSECTICIDES:

- A. No insecticides shall be used on-site without the Contractor notifying and obtaining the prior approval of the Engineer.
- B. Insecticides shall be EPA registered and approved for use in public open spaces. All insecticides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer’s containers, and used in accordance with the manufacturer’s instructions.
- C. Insecticide use shall be limited and selective, only to control specific insect infestations, as identified by the Contractor or the Owner’s Representative that may result in the disfigurement, decline, or death of plant materials.

2.11 HERBICIDES:

- A. No herbicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.
- B. Herbicides shall be EPA registered and approved for use in public open spaces. All herbicide shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
- C. Herbicide for post-emergent application shall be glyphosate contact, 'Roundup', as manufactured by Monsanto, Inc., or approved equal.
- D. Herbicide use shall be limited and selective, only to control specific weed infestations that have been identified by the Contractor or the Owner's Representative.

2.12 FUNGICIDES:

- A. No fungicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.
- B. Fungicides shall be EPA registered and approved for use in public open spaces. All fungicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.
- C. Fungicide use shall be limited and selective, only to control specific fungal pathogenic disease infestations, as identified by the Contractor or the Owner's Representative, that may result in the disfigurement, decline, or death of plant materials.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. All plants shall be subject to inspection and approval by the Engineer upon delivery to the site. No materials shall be planted until approval is received.
- B. All work shall be performed by skilled workers with a minimum of 2 years planting experience, in accordance with accepted horticultural/nursery practices, under the full-time supervision of a Certified Nurseryman or Arborist.
- C. All balled and burlapped plants that cannot be planted immediately upon delivery shall be set on the ground and the root balls shall be well protected with soil, wet moss, or other acceptable material. All foliage shall be protected and covered with perforated shade materials.

- D. The planting season for evergreen trees and shrubs shall extend from the time the soil becomes workable in the spring until new growth appears, and from September 15 until November 30 in the fall. Deciduous trees and shrubs shall be planted only when dormant, either prior to bud break and/or before leaves appear in the spring, or subsequent to their leaf drop in the fall. Ground covers shall be planted only after the last frost in the spring through mid-May. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer. Extended or out-of-season planting requirements shall include application of antitranspirant and extra water as needed. Plant guarantee periods shall remain as stated below. Planting shall not be permitted in frozen ground.
- E. All plant locations and outlines for planting beds shall be staked out for review and potential adjustment by the Engineer before any excavation is begun. In the event that rock, underground construction work or obstructions are encountered in any proposed planting pit or bed, the Engineer may select alternate locations. Where locations cannot be changed, the obstruction shall be removed, subject to the Engineer's approval, to a depth of not less than 3 feet below grade and not less than 6-inches below the bottom of the root ball when plant is properly set at the required grade. Removal of boulders or obstructions greater than 1 cubic yard in size shall be subject to approval and will be paid for by the Owner. No ledge will be removed to create planting pits or beds
- F. All planting pits shall be excavated with sloped walls, wider at the top than at the bottom, and scarified to eliminate glazing. Tree pits shall be at least 2 feet greater in diameter than the root ball of earth or root system. Shrub pits shall be at least 1 foot greater than the diameter of the root ball. Planting pits shall not be deeper than the height of the root ball.
- G. When excavation occurs in areas of heavily compacted earth, stones, concrete chunks or other foreign matter, pits shall be dug at least 3 times the width of the rootball. Excavated material from plant pits shall be disposed of as required.
- H. Container plants shall be removed from their growing container before planting. If roots are densely matted, the outer root mass shall be scored, sliced vertically, with a sharp knife to separate roots. All herbaceous plants and groundcovers shall be evenly spaced to produce a uniform effect and staggered in rows at intervals designated on the contract drawings.
- I. Shrubs and trees shall be set in the center of planting pits, plumb and straight, and at such a level that after settlement the crown of the roots will be 1-inch above the surrounding finished grade. Root ball masses shall not be loosened, broken or damaged. When balled and burlapped plants are set, planting mixture shall be compacted around bases of balls to fill all voids. All tying materials, twine and rope shall be cut and removed. Biodegradable burlap shall be laid back or cut away from the top half of the ball. If a wire basket is present, the upper 2/3 of the basket shall be cut away and removed. Do not remove the entire basket. Roots or bare root plants shall be properly spread out and planting mixture carefully worked in among them. Broken or frayed roots shall be cleanly cut.

- J. Backfill plant pits with planting mixture in layers of not more than 9-inches and firmly tamp each layer and water to sufficiently settle the backfilled soil before the next layer is put in place. When the planting pit is 2/3 backfilled, the hole shall be flooded and watered thoroughly so that the water level reaches the top of the planting pit. Allow water to soak in, then complete the backfilling operation. Immediately after planting pit is backfilled, a shallow basin 3-inches deep and slightly larger than the pit shall be formed with a ridge of soil for water retention. Form a common basin for plant materials throughout mass planting beds. After planting, lightly till the soil in planting beds between planting pits and rake smooth to eliminate compaction of soils.
- K. All planting hole basins shall be flooded with water twice within the first 24 hours of planting, and watered not less than twice per week until final acceptance of the work.
- L. Stake trees immediately after planting as detailed. All staking apparatus shall be adequate to hold the tree in a vertical position under severe weather conditions. All staking apparatus and tree trunk wrapping shall be removed and disposed of off-site by the Contractor at the end of one growing season.
- M. Immediately after planting and staking operations are complete, all plant pit basins and plant beds shall be covered with approved mulch to the depths designated on the plans. Mulch shall not contact tree bark, cover tree root flares, or shrub crowns. No mulch shall be applied prior to the first watering.
- N. The pruning of trees and shrubs shall only be permitted to remove dead or dying branch limbs and tips, sucker growth, water sprouts, crossing or rubbing branches, broken or damaged branches, diseased or insect infested limbs, and to preserve the natural character of the plant. Plant materials shall be pruned in accordance with American Nurserymen Association Standards and as required by the Engineer. Questionable weak limbs and branch removals that may disfigure the plant shall be left to the discretion of the Engineer. The tree leader shall never be permitted to be cut. Pruning shall be done with clean, sharp tools. All large pruning cuts that are ½-inch in diameter or larger shall be made along the bark branch ridge. Pruning cuts shall not breach or otherwise interfere with the branch collar. All pruning cuts less than ¼-inch diameter shall be made with hand pruners as close to the main stem as possible without damaging the cambium or bud. Tree paint shall not be used to cover pruning cuts.
- O. As the work proceeds, the Contractor shall remove all debris from the site, including but not limited to branches, rock, paper, and rubbish. All areas shall be kept clean, neat and in an orderly condition at all times. Prior to final acceptance, the Contractor shall cleanup the entire area to the satisfaction of the Engineer.

3.02 MAINTENANCE:

- A. Maintenance shall begin immediately after each plant is planted and shall continue until completion of the guarantee period and final acceptance of the project. Plants shall be watered, pruned, sprayed, fertilized, cultivated and otherwise maintained and protected.

Tree guys and stakes shall be tightened and repaired. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

- B. Settled plants shall be reset to proper grade and position, planting pits and common basins restored, and dead materials removed and replaced. Planting beds and individual basins shall be neat in appearance, maintained to their original layout lines and kept free of weeds. Mulch shall be replaced as required to maintain proper depths.
- C. Contractor shall make arrangements to provide sufficient water to maintain all trees, shrubs and plant materials until final acceptance. Plants shall be sprayed with anti-transpirant or anti-desiccant if required by seasonal conditions or as required by the Engineer.
- D. Planting areas shall be protected against trespass and damage of any kind during the maintenance period. This shall include the furnishing and installation of approved temporary fencing if necessary. If any plants become damaged during the maintenance period, they shall be treated or replaced as required by the Engineer at no additional cost to the Owner.

3.03 INSPECTION AND PRELIMINARY ACCEPTANCE:

- A. Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.
- B. Inspection and acceptance of plantings may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.04 GUARANTEE:

- A. All plant materials shall be guaranteed for a period of one year after the date of completion of the specified maintenance period and preliminary acceptance of the project by the Owner.
- B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.
- C. Plants shall be healthy, free of pests and disease. Plants shall exhibit vigorous growth, shall bear foliage of normal density, size and color and shall have no less than seventy-five percent (75%) of their branches alive at the end of the guarantee period. If the leader of any single-leader species is dead, the entire plant shall be considered dead.
- D. Any plant required under this Contract that is dead or unsatisfactory, as determined by the Engineer, shall be removed from the site. These shall be replaced as soon as weather

permits during the specified planting season, at no additional cost to the Owner, until the plants live through one year.

- E. All replacements shall be plants of the same kind and size as specified on the Plant List. They shall be furnished and planted as specified above.
- F. The guarantee of all replacement plants shall extend for an additional one-year period from the date of their acceptance as replacement.
- G. Guarantee shall not apply to the replacement of unacceptable plants resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.
- H. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.05 FINAL INSPECTION AND FINAL ACCEPTANCE:

- A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.
- B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

\\wse03.local\WSE\Projects\CT\Cheshire CT\Bartlem Park Design Documents\Specifications\32 93 00 Trees, Shrubs, Ground Cover and Landscaping.docx

SECTION 33 05 26.13

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling and installation of tracer tape, as called for on the drawings.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.
- B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

- A. Tracer tape shall be at least 3-inches wide for Drain, Gas, Electrical, Telephone, Sewer, and Chemical. Tracer tape shall be at least 6-inches wide for Water.
- B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18-inches with ordinary pipe locaters.
- C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.
- D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER", "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30-inches to identify the pipe.
- E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red
Gas & Oil	Yellow

Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12-inches below the proposed ground surface.
- B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION

SECTION 33 11 13.13

DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the furnishing, handling, hauling, laying, jointing, testing and disinfecting of all ductile iron pipe, including fittings and appurtenant work as indicated on the drawings and as specified.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 33 11 13.13, WATER SERVICE CONNECTIONS
- C. Section 33 11 13.16, CONNECTIONS TO EXISTING WATER MAINS
- D. Section 33 11 13.43, INSULATION FOR PIPELINES
- E. Section 33 12 22, HYDRANTS AND VALVES

1.03 QUALITY ASSURANCE:

- A. All pipe and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates of such tests.
- B. In addition, the Owner reserves the right to have any or all pipe, fittings and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

1.04 REFERENCES:

- A. The following standards, latest version thereof, form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA	C104	Cement-Mortar Lining for Ductile- Iron Pipe and Fittings
AWWA	C105	Polyethylene Encasement for Ductile Iron Pipe Systems
AWWA	C110	Ductile-Iron and Gray-Iron Fittings Water

AWWA	C111	Rubber Gasket Joints for Ductile- Iron Pressure Pipe and Fittings
AWWA	C116	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA	C150	Thickness Design of Ductile-Iron Pipe
AWWA	C151	Ductile-Iron Pipe, Centrifugally Cast for Water
AWWA	C153	Ductile-Iron Compact Fitting for Water Service.
AWWA	C600	Installation of Ductile-Iron Water Mains & Their Appurtenances
AWWA	C651	Disinfecting Water Mains

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Shop drawings shall be submitted to the Engineer for review.
- B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements. Shop drawings shall be submitted for the ductile iron pipe, type of joint, fittings, couplings, filling rings, restrained joints, and lining and coating in accordance with specifications.

PART 2 - PRODUCTS

2.01 PIPE:

- A. The Contractor shall use push-on joint type ductile iron pipe unless otherwise indicated on the plans or specified herein.
- B. All ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151.
- C. Unless otherwise indicated or specified, ductile iron pipe shall be Thickness Class 52.

2.02 JOINTS:

- A. Joints for ductile iron pipe shall conform to AWWA C111.
- B. Pipe and fittings shall be furnished with approved joint restraining appurtenances as specified herein, or within the limits as indicated on the drawings, to keep the piping from pulling apart under pressure.

2.03 FITTINGS:

- A. Fittings shall conform to the requirements of AWWA C110 or C153 as appropriate and shall be of a pressure classification and coating at least equal to that of the pipe with which they are used.
- B. The Contractor shall use ductile iron fittings.
- C. Unless otherwise indicated, fittings shall have all bell mechanical joint ends.

2.04 GASKETS, GLANDS, NUTS AND BOLTS:

- A. Gaskets, glands, nuts, bolts and accessories shall conform to AWWA C111 or C153 as appropriate.
- B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.
- C. Glands shall be ductile or cast iron.
- D. Bolts and nuts shall be high strength alloy.

2.05 LINING AND COATING:

- A. The inside of pipe and fittings shall be given a cement lining and asphaltic seal coat in accordance with AWWA C104. The thickness of the lining shall be double that specified in AWWA C104.
- B. The outside of pipe and fittings shall be coated with the standard asphaltic coating specified under the appropriate AWWA Standard Specification for pipe and fittings.
- C. Machined surfaces shall be cleaned and coated with a suitable rust preventative coating at the shop immediately after being machined.

2.06 FLEXIBLE COUPLINGS:

- A. The Contractor shall use solid sleeve coupling fittings for joining pipe. With the approval of the Engineer, sleeve-type flexible couplings may be substituted.
- B. All sleeve-type couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
- C. Couplings shall be cast or ductile iron and shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
- D. Sleeve-type couplings shall be made by Dresser Mfg. Div., Bradford, PA; Smith-Blair, Inc., San Francisco, CA; Romac Industries Inc., Seattle, WA; Ford Meter Box Co., Wabash, IN; or be an approved equal.

- E. Couplings for buried pipe shall be Dresser 153; Smith-Blair Type 441 or 443; Romac Style 501; Ford Style FC1 or FC2; or approved equal.

2.07 JOINT RESTRAINTS:

- A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, anchoring and joint restraint methods shall be utilized. Methods shall be restrained joint systems. The number of joints to be restrained shall be determined in accordance with Table 1, as shown on the construction plans or provided by the Engineer.
- B. Restrained joint systems for standard mechanical joint fittings or push on joint pipe shall be restraining glands (Megalug by EBAA Iron Sales Inc., Eastland, TX; StarGrip by Star Pipe Products, Houston, TX; RomaGrip by Romac Industries, Inc., Sultan, WA; Sigma One-Lok by Sigma Corporation, Cream Ridge, NJ; or approved equal) and restraining gaskets (Fast-grip joint by American Cast Iron Pipe Company, Birmingham, AL; Field Lok 350 Gasket by United States Pipe and Foundry Company, Birmingham, AL; Sure Stop 350 Restrained Joint Gaskets by McWane Ductile, Phillipsburg, NJ; or approved equal). Methods that rely on the use of friction clamps and/or retainer glands with set screws alone are not acceptable.
- C. Restrained joint systems for non-standard or modified joints shall be Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, Birmingham, AL; TR-Flex Joint by United States Pipe and Foundry Company, Birmingham, AL; Super-Lock Joint by Clow Corporation, Bensenville, IL; Fastite Joint by Atlantic States Cast Iron Pipe Company, Phillipsburg, NJ; Snap-Lok or Bolt-Lok by Griffin Pipe Products Company, Oak Brook, IL; or approved equal.
- D. Concrete thrust blocks may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Use of concrete thrust blocks shall be installed with the minimum bearing area (in square feet) against undisturbed material in accordance with the following:

Size of Main	90° Bends, Tees, Caps and Plugs	45° Bends and Wyes	22-1/2° Bends	11-1/4° Bends
6- & 8-inch	5	4	2	2
10- & 12-inch	12	9	5	2

- E. Tie rods may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Bolts shall have adequate length to allow nuts on both sides of the gland. Tie bolts shall have the same diameter as the tie rods and be in accordance with the following:

Pipe Size	Tie Rod	
	Number	Diameter
6	2	1/2"
8	2	3/4"

10	2	¾"
12	4	¾"

- F. Location of restrained joints shall be based on Table 1, as shown on the construction plans or provided by the Engineer. All joints that occur within the restrained length listed in Table 1, for the specific application, shall be restrained. For example, for a 90° bend, 8-inch unwrapped pipe, the restrained length required is 33 feet. Therefore, all joints within 33 feet of the 90° bend must be restrained.

2.08 POLYETHYLENE ENCASEMENT:

- A. Where called for on the drawings, the pipe shall be encased in polyethylene conforming to AWWA C105.
- B. Polyethylene encasement shall be either linear low density, minimum 8 mils thick or high density, cross-laminated, minimum 4 mils thick. Polyethylene encasement shall be clearly marked at a minimum of every 2-feet along its length with print that does not contain hazardous material. Markings shall contain manufacturer’s name, manufacture year, AWWA C105, minimum film thickness, and ‘Warning – Corrosion Protection – Repair any damage.’
- C. Adhesive tape shall be dielectric tape, suitable for use with polyethylene encasement. The use of duct tape shall not be accepted.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

Pipes and fittings shall be subjected to a careful inspection just before being laid or installed.

3.02 HANDLING AND CUTTING:

- A. Any pipe or fitting which has a damaged lining, scratched or marred machine surface and/or abrasion of the pipe coating or lining shall be rejected and removed from the job-site.
- B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe

used will be perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.

- D. Except as otherwise approved, all cutting shall be done with a machine suitable for cutting ductile iron pipe. Hydraulic squeeze cutters are not acceptable for cutting ductile iron pipe. Travel type cutters or rotary type abrasive saws may be used. All cut ends shall be examined for possible cracks caused by cutting.
- E. Lined and coated pipe and fittings shall be assembled and installed with approved packing or gaskets of the type recommended by the pipe manufacturer for the particular lining used.

3.03 INSTALLATION:

A. DEPTH:

1. The pipe shall be installed with a minimum of 4'-6" of cover, unless specifically indicated otherwise on the plans or required by the Engineer.
2. Where pipe is installed at less than the required cover, the Contractor shall furnish and install insulation in accordance with Section 33 11 13.43, INSULATION FOR PIPELINES, or as required by the Engineer.

B. PIPE AND FITTINGS:

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. Care shall be taken to ensure good alignment both horizontally and vertically.
4. In buried pipelines, each pipe shall have firm bearing along its entire length.
5. Castings to be encased in masonry shall be accurately set, with the bolt holes, if any, carefully aligned.
6. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.
7. Fittings shall not be used to clear beneath or above an existing structure or pipeline unless approved by the Engineer. The water main shall be brought to a depth sufficient to clear the structure or pipeline without the use of bends.

C. TEMPORARY PLUGS:

At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. PUSH ON JOINTS:

1. Joining of push-on joint pipe shall conform to AWWA C600.
2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.
3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in AWWA C600. The tables in AWWA C600 indicate the maximum permissible deflection for 18 and 20-foot pipe lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

E. MECHANICAL JOINTS:

1. Assembling of fittings with mechanical joint ends shall conform to AWWA C600.
2. If effective sealing of the joint is not attained at the maximum torque indicated in the above standard, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint.
3. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the following table. These values indicate the maximum permissible deflection for 18-foot lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

Pipe Deflection Allowances	
Maximum permissible deflection, inches	
<u>Diameter of Pipe (inches)</u>	<u>Mechanical-Joint</u>
6	27
8-12	20
16	13.5
20	11
24	9

F. RESTRAINED JOINTS:

1. Joining of restrained joint piping shall conform to the manufacturer's recommendations.
2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.
3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection recommended by the manufacturer.
4. All restraining appurtenances (and tie rods) shall be coated with an approved bituminous paint after assembly. The completed joint shall be inspected and the paint repaired/touched-up as necessary.

G. SLEEVE-TYPE COUPLINGS:

1. Pipe ends shall be cleaned thoroughly prior to installation. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferable by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed 90 foot-lb. for joints up to 24-inches.

3.04 POLYETHYLENE ENCASUREMENT:

- A. The pipe to be encased shall be thoroughly cleaned of all soil and debris prior to installation of the polyethylene encasement. No soil or debris shall be allowed to enter the encasement during or after its installation.
- B. Polyethylene encasement shall be installed using Method A as described in AWWA C105, with the encasement joints coincident with pipe joints. Adhesive tape shall be used to secure the encasement.
- C. Minimum overlap of polyethylene encasement shall be 24-inches, 12 inches on each side of pipe joints.
- D. If required, two layers of polyethylene encasement shall be installed. The first layer shall be completely installed on and secured to the length of pipe before the second layer is installed.
- E. Tears, cuts and other damage shall be repaired with a piece of polyethylene covering secured with adhesive tape, when approved by the Engineer. Otherwise, the damaged length of polyethylene shall be replaced at the Contractor's expense.
- F. Care shall be taken when backfilling to avoid damage to the polyethylene encasement.

- G. Service and fitting connections shall be made by making an x-shaped cut in the polyethylene and folding back the cut film. Immediately following completion of the connection, the film shall be secured to the connection with adhesive tape and the cut area repaired. Service connections shall be wrapped with polyethylene encasement for a minimum of 3 feet from the point of connection to the encased pipe.
- H. At the junctions between wrapped and unwrapped pipe the polyethylene encasement shall be extended a minimum of 3 feet beyond the end of the pipe scheduled to be encased and the ends of the encasement securely taped so that no soil can enter the encasement.

3.05 TESTING:

- A. Prior to the hydrostatic pressure test, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings. Flushing velocity shall be a minimum of 2.5 ft. /sec.
- B. The installed pipe shall be pressure tested in accordance with AWWA Standard C600.
- C. HYDROSTATIC PRESSURE TEST:
 - 1. Unless otherwise approved, all pipelines shall be given a hydrostatic pressure test between line valves. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gates, and other necessary equipment; and all labor required. The Owner or Engineer shall have the privilege of using its own gauges.
 - 2. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when desired.
 - 3. Pipelines intended for buried service shall be tested after backfill and compaction of the trench.
 - 4. The section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. The Contractor shall follow established procedures for filling the pipe and expelling trapped air to avoid exposing the piping system to water-hammer. If blowoffs are not available at high points for releasing air, the Contractor shall excavate as required and install the necessary taps. If the Contractor changes the grade of pipe installation, he will be responsible for locating the taps at the correct location in the system for testing. Taps shall be installed at the beginning and end of each disinfection run. After completion of the test, if so required by the Engineer, the Contractor shall remove corporations used for testing; plug the holes; and backfill as necessary.

5. The section under test shall be maintained full of water at working pressure for a period of 24 hours prior to the hydrostatic pressure test being applied to stabilize the pipeline with respect to movement under pressure, water absorption by the lining, etc. The pipeline may require several cycles of pressurizing and bleeding trapped air prior to beginning the test.
6. When hydrants are in the pipeline test section, the hydrostatic test shall be made against the main valve in the hydrant. The hydrostatic test shall not be conducted against the branch valve.
7. The hydrostatic test shall consist of raising the water pressure within the test section to a pressure not less than 1.25 times the working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the working pressure of the lowest elevation of the test section. The specified test pressure shall be corrected to the elevation of the test gauge.
8. The hydrostatic test shall be of at least a 2 hour duration. The test pressure shall not vary by more than +/- 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline test section.
9. The amount of makeup water (testing allowance) added to the test section shall be accurately measured by suitable methods and shall not exceed the maximum allowable quantity of makeup water. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{S D \sqrt{P}}{148,000}$$

Where:

- L = makeup water, in gallons per hour
- S = length of test section, in feet
- D = nominal diameter of pipe, in inches
- P = average test pressure, in psi (gauge)

10. If the section fails to pass the hydrostatic pressure test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified hydrostatic test.

3.06 DISINFECTION AND FLUSHING:

- A. The Contractor shall disinfect the lines carrying potable water.

- B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651 and all amendments thereto.
- C. In general, the procedure of disinfecting the main shall be to apply the chlorine through a tap in one end of the section and bleed it off through a tap at the other end.
- D. The applied dosage shall be such as to produce a chlorine concentration of not less than 10 mg/l after a contact time of not less than 24 hours.
- E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
- F. Any temporary connection to the mains or other facilities required to accomplish the disinfection of the mains shall be at the Contractor's expense.
- G. After treatment, the main shall be flushed with clean water until the residual chlorine concentration is less than 0.2 mg/l. The flushing rate shall be 3.0 ft/sec to achieve full scour of sand particles.
- H. Before disposing of the water used in disinfecting and flushing water mains the Contractor shall thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651 and C655.
- I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 (Option A – One sample taken after flushing is complete followed by another sample taken 16 hours after the first sample or Option B – Two samples taken 15 minutes apart after a 16 hour post flushing rest period) for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.
- J. Bacteriological sampling and testing shall be conducted by a state certified laboratory certified for total and fecal coliform analyses of potable water.
- K. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms.

END OF SECTION

SECTION 33 11 13.16

SERVICE CONNECTIONS (WATER SERVICES)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of new water service connections and the repair, replacement, and/or transfer of existing water service connections as shown on the drawings, as specified herein, and as required by the Engineer.

1.02 RELATED WORK:

- A. Section 32 12 00, PAVING
- B. Section 32 91 19, LOAMING AND SEEDING
- C. Section 33 11 13.13, DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

- | | | |
|------|-------|---|
| ASTM | B88 | Seamless Copper Water Tube |
| ASTM | B584 | Copper Alloy Sand Castings for General Applications |
| ASTM | D2737 | Polyethylene (PE) Plastic Tubing |

American Water Works Association (AWWA)

- | | | |
|------|------|--|
| AWWA | C800 | Water-Service Line Fittings |
| AWWA | C651 | Disinfecting Water Mains |
| AWWA | C901 | Polyethylene Pressure Pipe & Tubing, 1/2-inch through 3-inch for Water Service |

Federal Specifications (FS)

- | | | |
|----|-----------|------------------------|
| FS | WW-T-799C | Tube, Copper, Seamless |
|----|-----------|------------------------|

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Manufacturer's literature of the materials of this section for review.

PART 2 - PRODUCTS

2.01 SERVICE PIPING:

- A. Piping for buried copper water services shall be continuous Type K annealed seamless copper water tubing conforming to ASTM B43-58 Standard Specification for Seamless Copper Water Tube. Tubing shall be 1-inch diameter unless otherwise indicated.
- B. Couplings, if required, for existing to new service pipe connections shall have compression connections on the inlet and compression connections on the outlet. Couplings shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the coupling shall be 5 parts per billion (ppb). Couplings shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

2.02 CORPORATION STOPS:

- A. Corporations stops shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the corporation stops shall be 5 ppb. Corporation stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.
- B. (Not Applicable)
- C. Service clamps shall be installed with all corporation stops 2-inches and larger in size and with all corporation stops installed in PVC pipe. Clamps shall be all bronze, ductile iron or stainless steel, double strap, AWWA taper thread (CC) with O-ring seal.
- D. Corporation stops shall be by Ford Meter Box Co., Inc., Wabash, IN; Red Hed Manufacturing Co., Lincoln, RI; Mueller Co., Decatur, IL; or Regional Water approved equal.

2.03 CURB STOPS:

- A. Curb stops shall be of brass as specified in AWWA C800/ASTM B62 (85-5-5-5). All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach

limit of the curb stops shall be 5 ppb. Curb stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

- B. Curb stops shall be ball style and the inlet and the outlet shall have compression connections.
- C. Curb stops shall be by Red Hed Manufacturing Co., Lincoln, RI; Ford Meter Box Co., Inc., Wabash, IN; Mueller Co., Decatur, IL; or Regional Water approved equal.

2.04 CURB BOXES:

- A. The cast iron box shall be the Buffalo screw type with Arch pattern base. Minimum shaft diameter shall be 2-1/2-inch for 1-inch curb stops and 5-1/4-inch for 1-1/2-inch and larger curb stops. Curb box lid shall cast iron and be Erie pattern with "WATER" marked on the lid.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Where new water mains are being installed and existing water services are to be transferred to the new main, the Contractor shall discontinue the existing water services by shutting down the corporation stop at the old water main, unless specifically otherwise required by the Engineer. The Contractor shall take special care to minimize the interruption of existing water service.
- B. The Contractor shall tap a new corporation stop, cut the existing service piping and connect the new service piping to the old service piping using an approved coupling at a point between the main and the existing curb stop and box.
- C. Where transfers are to be made and the existing curb stop and box cannot be utilized or a new curb stop and box is required, the Contractor shall connect the new service piping to the existing service piping using an approved coupling approximately 12-inches from the curb stop on the building side of the stop.
- D. Where transfers are being made and the existing service is of lead, galvanized steel, or iron, the service shall be replaced to the curb stop and box unless otherwise required. If required, the curb stop and box shall be replaced as specified above.
- E. Curb stops and boxes shall be set plumb, flush with the ground or paved surface, and centered with the box located directly over the stop. The box shall be set on a concrete block or flat stone. Earth fill shall be carefully tamped around the boxes to a distance of 4 feet on all sides of the box or to the undisturbed face of the trench, if less than 4 feet.
- F. Curb stops shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify the proper operation of all curb stops in the

presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.

- G. All services shall be installed at 4 feet 6 inches of cover unless otherwise required by the Engineer.
- H. Service connections shall be tested and disinfected in accordance with AWWA standards.

END OF SECTION

SECTION 33 11 13.34

CONNECTIONS TO EXISTING WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers connections to existing water mains, complete.
- B. The Contractor shall furnish all pipe, fittings, valves, tapping machines, if required, and appurtenances. The Contractor shall do all excavation and backfill as required.

1.02 RELATED WORK:

- A. Section 03 05 00, FIELD CONCRETE
- B. Section 33 11 13.13, DUCTILE IRON PIPE AND FITTINGS
- C. Section 33 12 22, HYDRANTS AND VALVES

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 CONTRACTOR OPERATIONS:

- A. The Contractor shall make all connections to the existing mains as indicated on the drawings and as herein specified.
- B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing work shall be planned so as to interfere with operation of the existing facilities for the shortest possible time and when the demands on the system best permit such interference even to the extent of working outside of normal working hours to meet these requirements.
- C. The Contractor shall have all possible preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.
- D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting its operations to the needs of the Owner's water supply. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall

any damages be claimed because of water leaking through closed valves after dewatering is completed.

- E. Under no circumstances shall any customers be without water for a period of more than 4 hours without prior approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install temporary water service as specified in Section 01 51 36, TEMPORARY WATER SERVICE where required by the Engineer.
- F. Existing pipeline that is not to be abandoned but is damaged by the Contractor during the work shall be replaced by it at its own expense in a manner approved by the Engineer.

3.02 TAPPING CONNECTION TO EXISTING MAINS:

- A. Tapping connections to the existing mains, where indicated on the drawings, shall be made with service pressure in the main, using tapping sleeves and valves and a suitable tapping machine.
- B. Other connections to existing mains shall be made with the main out of service, unless otherwise required by the Engineer. Such connections will not require tapping sleeves and valves but connections as indicated on the drawings.

END OF SECTION

SECTION 33 12 22

HYDRANTS AND VALVES FOR POTABLE WATER WORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the furnishing and installation of all outside hydrants, valves and appurtenances as indicated on the drawings and as specified herein.
- B. Pipe and couplings shall be specified under the appropriate pipe sections.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 33 11 13.13, DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS
- C. Section 33 11 13.34, CONNECTIONS TO EXISTING WATER MAINS

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	A48	Gray Iron Castings
ASTM	A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM	A536	Ductile Iron Castings
ASTM	B62	Composition Bronze or Ounce Metal Castings
ASTM	D429	Test Method for Rubber Property Adhesion to Rigid Substrate.

American Water Works Association (AWWA)

AWWA	C500	Metal Seated Gate Valves For Water Supply Service
AWWA	C502	Dry-Barrel Fire Hydrants
AWWA	C504	Rubber-Seated Butterfly Valves
AWWA	C509	Resilient-Seated Gate Valves for Water Supply Service

AWWA C515 Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service

AWWA C550 Protective Interior Coatings for Valves and Hydrants
Federal Specifications (FS)

FS TT-V-51F Varnish, Asphalt

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Shop drawings shall be submitted for the hydrants, valves and appurtenances indicating type of joint, and lining and coating, etc., in accordance with the specifications.
- B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements.
- C. Refer to Paragraph 3.01.A for Affidavit of Compliance required to be submitted.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Valves shall open right (clockwise).
- B. Hydrants shall open left (counterclockwise).

2.02 HYDRANTS:

- A. Hydrants shall conform to the requirements of AWWA C502. They shall be equipped with a 5-1/4-inch main valve and 6-inch mechanical joint inlet.
- B. Hydrants shall have one 4-1/2-inch pumper and two 2-1/2- inch hose connections. Threads shall be NST.
- C. Hydrant operating and nozzle cap nuts shall be of pentagonal shape and measure one and one half inches from flat to point. The height of the nut shall not be less than one inch.
- D. All internal operating parts including main valve, main valve seat, drain valve mechanism, operating rod, etc., shall be removable without excavating.
- E. Main valve seat rings shall be made of brass or bronze, and shall screw into a seat retainer ring or sub-seat, which shall also be made of brass or bronze.
- F. Hydrants shall be traffic models with frangible bolts or breakaway couplings. Details of hydrant design shall meet the requirements of the Regional Water Authority.

- G. For purposes of standardization, hydrants shall be Metropolitan 250 Model 94 as manufactured by US Pipe and Foundry, Chattanooga, TN

2.03 HYDRANT PAINT:

- A. Hydrants shall be thoroughly cleaned and given two shop or field coats of paint in accordance with AWWA C502 and the instructions of the paint manufacturer. Paint color shall be the standard hydrant color of the Owner as follows:
 - 1. Barrel - OSHA yellow
 - 2. Bonnet - OSHA yellow
 - 3. Nozzle Caps - OSHA yellow
- B. If the hydrants are delivered with the Regional Water Authorities standard color, they shall be given one matching field coat of an alkyd gloss enamel. If the hydrants are not delivered with the Owner's standard color, they shall be given two coats of an alkyd gloss enamel, colors as indicated above.
- C. Hydrant paint shall be as manufactured by Sherwin-Williams, Cleveland, OH; Tnemec Company, Inc., Kansas City, MO; or Minnesota Mining and Manufacturing Co. (3M), St. Paul, MN; or approval equal.
- D. Alkyd gloss enamel shall be 801 DTM by Sherwin-Williams, 2H-Tneme by Tnemec; or approved equal. Reflective paint shall be Scotchlite #7211 by 3M.

2.04 YARD HYDRANT:

- A. (Not Applicable)

2.05 RESILIENT SEAT GATE VALVES:

- A. Resilient seat, wedge type gate valves shall be manufactured to meet all applicable requirements of AWWA C509 or AWWA C515. All valves shall be bubble-tight at 200 psi water working pressure, tested in both directions.
- B. Valve bodies shall be of cast or ductile iron and shall have non-rising threaded bronze stems acting through a bronze stem nut. Opening nuts shall be 2-inches square and shall open as specified above. All buried valves shall have mechanical joint ends.
- C. Valve wedges shall be of ductile iron with resilient seating surfaces permanently bonded to the wedges in strict accordance with ASTM D429 or attached to the face of the wedges with stainless steel screws. Each valve shall have a smooth, unobstructed water way free from sediment pockets.
- D. Valves shall have low friction, torque-reduction thrust bearings. All O-rings and gaskets shall be removable without taking the valves out of service.

- E. An NSF 61-approved epoxy coating, which is safe for potable water, shall be applied to exterior and interior valve surfaces. Epoxy Coating shall conform to the latest revision of AWWA C-550.
- F. Valves for horizontal applications shall have Delrin wedge covers, and be specifically designed for horizontal installation.
- G. Resilient seat gate valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant, Birmingham, AL; Waterous Co., S. St. Paul, MN; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; or approved equal.
- H. Post indicating valve assemblies shall have a post and indicator as an integral part of the resilient seated gate valve assembly. The unit shall be provided with a detachable crank which OPENS the valve in a counterclockwise direction. Shafts shall be Type 304 stainless steel. Post indicators and valves shall be UL listed, FM approved. Post indicators and valves shall be as manufactured by Pratt, Clow or approved equal.

2.06 TAPPING SLEEVES AND VALVES:

- A. Tapping sleeves and valves shall consist of a split cast iron or ductile iron sleeve tee with mechanical joint ends on the main and a flange on the branch. Tapping-type gate valves shall have one flange and one mechanical joint end. The valves shall conform to the requirements hereinbefore specified for gate valves and shall be furnished with a 2-inch square operating nut. The Contractor shall be responsible for verifying the outside diameter of the pipe to be tapped.
- B. Oversized valves shall be provided as required to permit the use of full size cutters. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be of cast iron furnished with rubber gaskets. Gaskets shall cover the entire area of flange surfaces.
- C. Tapping sleeves and valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant, Birmingham, AL; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; US Pipe, Chattanooga, TN; or approved equal.

2.07 BUTTERFLY VALVES:

- A. Buried butterfly valves shall be Class 150B, iron body, rubber seated, with mechanical joint ends. Butterfly valves shall conform to AWWA C504, except as otherwise specified herein. Butterfly valves shall have valve seats designed to provide bubble-tight shutoff at 150 psi upstream and downstream.
- B. Butterfly valve designs utilizing continuous lining on the internal body surfaces and extending over the flanges, will NOT be acceptable. Valve disks shall seat at an angle of 90 degrees to the axis of the pipe.

- C. Valve seats shall be of molded natural rubber, BUNA-NM or EPDM. Rubber seats may be attached to the body or the disk. If the seat is attached to the disk, the seat ring on the body shall be of stainless steel. Bolts shall extend through the seat.
- D. Seats mounted on the disk shall be securely clamped to the disk. All clamps, retaining rings, and their fasteners shall be Series 300 stainless steel.
- E. The valve disk shall be of either ductile iron conforming to ASTM A536 or Type 304 stainless steel.
- F. The valve shaft shall be Type 300 stainless steel or carbon steel with stainless steel joints. The valve disk and shaft connection shall be by means of mechanically secured taper pins extending through the disk and shaft. Taper pins, lockwashers and nuts shall be 18-8 stainless steel. The shaft seals shall be designed for the use of standard chevron type packing or standard O-ring seals.
- G. The manual operation mechanism shall be firm fixed to the valve body. The operator shall be permanently lubricated, and totally enclosed with a cast iron case, and the nut for buried valves shall turn in the direction specified above to open. The operator for buried valves shall be suitable for submersion. The operator shall have adjustable threaded collars at each end of the stroke.
- H. Butterfly valves shall be as manufactured by MH Valve Company, Anniston, AL; Keystone Valves USA, Houston, TX; Henry Pratt Company, Aurora, IL; or approved equal and shall conform to the above specifications.

2.08 DAMPENED SWING CHECK VALVES:

- A. Provide swing check valves with weighted arm plus an externally mounted air cushion cylinder APCO Series 6000 as manufactured by Valve and Primer Corporation, Inc.; Golden-Anderson Figure 250-D as manufactured by GA Industries, Cranberry Township, PA, or approved equal.
- B. The dampened swing check valves shall be flanged with cast iron body, bronze seat ring and continuous stainless steel shaft connected to an external lever and weight and bronze air cushion cylinder.
- C. Valves shall be full ported and prevent reverse flow when the inlet pressure becomes less than the downstream pressure, and shall be tight seated.
- D. The disc shall be cast iron, utilizing a double clevis hinge connected to a ductile iron disc arm. The disc arm assembly shall be suspended from the stainless steel shaft.
- E. The air cushion cylinder shall be constructed of corrosion resistant material and the piston shall be totally enclosed within the cylinder (not open at one end). The cushion cylinder assembly shall be externally attached to the right side of the valve body looking downstream and be adjustable to cushion the closure of the valve. Cushioning shall be

by air trapped in the cushion cylinder, which shall be fitted with a one-way adjustable control check valve to cushion disc contact to the seat at the shut-off point.

2.09 INSERTION VALVES:

- A. Insertion valves shall consist of a ductile iron or ASTM A-36 steel fusion bonded epoxy coated to 10-12 mils in accordance with AWWA C-213. The valves shall conform to the requirements herein specified for gate valves and shall be furnished with a 2-inch square operating nut. The contractor shall be responsible for verifying the outside diameter of the pipe where the valve will be inserted.
- B. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be furnished with a rubber gasket that fits 360 degrees around the pipe at each end.
- C. Insertion valves shall be as manufactured by Hydra-Stop, Inc., Blue Island, IL; Romac Industries, Inc, Seattle, Washington; or approved equal.

2.10 WATER LINE STOPS:

- A. Water line stop fitting body shall consist of a ductile iron or ASTM A-36 steel fusion bonded epoxy coated to 10-12 mils in accordance with AWWA C-213. The fitting shall be full encirclement, pressure retention-type split tee. The outlet of the fitting shall have locking pins built in to retain the completion plug. The contractor shall be responsible for verifying the outside diameter of the pipe where the valve will be inserted.
- B. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be furnished with a nitrile gasket that fits 360 degrees around the pipe at each end.
- C. The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from line stop flange and second to contain a compressible "O" ring to seal tight under pressure. The line stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the line stop flange.
- D. The Contractor shall provide the materials, machines, and related equipment necessary to install the line stop into an existing piping system under full operating pressure without interrupting service.
- E. Line stops shall be as manufactured by South Shore Pipeline, Hanover MA, John Hoadley & Sons, Inc. Rockland MA, Hydra-Stop, Inc., Blue Island, IL; IPSCO Paulsboro NJ; or approved equal.

2.11 VALVE BOXES AND EXTENSIONS:

- A. Valve boxes shall be manufactured in North America. The minimum inside diameter of the boxes shall be 6-inches and the lengths shall be as necessary to suit the ground elevation and the depth of each valve operator, regardless of the depth of cover.
- B. When there is more than 6 feet of cover, valve operators shall have non-rising extension stems which raise the operating nut to a depth of approximately 4 feet below grade. The extension stem shall have a centering support ring at the upper end. The lower socket shall be tapped with a set screw into the valve nut to prevent the extension stem from lifting off the valve nut.
- C. Each valve shall be provided with a box which has a close fitting 7-1/4-inch diameter cover and is substantially dirt-tight. The top of the cover shall be flush with the top of the box rim. The word "WATER" shall be cast in the top of the cover.
- D. Valve boxes shall be of cast iron and of the adjustable sliding, heavy pattern type. They shall be so designed and constructed as to prevent direct transmission of traffic loads to the pipe or valve. The upper or sliding section of the box shall be provided with a flange on the top of the section (not on the bottom) having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and to rest on the backfill. The boxes shall be adjustable through at least 6 inches vertically without reduction of lap between sections to less than 8-inches.

2.12 POLYETHYLENE ENCASEMENT:

Where called for on the drawings, the pipe shall be encased in polyethylene conforming to AWWA C105.

PART 3 - EXECUTION

3.01 AFFIDAVIT OF COMPLIANCE

- A. The manufacturer shall furnish as part of the shop drawing submittal the ENGINEER with an affidavit stating that valve(s), hydrants conform to the applicable requirements of the applicable AWWA Standard and the ENGINEER's specifications, and that all tests specified therein have been performed and all test requirements have been met and the test date.
- B. A copy of the Affidavit of Compliance shall be delivered to the construction site attached to each valve and/or hydrant furnished. The Affidavit shall be attached to the valve or hydrant inside a waterproof pouch.
- C. Any valve or hydrant received without the required affidavit shall be removed from the project and replaced at no expense to the Owner.
- D. All materials shall be certified "NEW". No reconditioned or repaired materials are permitted. Any reconditioned or repaired materials furnished or installed shall be removed and replaced with new materials at no expense to the Owner.

3.02 INSTALLATION:

- A. All valves shall be carefully installed and supported in their respective positions free from distortion and strain. Care shall be taken to prevent damage or injury to the valves and appurtenances during handling and installation.
- B. All material shall be carefully inspected for defects in workmanship and all debris and foreign material cleaned out of valve openings and seats. All mechanisms shall be operated to check for proper functioning, and all nuts and bolts checked for tightness.
- C. Valves and other equipment that do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.
- D. Hydrants shall be set plumb. Earth fill shall be carefully tamped around the hydrants to a distance of 4 feet on all sides of the hydrant, or to the undisturbed trench face, if less than 4 feet. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing main. Hydrants shall be set upon a layer of stone or a slab of concrete not less than 4 inches thick and 15 inches square. The side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with a concrete thrust block, as indicated on the drawings.
- E. Broken stone shall be placed around the base of the hydrant at the location of the drain hole, and backfill around the hydrant shall be thoroughly compacted to the grade line in a satisfactory manner. Hydrants shall have the interiors cleaned of all foreign matter before installation, and shall be inspected in both the open and closed positions.
- F. The body of the hydrant shall be of sufficient length to allow the hydrant to be set at the proper elevation, as shown on the drawings. Extensions shall be furnished and installed at the Contractor's expense, when required for greater depths.
- F. Valve boxes shall be set plumb, flush with the ground or paved surface, and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the valve boxes to a distance of 4 feet on all sides of the boxes or to the undisturbed trench face, if less than 4 feet.
- G. Valves shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify proper operation of all valves in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.

3.03 POLYETHYLENE ENCASEMENT:

- A. The pipe, hydrants and valves to be encased shall be thoroughly cleaned of all soil and debris prior to installation of the polyethylene encasement. No soil or debris shall be allowed to enter the encasement during or after its installation.
- B. Polyethylene encasement shall be installed using Method A as described in AWWA C105, with the encasement joints coincident with pipe joints. Adhesive tape shall be used to secure the encasement.
- C. Minimum overlap of polyethylene encasement shall be 24-inches, 12-inches on each side of pipe joints.
- D. If required, two layers of polyethylene encasement shall be installed. The first layer shall be completely installed on and secured to the length of pipe before the second layer is installed.
- E. Tears, cuts and other damage shall be repaired with a piece of polyethylene covering secured with adhesive tape, when approved by the Engineer. Otherwise, the damaged length of polyethylene shall be replaced at the Contractor's expense.
- F. Care shall be taken when backfilling to avoid damage to the polyethylene encasement.

END OF SECTION

SECTION 33 31 13.16

POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
(SDR-35)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of Polyvinyl Chloride (PVC) pipe and fittings, as indicated on the drawings and as specified herein.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 31 50 00, SUPPORT OF EXCAVATION
- C. Section 33 05 26.13, TRACER TAPE
- D. Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS

1.03 REFERENCES:

- A. The following standards form a part of these specifications as referenced:

American Society for Testing and Materials (ASTM)

ASTM	D2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM	D3034	Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM	D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM	F679	Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings (18" - 27")

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Manufacturer's literature of the materials of this section.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. PVC nonpressure sewer pipe 4-inches through 15-inches diameter shall conform to ASTM D3034, 18-inches through 27-inches diameter to ASTM F679, all with SDR of 35 unless noted, and shall meet the specific requirements and exceptions to the aforementioned specifications that follow.
- B. PVC nonpressure sewer pipe shall be furnished in standard lengths.
- C. One pipe bell consisting of an integral wall section with a solid cross section rubber ring, factory assembled, shall be furnished with each standard, random and short length of pipe. Rubber rings shall be provided to the requirements of ASTM D3212.
- D. The rubber ring shall be retained within the bell of the pipe by a precision formed groove or recess designed to resist fishmouthing or creeping during assembly of joints.
- E. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper jointing of the two pipes.
- F. PVC fittings shall be provided with bell and/or spigot configurations with rubber gasketed joints compatible with that of the pipe. Bend fittings with spigot ends shorter than the pipe recess bells will not be allowed. The shorter spigot end would not allow proper seating of the spigot in the mating bell and would permit undesired contact between the mating bell and the outside of the fitting bell.
- G. All pipe delivered to the job site shall be accompanied by independent testing laboratory reports certifying that the pipe and fittings conform to the above-mentioned specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such of the tests specified as he may from time to time deem necessary.
- H. All cutting of pipe shall be done with a machine suitable for cutting PVC pipe. Cut ends shall be beveled when recommended by the pipe manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D2321.
- B. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and bring the inverts continuously to the required grade.

- C. The pipe shall be supported by compacted crushed stone. Crushed stone shall be as specified under Section 31 00 00, EARTHWORK.
- D. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, rammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.
- E. Before a joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and conform to the required line and grade.
- F. For pipe placed on crushed stone, immediately after the joint is made, the jointing area shall be filled with suitable materials so placed and compacted that the ends of either pipe will not settle under backfill load.
- G. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
- H. Branches and fittings shall be laid by the Contractor as indicated on the drawings, and/or as required by the Engineer. Open ends of pipe and branches shall be closed with PVC caps secured in place with premolded gasket joints or as required by the Engineer.
- I. All pipe joints shall be made as nearly watertight as practicable. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline, connecting pipes, or structures, the defects shall be repaired to the satisfaction of the Engineer.
- J. The Contractor shall build a tight bulkhead in the pipeline where new work enters an existing sewer. This bulkhead shall remain in place until the Engineer authorizes its removal.
- K. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at openings for manholes.
- L. As soon as possible after the pipe and manholes are completed on any street, the Contractor shall flush out the new pipeline using a rubber ball ahead of the water, and none of the flushing water or debris shall be permitted to enter any existing sewer.

3.02 QUALITY ASSURANCE

A. LEAKAGE TESTING:

1. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall install suitable bulkheads as required, dewater and test the sewer for leakage.

2. Unless otherwise approved, the section shall be tested using low pressure air test procedures. If circumstances permit, the Engineer may allow testing by infiltration or exfiltration in lieu of air testing.
3. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psig (greater than the average groundwater back pressure of any groundwater above the pipe, but not greater than 9.0 psig). The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. **Note that UNI-B-6 suggests that use of the 0.5 psig pressure drop is more efficient since the time requirements are half of the 1.0 psig-pressure drop.** The two tables are reproduced on the following pages.
4. Using the air pressure test, if there has been no leakage (zero psig drop) after one hour of testing, the section undergoing test shall have passed.
5. If either infiltration or exfiltration testing is permitted by the Engineer, the test shall be conducted for at least 24 hours. The amount of infiltration or exfiltration shall not exceed 100 gallons per inch-diameter per mile of sewer per 24 hours.
6. The infiltration test measures leakage into a section of sewer and may be used only where the groundwater level is one foot or more above the crown of the section of sewer pipe at its upper end and at least one foot above the top of building connections and chimneys. For making the infiltration tests, underdrains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable. Allowances shall be made for water that may enter the sewer through pipe connections and inlets during the infiltration test.
7. Where the groundwater level is less than 1 foot above the top of the pipe at its upper end, the exfiltration test may be used. The sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 feet above the highest point in the system to be tested, including main pipeline, service connections and chimneys. When slopes between manholes are steep, the Contractor shall insure that this test can be accomplished without danger of forcing stoppers from wye or tee branches.
8. The rate of exfiltration from the sewers shall be determined by measuring the amount of water required to maintain the water level at the elevation established at the beginning of the test.
9. The Contractor shall construct such weirs or other means of measurements as may be required, shall furnish water and shall do all necessary pumping to enable the test to be properly made.
10. The Contractor shall be responsible for the satisfactory watertightness of the entire section of sewer. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer

may require without additional compensation. A plan of the method of repairing any leaks that are found shall be submitted to the Engineer for review.

1. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall TV inspect the section in accordance with Section 33 01 30.61, Sewer Cleaning, Inspection, Testing and Sealing at no additional cost to the Owner.
2. The Contractor shall be responsible for the satisfactory water-tightness of the entire section of the sewer. Should the Engineer determine that the sections inspected are unsatisfactory, the Contractor shall do all work required to locate and repair the defects and re-inspect as the Engineer may require without additional compensation.
3. A plan of the method for repairing any defects that are found shall be submitted to the Engineer for review.

B. PIPE DEFLECTION MEASUREMENT:

1. In accordance with ASTM D3034, no less than 30 days after completion of the PVC sewer pipe installation, the Contractor shall test the pipeline for deflection using a "go/no-go" deflection mandrel having a minimum of nine evenly spaced arms or prongs. The "go/no-go" gauge shall be hand pulled through all sections of the pipeline by the Contractor. The Contractor shall submit drawings of the "go/no-go" gauge to the Engineer for approval prior to testing. Complete dimensions of the gauge for each diameter of pipe to be tested shall be in accordance with ASTM D3034.
2. Any section of pipe found to exceed 7.5 percent deflection shall be deemed a failed pipe and shall be excavated and replaced by the Contractor at his own expense.

TABLE I

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Length for Longer Length (sec)	Specification time for length (L) shown (min:sec)								
				<u>100 ft</u>	<u>150 ft</u>	<u>200 ft</u>	<u>250 ft</u>	<u>300 ft</u>	<u>350 ft</u>	<u>400 ft</u>	<u>450 ft</u>	
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.52 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	31:09	35:36	
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	

TABLE II

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Length for Longer Length (sec)	Specification time for length (L) shown (min:sec)							
				<u>100 ft</u>	<u>150 ft</u>	<u>200 ft</u>	<u>250 ft</u>	<u>300 ft</u>	<u>350 ft</u>	<u>400 ft</u>	<u>450 ft</u>
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	26:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54
30	14:10	80	10:683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12:926 L	21:33	32:19	43:56	53:25	64:28	75:24	86:10	96:57
36	17:00	66	15:384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

END OF SECTION

SECTION 33 31 13.46

CONNECTIONS TO EXISTING STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish materials, tools, labor and equipment to cut suitable openings into the existing sewer manholes, make connections to existing sewers and all other work necessary to direct the existing sewage flow as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Prior to start of work, submit details of the methods proposed for doing the work and for maintaining the sewage flow as herein specified.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. The Contractor shall provide temporary plugs or provide other suitable means for maintaining the new sewer free of sewage flow until such time as it can be inspected and tested for leakage.
- B. Connections to the new sewer shall be made when required by the Engineer and only after the new pipeline has been inspected and has successfully passed the leakage test.
- C. The Contractor shall modify each existing structure for installation of the necessary piping, but in so doing shall confine the cutting to the smallest amount possible consistent with the work to be done.
- D. All new piping connected to existing structures shall be encased in concrete in a manner satisfactory to the Engineer.
- E. All work shall be done with the proper tools and by careful workmen competent to do work.
- F. The Contractor shall cut, reshape and fill the existing manhole tables and plug existing outlets as indicated on the drawings and as required by the Engineer, to accommodate the

new connections. Reshaped manhole invert channels shall be smoothly shaped to permit the flow of sewage. Manhole invert channels shall be reconstructed as specified under Section 33 39 13, PRECAST MANHOLES AND CATCH BASINS.

END OF SECTION

SECTION 33 39 13

PRECAST MANHOLES AND CATCH BASINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all precast manholes and catch basins complete, including, but not limited to, bases, walls, cones, mortar, inverts, frames and covers.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK
- B. Section 32 12 00, PAVING
- C. Section 03 05 00, FIELD CONCRETE

1.03 SYSTEM DESCRIPTION:

- A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as required by the Engineer.
- B. All manholes and catch basins shall have concrete bases. Concrete bases shall be precast unless otherwise specified. Invert channels shall be formed of brick and mortar upon the base.
- C. Catch basins shall have a 4-foot deep sump unless otherwise specified. Leaching basins shall have a bottom opening as shown on the drawings.
- D. Riser and cone sections shall be precast concrete.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM A48	Gray Iron Castings
ASTM C32	Sewer and Manhole Brick
ASTM C144	Aggregate for Masonry Mortar
ASTM C207	Hydrated Lime for Masonry Purposes
ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
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Occupational Safety and Health Administration

OSHA 29 CFR 1910.27	Fall Prevention Protection
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1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23
SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature of the materials of this section.
- B. Test reports as required by the Engineer.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS:

- A. All precast concrete sections shall conform to ASTM C478 with the following exceptions and additional requirements:

1. The wall thickness of precast sections shall be as designated on the drawings, meeting the following minimum requirements:

<u>Section Diameter (Inches)</u>	<u>Minimum Wall Thickness (Inches)</u>
48	5
60	6
72	7
84	8

2. Type II cement shall be used except as otherwise approved.
 3. Sections shall be steam cured and shall not be shipped until at least five days after having been cast.
 4. Minimum compressive strength of concrete shall be 4000 psi at 28 days.
 5. No more than two lift holes may be cast or drilled in each section.
 6. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.
 7. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.
 8. Circumferential steel reinforcement in walls and bases shall be a minimum of 0.12 sq. in./lin. ft. for 4-foot diameter sections and 0.15 sq. in./lin. ft. for 5- and 6-foot diameter sections. Reinforcing shall extend into tongue and groove.
- B. Conical reducing sections shall have a wall thickness not less than 5-inches at the bottom and wall thickness of 8-inches at the top. Conical sections shall taper from a minimum of 48-inches diameter to 24 or 30-inches diameter at the top, as shown on the drawings.
- C. Except where insufficient depth of cover dictates the use of a shorter base, bases shall be a minimum of 4 feet in height.
- D. Slab top sections and flat riser sections (Grade Rings) shall conform to the contract drawings, with particular attention focused upon the reinforcing steel and be designed to meet or exceed an HS-20 Loading requirement.
- E. The tops of the bases shall be suitably shaped by means of accurate ring forms to receive the riser sections.
- F. Precast sections shall be manufactured to contain wall openings of the minimum size to receive the ends of the pipes, such openings being accurately set to conform with line and grade of the sewer or drain. Subsequent cutting or tampering in the field, for the purpose

of creating new openings or altering existing openings, will not be permitted except as required by the Engineer.

- G. "Drop-over" manholes shall be placed where indicated on the drawings. The Contractor shall accurately measure the diameter of the existing outlet pipe and inform the manufacturer of its size, so that the "Drop-over" type opening can be cut into the precast manhole base. The bottom shall be cast in place by the Contractor in accordance with Section 03 05 00, FIELD CONCRETE. The invert channel shall be formed of brick and mortar, as specified in this specifications section. The sub-base shall be a compacted, level foundation of crushed stone, at least 6-inches thick, as specified in Section 02300 EARTHWORK, but shall vary to the depth necessary to reach sound undisturbed earth.
- H. The exterior surfaces of all precast manhole bases, walls, and cones shall be given a minimum of one shop coat of bituminous dampproofing.
- I. The Engineer reserves the right to reject any unsatisfactory precast section and the rejected unit shall be tagged and removed from the job site immediately.
- J. The Engineer may also require the testing of concrete sections as outlined under Physical Requirements in ASTM C478 with the Contractor bearing all testing costs.

2.02 BRICK MATERIALS:

- A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.
- B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.
- C. Mortar shall be composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required by the Engineer and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand.
- D. Cement shall be Type II portland cement as specified for concrete masonry.
- E. Hydrated lime shall be Type S conforming to ASTM C207.
- F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.03 FRAMES, GRATES, COVERS AND STEPS:

- A. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- B. All castings shall be thoroughly cleaned and may be subject to a careful hammer inspection at the Engineer's discretion.
- C. Castings shall be ASTM A48 Class 30B or better.
- D. The surface of the manhole covers shall have a diamond pattern with the cast words "WATER," "DRAIN" or "SEWER," whichever is appropriate.
- E. Manhole frames with 32-inch covers for 30-inch openings shall be 500 pounds minimum by EJ, No. V-1419; Quality Water Products, Style 47; Neenah Foundry Co., R1740B or approved equal.
- F. Watertight type manhole frames with 32-inch diameter covers (bolted and gasketed) shall be EJ, No. 2006APT 2008ZPT; Quality Water Products, Style C47WT; Neenah Foundry Co., R-1916-H or approved equal.
- G. Manhole frames with 26-inch covers for 24-inch openings shall be 475 pounds minimum by EJ No. 2110 (formerly LK110A); Neenah Foundry Co. R1720; Quality Water Products, Style 40; or approved equal.
- H. Watertight type manhole frames with 26-inch diameter covers (bolted and gasketed) shall be EJ No. 1268; Mechanics Iron Foundry Type A2073; Quality Water Products, Style 40WT; or approved equal.
- I. Frostproof manhole frames, with 30-inch diameter covers and inner lids, shall be R-1755 series by Neenah Foundry Co., Neenah, WI; 2006A1 2009Z by EJ, Brockton, MA; B-3045 (or similar) by Mechanics Iron Foundry, Boston, MA; or approved equal.
- J. 2-inch thick polystyrene insulation shall be firmly adhered to all frostproof inner lids.
- K. Catch basin frames and 23-7/8-inch square grates with 2-inch square openings shall be 8-inches in height minimum. They shall be Neenah Foundry Co. No. R3588-A; Quality Water Products No. 45-600; EJ 5548Z 5520M; or approved equal.
- L. Catch basin frames with bar grate openings and 23-7/8-inch square grates shall be 8-inches in height minimum. Bar grates shall not be used in areas where bicycle traffic could be present. They shall be Neenah Foundry Co. No. R-3589; Quality Water Products No. 45; EJ 5521Z 5520M3 BIKE GR LK121; or approved equal.

- M. Catch basin frames with cascade grate openings and 23-7/8-inch square grates shall be 8-inches in height minimum. They shall be Neenah No. R-3589; Quality Water Products LK121; EJ 5548Z 5520M; or approved equal.
- N. Catch basin frames set against curbing shall have three flanges only.
- O. Manhole steps shall conform to ASTM C478 requirements and shall be fabricated of either extruded aluminum or steel reinforced plastic. Steps shall be uniformly spaced at a maximum of 12-inches unless otherwise shown on the drawings.
- P. Type "A" Grate shall conform to ConnDOT Standard Detail HW-586-08 and Section M.08.02.5.

2.04 SEWER MANHOLE ACCESSORIES:

- A. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M-198.
- B. Couplings at the manhole-pipe interface shall be made with a rubber seal system (with or without stainless steel straps) meeting the requirements of ASTM C923 and recommended for this type of connection.
- C. Stubs installed as specified and indicated on the drawings shall be short pieces of the same class pipe as that entering the manhole and shall have either stoppers or end caps as shown on the drawings. Stoppers or end caps shall be especially designed for that application.

2.05 MANHOLE FALL PREVENTION SYSTEMS:

- A. (Not Applicable)

2.06 YARD DRAINS

- A. Yard drains shall be drain basins manufactured by Nyloplast, or approved equal.
- B. Yard drains shall have 24" deep sumps for capture of debris and sediment.
- C. Grates for Drain Basins shall be heavy-duty (H20 load rated) as manufactured by Nyloplast.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. PRECAST SECTIONS:

1. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 31 00 00 EARTHWORK, at least 6-inches thick, but shall vary to the depth necessary to reach sound undisturbed earth.
2. Precast reinforced concrete sections shall be set vertical and with sections in true alignment.
3. Butyl rubber joint sealant shall be installed between each concrete section. Catch basin sections do not require joint sealant if so indicated on the drawings.
4. All holes in sections used for handling the sections shall be thoroughly plugged with mortar. Mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. BRICK WORK:

1. Bricks shall be moistened by suitable means, as required by the Engineer, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
2. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.
3. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

C. CASTINGS:

1. Cast iron frames, grates and covers shall be as specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.
2. Cast iron manhole frames and covers not located in paved areas shall be set 6-inches above finished grade, at a height as required by the Engineer, or as indicated on the drawings. The top of the cone shall be built up with a minimum of 1 course and a maximum of 5 courses of brick and mortar used as headers for adjustment to final grade.
3. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight.

A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.

4. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.

D. ACCESSORIES:

1. Accessories shall be installed in accordance with manufacturer's instructions.
2. Stubs shall be set accurately to the dimensions indicated on the drawings. Stubs shall be sealed with suitable watertight plugs.

E. MANHOLE FALL PREVENTION SYSTEM:

Carrier rail shall extend from the manhole invert shelf to within 18-inches of finish grade. The rail and manhole rung clamp assembly shall be rigidly connected utilizing 3/8-inch stainless steel bolts. Assembly shall be clamped to manhole steps at 2-foot centers or as recommended by the manufacturer.

3.02 LEAKAGE TESTS:

- A. Leakage tests shall be made by the Contractor and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below:

B. VACUUM TEST:

1. The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from Table 1 are excerpted below.

TABLE 1

Minimum Test Times for Various Manhole Diameters

<u>Depth (Feet)</u>	<u>Diameter (Inches)</u>		
	48	60	72
	<u>Times (Seconds)</u>		
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

2. If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. WATER EXFILTRATION TEST:

1. After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.
2. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the Contractor so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as required by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as required by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.
3. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.
4. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied

with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.03 CLEANING:

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 33 41 13.16

POLYETHYLENE DRAINAGE PIPE
(Perforated)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section includes furnishing all material, labor and equipment and installing polyethylene drainage pipe and fittings with synthetic protective wrap, as shown on the drawings and as specified herein.

1.02 RELATED WORK:

- A. Section 31 00 00, EARTHWORK

1.03 REFERENCES:

- A. The following standards form a part of these specifications as referenced:

American Society for Testing and Materials (ASTM)

ASTM D 1557 Standard Test Methods for Moisture-Density Relations of Soils and Soil - Aggregate Mixtures Using 10-lb. Rammer and 18-inch Drop.

ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

ASTM F405 Standard Specification for Corrugated Polyethylene Pipe and Fittings.

ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.

American Association of State Highway and Transportation Officials (AASHTO).

AASHTO M252 Corrugated Polyethylene Drainage Tubing.

AASHTO M294 Corrugated Polyethylene Pipe, 12 to 36 inch diameter.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature on the materials of this Section.

- B. Manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the Engineer on request.

1.05 DELIVERY, STORAGE AND HANDLING:

Pipe shall be packaged to withstand shipment without damage and handled carefully on arrival at job site. Pipe shall be stored so that it is not exposed to sunlight.

PART 2 - PRODUCTS

2.01 GENERAL

- A. This Section applies to high density polyethylene corrugated pipe with an integrally formed smooth interior. It is applicable to nominal sizes 4- through 36-inch diameter.
- B. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.
- C. The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.
- D. When perforated pipe is specified, the perforations shall be cleanly cut so as not to restrict the inflow/outflow of water and uniformly spaced along the length and circumference of the pipe. Dimensions of the perforations shall be as stated in AASHTO M252.
- E. Joints shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. Where required by the Engineer, a neoprene gasket shall be utilized with the coupling to provide a soil-tight joint.
- F. Pipe sizes 4- through 10-inch shall conform to AASHTO M252. Pipe sizes 12- through 36-inch shall conform to AASHTO M294.
- G. Pipe sizes 4- through 6-inch shall conform to ASTM F405. Pipe sizes 8- through 15-inch shall conform to ASTM F667.

2.02 SYNTHETIC PROTECTIVE WRAP:

- A. Provide a synthetic protective piping wrap that will admit fine silt and clay and retain sands and coarse silts.
- B. The synthetic protective wrap shall have the following characteristics:
 - 1. Non-toxic, non-irritating.

2. Inert in soil.
3. Non-biodegradable.
4. Resist alkalis and acids.
5. Not affected by freezing or thawing.
6. Air permeability shall be a minimum of 500 cubic feet per minute per square foot.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. The pipe shall be installed as shown on the drawings and in accordance with the requirements of ASTM D2321.
- B. Installation of pipe and protective wrap shall be per the manufacturer's recommendations as approved by the Engineer.
- C. If protective wrap is not scheduled for immediate installation, the Contractor shall protect the pipe from sunlight ultra violet rays.
- D. Material for pipe support is specified under Section 31 00 00, EARTHWORK.
- E. Backfill shall be as shown on plans and specified in Section 31 00 00.
- F. Backfill material shall be compacted to 95 percent of maximum density according to ASTM D 1557.

END OF SECTION

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SECTION 33 41 13.22

CORRUGATED POLYETHYLENE [HDPE] DRAINAGE PIPE

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. This section includes furnishing all materials, labor and equipment and installing corrugated polyethylene [HDPE] drainage pipe and fittings as shown on the drawings and as specified herein.

1.02 RELATED WORK:

- A. Section 31 00 00 – EARTHWORK
- B. Section 31 50 00 – SUPPORT OF EXCAVATION

1.03 REFERENCES:

- A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

ASTM D2321	Standard for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
ASTM F405	Standard Specification for Corrugated Polyethylene Pipe and Fittings
ASTM F667	Standard Specification for Large Diameter Corrugated Polyethylene Pipe and fittings

American Association Of State Highway and Transportation Officials

AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe
AASHTO MP6	Standard Specification for Corrugated Polyethylene Pipe 42” and 48” Diameter

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer’s literature on the materials of this Section.
- B. Manufacturer’s certification that the product was manufactured, tested, and supplied in accordance with this specification.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Pipe shall be packaged to withstand shipment without damage and handled carefully on the jobsite. Pipe shall be stored so that it is not exposed to sunlight.

PART 2 – PRODUCTS:

2.01 MATERIALS:

- A. This Section applies to corrugated polyethylene pipe with an integrally formed smooth interior.
- B. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.
- C. The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

2.02 MANUFACTURERS:

- A. Pipe and fittings shall be manufactured by Ipex, Inc.; Plexco, Division of Chevron Chemical Co.; J-M Pipe Co.; Advanced Drainage Systems, Inc. (ADS) or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned before installation. Pipes and fittings shall be maintained clean.
- B. Pipes shall be installed in the locations and to the required lines and grades shown on the drawings and provided in these Specifications, using an approved method of control.
- C. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water, nor shall there be any joints made up in water.
- D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

END OF SECTION

SECTION 33 44 19.13

STORMWATER TREATMENT SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install all precast concrete storm-water treatment systems and appurtenances in accordance with the Drawings and these specifications.

1.02 RELATED WORK:

- A. Section 03 05 00, FIELD CONCRETE
- B. Section 31 00 00, EARTHWORK
- C. Section 32 12 00, PAVING

1.03 QUALITY CONTROL INSPECTION:

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi when tested in accordance with ASTM C-109. Epoxy mortar may be utilized for repairs.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Shop Drawings

Structural design calculations and shop drawings, which shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed.

B. Affidavit on patent infringement

The Contractor shall submit to the Engineer, prior to installation of the stormwater treatment system, an affidavit regarding patent infringement rights stating that any suit or claim against the Owner due to alleged infringement rights shall be defended by the Contractor who will bear all the costs, expenses and attorney's fees incurred thereof.

C. Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Laboratory Data

The stormwater treatment system supplier shall provide documentation of Total Suspended Solids (TSS) removal efficiency from laboratory testing conducted on the supplier's full-scale system. The documentation shall include:

- a. TSS removal efficiency versus operating rate for the full operating range of the stormwater treatment system for a uniform 50-micron particle size.
- b. TSS removal calculations for each system specified herein. The calculations must demonstrate that the system(s) is capable of achieving a net annual TSS removal efficiency as required by local regulations and as based upon a uniform 50-micron particle size and the best available rainfall data for the project site location.

2. Field Test Data

The stormwater treatment system supplier shall provide documentation of TSS removal efficiency from field testing conducted on an installed system. The documentation shall be in accordance with the following:

- a. The testing and documentation shall have been conducted by an independent third party.
- b. The testing and documentation shall include at least 10 storms.
- c. The testing and documentation must show TSS removal results that meet or exceed the performance requirements for the system(s) specified herein.

3. Manufacturing Experience

The stormwater treatment supplier shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

D. Operation and Maintenance Manuals

Furnish four copies of the operation and maintenance manuals for the stormwater treatment systems.

PART 2 - PRODUCTS

2.01 MATERIALS AND DESIGN:

- A. Concrete for precast storm-water treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:
1. The wall thickness shall not be less than 6-inches (152 mm) or as shown on the dimensional drawings. In all cases the top slab and wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a Licensed Professional Engineer.
 2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.
 3. Cement shall be Type II Portland cement conforming to ASTM C 150.
 4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.
 5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a rubber seal system meeting the requirements of ASTM C923.
- B. Internal aluminum plate components shall be ¼-inch (6 mm) thick aluminum alloy 5052-H32 in accordance with ASTM B 209.
- C. Internal aluminum angle components shall be ¼-inch (6 mm) thick aluminum alloy 6063 in accordance with ASTM B 308.
- D. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.
- E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CLASS 30B and AASHTO M105.

- F. A bitumen sealant in conformance with ASTM C 990 shall be utilized in affixing the aluminum swirl chamber to the concrete vault.

2.02 PERFORMANCE:

- A. Unless otherwise indicated, all equipment used shall provide the results listed in the schedule below. Proposed equipment shall be submitted in writing to the Engineer, along with sufficient data supported by certified tests that the system can meet the end results shown in the table and this specification section:

Table 2.02

Location	Model (1)	Design Treatment (Water Quality Flow) (cfs) (2)	Design Flow Bypass (cfs) (2)
A1	Contech CDS	1.4	5.9
B2	Contech CDS	0.9	5.3

(1) Systems shall be designed and manufactured by Contech as noted or approved equal.

(2) The systems shall be capable of providing above flow capacities and sediment storage volumes.

- D. Each stormwater treatment system shall include a circular aluminum “swirl chamber” (or “grit chamber”) with a tangential inlet to induce a swirling flow pattern that will accumulate and store settle-able solids in a manner and a location that will prevent re-suspension of previously captured particulates.
- E. Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.
- D. Each stormwater treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a uniform 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity (Water Quality Flow) listed in Table 2.02, and shall not resuspend trapped sediments or reentrain floating contaminants at flow rates up to and including the specified Design Flow Bypass.
- E. Individual stormwater treatment systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

- F. A feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.
- G. The stormwater treatment system manufacturer shall furnish documentation which supports all product performance claims and features, storage capacities and maintenance requirements.
- H. Stormwater treatment systems shall be completely housed within one structure.

2.03 MANUFACTURER:

- A. Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.
- B. Each stormwater treatment system shall be a Contech CDS™ System as manufactured by Contech Construction Products Inc., 9025 Centre Pointe Drive - Suite 400, West Chester, Ohio 45069, or shall be of a model and manufacturer on the Connecticut Department of Transportation list of approved hydrodynamic separators.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Each stormwater treatment system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise required by the Engineer.
- B. Place the precast base unit on a granular subbase of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.
- C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990-91 along the construction joint in the section that is already in place.
- D. After setting the base and wall or riser sections, install the circular swirl chamber wall by bolting the swirl chamber to the side walls at the three (3) tangent points and at the 3-inch wide inlet tab using HILTI brand concrete anchors or equivalent 1/2-inch diameter by 2-3/4-inch minimum length at heights of approximately 3-inches off the floor and at the mid-height of the completed trap (at locations of pre-drilled holes in aluminum components). Seal the bottom edge of the swirl chamber to the trap floor with the supplied aluminum

angle flange. Adhere ¼-inch thick by 1-inch wide neoprene sponge material to the flange with half of its width on the horizontal leg of the flange and half of its width on the vertical leg. The aluminum angle flange shall be affixed to the floor with a minimum 3/8-inch diameter by 2-3/4-inch drop in wedge anchor at the location of the predrilled holes. Affix the swirl chamber to the flange with hex head ¼-inch x 1-1/2-inch zinc coated self-tapping screws at the location of the predrilled holes. Seal the vault sidewalls to the outside of the swirl chamber from the floor to the same height as the inlet pipe invert using butyl mastic or approved equal.

- E. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least 1-inch greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.
- F. After setting the precast roof section of the storm-water treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a ¼-inch maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Storm-water Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".
- G. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.
- H. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

END OF SECTION

Appendix A
Environmental Report

ITEM #0406999A - ASPHALT ADJUSTMENT COST

Description: The Asphalt Adjustment Cost will be based on the variance in price for the performance-graded binder component of Hot Mix Asphalt (HMA), Polymer Modified Asphalt (PMA), Ultra-Thin Bonded HMA (UTB-HMA), and Ultra-Thin Bonded PMA (UTB-PMA) mixtures completed and accepted during the Contract.

The Asphalt Price is available on the Department of Transportation website at:
<http://www.ct.gov/dot/asphaltadjustment>

Construction Methods:

An asphalt adjustment will be applied only if all the following conditions are met per mixture:

- I. For HMA and PMA mixtures:
 - a. The HMA or PMA mixture for which the adjustment would be applied is listed as a Contract item with a pay unit of tons.
 - b. ***The total quantity for all HMA and PMA mixtures in the Contract or individual purchase order (Department of Administrative Service contract awards) exceeds 1000 tons or the Project duration is greater than 6 months.***
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.
- II. For UTB-HMA and UTB-PMA mixtures:
 - a. The UTB-HMA or UTB-PMA mixture for which the adjustment would be applied is listed as a Contract item.
 - b. The total quantity for the UTB-HMA or UTB-PMA mixture in the Contract exceeds:
 - i. 800 tons if the UTB-HMA or UTB-PMA item has a pay unit of tons.
 - ii. 30,000 square yards if the UTB-HMA or UTB-PMA item has a pay unit of square yards.Note: The quantity of UTB-HMA or UTB-PMA measured in tons shall be determined from the material documentation requirements set forth in the UTB-HMA or UTB-PMA item specification.
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.
 - d. No Asphalt Adjustment Cost will be applied to the liquid emulsion that is specified as part of the UTB-HMA or UTB-PMA mixture system.
- III. Regardless of the binder used in all HMA, PMA, UTB-HMA or UTB-PMA mixtures, the Asphalt Adjustment Cost will be based on PG 64-22.

The Connecticut Department of Transportation (CTDOT) will post on its website, the average per ton selling price (asphalt price) of the performance-graded binder. The average is based on the high and low selling price published in the most recent available issue of the **Asphalt Weekly Monitor®** furnished by Poten & Partners, Inc. under the “East Coast Market – New England, New Haven, Connecticut area,” F.O.B. manufacturer’s terminal.

The selling price furnished from the Asphalt Weekly Monitor ® is based on United States dollars per standard ton (US\$/ST).

Method of Measurement:

Formula: $HMA \times [PG\%/100] \times [(Period\ Price - Base\ Price)] = \$ \underline{\hspace{2cm}}$

Where:

- **HMA:**
 1. For HMA, PMA, UTB-HMA and UTB-PMA mixtures with pay units of tons:
The quantity in tons of accepted HMA, PMA, UTB-HMA or UTB-PMA mixture measured and accepted for payment.
 2. For UTB-HMA or UTB-PMA mixtures with pay units of square yards:
The quantity of UTB-HMA or UTB-PMA mixture delivered, placed, and accepted for payment, calculated in tons as documented according to the Material Documentation provision of the UTB-HMA or UTB-PMA specification.
- **Asphalt Base Price:** The asphalt price posted on the CTDOT website 28 days before the actual bid opening posted.
- **Asphalt Period Price:** The asphalt price posted on the CTDOT website during the period the HMA, PMA, UTB-HMA or UTB-PMA mixture was placed.
- **PG% (Performance-Graded Binder percentage):**
 1. For HMA or PMA mixes:
 - PG% = 4.5 for HMA S1 and PMA S1
 - PG% = 5.0 for HMA S0.5 and PMA S0.5
 - PG% = 6.0 for HMA S0.375, PMA S0.375, HMA S0.25 and PMA S0.25
 2. For UTB-HMA and UTB-PMA mixes:
 - PG% = Design % PGB (Performance Graded Binder) in the approved job mix formula, expressed as a percentage to the tenth place (e.g. 5.1%)

The Asphalt Adjustment Cost shall not be considered as a changed condition in the Contract as result of this provision since all bidders are notified before submission of bids.

Basis of Payment: The "Asphalt Adjustment Cost" will be calculated using the formula indicated above. A payment will be made for an increase in costs. A deduction from monies due the Contractor will be made for a decrease in costs.

The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this item will be considered the bid price although the adjustment will be made as described above. The estimated cost figure is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

Pay Item	Pay Unit
Asphalt Adjustment Cost	est.

Appendix B
Geotechnical Report

November 8, 2022

Mr. Sean M. Kimball, Cheshire Town Manager
Town of Cheshire
84 South Main Street
Cheshire, CT 06410

**RE: Geotechnical Engineering Report
Improvements to Bartlem Recreational Area
Cheshire, Connecticut**

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present our geotechnical engineering report for the proposed design improvements to Bartlem Park South in Cheshire, CT. Our project understanding is based on a draft permitting plan set dated July 13, 2022. Our services were completed in general accordance with the February 2022 Services Agreement.

Information on the use of this report is provided in the document titled "Important Information about this Geotechnical Engineering Report" by Geoprofessional Business Association (GBA), Inc., as described in the Limitations section of this report.

EXISTING CONDITIONS

The location of Bartlem Recreational Area is shown on *Figure 1 – Locus Map*. The site is bounded by South Main Street to the west, commercial and residential developments to the south, Mill River to the east, and residential properties along Chipman Drive and a wooded area to the north. The site is approximately 17-acres and is primarily grass-covered with athletic fields, a skate park, playground, pool, and associated access roads and parking lots.

According to the drawing entitled "Existing Conditions Plan" from the permitting plan set dated July 13, 2022, subsurface utilities include electric, gas, and communication lines on the north side of the site, stormwater sewer conduits on the north and east sides of the site, and water conduits with various catch basins along the central portion of the site. The invert depths of the subsurface utilities were not indicated. Light poles are located on the access roads and parking lots.

Ground surface elevations generally increase from south to north from El. 167 to El. 177. Elevations in this report are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

PROJECT UNDERSTANDING

The proposed improvements will be in the southern portion of the park as shown on *Figure 2 – Site Limits Plan*. The improvements include construction of a 20 by 30 foot restroom pavilion, a pre-manufactured bandshell, multi-purpose synthetic turf field with six Musco Stadium Lights, parking/roadway pavement covering about

130,000 square feet (SF), site pedestrian lighting, and infiltration for stormwater design, as shown in *Figure 3 –Site Plan*.

According to the drawing entitled “Grading Index Plan” from the August 31, 2022 permitting plan set, proposed grades are generally within about 2 feet of existing grades except in the western area where up to 5 feet of fill will be placed for the access drive, parking lot and a berm around the stormwater detention basin. It is our understanding that retaining walls are not included in the project.

SUBSURFACE CONDITIONS

Geologic Setting

Information from the United States Geological Survey (USG) “Surficial Materials Map of Connecticut” (1992) compiled by Janet Roadway Stone, et al. indicates that portions of the site are underlain by thin till, generally less than 10 to 15 feet thick that is moderately compact, generally sandy, and commonly stony; or sand and gravel generally less than 20 feet thick overlying sand.

According to the 1985 “Bedrock Geologic Map of Connecticut” compiled by John Rogers, bedrock at the site consists of New Haven Arkose that is reddish in color and poorly sorted.

Subsurface Explorations

Test Pits

A total of fourteen test pits were performed at the site by the Cheshire Public Works (CPW) on July 11 and 12, 2022. Approximate test pit locations (TP-20 through TP-29, TP-31, TP-32, TP-34, and TP-36) are shown on *Figure 3*. The test pits were advanced to depths ranging from approximately 4 to 8 feet. Shallow bedrock and/or early refusals were not encountered.

The test pits were performed to support stormwater design and the findings are provided as part of a Weston & Sampson memorandum dated July 28, 2022 which is included in *Attachment A*.

Borings

Subsurface conditions were explored on June 21 and June 23, 2022 by advancing thirteen borings (B-1 through B-13). Approximate boring locations are shown in *Figure 2*. Weston & Sampson geotechnical engineering staff monitored boring activities, measured boring locations relative to existing site features, and prepared logs for each boring.

The borings were completed by Soil Testing, Inc. of Oxford, CT using either a Diedrich D-50 ATV-mounted rig, CME 45C trailer rig, or truck mounted drill rig. The borings were advanced using either 2-1/4-inch, 3-3/4-inch, or 4-1/4-inch inside diameter (ID) hollow-stem auger (HSA) drilling methods as noted on the boring logs. Standard penetration tests (SPTs) were conducted in each boring by driving a split spoon sampler with an automatic hammer in general accordance with ASTM D1586. The borings were advanced to depths ranging from approximately 4 to 22 feet. Copies of the boring logs along with the Guide to Subsurface Exploration Logs are included in *Attachment B*.

Following completion of drilling, two of the borings (B-7 and B-8) were completed as monitoring wells and the remaining borings were backfilled with cuttings.

Encountered Subsurface Conditions

Subsurface conditions encountered in the test pits and borings generally consisted of surficial topsoil underlain by native silt, silty sand, and sand to the depths explored. The subsurface conditions encountered in the borings were generally consistent with mapped surficial geology.

Subsurface soil and groundwater conditions described below have been interpreted based on a limited number of explorations that were observed by Weston & Sampson. Variations may occur and should be expected between locations. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Refer to the boring logs included in *Attachment B* for detailed descriptions of the soil samples collected. The general Unified Soil Classification System (USCS) designation(s) for each stratum is included in the descriptions below in parentheses. Depths provided below are relative to the existing ground surface at the time of drilling.

Surficial Materials – Surficial materials generally consisted of 2 inches of topsoil or loam except at B-9, performed in the existing parking lot, where 2 inches of gravel was encountered at the ground surface.

Silt – Stiff to hard silt was encountered below the surficial materials in five of the thirteen borings (B-1, B-2, B-3, B-5, and B-8). The silt extended to depths ranging from approximately 2 to 4 feet and was generally comprised of little to some fine to medium sand, trace to little fine gravel, and trace roots (ML).

Sand – Medium dense to very dense, native sand was encountered below the surficial materials or silt and each of the borings. The sand was generally comprised of fine to coarse SAND with trace to some non-plastic fines, and trace to some gravel (SM, SP-SM, SW-SM). In the boring near the proposed restroom pavilion (B-7), little low plasticity fines with few fine gravel was encountered at a depth of approximately 18.5 feet (SC). Each boring was terminated in the sand at depths ranging from 4 to 22 ft.

A sand and gravel layer with varying amounts of silt and some cobbles and up to occasional boulders was encountered in each of the test pits below the surficial materials. The cobbles and boulders were encountered at depths as shallow as 0.3 to 2 feet and extended to the final depths explored.

Refusal – Nine of the thirteen borings encountered drilling or split-spoon refusal at depths ranging from 4 to 20.9 feet. Rock coring was not completed at the refusal depths indicated above. Therefore, refusals could have been on very dense soils, boulders, large pieces of debris, or bedrock.

Groundwater – Groundwater was encountered in three of the thirteen borings at depths ranging from 15 to 18 feet below the ground surface (El. 153.5 to 158). We anticipate that groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

Laboratory Testing

Selected soil samples were submitted to Thielsch Engineering of Cranston, RI for laboratory grain size (ASTM D6913) to confirm field classifications and estimate engineering properties. Laboratory test results are included in the boring logs in *Attachment B* and the laboratory test results are included in *Attachment C- Laboratory Test Results*.

GEOTECHNICAL RECOMMENDATIONS

General

A primary geotechnical consideration for construction of the proposed building and related site improvements is the presence of shallow refusals encountered at nine of the thirteen boring locations and prevalence of cobbles and boulders encountered in the test pits at depths as shallow as 0.3 feet. Additionally, according to the July 28, 2022 memorandum (*Attachment A*) the majority of the southern portion of the site, including the area of the proposed bandshell, was historically occupied by residential barn and shed structures; test pit TP-27 encountered remnants of these buried concrete foundations. Difficult excavation conditions through cobbles, boulders, and buried structures should be anticipated during construction.

Bandshell and Restroom Pavilion Foundation Recommendations

Based on the subsurface conditions encountered in our explorations, the proposed structures can be supported by shallow spread footings bearing on the native undisturbed sand or on Structural Fill directly overlying suitable native materials.

Very dense soils with sampler refusals and cobbles/boulders were encountered at depths ranging from 2 to 4 feet near the proposed restroom pavilion and bandshell structure. Additionally, buried structures were encountered near the proposed bandshell structure in TP-27. Difficult excavation conditions, including removal of boulders and buried structures, should be anticipated during construction. Foundation subgrade preparation recommendations are provided in the Earthwork and Construction Considerations section of this report.

Footings founded as recommended herein can be designed using an allowable bearing pressure of 4,000 psf. The allowable bearing pressure can be increased to 6,000 psf to resist temporary wind and seismic loads provided the vertical component of the resultant of all forces due to load eccentricities remains within the middle third of the footing. Resistance to lateral loads can be obtained by a passive equivalent fluid pressure of 90 pcf, ignoring the top 12 inches of embedment, and by a footing base friction coefficient of 0.45.

Foundations for proposed structures should be designed in accordance with the provisions of the current edition of the Connecticut State Building Code (CSBC). Footings should be embedded at least 3.5 feet below the nearest proposed adjacent ground surface exposed to freezing. Interior foundation bearing surfaces not exposed to freezing can be embedded at least 18 inches below the lowest overlying floor slab elevation, but these footings will likely require special frost protection measures if constructed during freezing conditions.

Shallow foundations constructed as recommended herein are anticipated to undergo total and differential settlements of less than 1-inch and ½-inch, respectively. The majority of foundation settlement is expected to occur during construction. We recommend that construction of settlement sensitive building elements such as dry wall and tiling be delayed as long as practicable to reduce the potential for damage due to post-construction settlements.

Light Pole Foundation Recommendations

Based on the conditions encountered in our explorations, refusals were encountered in five of the six proposed light pole boring locations at depths ranging from 4 to 11 feet. Test pits TP-31, TP-32 and TP-34 encountered large amounts of cobbles and boulders at depths as shallow as 0.8 feet.

Field lights are typically supported on drilled shafts. However, these subsurface conditions likely preclude traditional drilling methods for drilled shaft construction. Based upon conversations with Mike Mahoney of Musco on August 12, 2022, we therefore recommend a spread footing with an integrated concrete extrusion to accommodate the pole base sleeve. As noted above, difficult excavation conditions should be anticipated. Foundation subgrade preparation recommendations are provided in the Earthwork and Construction Considerations section of this report.

Footings founded as recommended herein can be designed using an allowable bearing pressure of 5,000 psf assuming the foundation is about 5 feet square.

Light pole foundations should be designed in accordance with the provisions of the current edition of the Connecticut State Building Code and the Technical Specifications provided by the light pole manufacturer.

Seismic Design

Seismic site class is determined in accordance with the International Building Code (IBC) using a weighted average of SPT blow counts in the upper 100 feet of soil at a site. As our deepest explorations extended to a depth of 22.0 feet (B-7 and B-8), our site class evaluation considered mapped surficial geologic conditions in the site vicinity and assumed SPT blow counts below a depth of 22 feet. Based on the results of explorations and analyses and depths of proposed structures, we recommend that the subject project be evaluated using parameters associated with Site Class D. The structural engineer shall determine the seismic site parameters (S_1 and S_2) based on the site location and site coefficients (F_a and F_v) based on the seismic site parameters and Site Class.

Liquefaction is the sudden drop in shear strength between soil particles that can occur in saturated, cohesionless soils as a result of ground acceleration during a seismic event. Liquefaction typically results in soil densification and subsequent settlement of overlying features and structures. Conditions most likely to contribute to liquefaction include a soil matrix containing loose, uniform medium to fine sand (poorly graded sand) below the groundwater table. Based on the soil and groundwater conditions encountered in our explorations, the risk of liquefaction induced structurally damaging ground deformations is low.

Slabs

Interior and exterior building and equipment slabs should bear on recompacted subgrades of native undisturbed sand or properly constructed Structural Fill overlying suitable native soils. Based on the subgrade preparation procedures recommended herein and the existing soil conditions, a modulus of subgrade reaction of 230 psi/in is recommended for slab design.

Concrete slabs on-grade should be supported on a minimum of 6 inches of clean, well graded, angular crushed stone with no more than 10 percent passing a #200 sieve placed between the prepared subgrade and concrete. If the underslab stone is saturated or trapping water, the water should be removed prior to slab placement.

The native silt encountered in B-1, B-2, B-3, B-5, and B-8 is susceptible to frost heave. Therefore, consideration should be given to removing this material from below exterior slab to the frost depth and replacing with crushed stone or free draining Structural Fill.

Some flooring manufacturers require specific slab moisture levels and/or vapor barriers to validate the

warranties on their products. A properly installed and protected vapor flow retardant can reduce slab moistures. If a vapor flow retardant is used, care should be taken not to trap moisture within the overlying crushed stone and floor slab concrete.

Drainage

Exterior ground surfaces should be sloped to drain away from all structures including walkways, pavements, and landscaping. Surfaces should also be sloped to drain away from slopes. Drainage elements such as catch basins or strip drains should provide drainage if sloping is not possible. Stormwater should not be discharged on or above slopes.

Gutters and drains should be tight-lined to a suitable erosion protected discharge and maintained as free-flowing. Cleanouts and redundant drain pipes are recommended.

Asphalt Concrete Pavement

General

At the time of this report we did not have specific information regarding the type and frequency of expected traffic within the proposed access drives and parking areas. We understand the town has provided standard pavement detail for the proposed access drives and parking areas from an August 31, 2022 drawing titled "Town Standard Details", Sheet L810 prepared by Weston & Sampson. A high fines content was encountered on the eastern portion of the access drive (in B-11). Based on the grading plans provided, fills up to approximately 5 feet are proposed in this area. Where high fines contents exist, we assume the additional fill thicknesses will provide adequate drainage while meeting the town's standards for pavement design.

Frost Considerations

Pavement structures are susceptible to frost (i.e. freeze-thaw cycles), which generally result in reduced pavement life and increased maintenance costs. We generally recommend a minimum total pavement structure thickness (AC + Base Aggregate) of 19 inches to provide some degree of frost protection. This minimum thickness is intended to reduce, not prevent frost damage.

Depending on available funds and based on the Town Standard Details drawing, the Town may consider including an additional 12" of bank run gravel, geotextile fabric, underdrains, or other stabilizing methods if the subgrade materials possess high frost susceptibility.

EARTHWORK AND CONSTRUCTION CONSIDERATIONS

Site Preparation

Site preparation for earthwork and foundation construction should include removal of existing pavement, debris, and surficial organic and unsuitable (e.g. soft or disturbed) soils from within a 5-foot perimeter around all proposed structure, pavement, and fill areas. The exploration completed in existing gravel parking area encountered 1 inch of gravel. The remaining explorations within grassy areas encountered about 1 inch of topsoil. No explorations were performed in the existing paved parking areas and access roads, so thicknesses are unknown. Deeper stripping depths and removal of loose surficial organic soil should be anticipated in areas of landscaping, shrubs, and trees. Root balls from trees and brush may extend several feet and grubbing

operations can cause considerable subgrade disturbance. In general, roots greater than one-inch in diameter should be removed as well as areas of concentrated smaller roots. All disturbed material should be removed to undisturbed subgrade.

Excavations resulting from site preparation should be backfilled as recommended herein. Any existing utilities should be removed or properly abandoned using Structural Fill, controlled density fill (CDF), or grouting in such a manner to prevent voids.

Subgrade Preparation and Protection

Based on the subsurface conditions encountered in our explorations and assuming proposed subgrade elevations are within a few feet of existing grades, stripping and subgrade preparation will likely expose native sandy soils with variable amounts of silt, gravel, cobbles, and boulders. Undocumented fill, organics, and loose or disturbed soils should be removed from within the zone-of-influence of all foundations and slab areas. Boulders, cobbles, and buried structures should be removed to a minimum depth of 1 foot below footing, slab, utility, and pavement subgrades.

Footing and slab subgrades in granular materials should be proof compacted with at least 5 passes by a minimum 12-ton smooth drum vibratory roller. All subgrades should be observed by Weston & Sampson prior to placement of fill, forms and rebar. Observation of subgrade preparation by the Owner's Engineer is typically required as a condition of the ground improvement design and performance warranty.

If subgrade preparation exposes existing fill in areas outside the zone-of-influence of proposed structures, slabs, and other rigid site improvements, it may be possible to leave the fill in place provided the thickness, composition, and stability of the fill is evaluated by the Geotechnical Engineer. If the fill can be left in place, the surface of the fill should be prepared by scarifying (ripping) the surface of the fill to a minimum depth of 12 inches and recompacting until dense and stable with several passes of a minimum 12-ton vibratory roller.

Soft and/or disturbed areas will require over-excavation and backfilling with compacted angular crushed stone or compacted structural fill. A geosynthetic separation layer between the excavation subgrade and crushed stone backfill may also be required. We recommend that a geosynthetic used for stabilization consist of a woven geosynthetic with an AOS of #70 to # 100 sieve, and a minimum puncture resistance of at least 120 pounds (such as Mirafi FW700 or equivalent).

Soils containing more than trace amounts of silt are highly susceptible to softening and disturbance by construction activity during wet or freezing weather. Subgrade protection should be the responsibility of the contractor and special precautions and protective measures appropriate for the weather and traffic conditions during construction should be used during earthwork and foundation construction to preserve the integrity of subgrades.

Construction traffic should not operate directly on subgrades. If the construction schedule allows, existing pavement areas can be used as staging areas but the existing asphalt concrete pavement section should not be expected to protect subgrades from concentrated heavy construction traffic.

A few inches of angular crushed stone can be placed and compacted at the base of footing excavations to protect subgrades from disturbance during construction and wet weather conditions. If foundation construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should

be employed to prevent foundation subgrades from freezing until the foundations are backfilled sufficiently to prevent frost from reaching the footing subgrades and penetrating beneath foundation elements.

Excavation Considerations

Excavation will be required for site preparation, foundation construction, trenches for utility construction, site grading, etc. Groundwater and surface water should be controlled during construction and prevented from eroding slopes and disturbing excavation and subgrade materials. Groundwater was observed in some of the borings at depths ranging from about 15 to 18 feet below existing grades. Some excavations may encounter perched groundwater and moderate to severe caving and possible flowing conditions should be expected where seepage is present.

Depending on excavation depth and amount of groundwater seepage, dewatering may be necessary. Flow rates for dewatering are likely to vary depending on location, soil type, and the season during which the excavation occurs. The dewatering systems should be designed by the contractor and be capable of adapting to variable flows and conditions.

Temporary excavation support will be required for excavation depths greater than 4 feet where sloping is not feasible or where groundwater seepage is present. Temporary excavation support should be anticipated if excavations approach the zone-of-influence beneath existing footings, structures, site features, or property lines. Foundations and utilities should be designed and constructed so that excavations into zones of influences below footings are not required.

We recommend that the type and design of shoring and dewatering systems be the responsibility of the contractor, who is in the best position to choose a system that fits the overall plan of operation. All excavations should be made in accordance with applicable OSHA safety regulations.

Trenches

Utility trench excavations should be completed as recommended above. Pipe bedding should be installed in accordance with the pipe manufacturers' recommendations. If groundwater seepage or standing water is present in the base of utility trench excavations, we recommend over-excavating the trench by 12 to 18 inches and placing trench stabilization material in the base. Trench stabilization material should consist of well-graded, crushed stone or crushed gravel with a maximum particle size of 4 inches and be free of deleterious materials. The percent passing the U.S. Standard No. 200 Sieve should be less than 5 percent by weight when tested in accordance with ASTM C 117. It may be necessary to include a filter fabric separation layer between the stabilization material and the bottom and sides of excavations.

Trench backfill above the pipe zone should consist of well graded, angular crushed stone or sand fill with no more than 6 percent passing a #200 sieve. Trench backfill should be compacted to 92 percent relative to ASTM D1557 and to 95 percent of maximum dry density as determined by ASTM D1557 within 2 feet of finished grades. Construction of hard surfaces, such as sidewalks or pavement, should not occur within two weeks of backfilling.

Fill Materials

Structural Fill – Well graded sand and gravel with a maximum particle size of 4 inches and less than approximately 10 percent fines (such as CTDOT M.02.01 Granular Fill) are recommended for use as Structural Fill beneath proposed structures, within the zone-of-influence beneath foundations and behind below grade

structures, and within two feet below pavements and sidewalks. Free draining Structural Fill should contain less than 5 percent fines. Structural Fill should be placed in maximum 12-inch-thick lifts (measured prior to compaction) with each lift compacted to at least 95 percent of maximum dry density as determined by ASTM D1557 (modified Proctor) for the specific fill material.

Ordinary Fill – Well graded sand and gravel with a maximum particle size of 6 inches and less than approximately 20 percent fines and free of organics, contamination (including metals, VOCs, SVOCs, etc.), and other deleterious may be suitable for use as fill (i.e., Ordinary Fill) in areas beyond the zone-of-influence beneath foundations and below grade structures, and more than two feet below pavements and sidewalks if properly conditioned. Ordinary Fill should be placed in maximum 12-inch-thick lifts (measured prior to compaction) with each lift compacted to at least 92 percent of maximum dry density as determined by ASTM D1557 (modified Proctor) for the specific fill material.

Crushed Stone - Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the requirements provided in CTDOT M1.02 Coarse Aggregate for No. 3 or No. 4 Coarse Aggregate. Crushed stone should be placed and compacted to a firm and unyielding condition with at least 4 passes of a vibratory compactor.

Reuse of On-Site Soils - Fill and natural soils excavated from the site free of organics, contamination (including metals, VOCs, SVOCs, etc.), and other deleterious materials may be suitable for reuse as Structural or Ordinary Fill provided the grain size distribution meets the requirements provided above. Based on the soils encountered in our explorations, screening of on-site materials to remove cobbles and boulders will be required if re-used. Use of on-site materials as Structural or Ordinary Fill should be evaluated on a case by case basis during construction by the Geotechnical Engineer.

The moisture content of fill materials should be within 3 percent of the optimum moisture content. Moisture conditioning, if required, could consist of drying by scarification and frequent mixing in thin lifts during warm, dry conditions.

Density testing should be completed on each lift of fill during construction to confirm adequate compaction. In addition to density testing, we recommend that the fill lifts pass a proof roll using a fully loaded 10-wheel dump truck or equipment of similar size and weight and observed by the Geotechnical Engineer. In confined areas and where only hand-guided compaction equipment can be used, the lift thickness should be reduced to not more than six inches and the maximum particle size reduced to three inches.

Slopes

Soil slopes should be excavated with a smooth excavator bucket with the surface repaired if disturbed. Surface runoff should be routed so that it does not run down the face of the slopes. Erosion control is critical to maintaining all slopes and should be in place immediately after construction of all slopes. No outfalls or stormwater discharge points should be located on or above slopes. All slopes and excavations should be constructed in accordance with applicable OSHA and local safety standards.

Temporary slopes up to 10 feet high can be inclined up to 1.5H:1V provided no seepage or sloughing is present. Equipment should not be allowed to induce vibration or infiltrate water above the slopes and no surcharges should be located within 20 feet of slope crests. Temporary slopes should be expected to ravel

somewhat, depending on weather conditions, soil conditions, seepage, and duration of exposure. Soft or loose fill soils and the presence of seepage may require flatter slopes, erosion control measures, drainage elements, and/or temporary excavation support.

Permanent cut and fill slopes up to 10 feet high should be formed at 2H:1V or flatter, however shallower (3H:1V) slopes are recommended for ease of maintenance and mowing. Steeper slopes may be feasible if intact rock is encountered at the cut face, and such conditions should be evaluated by the Geotechnical Engineer during construction. The faces of fill slopes should be overbuilt and cut back into compacted materials with a smooth excavator bucket. If steeper fill slopes are desired, we should be consulted to evaluate use of grid reinforcement, rock blankets, or rock fill buttresses.

The presence of slow seepage may require drainage in the form of a blanket of angular crushed stone or a suitably revegetated reinforced erosion control blanket (such as North American Green SC150 or equivalent). Faster seepage, or the presence of soft or loose sandy soils or layers may require improved erosion control measures, subsurface drainage elements, and/or flatter slopes, and we should be consulted.

LIMITATIONS

Observation of Construction

Satisfactory earthwork and foundation performance depends to a large degree on the quality of construction. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to evaluate whether actual subsurface conditions differ from those anticipated. In addition, full-time construction observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications.

The recommendations in this report are preliminary as actual subsurface conditions may differ from those interpreted based on our subsurface explorations. In order for our recommendations to be considered final, we must be retained to observe the actual subsurface conditions encountered during construction. Our observations will allow us to interpret the actual conditions present during construction and adapt our recommendations if needed.

Variations of Subsurface Conditions and Use of Report

We have prepared this report for use by the owner, members of the design and construction team for the subject project and site, only. The data and report can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Explorations indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist outside or between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, reevaluation will be necessary and we should be consulted.

Site development plans and design details were considered preliminary at the time this report was prepared. If changes are made in site grades, configuration, design loads, or type of construction for the structure, the conclusions and recommendations may not be applicable. We should be consulted to review final design

drawings and specifications to see that our recommendations are suitably followed. If design changes are made, we should be retained to review our conclusions and recommendations and provide a written evaluation or modification. Additional geotechnical engineering analyses and explorations may be necessary.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, is given. For additional information on the use of this report, please refer to the document titled "Important Information about This Geotechnical-Engineering Report" included in *Attachment D*.


It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.



Carolyn Conlee, PhD
Project Engineer



Jennifer MacGregor, PE
Team Leader

Attachments:

Figure 1 – Locus Plan

Figure 2 – Site Limits Plan

Figure 3 – Site Plan

Attachment A – Test Pit Memorandum

Attachment B – Boring Logs

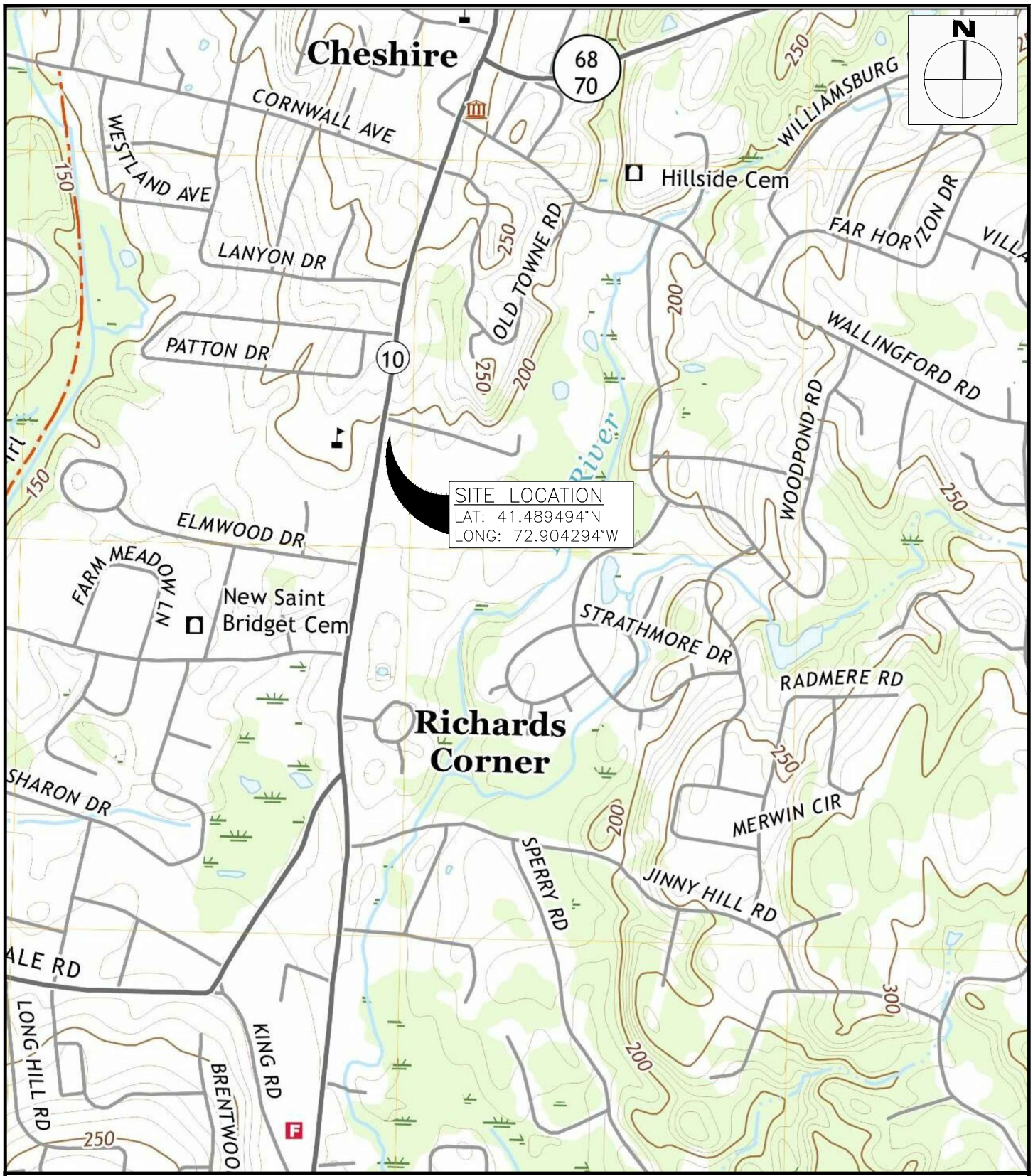
Attachment C – Laboratory Test Results

Attachment D – Important Information about This Geotechnical-Engineering Report

CTC:JACM

File path: \\wse03.local\WSE\Projects\CT\Cheshire CT\Bartlem Park Design Documents\Geotech\5.0 Report\Bartlem Park Geotechnical Letter Report.docx

FIGURES



**FIGURE 1
LOCUS MAP**

**520 SOUTH MAIN STREET
TOWN OF CHESHIRE, CONNECTICUT
NEW HAVEN COUNTY**

USGS QUAD: MOUNT CARMEL, CT

SCALE IN FEET

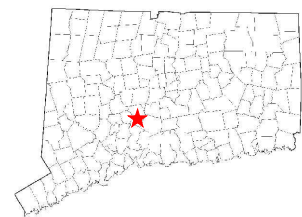
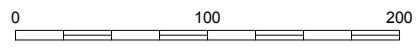
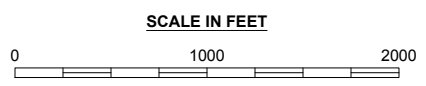






FIGURE 2
SITE LIMITS PLAN
520 SOUTH MAIN STREET
TOWN OF CHESHIRE, CONNECTICUT
NEW HAVEN COUNTY



NOTES

1. THIS PLAN IS BASED ON PROPOSED PERMITTING DRAFT DRAWINGS PREPARED BY WESTON & SAMPSON DATED JULY 13, 2022.
2. BORINGS WERE COMPLETED BY SOIL TESTING, INC. OF OXFORD, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON JUNE 21 AND JUNE 23, 2022.
3. TEST PITS WERE COMPLETED BY CHESHIRE PUBLIC WORKS AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON JULY 11 AND 12, 2022.
4. EXPLORATIONS LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES.

LEGEND

-  B-# DESIGNATION AND APPROXIMATE LOCATION OF JUNE 2022 BORINGS
-  TP-# DESIGNATION AND APPROXIMATE LOCATION OF JULY 2022 TEST PITS

GRAPHIC SCALE



SCALE: 1"=100'

ORIENTATION



TITLE

SITE PLAN

PROJECT

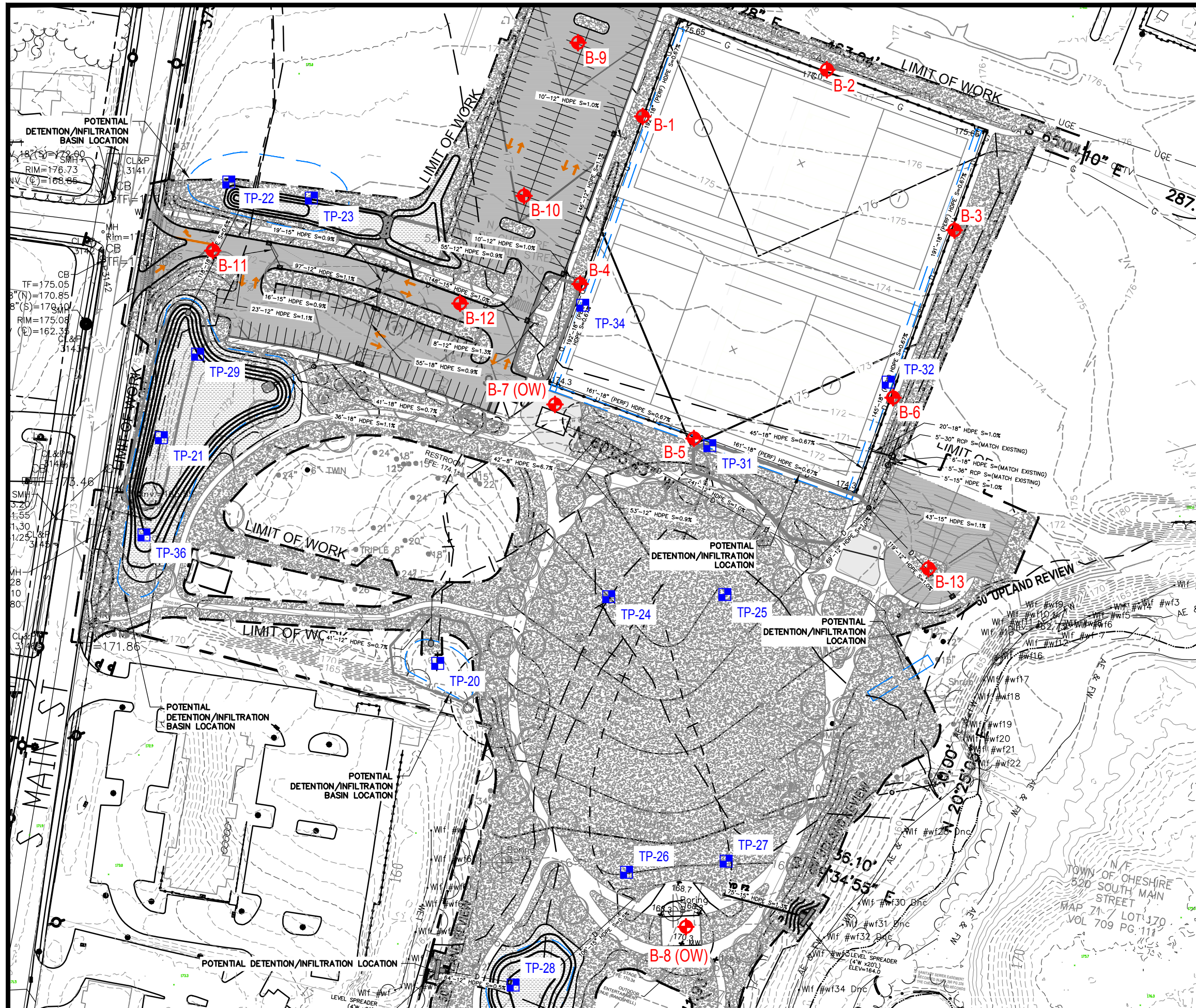
BARTLEM RECREATION AREA

520 SOUTH MAIN STREET
CHESHIRE, CONNECTICUT

FIGURE

FIGURE 3

DATE	7/2022
DRWN BY	NMK
CHKD BY	CC
PRJ. NO.	ENG22-0258
REV. NO.	-



Attachment A

Test Pit Memo

MEMORANDUM

TO: Joe Perugini and Ryan Chmielewski

FROM: Corey Hedges, Geologist III

DATE: 07/28/2022

SUBJECT: Summary of Subsurface Investigations – Bartlem Park, Cheshire CT

WSE PROJECT ID: ENG22-0258

This memorandum summarizes subsurface investigations that occurred between July 11 – 12, 2022, at Bartlem Park in Cheshire, Connecticut (the Site). The investigation was conducted for the Town of Greenwich and included the completion of 14 observation test pits within recreational fields located along the eastern side of S Main Street (Figure 1).

Test Pitting – Between July 11 – 12, 2022, 14 deep observation test pits were excavated by the Cheshire Public Works (CPW) under the supervision of Weston & Sampson. Materials encountered were observed and recorded by a Weston & Sampson geologist. The locations of the test pits were pre-labeled TP-20 through TP-29, TP-31, TP-32, TP-34, and TP-36. The depth of the test pits ranged from 4 to approximately 8 feet below ground surface (ft bgs). Upon completion of the investigation, each test pit was backfilled and regraded to elevations that existed prior to the beginning of the test pitting effort.

Subsurface Conditions – All of the test pits completed at Bartlem Park were excavated on the existing recreational fields. For the purpose of this memorandum, description of the subsurface materials will be described in the following three subsections: southern portion, western edge, and athletic fields.

Southern Portion

Observation test pits located in the southern portion of Bartlem Park include TP-20, TP-24, TP-25, TP-26, TP-27, and TP-28. The root layer across this portion site, consisting of loose sandy silt and grass roots, was generally 1-foot thick, with a thinner layer observed in the east at TP-20 (0.3 feet) and a thicker layer observed in the north at TP-25 (2 feet). The subsequent layer consisted of a loose reddish-brown gravelly silt with coarse sand and rounded and subrounded cobbles and boulders. This layer was observed in all southern test pits from below the root layer to the respective test pit depth. The native soils that were observed during the test pit investigation are listed on Web Soil Survey as Branford silt loam (TP-20, TP-24, TP-25) and Ellington silt loam (TP-26, TP-27, and TP-28). Web Soil Survey describes both the Branford and Ellington silt loams as coarse loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt, with a typical profile of gravelly coarse sand to loamy fine sand. This description confirms what was observed during the test pitting investigation.

Of note, a majority of the southern portion of the Site was historically occupied by residential barn and shed structures. Evidence of the former structures were encountered when excavating at TP-27, consisting of inactive electrical lines and broken-up concrete foundation.

Infiltration testing was conducted at all southern observation test pits using a double ring filtrometer. The testing was conducted at depths ranging from below the root layer to 4 ft bgs. High percolation rates were observed at TP-24, TP-25, and TP-28, most notably at northern test pits TP-24 and TP-25, which yielded excessive draining. Lower percolation rates were observed at TP-20, TP-26, and TP-27. Web Soil Survey describes the Branford and Ellington silt loams as well drained, which is consistent with the infiltration testing. **Table 1** summarizes the results of the infiltration testing in the southern portion of the investigation area.

Table 1 – Infiltration Testing Results in the Southern Portion of the Investigation Area

Test Pit Location	Depth of Infiltration Test (ft bgs)	Infiltration Test Results
TP-20	1 ft bg	0.39" in 15 mins
TP-24	4 ft bg	Draining too quick to record
TP-25	4 ft bg	Draining too quick to record
TP-26	3 ft bg	3.5" in 2 mins
TP-27	1 ft bg	0.5" in 15 mins
TP-28	3 ft bg	3.5" in 1 min

Western Edge

Observation test pits located in the western edge of Bartlem Park include TP-21, TP-22, TP-23, TP-29, and TP-36. Similar to the southern portion of the site, the two apparent soil layers consisted of the root layer and the gravelly sandy silt layer. The root layer across the western edge consisted of loose sandy silt and grass roots. This layer ranged from 0.5 ft bgs thick at TP-22, TP-23, and TP-36 to 0.8 ft bgs and 0.9 ft bgs at TP-29 and TP-21, respectively. The subsequent layer, consisting of the loose reddish-brown gravelly silt with coarse sand and rounded and subrounded cobbles and boulders, was observed in all western test pits from below the root layer to the respective test pit depth. The native soils that were observed during the test pit investigation are listed on Web Soil Survey as Belgrade silt loam. Web Soil Survey describes the Belgrade silt loams as silty glaciolacustrine deposits with a typical profile of silt loam. This description generally confirms what was observed during the test pitting investigation.

Infiltration testing was conducted at all western observation test pits using a double ring filtrometer. The testing was conducted at depths ranging from 1 to 3 ft bgs. High percolation rates were observed at TP-29, and lower percolation rates were observed at TP-21, TP-22, TP-23, and TP-36. Web Soil Survey describes the Belgrade silt loam as moderately well drained, which is consistent with the infiltration testing. **Table 2** summarizes the results of the infiltration testing in the western edge of the investigation area.

Table 2 – Infiltration Testing Results in the Western Edge of the Investigation Area

Test Pit Location	Depth of Infiltration Test (ft bgs)	Infiltration Test Results
TP-21	1 ft bg	2" in 15 mins
TP-22	2 ft bg	3" in 15 mins
TP-23	2 ft bg	2.5" in 15 mins
TP-29	4 ft bg	3" in 3 mins

Athletic Fields

Observation test pits located along the central athletic fields of Bartlem Park include TP-31, TP-32, and TP-34. Similar to the rest of the site, the two apparent soil layers consisted of the root layer and the gravelly sandy layer. The root layer across the athletic fields consisted of loose gravelly sandy silt and grass roots and was generally 1-ft thick. The subsequent layer was observed in all athletic field test pits from below the root layer to the respective test pit depth and consisted of a brown to reddish-brown gravelly sandy silt with coarse sand and rounded and subrounded cobbles and boulders. The native soils that were observed during the test pit investigation are listed on Web Soil Survey as Manchester gravelly sandy loam. Web Soil Survey describes the Manchester gravelly sandy loam as sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt, with a typical profile of stratified extremely gravelly coarse sand to very gravelly loamy sand. This description confirms what was observed during the test pitting investigation.

Infiltration testing was conducted at all athletic field observation test pits using a double ring filterometer. The testing was conducted at depths ranging from 2 to 4 ft bgs. High percolation rates were observed at TP-31 and TP-32 and lower percolation rates were observed at TP-34. Web Soil Survey describes the Manchester gravelly sandy loam as excessively drained, which is fairly consistent with the infiltration testing. Of note, when excavating to the proposed 4-ft bench for infiltration testing at TP-34, the excavator encountered and tore irrigation lines at approximately 2 ft bgs. CPW stopped excavation and the infiltration testing was conducted at this depth. The lower percolation rate at this location is likely attributed to the higher elevation depth of the testing.

Table 3 – Infiltration Testing Results near the Athletic Fields of the Investigation Area

Test Pit Location	Depth of Infiltration Test (ft bgs)	Infiltration Test Results
TP-31	3 ft bg	3.5" in 6 mins
TP-32	4 ft bg	3" in 1 min
TP-34	4 ft bg	1.75" in 15 mins

For further descriptions of the materials see Appendix A – Test Pit Logs and Appendix B – Web Soil Survey Data. Photos of the materials encountered are provided in Appendix C.

Limitations - The information presented herein and attached is for use by the Town of Greenwich and members of the design and construction teams for the subject project only. The information can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Soil test pits indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, reevaluation may be necessary.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, are given.

FIGURE 1
SITE MAP

APPENDIX A
TEST PIT LOGS

TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-20 <hr/> GROUND SURFACE ELEVATION <u>~167.00</u> DEPTH TO GROUNDWATER _____
--	---

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.3: Root layer; brown sandy silt; very fine sand; grass roots	LOAM (A horizon)
2	0.3 - 4.0: brown silt; some very fine sand; some subrounded cobbles; some large subangular gravel	SAND and GRAVEL (C Horizon)
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 1.0 ft bg Infiltration: 10 mm / 15 mins	

NOTES:	TEST PIT NUMBER TP-20 <hr/>
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-21 <hr/> GROUND SURFACE ELEVATION <u>~167.00</u> DEPTH TO GROUNDWATER _____
--	---

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.9: Root layer; brown sandy silt; very fine sand; grass roots	LOAM (A horizon)
2		
3	0.9 - 5.0: brown silt; some fine sand; some subrounded cobbles; some large subangular gravel	SAND and GRAVEL (C Horizon)
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 1.0 ft bg Infiltration: 2" / 15 mins	

NOTES:	TEST PIT NUMBER TP-21 <hr/>
--------	--

TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-22 <hr/> GROUND SURFACE ELEVATION <u>~173.00</u> DEPTH TO GROUNDWATER _____
--	---


DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.5: Root layer; brown sandy silt; very fine sand; grass roots	LOAM (A horizon)
2	0.5 - 2.0: light brown silt; some fine sand; few rounded cobbles	SAND and GRAVEL (C Horizon)
3	2.0 - 6.0: brown to orangy dark brown silt; some fine sand; some subrounded and rounded cobbles; some large subrounded gravel; occasional rounded boulder	
4		
5		
6		
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8		
9		
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11		
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14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 2.0 ft bg Infiltration: 3" / 15 mins	

NOTES:	TEST PIT NUMBER TP-22 <hr/>
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TEST PIT LOG

PROJECT NAME/NO.	Bartlem Park	TEST PIT NUMBER	
LOCATION	Cheshire, CT	TP-23	
CLIENT	Town of Cheshire	GROUND SURFACE	
CONTRACTOR	Cheshire Public Works	FOREMAN:	
OBSERVED BY	Corey Hedges	DATE	7/11/22
CHECKED BY		DATE	
		ELEVATION	~173.00
		DEPTH TO GROUNDWATER	

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.5: Root layer; brown sandy silt; very fine sand; grass roots	LOAM (A horizon)
2	0.5 - 2.0: light brown silt; some fine sand; few rounded cobbles	SAND and GRAVEL (C Horizon)
3		
4	2.0 - 6.0: brown to orangy dark brown silt; some fine sand; some subrounded and rounded cobbles; some large subrounded gravel	
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	<p>Perc Test: Depth of hole: 2.0 ft bg Infiltration: 2.5' / 15 mins</p>	

NOTES:	TEST PIT NUMBER
	TP-23
	

TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-24 <hr/> GROUND SURFACE ELEVATION <u>~176.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION		
Surface	grass	grass		
1	0.0 - 1.0: Root layer; brown sandy silt; very fine sand; some subrounded gravel; grass roots	LOAM (A horizon)		
2				
3	1.0 - 7.0: gravelly brown silt, reddish-brown at 4.0 - 7.0 ft bg; rounded and subrounded cobbles and boulders; fine to coarse subangular gravel; some fine to medium sand	SAND and GRAVEL (C Horizon)		
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
			Perc Test: Depth of hole: 4.0 ft bg Infiltration: draining too quick to record time	

NOTES:	TEST PIT NUMBER TP-24 <hr/>
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/12/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-25 <hr/> GROUND SURFACE ELEVATION <u>~176.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 2.0: Root layer; brown sandy silt; very fine sand; grass roots, denser grass roots from 0.0 - 0.5 and 1.5 - 2.0 ft bgs	LOAM (A horizon)
2		
3	2.0 - 7.0: gravelly brown silt, reddish-brown at 3 - 7 ft bg; rounded cobbles and boulders; some medium to coarse sand	SAND and GRAVEL (C Horizon)
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 4.0 ft bg Infiltration: draining too quick to record time	

NOTES: _____ _____	TEST PIT NUMBER TP-25 <hr/>
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TEST PIT LOG

PROJECT NAME/NO.	Bartlem Park		TEST PIT NUMBER	
LOCATION	Cheshire, CT		TP-26	
CLIENT	Town of Cheshire		GROUND SURFACE	
CONTRACTOR	Cheshire Public Works	FOREMAN:	ELEVATION ~170.00	
OBSERVED BY	Corey Hedges	DATE	DEPTH TO GROUNDWATER	
CHECKED BY		DATE		

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 1.5: Root layer; gravelly brown silt; very fine sand; grass roots	LOAM (A horizon)
2		
3		
4	1.5 - 7.0: gravelly reddish-brown silt; rounded cobbles and boulders; fine to coarse subrounded gravel	SAND and GRAVEL (C Horizon)
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	<p>Perc Test: Depth of hole: 3.0 ft bg Infiltration: 3.5' / 15 mins</p>	

NOTES:	TEST PIT NUMBER TP-26
	

TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/12/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-27 <hr/> GROUND SURFACE ELEVATION <u>~168.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 1.0: Root layer; gravelly brown silt; very fine sand; grass roots	LOAM (A horizon)
2	1.5 - 7.0: gravelly brown silt, reddish-brown from 4 - 7 ftbg; rounded cobbles and boulders; fine to coarse subrounded gravel; some very fine sand	SAND and GRAVEL (C Horizon)
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18	Perc Test: Depth of hole: 1.0 ft bg Infiltration: 0.5' / 15 mins	

NOTES:	TEST PIT NUMBER TP-27
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/12/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-28 <hr/> GROUND SURFACE ELEVATION <u>~168.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.9: Root layer; brown silt; very fine sand; grass roots	LOAM (A horizon)
2	0.9 - 2.5: brown silt; some rounded cobbles and boulders	SAND and GRAVEL (C Horizon)
3		
4		
5	2.5 - 7.0: rounded cobbles and boulders; brown silt; some large subrounded gravel	
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 3.0 ft bg Infiltration: 3.5' / 1 mins	

NOTES:	TEST PIT NUMBER TP-28
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-29 <hr/> GROUND SURFACE ELEVATION <u>~170.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.8: Root layer; brown silt; grass roots	LOAM (A horizon)
2		
3		
4		
5	0.8 - 8.0: rounded cobbles and boulders; brown silt; some fine-grained sand; some large subrounded gravel	SAND and GRAVEL (C Horizon)
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 3.0 ft bg Infiltration: 3" / 3 mins	

NOTES:	TEST PIT NUMBER TP-29 <hr/>
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/12/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-31 <hr/> GROUND SURFACE ELEVATION <u>~172.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.8: Root layer; brown sandy silt; some fine to coarse subrounded gravel; grass roots	LOAM (A horizon)
2	0.8 - 7.0: gravelly brown silt, reddish-brown from 4 to 7 ft bg; rounded and subrounded cobbles and boulders; fine to coarse rounded gravel; some fine to medium sand	SAND and GRAVEL (C Horizon)
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 3.0 ft bg Infiltration: 3" / 3 mins	

NOTES:	TEST PIT NUMBER TP-31 <hr/>
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TEST PIT LOG

PROJECT NAME/NO.	Bartlem Park	TEST PIT NUMBER	
LOCATION	Cheshire, CT	TP-32	
CLIENT	Town of Cheshire	GROUND SURFACE	
CONTRACTOR	Cheshire Public Works	FOREMAN:	
OBSERVED BY	Corey Hedges	ELEVATION	~172.00
CHECKED BY		DEPTH TO GROUNDWATER	
		DATE	7/12/22
		DATE	

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 1.0: Root layer; dark brown silty loam; grass roots	LOAM (A horizon)
2	1.0 - 8.0: gravelly dark brown sandy silt; rounded boulders and cobbles; fine to coarse subrounded gravel; fine to medium sand	SAND and GRAVEL (C Horizon)
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	<p>Perc Test: Depth of hole: 4.0 ft bg Infiltration: 3" / 1 min</p>	

NOTES:	TEST PIT NUMBER
	TP-32
	

TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/12/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-34 <hr/> GROUND SURFACE ELEVATION <u>~172.00</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.8: Root layer; dark brown silty loam; grass roots	LOAM (A horizon)
2		
3		
4	0.8 - 8.0: gravelly dark brown sandy silt; rounded boulders and cobbles; fine to coarse subrounded gravel; fine to medium sand	SAND and GRAVEL (C Horizon)
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 2.0 ft bg Infiltration: 1.5' / 15 min	

NOTES: Infiltration testing was originally proposed for 4 ft bgs; however, due to the excavator encountering irrigation lines, infiltration testing was completed at 2 ft bgs.	TEST PIT NUMBER TP-34 <hr/>
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TEST PIT LOG

PROJECT NAME/NO. <u>Bartlem Park</u> LOCATION <u>Cheshire, CT</u> CLIENT <u>Town of Cheshire</u> CONTRACTOR <u>Cheshire Public Works</u> FOREMAN: _____ OBSERVED BY <u>Corey Hedges</u> DATE <u>7/11/22</u> CHECKED BY _____ DATE _____	TEST PIT NUMBER TP-36 <hr/> GROUND SURFACE ELEVATION <u>~171.50</u> DEPTH TO GROUNDWATER _____
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DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	grass	grass
1	0.0 - 0.8: Root layer; brown sandy silt; very fine; grass roots	LOAM (A horizon)
2	0.5 - 2.0: brown silt; some fine sand; few rounded cobbles	GRAVELLY SILT (C Horizon)
3		
4		
5	2.0 - 8.0: dark brown silt; some fine sand; some rounded cobbles; few subrounded large gravel; trace deeper roots; trace round boulders	
6		
7		
8		
9		
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14		
15		
16		
17		
18		
	Perc Test: Depth of hole: 4.0 ft bg Infiltration: 1" / 15 min	

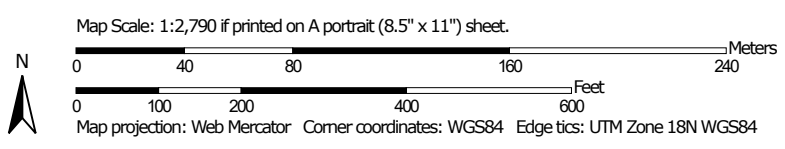
NOTES:	TEST PIT NUMBER TP-36 <hr/>
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APPENDIX B
WEB SOIL SURVEY DATA

Soil Map—State of Connecticut




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut

Survey Area Data: Version 21, Sep 7, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 27, 2014—Oct 14, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Raynham silt loam	1.6	6.8%
20A	Ellington silt loam, 0 to 5 percent slopes	3.7	15.2%
27A	Belgrade silt loam, 0 to 5 percent slopes	4.8	20.0%
30B	Branford silt loam, 3 to 8 percent slopes	7.8	32.4%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	5.3	21.9%
108	Saco silt loam	0.0	0.1%
306	Udorthents-Urban land complex	0.9	3.5%
Totals for Area of Interest		24.1	100.0%

State of Connecticut

27A—Belgrade silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 9llr

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 52 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Belgrade and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belgrade

Setting

Landform: Terraces

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Silty glaciolacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam

Bw1 - 8 to 16 inches: silt loam

Bw2 - 16 to 27 inches: silt loam

C1 - 27 to 45 inches: silt loam

C2 - 45 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 18 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Brancroft

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Elmridge

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Shaker

Percent of map unit: 3 percent
Landform: Terraces, drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Unnamed, red parent material

Percent of map unit: 2 percent
Hydric soil rating: No

Scitico

Percent of map unit: 2 percent
Landform: Terraces, drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Berlin

Percent of map unit: 1 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Maybid

Percent of map unit: 1 percent
Landform: Terraces, drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Raynham

Percent of map unit: 1 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

State of Connecticut

30B—Branford silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lm1

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 54 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Branford and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Branford

Setting

Landform: Terraces, outwash plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt

Typical profile

Ap - 0 to 8 inches: silt loam

Bw1 - 8 to 18 inches: loam

Bw2 - 18 to 24 inches: gravelly loam

2C - 24 to 65 inches: stratified very gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Ecological site: F145XY009CT - Well Drained Outwash

Hydric soil rating: No

Minor Components

Enfield

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Ellington

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Haven

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Manchester

Percent of map unit: 3 percent
Landform: Terraces, outwash plains, kames, eskers
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Hartford

Percent of map unit: 2 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

State of Connecticut

20A—Ellington silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 9lk5

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 54 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Ellington and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellington

Setting

Landform: Terraces, outwash plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt

Typical profile

Ap - 0 to 8 inches: silt loam

Bw1 - 8 to 18 inches: silt loam

Bw2 - 18 to 26 inches: very fine sandy loam

2C - 26 to 65 inches: stratified loamy fine sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.57 to 5.95 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B

Ecological site: F145XY010CT - Moist Outwash
Hydric soil rating: No

Minor Components

Unnamed, fine sandy loam surface

Percent of map unit: 5 percent
Hydric soil rating: No

Raypol

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Raynham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Branford

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

State of Connecticut

37C—Manchester gravelly sandy loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9In6

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 54 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Manchester and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manchester

Setting

Landform: Terraces, outwash plains, kames, eskers

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt

Typical profile

Ap - 0 to 9 inches: gravelly sandy loam

Bw - 9 to 18 inches: gravelly loamy sand

C - 18 to 65 inches: stratified extremely gravelly coarse sand to very gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Hartford

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Penwood

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Ellington

Percent of map unit: 3 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Branford

Percent of map unit: 3 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Unnamed, nongravelly surface

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, gravelly loamy sand surface

Percent of map unit: 2 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

APPENDIX C
PHOTOGRAPHS

Photo 1: Material encountered at TP-28, located at the southern-most edge of the southern portion of the investigation area



Photo 2: TP-21, located along the western edge of the investigation area



Photo 3: TP-32, located along the eastern side of the athletic fields



Photo 4: TP-27, located in the southern portion of the investigation area. Note inactive electrical lines and broken up concrete from the former barn.



Attachment B

Boring Logs

CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL: 175.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 4.0 ft. (Refusal)
EQUIPMENT: Truck Mounted Drill Rig	CORING METHOD: N/A	GRID COORDS: N:738384.7068 / E:957989.5329
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▶ Plastic Limit, PL (%)				
		S-1 21/24	6 14 63 52								
		S-2 3/3	50/3								
5											
10											
15											
20											

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

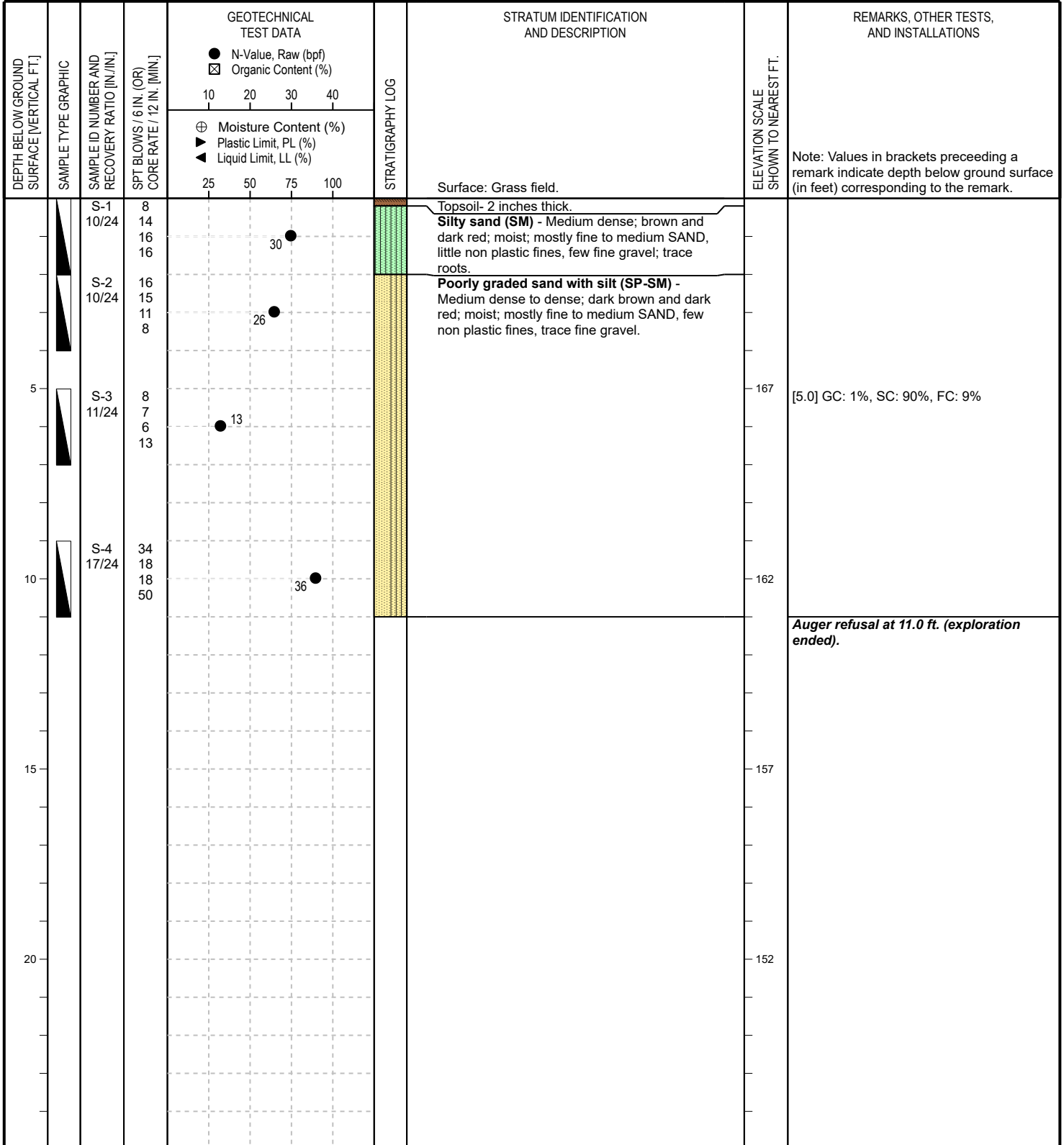
CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL: 177.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 6.0 ft. (Refusal)
EQUIPMENT: Truck Mounted Drill Rig	CORING METHOD: N/A	GRID COORDS: N:738431.7379 / E:958175.2725
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▶ Plastic Limit, PL (%)				
4		S-1	4								
11		16/24	11								
12			12				23				
15			15								
12		S-2	12								
50/5		6/11	50/5								
25		S-3	25								
27		14/15	27								
50/3			50/3								
172											[4.0] GC: 19%, SC: 61%, FC: 20%
167											
162											
157											
											Auger refusal at 6.0 ft. (exploration ended).

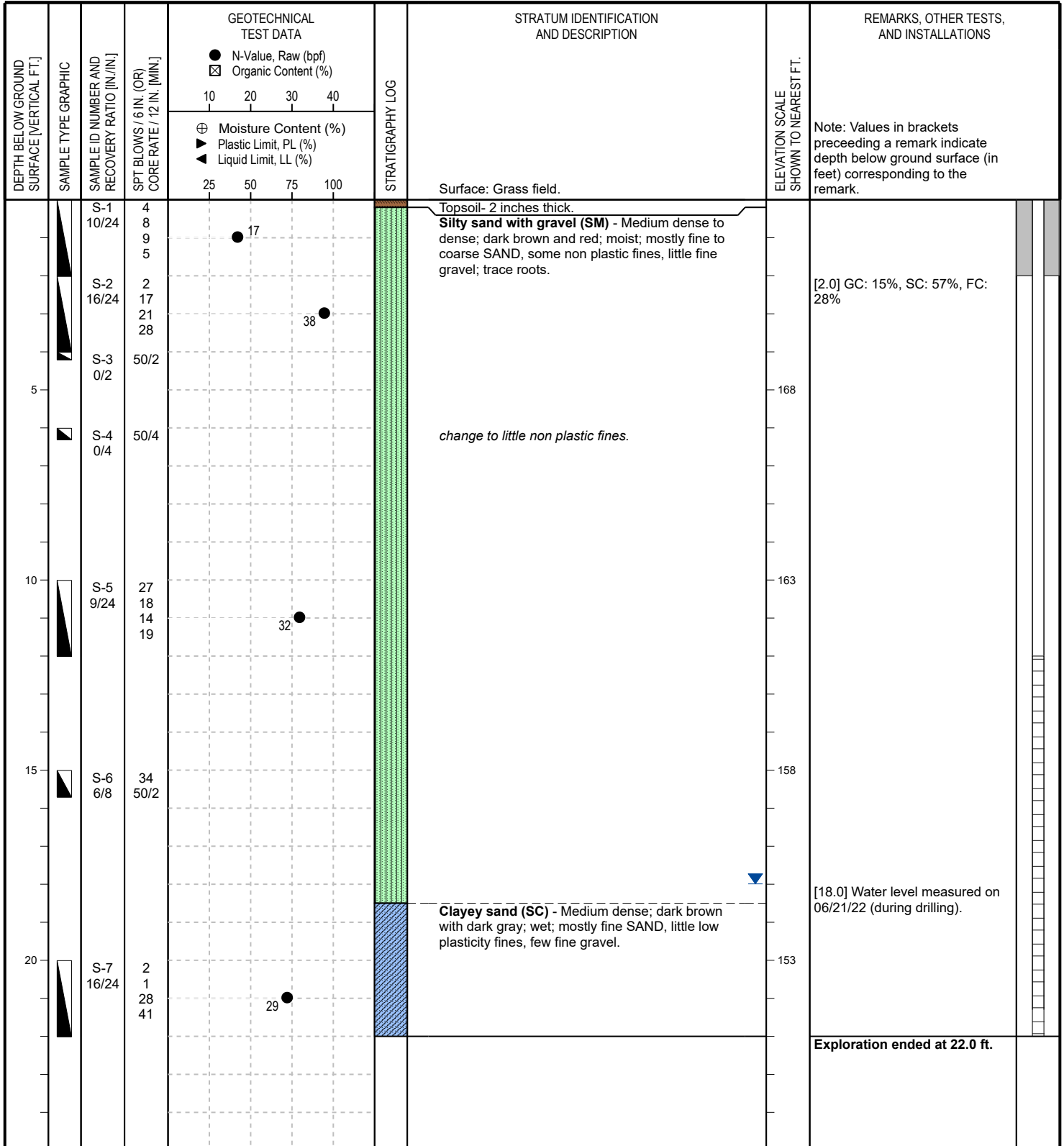
CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL: 175.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 6.0 ft. (Refusal)
EQUIPMENT: Truck Mounted Drill Rig	CORING METHOD: N/A	GRID COORDS: N:738270.2548 / E:958303.6472
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▴ Plastic Limit, PL (%)				
				10	20	30	40				
				25	50	75	100				
											Note: Values in brackets preceding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 16/16	22 34 50/4						Surface: Grass field. Topsoil- 2 inches thick. Sandy silt with gravel (ML) - Dark brown; moist; mostly non plastic FINES, some fine to medium sand, little fine gravel; trace roots.		
		S-2 12/24	5 37 45 31				>> 82		Poorly graded sand with silt and gravel (SP-SM) - Very dense; dark brown and dark red; moist; mostly fine to coarse SAND, little fine gravel, few non plastic fines.		
5		S-3 14/24	39 29 26 42				>> 55			170	
10										165	
15										160	
20										155	
											Auger refusal at 6.0 ft. (exploration ended).

CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL: 172.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 11.0 ft. (Refusal)
EQUIPMENT: Truck Mounted Drill Rig	CORING METHOD: N/A	GRID COORDS: N:738215.9222 / E:957926.5715
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)



CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 21, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 21, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 3-1/4" ID (Stem), 6-5/8" OD (Flights)	GROUND EL: 173.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 22.0 ft.
EQUIPMENT: Deidrich D-50, ATV Mounted	CORING METHOD: N/A	GRID COORDS: N:738094.6089 / E:957901.2017
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Observation Well Installed	GRID SYSTEM: NAD83 State Plane (CT)



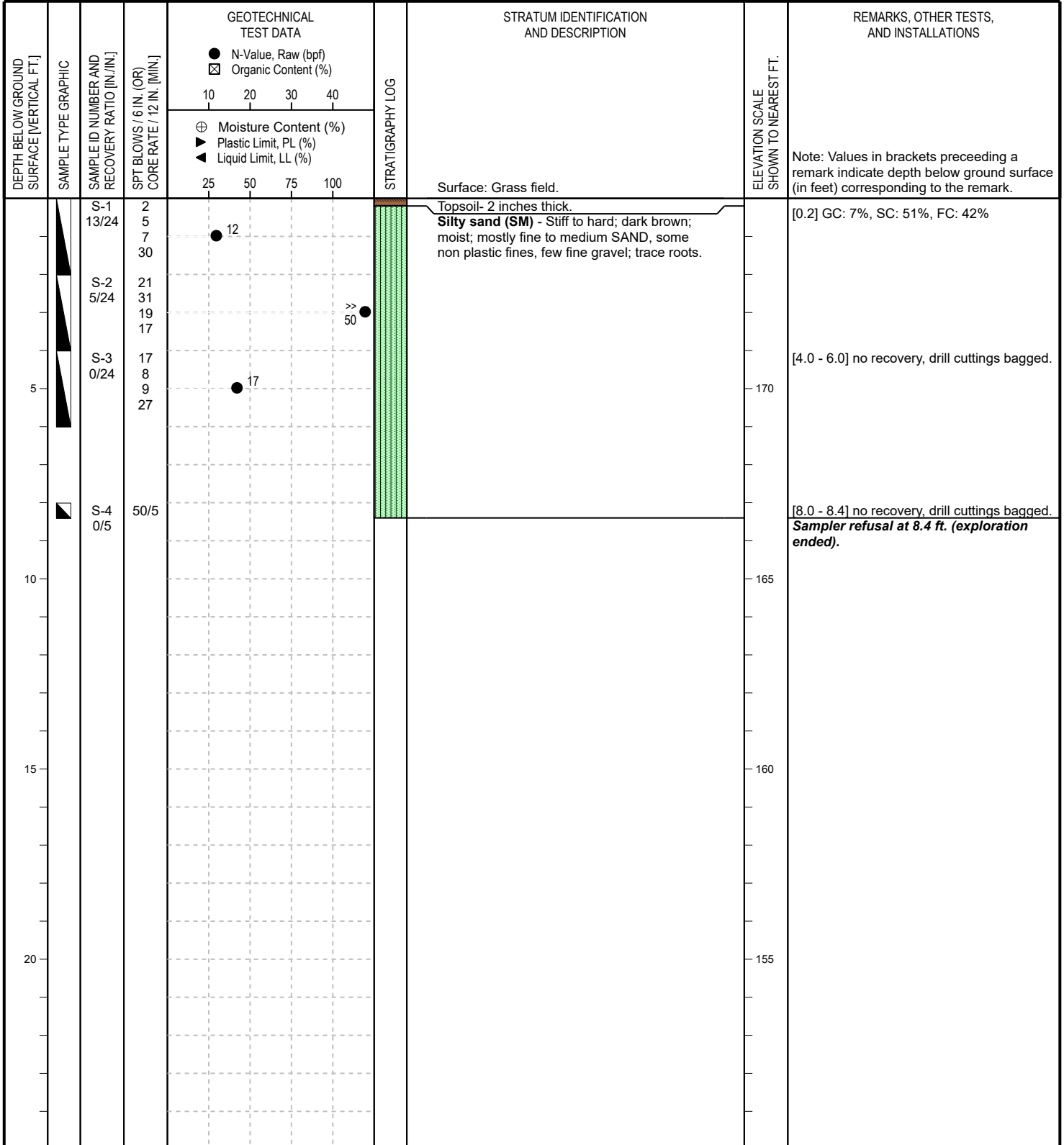
CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 2-1/4" ID (Stem), 5-5/8" OD (Flights)	GROUND EL: 175.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 10.0 ft.
EQUIPMENT: CME 45C Trailer	CORING METHOD: N/A	GRID COORDS: N:738459.0443 / E:957924.4615
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▴ Plastic Limit, PL (%)				
				10	20	30	40		Surface: Gravel parking area.		
				25	50	75	100		Gravel - 2 inches thick.		
		S-1 13/24	16 24 30 21					>> ● 54	Silty sand with gravel (SM) - Very dense to dense; brown and dark red; moist; some fine to coarse SAND, some fine to coarse gravel, little non plastic fines.		
		S-2 11/24	28 25 28 30					>> ● 53			[2.0] GC: 43%, SC: 43%, FC: 14%
5		S-3 12/24	21 30 34 32					>> ● 64		170	
		S-4 14/24	28 29 28 26					>> ● 57			
10		S-5 8/24	19 21 24 28					● 45		165	Exploration ended at 10.0 ft.
15										160	
20										155	

CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 2-1/4" ID (Stem), 5-5/8" OD (Flights)	GROUND EL: 173.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 10.0 ft.
EQUIPMENT: CME 45C Trailer	CORING METHOD: N/A	GRID COORDS: N:738304.7306 / E:957870.0717
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)

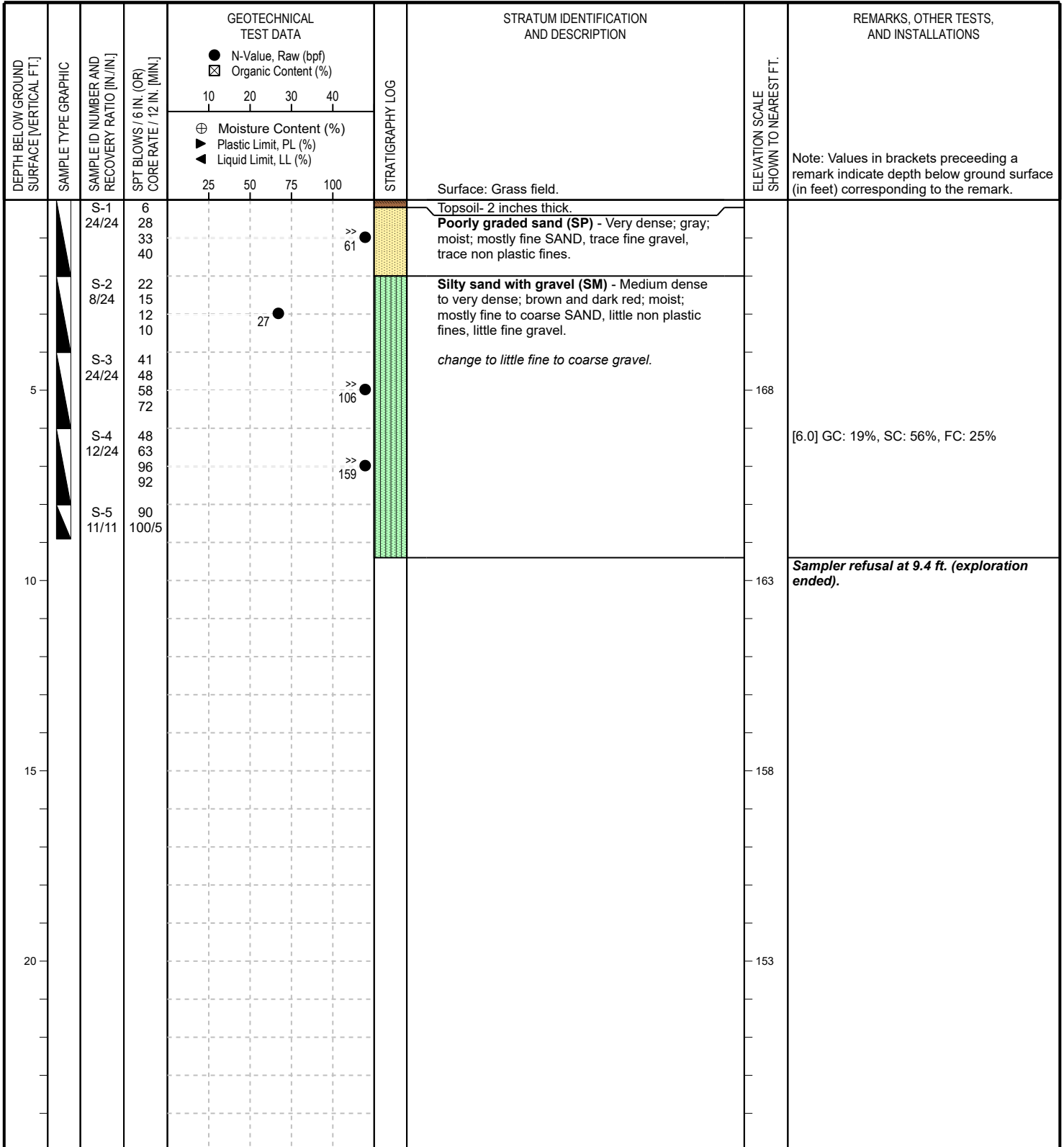
DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▶ Plastic Limit, PL (%)				
				10	20	30	40		Surface: Grass field.		Note: Values in brackets preceding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 16/24	7 15 22 25				37	Topsoil- 2 inches thick.			
		S-2 16/24	54 41 34 39				>> 75	Silty sand with gravel (SM) - Dense; brown and dark red; moist; mostly fine to medium SAND, little non plastic fines, little fine to coarse gravel.			
5		S-3 14/24	13 33 26 30				>> 59	Poorly graded sand with silt and gravel (SP-SM) - Very dense; brown and dark red; moist; mostly fine to coarse SAND, little fine to coarse gravel, few non plastic fines.	168		
		S-4 5/24	22 22 24 24				46	Silty sand with gravel (SM) - Dense to medium dense; dark brown and dark red; moist; mostly fine to coarse SAND, little fine gravel, little non plastic fines.			
10		S-5 11/24	17 14 13 19				27		163	Exploration ended at 10.0 ft.	
15									158		
20									153		

CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 21, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 21, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 3-1/4" ID (Stem), 6-5/8" OD (Flights)	GROUND EL: 175.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 8.4 ft. (Refusal)
EQUIPMENT: Deidrich D-50, ATV Mounted	CORING METHOD: N/A	GRID COORDS: N:738249.6408 / E:957556.3281
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)



Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

CONTRACTOR: Soil Testing	BORING LOCATION: See attached figure	DATE START: June 23, 2022
FOREMAN: Sam DeAngelis	ADVANCE METHOD: Hollow-Stem Auger Drilling	DATE FINISH: June 23, 2022
LOGGED BY: J. Westgate, EIT	AUGER DIAMETER: 2-1/4" ID (Stem), 5-5/8" OD (Flights)	GROUND EL: 173.0 ± (NAVD88)
CHECKED BY: C. Conlee, PE	SUPPORT CASING: N/A	FINAL DEPTH: 9.4 ft. (Refusal)
EQUIPMENT: CME 45C Trailer	CORING METHOD: N/A	GRID COORDS: N:737929.2875 / E:958277.4863
SPT HAMMER: Automatic (140-lb.)	BACKFILL MATERIAL: Drill Cuttings	GRID SYSTEM: NAD83 State Plane (CT)



Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 1 GENERAL INFORMATION

GENERAL NOTES AND USE OF LOGS

- 1.) Explorations were made by ordinary and conventional methods and with care adequate for Weston & Sampson's study and/or design purposes. The exploration logs are part of a specific report prepared by Weston & Sampson for the referenced project and client, and are an integral part of that report. Information and interpretations are subject to the explanations and limitations stated in the report. Weston & Sampson is not responsible for any interpretations, assumptions, projections, or interpolations made by others.
- 2.) Exploration logs represent general conditions observed at the point of exploration on the date(s) stated. Boundary lines separating soil and rock layers (strata) represent approximate boundaries only and are shown as solid lines where observed and dashed lines where inferred based on drilling action. Actual transitions may be gradual and changes may occur over time.
- 3.) Soil and rock descriptions are based on visual-manual examination of recovered samples, direct observation in test pits (when permissible), and laboratory testing (when conducted).
- 4.) Water level observations were made at the times and under the conditions stated. Fluctuations should be expected to vary with seasons and other factors. Use of fluids during drilling may affect water level observations. The absence of water level observations does not necessarily mean the exploration was dry or that subsurface water will not be encountered during construction.
- 5.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. Reported gravel conditions or poor sample recovery may not reflect actual in-situ conditions.
- 6.) Sections of this guide provide a general overview of Weston & Sampson's practices and procedures for *identifying* and *describing* soil and rock. These procedures are predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, the International Society of Rock Mechanics (ISRM) standards, and the *Engineering Geology Field Manual* published by the Bureau of Reclamation. Not all aspects of this guide relating to description and identification procedures of soil and rock may be applicable in all circumstances.

SAMPLER GRAPHICS

- Split Spoon (Standard)
2" OD, 1-3/8" ID
- Split Spoon (Oversize)
3" OD, 2-3/8" ID
- Shelby or Piston Tube
3" OD, 2-7/8" ID
- Double-Tube Rock Core Barrel
2" Core Diameter
- Direct Push with Acetate Liner
Various Liner Sizes
- Auger Sample
(from cuttings or hand auger)
- Grab Sample
(manual, from discrete point)
- Composite Sample
(multiple grab samples)

WELL GRAPHICS

- Cement concrete seal around casing or riser pipe
- Bentonite seal around casing or riser pipe
- Cement grout seal around casing or riser pipe
- Soil backfill around riser pipe or beneath screen
- Gravel backfill around screen or riser pipe
- Sand backfill around screen or riser pipe (filter sand)
- Solid-wall riser; Sch. 40 PVC, 1" ID unless noted otherwise
- Slotted screen; Sch. 40 PVC, 1" ID with machined slots

CAVING / SEEPAGE TERMS

The following caving and/or seepage terms may appear on a test pit log.

Caving Term	Criteria
Minor.....	less than 1 cubic ft.
Moderate.....	1 to 3 cubic ft.
Severe.....	greater than 3 cubic ft.
Seepage Term	Criteria
Slow.....	less than 1 gpm
Moderate.....	1 to 3 gpm
Fast.....	greater than 3 gpm

KEY TO WATER LEVELS

- Observed in exploration during advancement.
- Measured in exploration at completion, prior to backfilling or well installation.
- Measured in exploration after the stated stabilization period, prior to backfilling, or in well installation if noted.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length of material recovered in a drive or push type sampler over the length of sampler penetration, in inches (e.g. 18/24).

Standard Penetration Test (SPT) - An in-situ test where a standard split-spoon sampler is driven a distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (N) - The uncorrected blow count representation of a soil's penetration resistance over a 12-inch interval after an initial 6-in. seating interval, reported in blows per foot (bpf). The N-value is correlated to soil engineering properties.

Auger Refusal - No discernable advancement of the auger over a period of 5 minutes with full rig down pressure applied.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are reported as benzene equivalent units in parts per million (ppm) unless noted otherwise.

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures in the rock mass.

Fill (Made Ground) - A deposit of soil and/or artificial waste materials that has been placed or altered by human processes.

LABORATORY TESTS AND FIELD MEASUREMENTS

MC.....	Moisture Content	IC.....	1D Incremental Consolidation
OC.....	Organic Content	VS.....	Laboratory Vane Shear
PL.....	Plastic Limit	US.....	Unconfined Compression
LL.....	Liquid Limit	TC.....	Triaxial Compression
GC.....	Gravel Content	PP.....	Pocket (Hand) Penetrometer
SC.....	Sand Content	TV.....	Torvane (Hand Vane)
FC.....	Fines Content	PID.....	Photoionization Detector
DS.....	Direct Shear	FID.....	Flame Ionization Detector

BORING ADVANCEMENT METHODS

Hollow-Stem Auger Drilling - Utilizes continuous flight auger sections with hollow stems to advance the borehole. Drill rods and a plug are inserted into the auger stem to prevent the entrance of soil cuttings into the augers.

Rotary Wash Drilling - Utilizes downward pressure and rotary action applied to a non-coring bit while washing the cuttings to the surface using a circulating fluid injected down the drill rods. The borehole is supported with either steel casing or the drilling fluid. Where a casing is used, the borehole is advanced sequentially by driving the casing to the desired depth and then cleaning out the casing. The process of driving and cleaning the casing is commonly referred to as the 'drive-and-wash' technique.

Continuous Sampling - Includes a variety of methods and procedures during which the borehole is advanced via continuous recovery of soil samples. *Direct Push* sampling is a common method that uses static downward pressure combined with percussive energy to drive a steel mandrel into the ground at continuous intervals while recovering soil samples in disposable acetate liners.

Rock Coring - Utilizes downward pressure and rotary action applied to a core barrel equipped with a diamond-set or tungsten carbide coring bit. During conventional coring, the entire barrel is retrieved from the hole upon completion of a core run. Wireline coring allows for removal of the inner barrel assembly containing the actual core while the drill rods and outer barrel remain in the hole. Various types and sizes of core barrels and bits are used.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 2 SOIL DESCRIPTION

SOIL CONSTITUENTS

Naturally occurring soils consist of one or more of the following matrix constituents defined in terms of particle size.

Constituent	U.S. Sieve Size	Observed Size (in.)
Gravel (Coarse)	3/4 in. - 3 in.	3/4 - 3
Gravel (Fine)	No. 4 - 3/4 in.	1/5 - 3/4
Sand (Coarse)	No. 10 - No. 40	1/16 - 1/5
Sand (Medium)	No. 40 - No. 10	1/64 - 1/16
Sand (Fine)	No. 200 - No. 40	1/300 - 1/64
Fines (Silt or Clay)	Smaller than No. 200	Less than 1/300

SOIL IDENTIFICATION

Soil identification refers to the grouping of soils with similar physical characteristics into a category defined by a **group name** and corresponding **group symbol** based on estimation of the matrix soil constituents to the nearest 5% and simple manual tests. Proportions of cobbles, boulders, and other non-matrix soil materials are not considered during this procedure but are included in the overall soil description if observed or thought to be present. Refer to the following descriptions and tables adapted from ASTM D2488.

Coarse-Grained Soil - Coarse-grained soils contain fewer than 50% fines and are identified based on the following table.

Primary Constituent	Fines Percent	Type of Fines and Gradation	Group Symbol	Group Name ⁽¹⁾
GRAVEL	≤ 5%	well graded	GW	Well graded gravel
		poorly graded	GP	Poorly graded gravel
	10%	clayey well graded	GW-GC	Well graded gravel with clay fines
		poorly graded	GP-GC	Poorly graded gravel with clay fines
SAND	≤ 5%	silty well graded	GW-GM	Well graded gravel with silt fines
		poorly graded	GP-GM	Poorly graded gravel with silt fines
	15% to 45%	clay fines	GC	Clayey gravel
		silt fines	GM	Silty gravel
% sand ≥ % gravel	≤ 5%	well graded	SW	Well graded sand
		poorly graded	SP	Poorly graded sand
	10%	clayey well graded	SW-SC	Well graded sand with clay fines
		poorly graded	SP-SC	Poorly graded sand with clay fines
	15% to 45%	silty well graded	SW-SM	Well graded sand with silt fines
		poorly graded	SP-SM	Poorly graded sand with silt fines
	15% to 45%	clay fines	SC	Clayey sand
		silt fines	SM	Silty sand

⁽¹⁾ If soil is a gravel and contains 15% or more sand, add "with sand" to the group name. If soil is a sand and contains 15% of more gravel, add "with gravel" to the group name.

Inorganic Fine-Grained Soil - Fine-grained soils contain 50% or more fines and are identified based on the following table.

Plasticity Criteria	Dry Strength	Coarse Fraction S = Sand, G = Gravel	Group Symbol	Group Name ⁽¹⁾
Medium	Medium to high	< 15% S + G	CL	Lean clay
		≥ 30% % S ≥ % G	CL	Sandy lean clay
		S + G % S < % G	CL	Gravelly lean clay
Non-plastic	None to low	< 15% S + G	ML	Silt
		≥ 30% % S ≥ % G	ML	Sandy silt
		S + G % S < % G	ML	Gravelly silt
High	High to very high	< 15% S + G	CH	Fat clay
		≥ 30% % S ≥ % G	CH	Sandy fat clay
		S + G % S < % G	CH	Gravelly fat clay
Low to Medium	Low to medium	< 15% S + G	MH	Elastic silt
		≥ 30% % S ≥ % G	MH	Sandy elastic silt
		S + G % S < % G	MH	Gravelly elastic silt

⁽¹⁾ If soil contains 15% to 25% sand or gravel, add "with sand" or "with gravel" to the group name.

Organic Fine-Grained Soil - Fine-grained soils that contain enough organic particles to influence the soil properties are identified as Organic Soil and assigned the group symbol **OL** or **OH**.

Highly Organic Soil (Peat) - Soils composed primarily of plant remains in various stages of decomposition are identified as Peat and given the group symbol **PT**. Peat usually has an organic odor, a dark brown to black color, and a texture ranging from fibrous (original plant structure intact or mostly intact) to amorphous (plant structure decomposed to fine particles).

SOIL DESCRIPTION

Soils are described in the following general sequence. Deviations may occur in some instances.

Identification Components

(1) Group Name and Group Symbol

Description Components

- (2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
- (3) Color (*note, the term "to" may be used to indicate a gradational change*)
- (4) Soil Moisture
- (5) Matrix Soil Constituents (Gravel, Sand, Fines)
 - ↳ Proportion (*by weight*), particle size, plasticity of fines, angularity, etc.
- (6) Non-Matrix Soil Materials and Proportions (*by volume*)
- (7) Other Descriptive Information (Unusual Odor, Structure, Texture, etc.)
- (8) [Geologic Formation Name or Soil Survey Unit]

SPT N-VALUE CORRELATIONS

Consistency	SPT N-Value	Apparent Density	SPT N-Value
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE

Dry..... Apparent absence of moisture; dry to the touch.
Moist..... Damp but no visible water.
Wet..... Visible free water; saturated.

PROPORTIONS / PERCENTAGES

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages **by weight** (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.
 Proportions of cobbles, boulders, and other non-matrix soil materials including artificial debris, roots, plant fibers, etc. are stated in the following terms indicating a range of percentages **by volume** (to the nearest 5%) of the total soil.

Mostly	50% - 100%	Numerous	40% - 50%
Some	30% - 45%	Common	25% - 35%
Little	15% - 25%	Occasional	10% - 20%
Few	5% - 10%	Trace	Less than 5%
Trace	Less than 5%		

PLASTICITY (FINES ONLY)

Non-plastic..... Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.
Low..... Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.
Medium..... Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.
High..... Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COBBLES AND BOULDERS

Cobbles - Particles of rock that will pass a 12-in. square opening and be retained on a 3-in. sieve.
Boulders - Particles of rock that will not pass a 12-in. square opening.

Note: Where the percentage (by volume) of cobbles and/or boulders cannot be accurately or reliably estimated, the terms "with cobbles", "with boulders", or "with cobbles and boulders" may be used to indicate observed or inferred presence.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 3 ROCK DESCRIPTION

ROCK DEFINITION

Where reported on an exploration log, *rock* is defined as any naturally formed aggregate of mineral matter occurring in large masses or fragments. This definition of rock should not be taken as a replacement for any definitions relating to rock and/or rock excavation defined in construction documents. Intensely weathered or decomposed rock that is friable and can be reduced to gravel size particles or smaller by normal hand pressure is identified and described as soil. Poorly indurated formational materials which display both rock-like and soil-like properties are identified and described as rock followed by the soil description. In such cases, the term "poorly indurated" or "weakly cemented" is added to the rock name (e.g. weakly cemented sandstone).

ROCK IDENTIFICATION

Rock is identified by a combination of *rock type* (igneous, metamorphic, or sedimentary) followed by the *rock name* (e.g. granite, schist, sandstone).

ROCK DESCRIPTION

Rock descriptions are presented in the following general sequence. The detail of description is dictated by the complexity and objectives of the project.

Identification Components

(1) Rock Type and Name

Description Components

- (2) Rock Grain Size (*for clastic sedimentary rock*)
- (3) Crystal Size (*for igneous and metamorphic rock*)
- (4) Bedding Spacing (*for sedimentary rock*)
- (5) Color
- (6) Hardness and Weathering Descriptors
- (7) Fracture Density
- (8) [Geologic Formation Name]

ROCK QUALITY DESIGNATION

$$RQD (\%) = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ inches}}{\text{Total length of core run (inches)}} \times 100$$

The RQD should correlate with the fracture density in most cases. Higher RQD values generally indicate fewer joints and fractures.

GRAIN / CRYSTAL SIZE

Grain Size for Clastic Sedimentary Rock

The names of clastic sedimentary rocks are generally based on their predominant clast or grain size (e.g. fine sandstone, medium sandstone, coarse gravel conglomerate, cobble conglomerate, siltstone, claystone).

Crystal Size for Igneous and Metamorphic Rock

Grain Size Description	Average Crystal Size (in.)
Very coarse grained (pegmatitic)	Greater than or equal to 3/8
Coarse-grained	Between 3/16 and 3/8
Medium-grained	Between 1/32 and 3/16
Fine-grained	Between 1/250 and 1/32
Aphanitic	Less than or equal to 1/250

BEDDING SPACING

Bedding Description	Thickness / Spacing
Massive	Less than 10 ft.
Very thickly bedded	3 ft. to 10 ft.
Thickly bedded	1 ft. to 3 ft.
Moderately bedded	4 in. to 1 ft.
Thinly bedded	1 in. to 4 in.
Very thinly bedded	1/4 in. to 1 in.
Laminated	Less than 1/4 in.

Note: Bedding is generally only applicable to sedimentary or bedded volcanic rocks.

HARDNESS

Hardness	Criteria
Extremely hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very hard	Cannot be scratched with a pocketknife or sharp pick with difficulty. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty. Breaks with heavy hammer blows.
Moderately hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick. Breaks with light to moderate manual pressure.
Very soft	Can be readily indented, grooved, or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

WEATHERING (INTACT ROCK)

Weathering Description	Discoloration and/or Oxidation	General Characteristics
Fresh	Body of rock and fracture surfaces are not discolored or oxidized.	Rock texture unchanged. Hammer rings when crystalline rocks are struck.
Slightly weathered	Discoloration or oxidation limited to surface of, or short distance from, fractures. Most surfaces exhibit minor to complete discoloration.	Rock texture preserved. Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately weathered	Discoloration or oxidation extends usually throughout. Fe-Mg minerals appear rusty. All fracture surfaces are discolored or oxidized.	Rock texture generally preserved. Hammer does not ring when rock is struck. Body of rock slightly weakened.
Intensely weathered	Discoloration or oxidation throughout. Feldspar and Fe-Mg minerals altered to clay to some extent. All fracture surfaces are discolored or oxidized and friable.	Rock texture altered by chemical disintegration. Can usually be broken with moderate to heavy manual pressure or by light hammer blow. Body of rock is significantly weakened.
Decomposed	Discoloration or oxidation throughout but resistant minerals such as quartz may be unaltered. All feldspar and Fe-Mg minerals are completely altered to clay.	Resembles a soil; partial or complete remnant rock structure may be preserved. Can be granulated by hand. Resistant minerals may present as stringers or dikes.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very slightly fractured	Core lengths greater than 3 ft.
Slightly fractured	Core lengths mostly from 1 ft. to 3 ft.
Moderately fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely fractured	Core lengths mostly from 1 in. to 4 in.
Very intensely fractured	Mostly chips and fragments

Note: Fracture density is based on the fracture spacing in recovered core, measured along the core axis (excluding mechanical breaks).

Attachment C

Laboratory Test Results



195 Frances Avenue
 Cranston RI, 02910
 Phone: (401)-467-6454
 Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
 Weston & Sampson
 Reading, MA
 PM: Carolyn Conlee
 Assigned By: Carolyn Conlee
 Collected By: Client

Project Information:
Bartlem Park
Cheshire, CT
 W&S Project Number: ENG22-0258
 Summary Page: 1 of 1
 Report Date: 07.26.22

LABORATORY TESTING DATA SHEET, Report No.: 7422-G-185

Boring No.	Sample ID	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G _s	Dry unit wt. (pcf)	Test Moisture Content %	γ _d MAX (pcf) W _{opt} (%)	γ _d MAX (pcf) W _{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913				D2974	D854			D1557					
B-2	S-3	4-6	22-S-2798				19.1	60.6	20.3										Red f-c SAND, some Silt, little fine Gravel	
B-4	S-3	4-6	22-S-2799				1.1	89.6	9.3										Red f-m SAND, trace Silt, trace fine Gravel	
B-5	S-4	10-12	22-S-2800				30.9	54.2	14.9										Red f-c SAND, some f-c Gravel, little Silt	
B-6	S-3	4-6	22-S-2801				24.3	57.6	18.1										Red f-c SAND, some fine Gravel, little Silt	
B-7	S-2	2-4	22-S-2802				15.2	56.7	28.1										Red f-c SAND, some Silt, little fine Gravel	
B-8	S-5	10-12	22-S-2803				30.2	54.5	15.3										Red f-c SAND, some fine Gravel, little Silt	
B-9	S-2	2-4	22-S-2804				42.9	43.4	13.7										Red f-c SAND and f-c GRAVEL, little Silt	
B-11	S-1	0-2	22-S-2805				6.7	51.2	42.1										Red f-m SAND and SILT, trace fine Gravel	
B-12	S-2	2-4	22-S-2806				38.1	49.0	12.9										Red f-c SAND and fine GRAVEL, little Silt	
B-13	S-4	6-8	22-S-2807				18.6	56.2	25.2										Red f-c SAND, some Silt, little fine Gravel	

Date Received: 07.21.22

Reviewed By: 

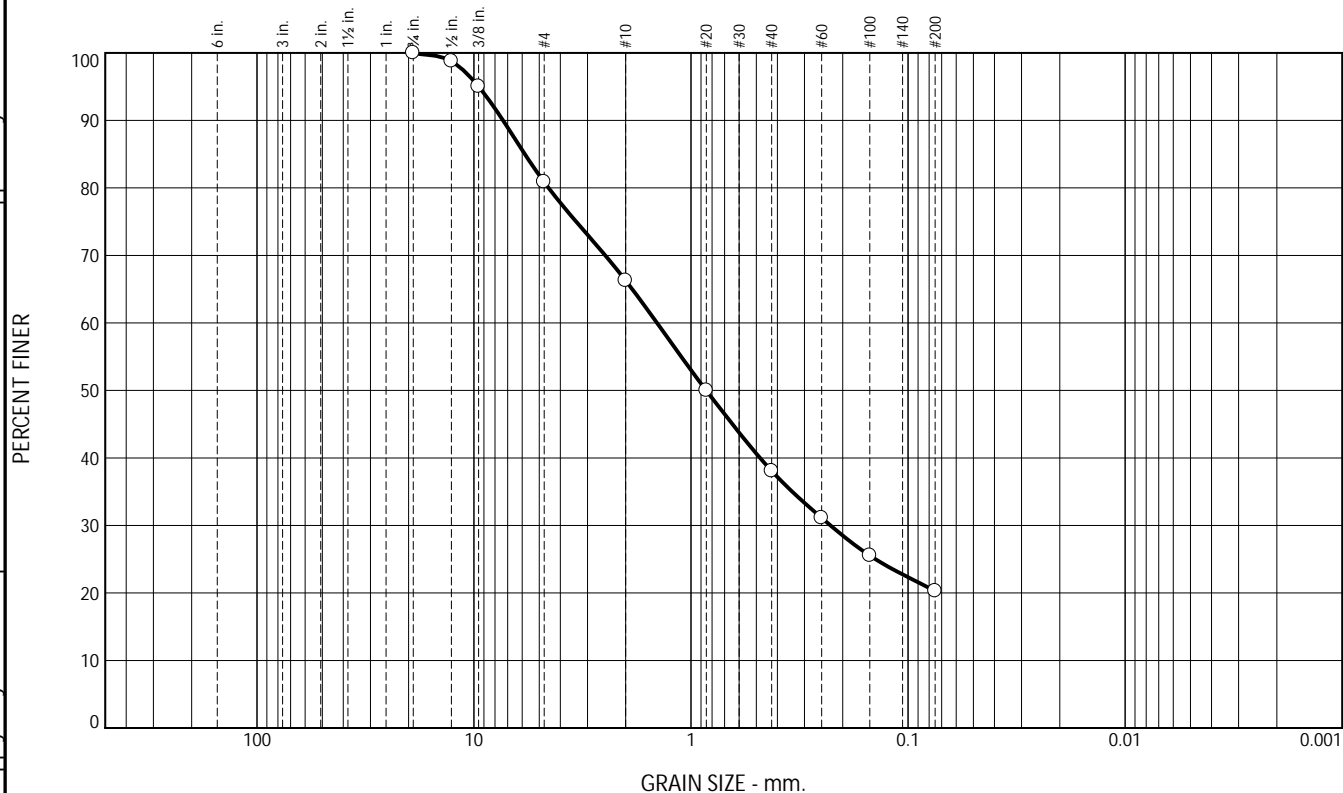
Date Reviewed: 07.27.22

This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.
 This report shall not be reproduced, except in full, without prior written approval from the Agency, as defined in ASTM E329.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.1	14.6	28.2	17.8	20.3	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	98.8			
3/8"	95.0			
#4	80.9			
#10	66.3			
#20	50.0			
#40	38.1			
#60	31.1			
#100	25.5			
#200	20.3			

Material Description

Red f-c SAND, some Silt, little fine Gravel

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 7.3474	D ₈₅ = 5.8272	D ₆₀ = 1.4343
D ₅₀ = 0.8509	D ₃₀ = 0.2277	D ₁₅ =
D ₁₀ =	C _u =	C _c =
	<u>Classification</u>	
USCS= SM	AASHTO= A-1-b	
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Boring Depth: 4-6'
 Sample Number: B-2 / S-3

Sample Date: 07.26.22

Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson

Project: Bartlem Park
 Cheshire, CT

Project No: ENG22-0258

Figure 22-S-2798

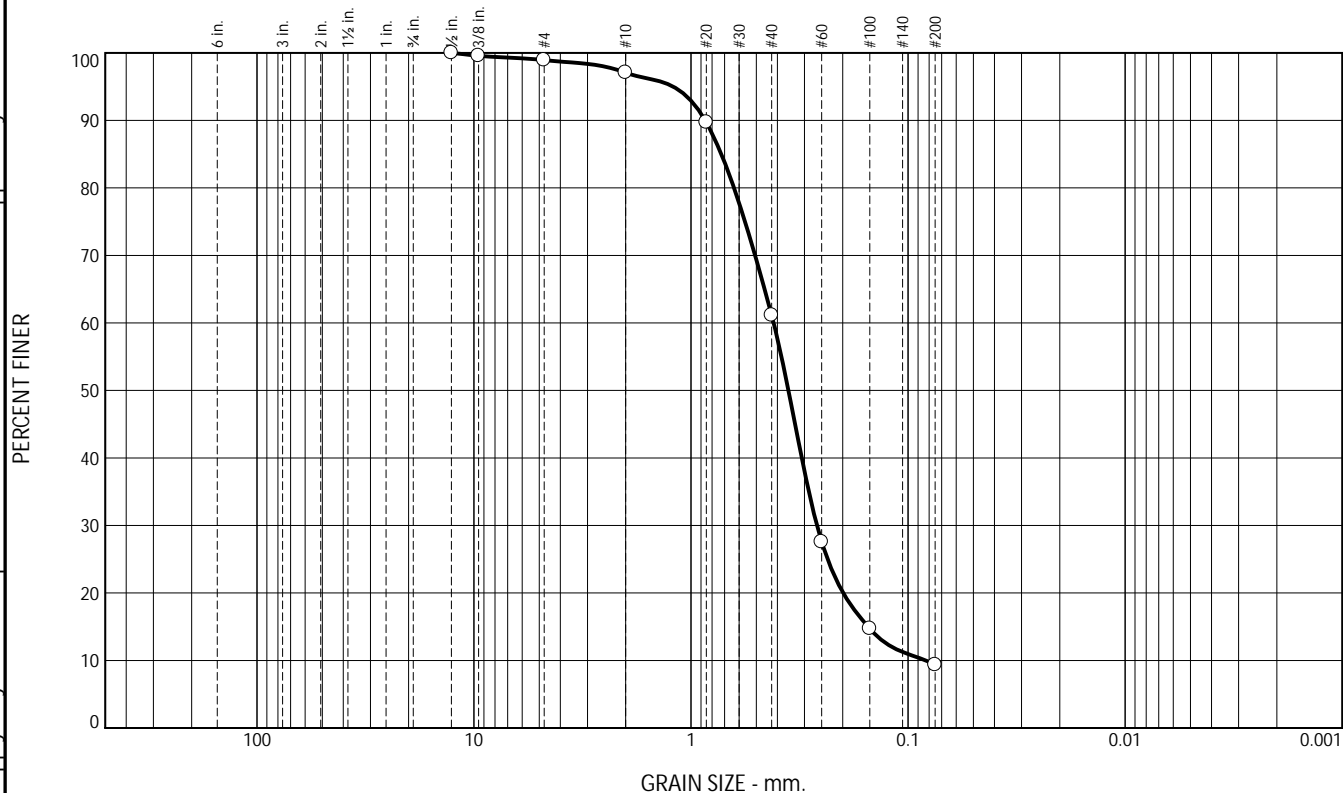
Tested By: JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	1.8	36.0	51.8	9.3	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1/2"	100.0			
3/8"	99.6			
#4	98.9			
#10	97.1			
#20	89.7			
#40	61.1			
#60	27.5			
#100	14.7			
#200	9.3			

Material Description

Red f-m SAND, trace Silt, trace fine Gravel

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 0.8603	D ₈₅ = 0.7251	D ₆₀ = 0.4163
D ₅₀ = 0.3559	D ₃₀ = 0.2630	D ₁₅ = 0.1527
D ₁₀ = 0.0829	C _u = 5.02	C _c = 2.00
	<u>Classification</u>	
USCS= SP-SM	AASHTO=	A-3
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Boring Depth: 4-6'
 Sample Number: B-4 / S-3

Sample Date: 07.25.22

Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson

Project: Bartlem Park
 Cheshire, CT

Project No: ENG22-0258

Figure 22-S-2799

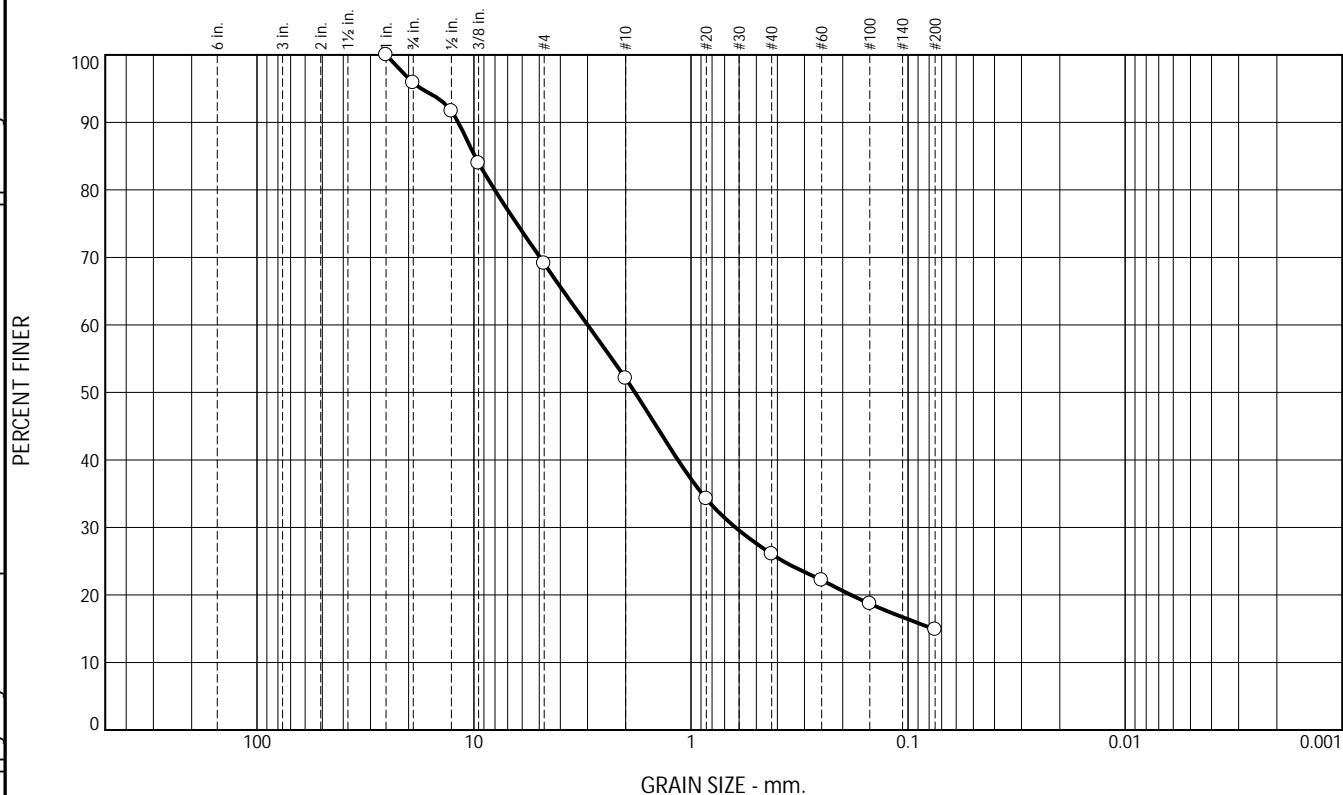
Tested By: JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.1	26.8	17.0	26.0	11.2	14.9	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1"	100.0			
3/4"	95.9			
1/2"	91.7			
3/8"	84.0			
#4	69.1			
#10	52.1			
#20	34.2			
#40	26.1			
#60	22.2			
#100	18.7			
#200	14.9			

* (no specification provided)

Material Description

Red f-c SAND, some f-c Gravel, little Silt

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 11.8068	D ₈₅ = 9.9202	D ₆₀ = 2.9957
D ₅₀ = 1.8117	D ₃₀ = 0.6245	D ₁₅ = 0.0771
D ₁₀ =	C _u =	C _c =
	<u>Classification</u>	
USCS= SM	AASHTO= A-1-b	
	<u>Test Remarks</u>	

Source of Sample: Boring
Sample Number: B-5 / S-4

Depth: 10-12'

Sample Date: 07.25.22

Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson

Project: Bartlem Park
Cheshire, CT

Project No: ENG22-0258

Figure 22-S-2800

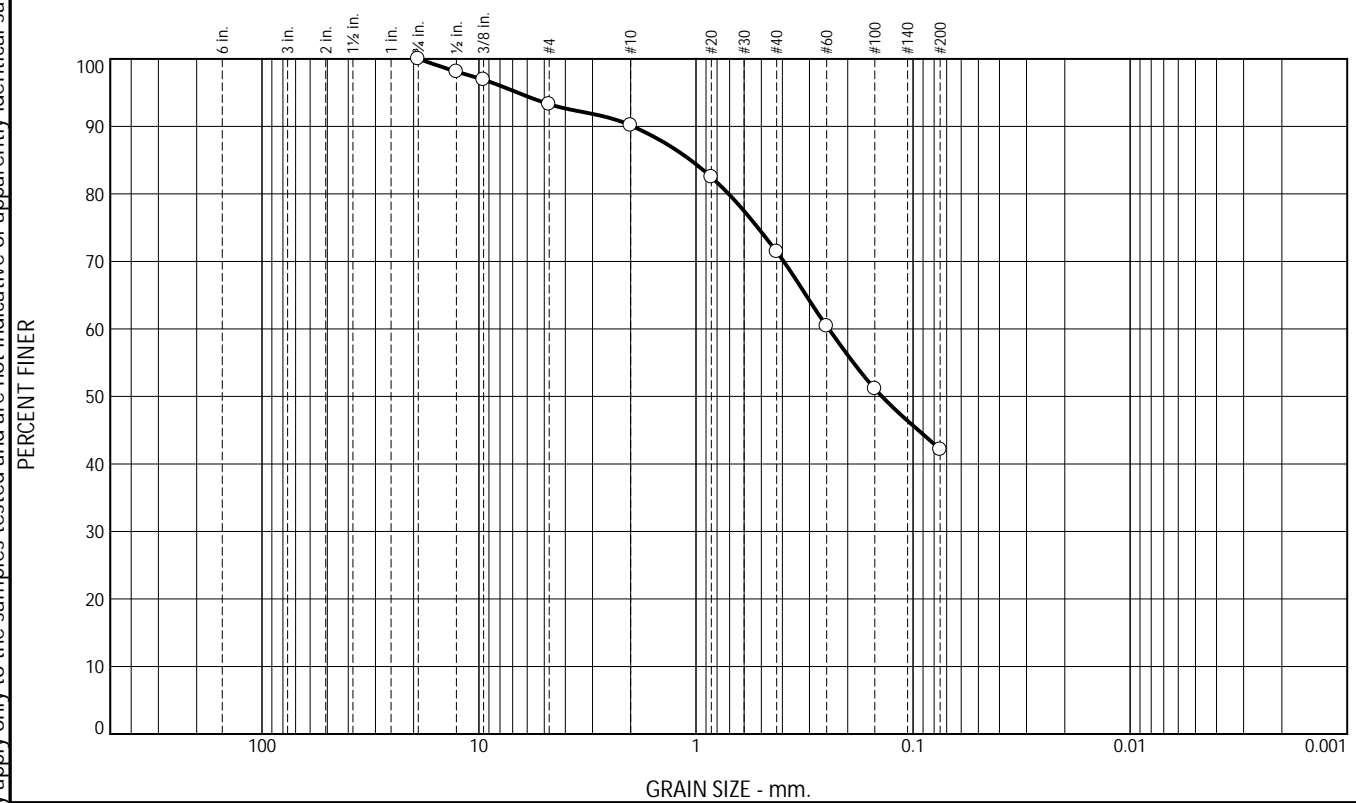
Tested By: JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.7	3.1	18.8	29.3	42.1	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	98.1			
3/8"	96.9			
#4	93.3			
#10	90.2			
#20	82.5			
#40	71.4			
#60	60.4			
#100	51.1			
#200	42.1			

Material Description Red
f-m SAND and SILT, trace fine Gravel

PL= NP Atterberg Limits LL= NV PI= NP

Coefficients

D₉₀= 1.9526 D₈₅= 1.0588 D₆₀= 0.2447
D₅₀= 0.1392 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Test Remarks

Sample visually classified as non-plastic.

* (no specification provided)

Source of Sample: Boring Depth: 0-2'
Sample Number: B-11 / S-1

Sample Date: 07.26.22

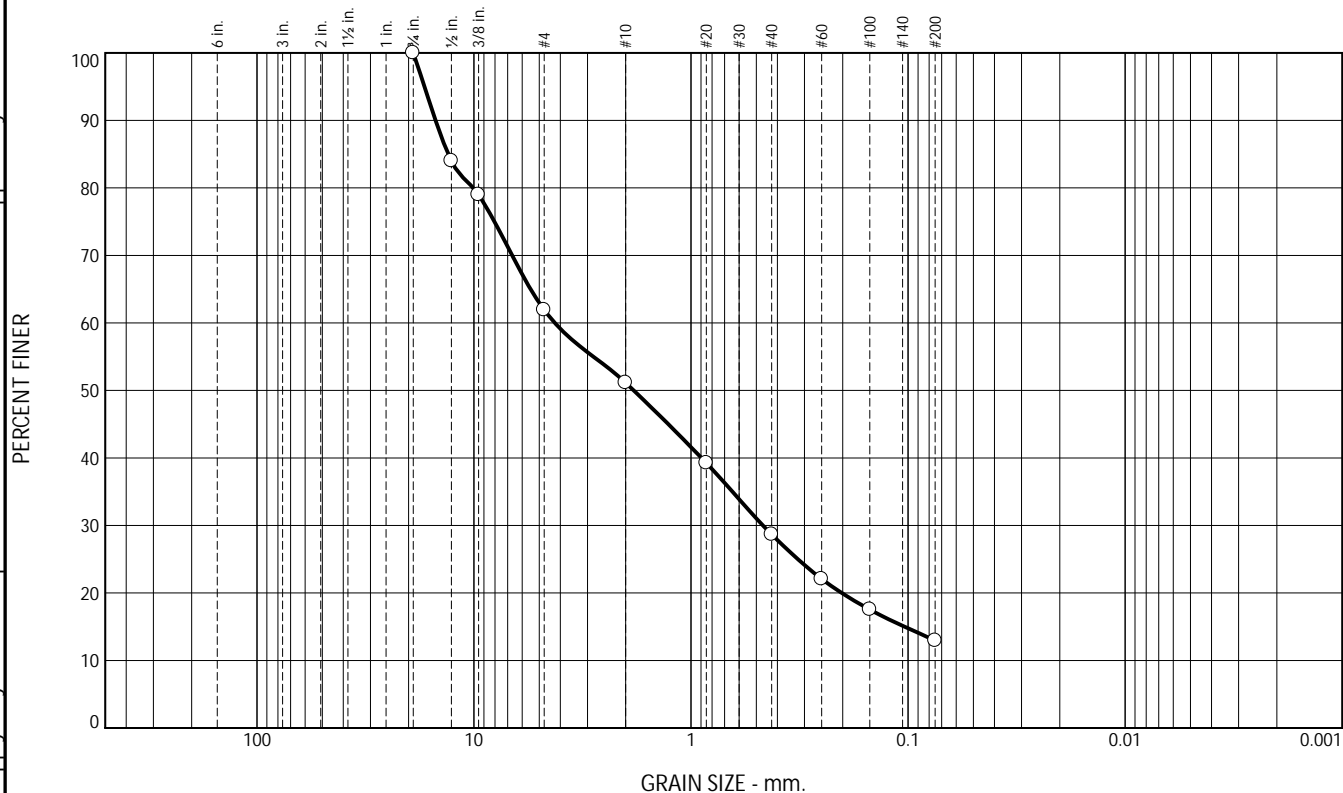
Thielsch Engineering Inc. Cranston, RI	Client: Weston & Sampson Project: Bartlem Park Cheshire, CT Project No: ENG22-0258	Figure 22-S-2805
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Tested By: JB Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	38.1	10.8	22.4	15.8	12.9	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	84.0			
3/8"	79.0			
#4	61.9			
#10	51.1			
#20	39.2			
#40	28.7			
#60	22.1			
#100	17.5			
#200	12.9			

Material Description

Red f-c SAND and fine GRAVEL, little Silt

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 15.0286	D ₈₅ = 13.1331	D ₆₀ = 4.2391
D ₅₀ = 1.8379	D ₃₀ = 0.4668	D ₁₅ = 0.1038
D ₁₀ =	C _u =	C _c =
	<u>Classification</u>	
USCS= SM	AASHTO=	A-1-b
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Boring Depth: 2-4'
 Sample Number: B-12 / S-2

Sample Date: 07.26.22

Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson

Project: Bartlem Park
 Cheshire, CT

Project No: ENG22-0258

Figure 22-S-2806

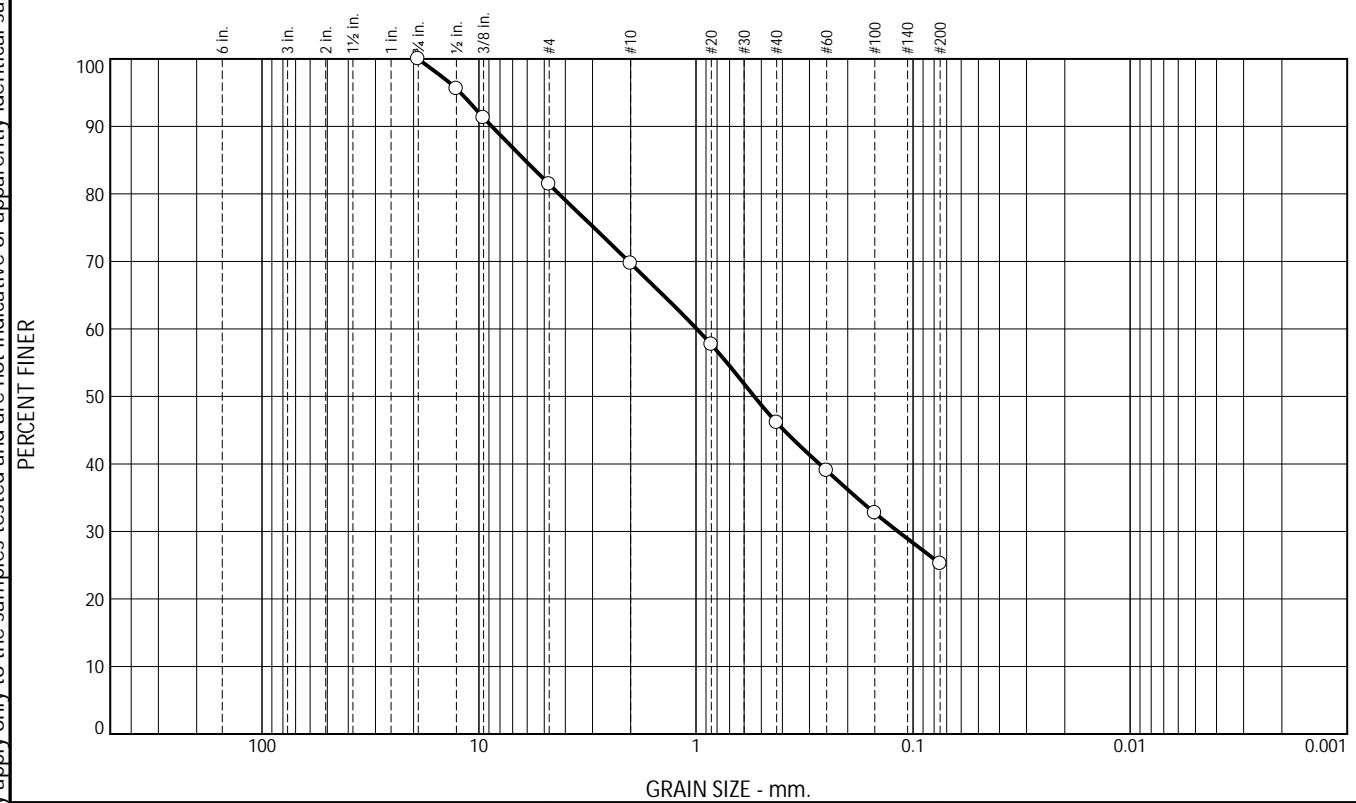
Tested By: JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.6	11.7	23.6	20.9	25.2	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	95.6			
3/8"	91.3			
#4	81.4			
#10	69.7			
#20	57.7			
#40	46.1			
#60	39.0			
#100	32.7			
#200	25.2			

Material Description

Red f-c SAND, some Silt, little fine Gravel

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 8.7225	D ₈₅ = 6.1364	D ₆₀ = 0.9923
D ₅₀ = 0.5395	D ₃₀ = 0.1174	D ₁₅ =
D ₁₀ =	C _u =	C _c =
	<u>Classification</u>	
USCS= SM	AASHTO= A-1-b	
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Boring Depth: 6-8'
 Sample Number: B-13 / S-4

Sample Date: 07.26.22

Thielsch Engineering Inc. Cranston, RI	Client: Weston & Sampson Project: Bartlem Park Cheshire, CT Project No: ENG22-0258	Figure 22-S-2807
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Tested By: JB Checked By:

Attachment D

Important Information about This Geotechnical-Engineering Report

Important Information about This

Geotechnical-Engineering Report

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

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

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it.* A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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Appendix C
Topsoil Tests



UConn Soil Nutrient Analysis Laboratory

6 Sherman Place, Union Cottage, Unit 5102
 Storrs, CT 06269-5102
 860-486-4274
 soiltesting.cahnrc.uconn.edu

UConn
 COLLEGE OF AGRICULTURE,
 HEALTH AND NATURAL
 RESOURCES
 EXTENSION & PLANT SCIENCE
 AND LANDSCAPE ARCHITECTURE

Soil Test Report

Order Number: 18283

Prepared For:

Jon Tunsky
 Weston and Sampson
 712 Brook Street, Suite 103
 Rocky Hill, CT 06067

tunsky.jonathan@wseinc.com
 959.777.5828

Sample Information:

Sample Name: Baseball
 Lab Number: 7249
 Area Sampled:
 Received: 10/14/2022
 Reported: 10/21/2022

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optimum	Optimum	Above Optimum	Excessive*
Calcium	1759 lbs/acre				
Magnesium	182 lbs/acre				
Phosphorus	7 lbs/acre				
Potassium	140 lbs/acre				

* Excessive only defined for Phosphorus (>40 lbs/acre)

		6.1	<u>Element</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Soil pH (1:1, H ₂ O)		6.1	Boron (B)	0.2	0.1 - 2.0
Est. Cation Exch. Capacity (cmole+/100g)		6.3	Copper (Cu)	0.2	0.3 - 0.8
Buffered pH (Mod. Mehlich)		6.4	Iron (Fe)	2.8	1.0 - 40.0
			Manganese (Mn)	3.6	3.0 - 20.0
			Zinc (Zn)	1.0	0.1 - 70.0
<u>Base Saturation</u>	<u>%</u>	<u>Suggested</u>	Sulfur (S)	17.6	10 - 100
Potassium	3	2.0 - 7.0	Aluminum (Al)	37.0	10 - 300
Magnesium	12	10 - 30			
Calcium	70	40 - 50	Est. Total Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Established Lawn

Limestone (Target pH of 6.6)

25 lbs / 1000 sq ft

Comments:

LIMESTONE:

Do not topdress turf with more than 50 lbs limestone per 1000 sq ft at one time. Split the above application between spring and fall (or at least at 30 day intervals) until the whole recommended amount is applied.

FERTILIZER:

Soil test PHOSPHORUS and POTASSIUM are ADEQUATE for turf growth. Follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet. Apply fertilizers to dry grass or water after application to prevent fertilizer burn. Only two fertilizer applications per year are required when grass clippings are returned to the turf.

In subsequent years, follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil at least three months after an application of fertilizer for more accurate recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email: ladybug@uconn.edu; website: www.homegarden.cahnr.uconn.edu.

References (Crop Related):

Soil Test Interpretation and Recommendations

<https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Standard-Nutrient-Analysis.pdf>

Fertilizer Practices for Lawns

<https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Lawns.pdf>

Your Lawn and the New Phosphorus Law in CT

<https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Your-Lawn-The-New-Phosphorus-Law.pdf>

Fertilizer Conversions & Garden Measurements

<https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Fertilizer-Conversions-Garden-Measurements.pdf>

RESULTS REPORT

October 21, 2022

Name: Jon Tunsky
Weston and Sampson
712 Brook Street, Suite 103
Rocky Hill, CT 06067

Order Number: 18283

Lab Number: MA22-427

Sample Name: Baseball

Textural Analysis

Percentages are based on the Fine Earth Fraction (Less than 2mm)

Sand: 56.6 %

Silt: 35.0 %

Clay: 8.4 %

According to USDA criteria, this sample classifies as a **SANDY LOAM**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 3.8 %

Soluble Salts

The soluble salts are 0.20 mmhos/cm

University of Connecticut Soil Nutrient Analysis Laboratory

6 Sherman Place Unit 5102 Storrs, CT 06269-5102

Tel: (860) 486-4274 Fax: (860) 486-4562 Web: www.soiltest.uconn.edu



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 RESOURCES
 EXTENSION & PLANT SCIENCE
 AND LANDSCAPE ARCHITECTURE

Soil Test Report

Order Number: 18283

Prepared For:

Jon Tunsky
 Weston and Sampson
 712 Brook Street, Suite 103
 Rocky Hill, CT 06067

tunsky.jonathan@wseinc.com
 959.777.5828

Sample Information:

Sample Name: Softball
 Lab Number: 7250
 Area Sampled:
 Received: 10/14/2022
 Reported: 10/21/2022

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optimum	Optimum	Above Optimum	Excessive*
Calcium	2277 lbs/acre				
Magnesium	232 lbs/acre				
Phosphorus	15 lbs/acre				
Potassium	198 lbs/acre				

* Excessive only defined for Phosphorus (>40 lbs/acre)

Soil pH (1:1, H ₂ O)	6.1	Element	ppm	Soil Range in CT
Est. Cation Exch. Capacity (cmole+/100g)	9.9	Boron (B)	0.2	0.1 - 2.0
Buffered pH (Mod. Mehlich)	6.3	Copper (Cu)	0.2	0.3 - 0.8
		Iron (Fe)	3.2	1.0 - 40.0
		Manganese (Mn)	3.7	3.0 - 20.0
		Zinc (Zn)	1.7	0.1 - 70.0
		Sulfur (S)	20.6	10 - 100
Base Saturation	%	Suggested		
Potassium	3	2.0 - 7.0	Aluminum (Al)	32.3
Magnesium	10	10 - 30		
Calcium	57	40 - 50	Est. Total Lead (Pb)	low

Limestone & Fertilizer Recommendations for Established Lawn

Limestone (Target pH of 6.6)

50 lbs / 1000 sq ft

Comments:

LIMESTONE:

Do not topdress turf with more than 50 lbs limestone per 1000 sq ft at one time. Split the above application between spring and fall (or at least at 30 day intervals) until the whole recommended amount is applied.

FERTILIZER:

Soil test PHOSPHORUS and POTASSIUM are ADEQUATE for turf growth. Follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet. Apply fertilizers to dry grass or water after application to prevent fertilizer burn. Only two fertilizer applications per year are required when grass clippings are returned to the turf.

In subsequent years, follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil at least three months after an application of fertilizer for more accurate recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email: ladybug@uconn.edu; website: www.homegarden.cahnr.uconn.edu.

References (Crop Related):

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Fertilizer Practices for Lawns

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Your Lawn and the New Phosphorus Law in CT

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Fertilizer Conversions & Garden Measurements

<https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Fertilizer-Conversions-Garden-Measurements.pdf>

RESULTS REPORT

October 21, 2022

Name: Jon Tunsky
Weston and Sampson
712 Brook Street, Suite 103
Rocky Hill, CT 06067

Order Number: 18283

Lab Number: MA22-428

Sample Name: Softball

Textural Analysis

Percentages are based on the Fine Earth Fraction (Less than 2mm)

Sand: 57.8 %

Silt: 33.2 %

Clay: 9.0 %

According to USDA criteria, this sample classifies as a **SANDY LOAM**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 4.9 %

Soluble Salts

The soluble salts are 0.25 mmhos/cm

University of Connecticut Soil Nutrient Analysis Laboratory

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 EXTENSION & PLANT SCIENCE
 AND LANDSCAPE ARCHITECTURE

Soil Test Report

Order Number: 18283

Prepared For:

Jon Tunsky
 Weston and Sampson
 712 Brook Street, Suite 103
 Rocky Hill, CT 06067

tunsky.jonathan@wseinc.com
 959.777.5828

Sample Information:

Sample Name: GreatLawn
 Lab Number: 7251
 Area Sampled:
 Received: 10/14/2022
 Reported: 10/21/2022

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optimum	Optimum	Above Optimum	Excessive*
Calcium	1884 lbs/acre	[Bar chart showing Calcium level in the 'Below Optimum' range]			
Magnesium	167 lbs/acre	[Bar chart showing Magnesium level in the 'Below Optimum' range]			
Phosphorus	29 lbs/acre		[Bar chart showing Phosphorus level in the 'Above Optimum' range]		
Potassium	180 lbs/acre	[Bar chart showing Potassium level in the 'Below Optimum' range]			

* Excessive only defined for Phosphorus (>40 lbs/acre)

Soil pH (1:1, H2O)	6.0	Element	ppm	Soil Range in CT
Est. Cation Exch. Capacity (cmole+/100g)	9.8	Boron (B)	0.2	0.1 - 2.0
Buffered pH (Mod. Mehlich)	6.2	Copper (Cu)	0.3	0.3 - 0.8
		Iron (Fe)	5.8	1.0 - 40.0
		Manganese (Mn)	2.9	3.0 - 20.0
		Zinc (Zn)	4.0	0.1 - 70.0
Base Saturation	%	Suggested	Sulfur (S)	16.2
Potassium	2	2.0 - 7.0	Aluminum (Al)	36.6
Magnesium	7	10 - 30	Est. Total Lead (Pb)	low
Calcium	48	40 - 50		

Limestone & Fertilizer Recommendations for Established Lawn

Limestone (Target pH of 6.6)

75 lbs / 1000 sq ft

Comments:

LIMESTONE:

Do not topdress turf with more than 50 lbs limestone per 1000 sq ft at one time. Split the above application between spring and fall (or at least at 30 day intervals) until the whole recommended amount is applied.

FERTILIZER:

Soil test values for PHOSPHORUS are ABOVE OPTIMUM. Select a zero phosphorus lawn fertilizer (i.e. 22-0-6) and follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS sheet. Apply the lawn fertilizer between mid-April and mid-May and again between mid-September and mid-October.

In subsequent years, continue to use zero phosphorus fertilizers and follow the recommendations for maintenance fertilizers on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet. Recent phosphorus legislation in CT mandates that phosphorus is only to be applied to established lawns if a soil test taken within two years recommends this nutrient. See the YOUR LAWN AND THE NEW PHOSPHORUS LAW fact sheet. Retest the soil in two years, at least three months after an application of fertilizer, to determine if phosphorus is needed. Apply fertilizers to dry grass or water after application to prevent fertilizer burn. Only two fertilizer applications per year are required when grass clippings are returned to the turf.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email: ladybug@uconn.edu; website: www.homegarden.cahnr.uconn.edu.

References (Crop Related):

Soil Test Interpretation and Recommendations	https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Standard-Nutrient-Analysis.pdf
Fertilizer Practices for Lawns	https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Lawns.pdf
Your Lawn and the New Phosphorus Law in CT	https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Your-Lawn-The-New-Phosphorus-Law.pdf
Fertilizer Conversions & Garden Measurements	https://soiltesting.cahnr.uconn.edu/wp-content/uploads/sites/3514/2022/06/Fertilizer-Conversions-Garden-Measurements.pdf

RESULTS REPORT

October 21, 2022

Name: Jon Tunsky
Weston and Sampson
712 Brook Street, Suite 103
Rocky Hill, CT 06067

Order Number: 18283

Lab Number: MA22-429

Sample Name: Great Lawn

Textural Analysis

Percentages are based on the Fine Earth Fraction (Less than 2mm)

Sand: 57.8 %

Silt: 33.6 %

Clay: 8.6 %

According to USDA criteria, this sample classifies as a **SANDY LOAM**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 4.5 %

Soluble Salts

The soluble salts are 0.15 mmhos/cm

University of Connecticut Soil Nutrient Analysis Laboratory

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Appendix D

ITEM #0406999A-Asphalt Adjustment Cost

Summary of Removal Activities

**Chapman Property
640 South Main Street
Cheshire, Connecticut**

February 2018

Prepared for:

Town of Cheshire
84 South Main Street
Cheshire, Connecticut 06410



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Appendices

Appendix A	CTDEEP Standards
Appendix B	Laboratory Certificates of Analysis - Petroleum AOCs
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Appendix D	Laboratory Certificates of Analysis – Pesticide AOC
Appendix E	Pesticide Disposal Documentation

1. Introduction

This report documents activities conducted to address previously identified environmental issues at 640 South Main Street in Cheshire, Connecticut (the Site, see Figure 1). Please note that when referring to the Site as a whole, the 640 South Main Street address will be used; however, the Site has had additional address numbers (630, 640, 650, and 662 South Main Street) associated with former structures.

The Site consists of an approximate 10.0-acre parcel of land that is identified by the Cheshire Assessor's Office as Lot 91 on Map 71. The Site was improved by two single-family residences (640 and 650 South Main Street); a three-family residence (630 South Main Street); a vacant store (662 South Main Street); two large barns; and numerous sheds and outbuildings. Site structures were demolished and removed from the Site in 2017. According to historical resources, the Site was initially developed prior to 1934 and, according to Mr. Richard Chapman, the former Site owner, the Site was his family's farm since the 1800s.

2. Previous Investigations

2.1 Areas of Concern

During the course of Phase I and II Environmental Site Assessments, BETA identified the following Areas of Concern (AOCs). Figure 2 depicts these areas.

- AOC-1: 1,000-gallon fuel oil underground storage tank (UST) north of the former multi-family residence at 630 South Main Street. Soil samples (630 UST-1 and SB-3) from this area did not identify any contaminant concentrations above the applicable Connecticut Department of Energy and Environmental Protection (CTDEEP) standards.
- AOC-2: 1,000-gallon fuel oil UST north of the former residence at 640 South Main Street. A soil sample (640 UST-1) and a groundwater sample (MW-5) from this area did not identify any contaminant concentrations above the applicable CTDEEP standards.
- AOC-3: 1,000-gallon fuel oil UST north of the former residence at 650 South Main Street. A soil sample (650 UST-1) and a groundwater sample (MW-4) from this area did not identify contaminant concentrations above the applicable CTDEEP standards.

- AOC-4: 250-gallon gasoline UST south of the driveway in the northern portion of the field area. A soil sample (Gas Tank TP-1) and a groundwater sample (MW-3) from this area did not identify contaminant concentrations above the applicable CTDEEP standards.
- AOC-5: 275-gallon aboveground storage tank (AST) in the basement of the former store building at 662 South Main Street. A soil sample (SS-28) from this area did not identify contaminant concentrations above the applicable CTDEEP standards.
- AOC-6: Three 275-gallon ASTs in the basement of the former multi-family residence at 630 South Main Street. Two soil samples (SB-Basement 1 and SB-Basement 2) and a groundwater sample (MW-8) were submitted for laboratory analysis from this area. The concentration of Connecticut Extractable Total Petroleum Hydrocarbons (CT ETPH) in the sample from SB-Basement 2 (1,110 mg/kg) exceeded the Connecticut Residential Direct Exposure Criteria (CT RDEC) and GA Pollutant Mobility Criteria (PMC) standards of 500 mg/kg. Other detected compounds were below their respective standards.
- AOC-7: Abandoned AST between the former Old and New Barns. A surficial soil sample (SS-12) from this area did not identify any contaminant concentrations above the applicable CTDEEP standards.
- AOC-8: Workshop area, 500-gallon gasoline AST, and two 275-gallon ASTs in the northwest corner of the former Old Barn. Two soil samples (SS-32 and SS-33) were submitted for laboratory analysis from this area. The concentrations of CT ETPH in the samples from SS-32 (44,200 mg/kg) and SS-33 (64,300 mg/kg) exceeded the CT RDEC and GA PMC standards of 500 mg/kg. Other detected compounds were below their respective standards.
- AOC-9: Workshop area in the former collapsed building south of 640 South Main Street. Two soil samples (SS-15 and SS-23) and a groundwater sample (MW-9) from this area did not identify any concentrations above the applicable CTDEEP standards. However, the evaluation of this area was hindered by the collapsed building that appears to have housed the workshop. The samples from this area were collected as safely as possible with respect to the collapsed structure, and did not identify any contaminant concentrations above the applicable CTDEEP standards.
- AOC-10: 3,000-gallon AST on the back of the fuel oil truck. A surficial soil sample (SS-34) was submitted for laboratory analysis from this area. The concentration of CT ETPH in the sample from SS-34 (664 mg/kg) exceeded the CT RDEC and GA PMC standards of 500 mg/kg. Other detected compounds were below their respective standards.
- AOC-11: Filled area and grass piles north of 630 South Main Street. Thirty soil samples (SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-31, SB-2 (2-4'), and SS-

101 through SS-122) and a groundwater sample (MW-2) were submitted for laboratory analysis from this area. The concentration of chlordane in the samples from SS-3 (0.558 mg/kg), SS-101 (2.2 mg/kg), and SS-117 (7.19 mg/kg) exceeded the RDEC standard of 0.49 mg/kg. The concentration of chlordane in the samples from SS-3 (0.558 mg/kg), SS-101 (2.2 mg/kg), SS-103 (0.181 mg/kg), SS-104 (0.258 mg/kg), SS-111 (0.436 mg/kg), SS-112 (0.232 mg/kg), SS-113 (0.212 mg/kg), SS-116 (0.0873 mg/kg), and SS-117 (7.19 mg/kg) exceeded the GA PMC standard of 0.066 mg/kg; The concentration of dieldrin in the samples from SS-5 (0.0275 mg/kg), SS-114 (0.0127 mg/kg), and SS-117 (0.0375 mg/kg) exceeded the GA PMC standard of 0.007 mg/kg. The concentration of heptachlor epoxide in the samples from SS-101 (0.0726 mg/kg) and SS-117 (0.308 mg/kg) were above the RDEC standard of 0.067 mg/kg and the GA PMC standard of 0.02 mg/kg. Other detected compounds were below their respective standards.

- AOC-12: Filled area south of driveway and east of 662 South Main Street. Four surficial soil samples (SS-24, SS-25, SS-26, and SS-27) from this area did not identify any contaminant concentrations above the applicable CTDEEP standards.
- AOC-13: Vehicle storage area southwest of the former Old Barn. Three surficial soil samples (SS-10, SS-29, and SS-30) from this area did not identify contaminant concentrations above the applicable CTDEEP standards.
- AOC-14: Vehicle storage area around the former New Barn. Six surficial soil samples (SS-7, SS-8, SS-9, SS-11, SS-13, and SS-14) from this area did not identify contaminant concentrations above the applicable CTDEEP standards.
- AOC-15: Vehicle storage area in the southern portion of the Site. Two soil samples (SB-6 (0-2') and SS-18) from this area did not identify any contaminant concentrations above the applicable CTDEEP standards.
- AOC-16: Entire site for historic use as a farm. Thirty-four surficial soil samples, eleven soil samples (seven soil samples from the soil borings and four samples from the test pits), and eight groundwater samples were submitted for laboratory analysis. The samples containing exceedances of CTDEEP standards (SS-3, SS-5, SS-32, SS-33, SS-34, and SB-Basement 2) are covered under other, specific AOCs. Other detected compounds were below their respective standards.
- AOC-17: Site groundwater. BETA oversaw the installation of nine groundwater monitoring wells (MW-1 through MW-9) across the Site. Eight groundwater samples (MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, and MW-9) were submitted for laboratory analysis. Please note that MW-6 did not contain enough water to be sampled. Detected compounds from the laboratory analysis did not exceed the above the applicable CTDEEP standards.

2.2 Recommendations

As stated in the Phase I ESA, the USTs, ASTs, 55-gallon drums, and vehicles should be removed from the Site. Although laboratory analysis of soil and groundwater samples near the USTs did not identify any contaminants above CTDEEP standards, the UST removals, in particular, should be monitored for the presence of contamination and/or evidence of leaks from the USTs. Furthermore, additional assessment may be warranted subsequent to the removal of the ASTs, the 55-gallon drums, and vehicles. BETA made the following recommendations for AOCs 6, 8, 9, 10, and 11:

- AOC - 6: Subsequent to the removal of the multi-family residential building at 630 South Main Street, petroleum impacted soil beneath the basement floor of this structure (SB-Basement 2) should be removed and properly disposed.
- AOC - 8: Subsequent to the removal of the Old Barn, the ASTs, and the 55-gallon drums of oil, petroleum impacted soil in the vicinity of the workshop area (SS-32 and SS-33) should be removed and properly disposed.
- AOC - 9: Subsequent to the removal of the collapsed structure, further assessment of this area should be conducted.
- AOC - 10: Petroleum impacted soil (SS-34) should be removed and properly disposed.
- AOC - 11: Pesticide-impacted soil (SS-3, SS-5, SS-101, SS-103, SS-104, SS-111, SS-112, SS-113, SS-114, SS-116, and SS-117) should be removed and properly disposed.

2.3 Cleanup Objectives

Although exceedances of CTDEEP standards were identified in soil samples collected at the Site, reporting was not required since the Site is not considered an “establishment” and because petroleum is exempt from reporting as a Significant Environmental Hazard (SEH).

Although the Site is not currently regulated by CTDEEP, the cleanup objectives for this work were the Residential Direct Exposure Criteria (RDEC) as well as the GA Pollutant Mobility Criteria (PMC). These criteria are applicable since the vicinity of the project area consists of residential properties and the proposed future uses of the Site are recreational uses and sports fields. CTDEEP defines “polluted” soil as “soil affected by a release of a substance at a concentration above the analytical detection limit [but below the applicable CTDEEP standards] for such substance.” Contaminated soil is soil containing concentrations of contaminants above the applicable CTDEEP standards. Thus, for the purposes of this project concentrations of contaminants above the RDEC or GA PMC would cause those soils to be considered contaminated. Appendix A contains a list of CTDEEP’s standards.

According to the CTDEEP’s November 2015 Water Quality Classifications Map, groundwater at the Site is classified as GAA. Groundwater classified as GAA is considered an existing or potential water supply and suitable for drinking without treatment. According to the CTDEEP’s August 1, 2016 “Aquifer Protection Areas” map for Cheshire, the majority of the Site appears to be within the South Cheshire (A 120) Level A Aquifer Protection Area.

3. Petroleum AOCs

On March 27, 2017, AES removed the four USTs from the Site. On March 24 and 27, 2017, AES removed the vehicles, drums, and ASTs from the Site. The following summarizes removal and sampling activities at each of the petroleum-related AOCs.

3.1 AOC-1

On March 27, 2017, AES removed the 1,000-gallon UST from AOC-1, north of the former multi-family residence at 630 South Main Street. During the removal, a release of fuel oil occurred due to the UST being damaged during removal. AES removed approximately 50 cubic yards of soil and oil from the tank excavation. BETA personnel field screened soil samples with a photoionization detector (PID). The PID readings from the excavation were as high as 400 parts per million by volume (ppmv) indicating that impacted soil remained in the excavation. AES decided to stop removal activities until the adjacent structure was demolished.

On August 4, 2017, AES excavated and stockpiled approximately 100 cubic yards of soil from AOC-1. On September 5, 2017, BETA collected eight soil samples, four from the bottom of the excavation (BOT-1 through BOT-4) and four from the sidewalls (Sidewall-1 to Sidewall-4) and submitted these samples to ESS for laboratory analysis of CTETPH. Table 1 includes the results and Appendix B contains the laboratory certificates of analysis. As can be seen in Table 1, none of the eight samples contained CTETPH above the applicable CTDEEP standard.

AES shipped the excavated soil (221.50 tons) to Clean Earth's disposal facility in Plainville, Connecticut under Non-RCRA Hazardous Waste manifest documentation. Appendix c contains copies of the manifests and disposal receipts. The following summarizes the dates and volumes of soil shipped:

- October 26, 2017: 170.75 tons in 7 loads
- October 27, 2017: 50.75 tons in 2 loads

3.2 AOCs 2, 3, and 4

On March 27, 2017, AES removed the 1,000-gallon UST from AOC-2, the 1,000-gallon UST from AOC-3, and the 275-gallon UST from AOC-4.

After the USTs were removed, BETA collected two soil samples from each of the UST excavations. These samples were submitted to ESS for laboratory analysis of CTETPH and VOCs by EPA Method 8260. Table 1 includes the CTETPH results and Appendix B contains the laboratory certificates of analysis. ESS identified one concentration of naphthalene from AOC-2 and CTETPH in the two samples from AOC-4 at concentrations below both the applicable CTDEEP standards.

3.3 AOC-6

Subsequent to the demolition of the structure at 630 South Main Street, on September 27 and October 2, 2017, AES excavated and stockpiled approximately 165 cubic yards of petroleum-impacted soil from beneath the former basement of this structure. BETA did not observe the excavation activities.

On October 11, 2017, BETA collected three soil samples (CSS-501 AOC-6, CSS-502 AOC-6, and CSS-503 AOC-6) from the bottom of the excavated area of the former structure. These samples were submitted to ESS for laboratory analysis of CTETPH. Table 1 includes these results and Appendix A contains the laboratory certificates of analysis. As can be seen in Table 1, ESS did not identify any CTETPH above the laboratory method detection limit in one of the samples (CSS-501 AOC-6) and identified 24.7 mg/kg of CTETPH in the CSS-502 AOC-6 sample and 35.3 mg/kg of CTETPH in the CSS-503 AOC-6 sample. These concentrations are below the CTDEEP RDEC of 500 mg/kg.

The soil from this AOC was combined with the soil from AOC-8 and AOC-10 and shipped to Clean Earth's disposal facility in Plainville, Connecticut under Non-RCRA Hazardous Waste manifest documentation. Appendix C contains copies of the manifests and disposal receipts. Section 3.7 below summarizes these shipments.

3.4 AOC-8

On September 5, 2017, AES excavated approximately 10 cubic yards of impacted soil (to depth of one foot below grade) from the vicinity of samples SS-32 and SS-33. On September 5, 2017, BETA collected six confirmatory samples (CC-401 AOC-8, CC-402 AOC-8, CC-403 AOC-8, CC-404 AOC-8, CC-405 AOC-8, and CC-406 AOC-8) from this location and submitted them to ESS for laboratory analysis of CTETPH. Table 1 includes the results and Appendix B contains the laboratory certificates of analysis. As can be seen in Table 1, ESS identified CTETPH above the CTDEEP 500 mg/kg standard in the samples from CSS-403 AOC-8 (563 mg/kg), CSS-404

AOC-8 (2,260 mg/kg), and CSS-406 AOC-8 (924 mg/kg). The remaining three samples did not contain CTETPH above the CTDEEP standard.

On September 27, 2017, AES excavated an additional 5 yards of impacted soil (to a depth of 2 feet below grade) from the vicinity of samples CSS-403 AOC-8, CSS-404 AOC-8, and CSS-403 AOC-8. On October 11, 2017, BETA collected three confirmatory samples CSS-403A AOC-8, CSS-404A AOC-8, and CSS-406A AOC-8 from the excavated area and submitted them to ESS for laboratory analysis of CTETPH. Table 1 includes the results and Appendix B contains the laboratory certificates of analysis. As can be seen in Table 1, ESS did not identify CTETPH above the CTDEEP 500 mg/kg standard in these samples.

The soil from this AOC was combined with the soil from AOC-6 and AOC-10 and was then shipped to Clean Earth's disposal facility in Plainville, Connecticut under Non-RCRA Hazardous Waste manifest documentation. Appendix C contains copies of the manifests and disposal receipts. Section 3.7 below summarizes these shipments.

3.5 AOC-9

Since BETA's investigation of this area was previously limited by the former building at this location, on September 5, 2017, AES assisted BETA in the collection of three soil samples (CSS-408 AOC-9, CSS-409 AOC-9, and CSS-410 AOC-9) after the demolition of the structure. These samples were submitted to ESS for laboratory analysis of CTETPH. Table 1 includes these results and Appendix A contains the laboratory certificates of analysis. As can be seen in Table 1, ESS did not identify any CTETPH above the laboratory method detection limit in two of the samples (CSS-408 AOC-9 and CSS-409 AOC-9) and identified 36.9 mg/kg of CTETPH in the third sample (CSS-410 AOC-9). This concentration is below the CTDEEP RDEC of 500 mg/kg.

3.6 AOC-10

On September 5, 2017, AES excavated approximately 5 yards of soil from the vicinity of sample SS-34. On September 5, 2017, BETA collected a confirmatory sample (CSS-407 AOC-10) from this location and submitted the sample to ESS for laboratory analysis of CTETPH. Table 1 includes this result and Appendix B contains the laboratory certificates of analysis. As can be seen in Table 1, ESS did not identify any CTETPH above the laboratory method detection limit at this location.

The soil from this AOC was combined with the soil from AOC-6 and AOC-8 and was then shipped to Clean Earth's disposal facility in Plainville, Connecticut under Non-RCRA Hazardous Waste manifest documentation. Appendix B contains copies of the manifests and disposal receipts. Section 3.7 below summarizes these shipments.

3.7 Soil Disposal

After excavation, AES shipped a total of 276.68 tons of petroleum-impacted soil from AOCs 6, 8, and 10 to Clean Earth's disposal facility in Plainville, Connecticut under Non-RCRA Hazardous Waste manifest documentation. Appendix B contains copies of the manifests and disposal receipts. The following summarizes the dates and volumes of soil shipped:

- September 27, 2017: 68.5 tons in 3 loads
- October 5, 2017: 47.55 tons in 2 loads
- October 6, 2017: 46.96 tons in 2 loads
- October 10, 2017: 75.53 tons in 4 loads
- October 11, 2017: 38.14 tons in 2 loads

4. Pesticide AOC

During the Phase I and II ESAs, BETA identified two areas of pesticide-impacted soil, grass, and leaves in AOC-11. The first (Area 1) consisted of a smaller area (approximately 2,500 square feet) to the east along the northern property line that encompassed sample locations SS-5, SS-114, SS-116, and SS-117. The second (Area 2) consisted of a larger area (approximately 10,000 square feet) to the west along the northern property line that encompassed sample locations SS-3, SS-101, SS-103, SS-104, SS-111, SS-112, and SS-113. Figure 2 depicts these locations.

4.1 AOC-11 Area 1

The following summarizes the removal and sampling activities in Area 1:

- **July 26, 2017:** AES excavated to a depth of 2 feet below grade in Area 1 and stockpiled the soil within the limits of the AOC. Excavation activities were not witnessed by BETA.
- **August 10, 2017:** BETA collected six (6) soil samples (CSS-101 to CSS-106) from Area 1 and submitted these samples to ESS for analysis of pesticides. Table 2 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 2, none of the six samples from Area 1 contained pesticides above the CTRDEC or GA PMC standards.
- **October 13, 17, 18, 19, 20, and 23, 2017:** AES loaded and transported the stockpiled pesticide soil from Areas 1 and 2 and excavated to a depth of 2 feet below grade at each of the stockpile areas in Areas 1 and 2.

- **November 11, 2017:** BETA collected six (6) soil samples (CSS-107 to CSS-112) from the former stockpile area in Area 1 and submitted these samples to ESS for analysis of pesticides. Table 2 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 2, none of these samples contained concentrations of pesticides above the applicable CTDEEP standards.

4.2 AOC-11 Area 2

The following summarizes the removal and sampling activities in Area 2 of AOC-11:

- **July 27, 2017:** AES excavated to a depth of 2 feet below grade in Area 2 and stockpiled the soil at two locations within the limits of the AOC. Excavation activities were not witnessed by BETA.
- **August 10, 2017:** BETA collected sixteen (16) soil samples (CSS-201 to CSS-216) from Area 2 and submitted these samples to ESS for analysis of pesticides. Table 3 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 3, eight samples from Area 2 (CSS-202, CSS-205, CSS-206, CSS-207, CSS-208, CSS-209, CSS-210, and CSS-214) contained concentrations of pesticides above the CTRDEC and/or GA PMC. Based on these results, additional excavation was recommended for Area 2.
- **August 31, 2017:** AES excavated to depth of 3 feet below grade in the areas of samples CSS-202, CSS-205, CSS-206, CSS-207, CSS-208, CSS-209, CSS-210, and CSS-214 and added this soil to the previously stockpiled areas.
- **September 5, 2017:** BETA collected eight (8) soil samples (CSS-301 to CSS-308) from the deeper excavation in Area 2 and submitted these samples to ESS for analysis of pesticides. Table 3 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 3, four samples from Area 2 (CSS-301, CSS-302, CSS-303, and CSS-306) contained concentrations of pesticides above the CTRDEC and/or GA PMC. Based on these results, additional excavation was recommended for Area 2.
- **September 27, 2017:** AES excavated to depth of 4 feet below grade in the areas of samples CSS-301, CSS-302, CSS-303, and CSS-306 and added this soil to the previously stockpiled areas.
- **October 11, 2017:** BETA collected four (4) soil samples (CSS-301A, CSS-302A, CSS-303A, and CSS-306A) from the deeper excavation in Area 2 and submitted these samples to ESS for analysis of pesticides. Table 3 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 3, none of these four samples contained concentrations of pesticides above the CTRDEC and/or GA PMC.
- **October 13, 17, 18, 19, 20, and 23, 2017:** AES loaded and transported the stockpiled pesticide soil from Areas 1 and 2 and excavated to a depth of 2 feet below grade at each of the stockpile areas in Areas 1 and 2.

- **November 11, 2017:** BETA collected twelve (12) soil samples (CSS-201 to CSS-216) from the former stockpile areas in Area 2 and submitted these samples to ESS for analysis of pesticides. Table 3 summarizes these results and Appendix D contains the laboratory certificates of analysis. As can be seen in Table 3, none of these samples contained concentrations of pesticides above the CTRDEC and/or GA PMC.

4.3 Soil Disposal

After excavation and stockpiling, AES shipped 1,110.45 tons of pesticide-impacted soil to the Chicopee Landfill under Material Shipping Record (MSR) documentation. Appendix E contains copies of the MSR log sheets and disposal receipts. The following summarizes the dates and volumes of soil shipped:

- October 13, 2017: 137 tons in 6 loads
- October 17, 2017: 212.09 tons in 9 loads
- October 18, 2017: 210.56 tons in 9 loads
- October 19, 2017: 209.83 tons in 9 loads
- October 20, 2017: 131.53 tons in 6 loads
- October 21, 2017: 209.44 tons in 9 loads

The total volume of soil shipped from AOC-6 was 1,110.45 tons in 48 loads.

5. Summary and Conclusions

5.1 Summary

The following summarizes the removal activities:

- The drums, vehicles, tanks, and structures were removed from the Site by AES between March and October 2017;
- Approximately 498.18 tons of petroleum-impacted soil was removed from AOCs 1, 6, 8, and 10 and disposed off-site.
- Confirmatory sampling after the completion of the excavation activities did not identify any CTETPH or VOCs above the CTDEEP standards at AOCs 1, 2, 3, 4, 6, 8, 9, or 10.
- Approximately 1,110.45 tons of pesticide-impacted soil was removed from the two areas within AOC-11.
- Confirmatory sampling after the completion of the excavation activities did not identify any pesticides above the CTDEEP standards in AOC-11.

5.2 Conclusions

Based on the laboratory results from the confirmatory sampling, soil with exceedances of the CTDEEP standards was removed and properly disposed off-site. AES also removed the drums, vehicles, tanks, and structures that previously posed threats of release to the Site.

BETA concludes that based on the activities conducted at the Site, no further action is required at this time.

